Research Design and Work Plan

Battlefield Survey for the 1637 Battle of Pequot (Munnacommock) Swamp
Site Identification and Documentation Project

National Park Service
American Battlefield Protection Program
GA-2287-17-004

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Contents
Introduction..................................................................................................................................................3
Project Abstract / Scope of Work ................................................................................................................5
Historic Context ............................................................................................................................................7
Quinnipiac Campaign (July 7-14, 1637) and Pequot Swamp Fight (July 13-14, 1637) ......................10
Archeological Identification of the Battle of Pequot Swamp .................................................................17
Research Design.........................................................................................................................................17
Battle of Pequot Swamp: Battlefield Patterns & Spatial Analysis..............................................................22
KOCOA Evaluation and Analysis ...........................................................................................................28
Terrain Analysis .........................................................................................................................................29
Battlefield Survey .....................................................................................................................................34
Research & Field Methods ..........................................................................................................................35
Site Identification & Documentation ........................................................................................................36
Orientation Phase ......................................................................................................................................36
Inventory Phase .......................................................................................................................................39
Recovery Phase .......................................................................................................................................41
Archeological Testing & Remote Sensing .................................................................................................42
Laboratory and Evaluation Phase ............................................................................................................43
Treatment of Human Remains ....................................................................................................................45
NAGPRA and ARPA Procedures ...............................................................................................................45
Final Report ...............................................................................................................................................45
Appendix I – Project Timeline 2017-2018 .............................................................................................47
Appendix II – Data Collection ....................................................................................................................49

Figure 1 – Battlefields of the Pequot War .................................................................................................8
Figure 2 – Viewshed from Lower Elevation on Mill Hill ........................................................................13
Figure 3 – Viewshed from Sasqua Village ..............................................................................................39
Figure 4 – Example of utility of X-Ray technology. Features invisible to the naked eye become visible in a radiograph image ...........................................................................................................43

Table 1 - Battlefield Events Timeline ....................................................................................................25
Table 2 - Critical Defining Features. Battle of Great Falls ...................................................................30
Introduction

In recognition of the historical and cultural significance of the 1637 Battle of Pequot (Munnacommock) Swamp in Fairfield, Connecticut, the Fairfield Museum and History Center (FMHC) received a Site Identification and Documentation grant (GA-2287-17-004) from the National Park Service American Battlefield Protection Program (NPS ABPP) to conduct a battlefield archeology survey at the Battle of Pequot (Munnacommock) Swamp fought on July 13-14, 1637.¹

The primary objective of the project is to conduct archeological fieldwork to locate, sequence, and document battlefield actions associated with the 24-hour Battle of Pequot (Munnacommock) Swamp which took place on July 13-14, 1637 between the Pequot and their Susqua allies and a Colonial force comprised of approximately 160 soldiers from Connecticut and Massachusetts Bay colonies. An additional objective will be to engage local officials, landowners, and the interested public in an effort to locate and encourage protection of the battlefield, and eventually to prepare National Register of Historic Places registration forms to nominate the battlefield to the National Register of Historic Places.

The FMHC received a Pre-Inventory Research and Documentation grant from the NPS ABPP (GA-2287-15-008) in 2015 to: 1) identify the probable locations of the engagements and ancillary sites related to the Battle of Pequot (Munnacommock) Swamp; 2) chronicle the series of sustained actions between the Pequot and the English Allied forces that took place over a 24-hour period from July 13-14, 1637; and 3) identify properties which could potentially yield evidence of the battle.

The Mashantucket Pequot Museum and Research Center (MPMRC) will conduct the battlefield archeology survey for the Battle of Pequot (Munnacommock) Swamp. The MPMRC’s battlefield archeology personnel who will be used for the project include the Director of Research, Laboratory Director/Conservator, Military Historian, Senior Researcher, GIS Specialist, and Battlefield Archeologists. The MPMRC staff have extensive experience conducting 17th century battlefield surveys and in the identification and analysis of Colonial Period domestic and military

¹ The NPS ABPP promotes the preservation of significant historic battlefields associated with wars on American soil. The purpose of the program is to assist citizens, public and private institutions, and governments at all levels in planning, interpreting, and protecting sites where historic battles were fought on American soil during the armed conflicts that shaped the growth and development of the United States, in order that present and future generations may learn and gain inspiration from the ground where Americans made their ultimate sacrifice. The goals of the program are: 1) to protect battlefields and sites associated with armed conflicts that influenced the course of American history, 2) to encourage and assist all Americans in planning for the preservation, management, and interpretation of these sites, and 3) to raise awareness of the importance of preserving battlefields and related sites for future generations.
material culture. To date the MPMRC has received seven NPS ABPP battlefield grants associated with the Pequot War, and has contracted with the Rhode Island Historical and Preservation and Heritage Commission to conduct a battlefield survey of the “Second Battle of Nipsachuck” fought in King Philip’s War (July 2-3, 1676), and with the Town of Montague, Massachusetts to conduct a battlefield survey of the Battle of Great Falls (May 19, 1676).

A significant part of the research and analysis associated with the identification and documentation of any Colonial-era archeological site is the ability of battlefield archeologists to identify relevant domestic and military battle-related objects from earlier and later colonial (and modern) material culture. The Battlefield Landscape within the vicinity of the Pequot Swamp has been used and occupied continuously for the last 380 years for a variety of domestic, light industrial and agricultural purposes with resulting deposition of associated material culture. Any historic landscape contains hundreds if not thousands of objects reflecting centuries of land use – most of them metallic. As a result, the battlefield survey is expected to recover hundreds of objects that must be quickly identified to determine if they are related to the battlefield sites and actions under investigation. Real time information on the nature and distribution of battle-related objects is essential to make appropriate decisions regarding the priorities, direction, and focus of field investigations. Over the last decade MPMRC battlefield archeologists have acquired a great deal of knowledge and experience in the identification and analysis of a wide range of Colonial Period domestic and military material culture including domestic artifacts, arms, ammunition, and articles of personal and military clothing (e.g., buttons, buckles, aglets). Although the MPMRC battlefield archeologists have developed a solid comparative knowledge of Colonial and post-Colonial Native and Euro-American domestic and military objects, additional research will be necessary to compile a comprehensive database of arms, equipment, clothing, and personal objects associated with 17th century battlefields and domestic sites at Munnacommock Swamp.

A very important aspect of the battlefield survey will be the presence of Native cultural specialists, local historians, and other knowledgeable individuals in the field on a regular basis to provide perspectives on in-field battlefield interpretations. Experience from other battlefield surveys has demonstrated the importance of daily and weekly discussions among all parties to help understand and interpret the nature and evolution of the battlefield as the battlefield survey progresses.
The MPMRC staff are very familiar with Sections 106 and 110 of the National Historic Preservation Act (1966), the Archeological Resources Protection Act (1979), the Native American Graves Protection and Repatriation Act (1990), and Connecticut Public Act 89-368: “An Act Implementing the Recommendations of the Task Force on Indian Affairs” which includes protocols for the discovery of native American human remains.

**Project Abstract / Scope of Work**

The Scope of Work and Tasks identified by the FMHC for the Site Identification and Documentation Project of the battle of Munnacommock (Fairfield) swamp include:

**Task 1:** Develop an archeological research design to standards acceptable to the ABPP and in accordance with the Connecticut State Historic Preservation Office (SHPO) permitting standards. The Research Design should address NAGPRA and protocols for the discovery of human remains. Consultants should review the Phase I Technical Report *Battle of Pequot (Munnacommock) Swamp, July 13-14, 1637, Department of the Interior National Park Service American Battlefield Protection Program GA-2287-15-008* available on the Fairfield Museum’s website: [www.fairfieldhistory.org/library-collections/pequot](http://www.fairfieldhistory.org/library-collections/pequot).

*The Research Design is outlined below*

**Task 2:** Prepare and Submit a Permit Application(s) for archeological investigations to the Connecticut State Historic Preservation Office (CT SHPO). The consultant will be responsible for obtaining any landowner permissions for archeological surveys and artifact donation.

An archeological permit application including a revised research design based on NPS ABPP comments will be submitted to the CT SHPO within a few weeks after the Mashantucket Pequot Museum and Research Center is awarded the contract. Draft landowner permission forms with artifact donation protocols will be submitted to the FMHC for review.

**Task 3:** Conduct Field Survey in accordance with Secretary of Interior’s Standards and Guidelines for Archeological Documentation

*Specific Information on these tasks are discussed in the Research Design outlined below*

**3.1 Walkover Survey:** A pedestrian survey will be conducted of the Battlefield Boundary to assess the battlefield terrain and integrity of the battlefield landscape.

*The walkover survey (see below) will consist of a lot by lot assessment of the battlefield terrain. The assessment will consist of a visual inspection of the area as well as conversations with landowners as necessary to determine relevant aspects of prior construction, placement of utilities, and any land use activities that may affect the integrity of the property. Aerial*
photographs will also be consulted to identify previous land use activities or changes in the landscape that may affect the integrity of the property.

3.2 Remote Sensing: The walkover will be followed by a metal detector survey of selected areas within each of the Core Area(s) of the battlefield. The survey will be conducted within a grid established in proportion to the size of the area to be examined. “Hits” will be flagged, mapped and evaluated with small excavation units. The grid location and depth of each artifact will be recorded on GPS for use in making a GIS map of artifact distribution.

The walkover will be followed by a metal detector survey of selected areas within the Battlefield Boundary (defined by all actions and movements associated with the battle and any Native domestic sites and particularly within the Core Areas (where the actual fighting is believed to have taken place). The survey will be conducted by employing different metal detector technologies (i.e., Beat Frequency Oscillators, Very Low Frequency, and Pulse Induction) to maximize the recovery of metallic objects in various soil conditions. Each metal detector ‘hit’ will be flagged, recovered by excavating a small 'plug,' evaluated to determine if the object is potentially battle related, and mapped. The grid location or GPS location and depth of each artifact will be recorded for use in making a GIS map of artifact distributions.

3.3 Subsurface Testing: Subsurface testing may also be conducted in selected portions of the Core Area that are expected to contain significant numbers of non-metallic artifacts and features. Examples include the margins of the swamp and prospective Sasqua Village Site.

Subsurface testing may also be conducted in Core Areas where there may be Native Domestic sites, particularly the possible locations of the Sasqua village somewhere along the west side of the Pequot Swamp. Subsurface testing will recover non-metallic objects such as lithics, features (e.g.,) hearths, refuse pits), and ceramics that would not be recovered during the metal detector survey but would indicate the presence of a Native domestic site.

3.4 Prepare GIS Map of Battlefield Area using NPS battlefield survey data dictionary.

GIS maps will be generated for the Battlefield Boundary and Core Areas and will include all relevant terrain and cultural features as well as battle-related objects. GIS products will with Federal Geographic Data Committee [FGDC] metadata standards, Content Standards for Digital Geospatial Metadata (FGDC-STD-001-1998), and National Park Service Cultural Resource Spatial Data Transfer Standards.

Task 4: Laboratory Analysis and Curation. The field methodology will be designed to document the battlefield boundaries with minimal artifact collection. Adequate laboratory facilities are required to handle the expected classes of recovered materials which may include small, corroded metallic objects, such as shell fragments, bullets, buckles and so forth. All artifacts will be cleaned, assessed for conservation needs, identified and catalogued and the location of each plotted on the battlefield base maps. All objects will be stored at the MPMRC which meets National Park Service Standards (NPS Museum Handbook I and II) until the FMHC determines the final location for the long term location of artifacts.
Specific Information on this task is discussed in the Research design discussed below

Task 5: Coordinate a public planning process which shall include three meetings. The first meeting should be to present the goals of the project. The second meeting will be to solicit public comment on the draft report. The third meeting will be a presentation of the final report.

At a minimum the MPMRC will produce three PowerPoint presentations. Additional public informational meetings will be prepared, some directed at landowners to, present the goals and objects of the project and to present current results of the battlefield survey. In addition a website will be maintained (www.pequotwar.org) providing landowners and the interested public with current information on the progress of the battlefield survey and any new findings.

Task 6: Prepare a technical report as specified in the work plan, with a preference for a final product that seamlessly combines the Phase I and Phase II report.

Specific Information on this task is discussed in the Research design discussed below

Task 7: Provide monthly written updates and detailed quarterly reports to the Fairfield Museum noting progress on the project work plan. Detailed invoices for all expenses and consultant hours shall be submitted to the Fairfield Museum monthly

Monthly reports will be prepared which will detail the progress and results of the tasks outlined in the RFP and will include updated maps relevant to the battlefield survey.

Task 8: Submit a detailed draft technical report to National Park Service that follows ABPP guidelines by April 1, 2019. Following NPS approval of the final technical report document, the consultant shall provide the Fairfield Museum with one digital and ten (10) acid-free paper copies of the Technical Report and GIS map. One copy should be ARPA redacted.

A draft technical report will be submitted to the FMHC for review and submission to the NPS ABPP. The technical report will meet the standards outlined by the NPS ABPP.

Historic Context

The Pequot War (1636-1637) consisted of several major battles and minor actions fought between September 1636 and August 1637 throughout southern New England (Figure 1). Thousands of combatants, including the English, Pequot, and other Natives (Narragansett, Niantic, Mohegan, Podunk, and Connecticut River Valley tribes), fought with and against the English.
In August 1636, Massachusetts Bay ordered a punitive expedition against the Manisses of Block Island and the Pequot in retribution for the murders of John Stone and his eight crew in the Connecticut River in early 1634 and John Oldham off Block Island in July of 1636. Massachusetts Bay sent a force of 90 soldiers under the command of Colonel John Endicott on August 24, bound first to Block Island and then to Pequot territory. They were ordered:

to put to death the men of Block Island, but to spare the women and children, and to bring them away, and to take possession of the island; and from thence to go to the Pequods to demand the murderers of Capt. Stone and other English, and one thousand fathom of wampom for damages, etc., and some of their children as hostages, which if they should refuse, they were to obtain it by force.²

At Block Island, the Endicott expedition disembarked from their boats and proceeded to search the island for the Manisses who hid themselves in the many swamps on Block Island. Over the next two days the English burned several villages and destroyed cornfields. From there the English sailed to Saybrook Fort at the mouth of the

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² Winthrop, *Winthrop’s Journal*. P. 186
Connecticut River to prepare for the expedition against the Pequot. During the first week of September, Endicott and twenty Massachusetts Bay men arrived and disembarked on the east side of the Pequot (Thames) River. Negotiations were unsuccessful, and the English burned two villages and killed several Pequot, thus beginning “the war between the Indians and us (English) in these parts.” For the next six months (September 1636 – March 1637), the Pequot laid siege to the fort and settlement at Saybrook at the mouth of the Connecticut River. Over 30 English settlers, traders, and soldiers were killed in and around Saybrook during the siege, including half of the fort’s garrison.

On April 23, 1637 a force of more than 100 Pequot attacked the English settlement at Wethersfield killing nine men, a woman, and a girl, and captured two girls from the Swaine family. The attack on Wethersfield caught the settlers by surprise. In spite of the Siege at Saybrook, the Connecticut Colony had not yet declared war against the Pequot as they felt the actions by Massachusetts Bay against the Pequot the previous September were unjustified. The attack galvanized the General Court of Connecticut into declaring an offensive war against the Pequot on May 1, 1637 and raised an army of 77 soldiers and 13 seamen under the command of Captain John Mason with orders to attack the Pequot fortified village at Mistick. At dawn on May 26, 1637 77 English and 250 Mohegan, Narragansett, and Wangunk allies attacked and burned the Pequot fortified village at Mistick. In little more than an hour more than 400 Pequot lay dead, half of them burned to death. The English and their Native allies suffered a number of casualties as well and the English Allied force was in serious trouble as they were running low on food, water, and ammunition and would have to fight their way through 6.5 miles of Pequot territory to reach the safety of their ships anchored in the Thames River.

The Battle of the English Withdrawal began at 9:00 A.M. and ended two miles from the Pequot River at approximately 5:00 P.M. Battlefield surveys of the first 2.5

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4 All of the following dates used to reconstruct the Mistick Campaign are based on times, dates, and references to the “Sabbath” which are found throughout the relevant primary Pequot War narratives. Recorded dates were in the Julian calendar, generally used by most European countries during the 17th century. The Julian calendar year consists of 365 days divided into twelve months with a leap year occurring every four years. The Gregorian calendar superseded the Julian calendar and in 1752, the British Empire adopted the new system. Even so, the Julian calendar remained in use in the Americas well into the early nineteenth century.
miles have recovered more than 1,200 battle related objects including musket balls and brass arrow points, and broken and discarded weapons and personal equipment.

**Quinnipiac Campaign (July 7-14, 1637) and Pequot Swamp Fight (July 13-14, 1637)**

On June 2, 1637, the Connecticut General Court authorized a second levy of troops to continue the war against the Pequot and Captain Mason was again put in command of a 30-man company. Five days later on June 7, 1637, Plymouth Colony declared war on the Pequot and planned to raise fifty men for land and sea service, but these forces were never deployed. During this time Gardiner and his command shared Saybrook Fort with Captains Underhill and Patrick along with sixty Massachusetts Bay soldiers. There they awaited the arrival of Captain Israel Stoughton and an army of one hundred and twenty-men from Massachusetts Bay.

In the weeks following the destruction of Mistick Fort the remaining Pequot villages (estimated at 24 with a population of 3,500 people) abandoned their territory for fear of additional attacks by the English. Sassacus and Mononotto, the two chief sachems, elected to continue the war against the English and Narragansett. Sassacus, with five or six sachems and perhaps two hundred men, women, and children, made their way west along the Connecticut coast intending to seek refuge and support from their allies and tributaries to the west at Quinnipiac (New Haven), Cupheag (Stratford), Poquonnock (Bridgeport), Sasqua (Fairfield), and eventually to make their way to the Mohawk near Albany, New York.

By late June 1637, Connecticut and Massachusetts Bay raised a force of 160 soldiers and an unknown number of Native allies to pursue Sassacus. The combined force embarked from Pequot Harbor in late June, first sailing for Long Island in pursuit of Sassacus. English Allied forces landed on Long Island, west of Montauk, where they met with the sachems of the place. These Native groups submitted to English authority and relayed that Sassacus was at Quinnipiac (New Haven).

With new intelligence received from the Montauk and others, the English Allied army sailed west to Quinnipiac. The following day, the English Allied force came to a

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harbor ten miles east of New Haven (Quinnipiac) Harbor, at present-day Guilford. There, four Native allies disembarked and captured several Pequot, two of whom were sachems. After an unsuccessful interrogation the sachems were executed and their heads placed in a tree on the neck of land where they were taken. The place name of “Sachem’s Head” still exists today.\(^8\) The next day the ships continued west to Quinnipiac Harbor where they were drawn to the sight of smoke from fires. Allied Native forces scouted the area and determined that the Natives there were “Connecticut (Allied) Indians” and not Pequot.\(^9\) The next day the English captured seven Pequot, one of whom was a sachem. One of the captives forced to serve as a guide for the English “directed them into quite contrary way, for which his life was deservedly taken from him.”\(^10\)

Finding few Pequot around Quinnipiac, the English Allied forces continued to sail west and made landfall west of the Housatonic River and continued their advance towards Poquonnock (present-day Stratford and Bridgeport). At this time a captive Pequot named Luz, who had been captured earlier in Pequot country and had promised to work for the English if he and his family were spared, was sent out to find Sassacus.\(^11\) It would be nearly a week before English commanders would hear back from him.

While Luz searched for Sassacus, English Allied forces split their companies into smaller units in order to cover more ground and to locate the many small groups of Pequots fleeing west. Thomas Stanton, official interpreter for Connecticut forces, noted that English forces “ded persue ym y° pequets” and “killed divers att new haven & att Cupheag,” Cupheag being the Native name for present-day Stratford, Connecticut.\(^12\) His statement suggests that the English began to engage small groups of Pequot as early as Quinnipiac.

During this time, the English spy Luz managed to find Sassacus and a large group of Pequot in Sasqua country in present-day Fairfield. At some point Pequot leaders became suspicious of Luz who they believed to be a spy. Luz fled the camp with Pequot warriors in pursuit, but according to the Minister William Hubbard, “he accidently met with a Canooe a little before turned adrift” which he used to paddle away and was picked

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\(^8\) Hubbard, *Narrative of the Trouble with the Indians.* P. 129; Mather, “Anonymous,” *A Relation.* P. 49.


\(^12\) Thomas Stanton, “1659 05 04 Testimony,” *Papers of William Samuel Johnson.* Connecticut Historical Society, Reel V, Volume III.
up by an English vessel. According to Captain Mason, the Anonymous account, and William Hubbard, it was Luz who then directed English commanders to Sasquanikut (Pequot Swamp). Upon receiving this new intelligence Mason recalled how English Allied forces “then hastened our March towards the Place where the Enemy was.” On the morning of July 13, 1637, one English Allied company of Connecticut, Massachusetts, and Native troops marching through Poquonnock encountered corn fields and cut them down, taking what corn they could. In the process they captured “a Pecott man very poore and weake” who told them of others nearby. Soon after, Allied Indians heard the sound of wood being cut in another direction, upon which English forces split their troops yet again. Mason reported that it was at these corn fields where “several of the English espied some Indians, who fled from them” and were closely pursued. A mixed company of Massachusetts, Connecticut, and Native forces under the command of Captain John Mason crossed the Mill River in present-day Fairfield and climbed present-day Mill Hill in Southport. Captain Mason recalled how the soldiers “coming to the Top of an Hill” were able to view the surrounding countryside and saw “several Wigwams” below them with “only a Swamp intervening, which was almost divided into two Parts.” According to Philip Vincent, this location was approximately “threescore miles beyond the Country (till within 36 miles of the Dutch plantations on Hudsons river).”

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13 Hubbard, *Narrative of the Trouble with the Indians*. P. 129.
Figure 2. Viewshed from Lower Elevation on Mill Hill South of Summit.

Battle of Pequot (Munnacommock) Swamp

The Native dwellings Mason saw to the south were part of the Sasqua village located west of a large wetland known by the local Native people as Munnacommock (roughly translated to “enclosed place” and generally refers to a place of refuge within a swamp and known today as the Pequot Swamp). There were several dozen Pequot and Sasqua men and over 80 Pequot and Sasqua women and children in the village. Once they realized the English were nearby they made the decision to flee into the swamp for safety and to mount a defense. Not wanting to lose the element of surprise the English Allied forces atop Mill Hill quickly descended south to engage the enemy. The first soldiers to reach the swamp, under the command of Connecticut’s Sergeant Palmer, moved to “surround the smaller Part of the Swamp” while a group of Massachusetts Bay

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21 Collections of the Massachusetts Historical Society. P. IX:121.
soldiers under Lieutenant Davenport headed directly to the village by charging into the swamp.\textsuperscript{22}

As Davenport’s file of a half dozen men entered the swamp he “overtook a man and a sachem Child” who he killed with his half pike. The men pushed further into the swamp when the last soldier in line, John Wedgwood, was shot in the stomach with an arrow and was captured by Pequot warriors. Davenport and three other soldiers turned to assist their comrade and were engaged by several additional warriors who shot at them with arrows.\textsuperscript{23} One soldier, Thomas Sherman, was shot in the neck and fell while Lieutenant Davenport was hit by fourteen arrows, two of which missed his armor and pierced his body. Davenport managed to kill or wound four of the attackers and saved Wedgwood in the process. The men were soon rescued by additional Massachusetts Bay soldiers under Sergeant Riggs and the Pequot men broke off the fight.\textsuperscript{24} Soon after, the rest of the English Allied army arrived and surrounded Munnacommock Swamp.

It was around 3 P.M. when English commanders deliberated on how to best proceed with their siege. Captains Patrick and Traske of Massachusetts Bay wanted to cut down the swamp using “Indian Hatchets” they had captured, but this was opposed. Others suggested that they palisade the entire swamp but this was considered unrealistic. Some believed that there was time to charge the swamp but this too was rejected. Finally, English commanders considered tightening their siege while sealing any open passages along the swamp with brush to secure the swamp until the morning, but this course of action was not taken either. Captain Mason recalled that “so different were our Apprehensions” that the commanders could not agree on a course of action and some of the men simply “concluded the Indians would make an Escape in the Night.” In the end English Allied forces maintained their circumference of the swamp, but their soldiers and Native allies were spread thin which Mason described as “keeping at a great distance” apart.\textsuperscript{25} Edward Johnson described how “some of them spyed an Indian with a kettle at his back going more inwardly into the swamp, by which they perceived there was some place of firm land in the midst thereof, which caused them to make way for the passage

\begin{footnotes}
\item[22] Mason in Prince, \textit{History of the Pequot War}. P. 15.
\item[23] Winthrop, \textit{Winthrop Papers}. III:453.,
\item[24] Hubbard, \textit{Narrative of the Trouble with the Indians}. P. 129.
\end{footnotes}
of their Souldiers." To reduce the circumference of the siege Captain Mason ordered his troops to push through the narrow part of the swamp and the firm land described by Johnson, in order to cut the swamp in two which was accomplished by Sergeant Davis.27

As the afternoon wore on English Allied forces engaged an undetermined number of Pequot men and their allies who fought back from the cover and protection of the swamp. The English estimated that they faced 70 or 80 warriors, but were unsure of the total number.28 According to Edward Johnson, the Pequot forces maintained contact with the English “and as they saw opportunity they made shot with their Arrowes at the English.” When English troops returned fire those Pequot warriors “then suddainly they would fall flat along the water to defend themselves from English musket fire.”29 The “Anonymous” account described how “the English beset the Swamp; and shot in upon them” but also mentions that in this engagement the Pequot shot back with their own firearms as “some of which were furnished with Guns.”30

After sustained fighting Thomas Stanton negotiated a brief truce to allow the Native non-combatants to surrender and made it clear that they only wanted the remaining Pequot and Sasqua warriors. Nearly a hundred Pequot, Sasqua, and Poquonnock Indians surrendered but the fighting soon continued.31 The English Allied force was not sufficient to prevent Pequot fighters from escaping the swamp and they proceeded to cut the swamp in half to more effectively surround it and contain the remaining defenders inside. What followed was an overnight battle as the English tried to keep the remaining Pequot men hemmed in the swamp and the Pequot and Allied fighters attempted to break through the English lines and escape. The following morning of July 14, under cover of fog, approximately sixty to eighty Pequot men broke through a section of the English lines and escaped. They did so by feigning a major attack on Captain Patrick’s section of the line, and when the English commanders sent their men to reinforce Patrick’s company large gaps opened in the English line the move allowed the

27 Mason in Prince, History of the Pequot War. P. 15.
31 All of those surrenders were sold into slavery either in the New England Colonies or to islands in the Caribbean. Pequot women and children of note in particular were sold into Caribbean slavery. Massachusetts Bay traders sent south to sell Indian captives often returned with African slaves. The African slave trade in New England is rooted in the Pequot War.
majority of Native men to escape the swamp.\textsuperscript{32} English accounts of Pequot casualties differ, ranging from seven dead to as many as sixty.\textsuperscript{33} The earliest, and possibly the most accurate, accounting of Pequot casualties comes from the “Anonymous” account which claimed that a “Diligent search was the next day made in the Swamp for dead Indians, Not many, (as some have made Narration) but seven, and no more could be found.”\textsuperscript{34} As later narratives of the war were published in the decades that followed, the alleged Pequot body count following the battle became drastically inflated. The English suffered a handful of wounded during the battle.\textsuperscript{35} Other than the initial casualties incurred in Lieutenant Davenport’s squad, “Anonymous” reported that “although the Indians coming up close to our men, shot their Arrows thick upon them, as to pierce their hat brims, and their Sleeves, and Stockings, and other parts of their Cloaths, yet so miraculously did the Lord preserve them, as that (excepting three that rashly ventured into the Swamp after them) not one of them was wounded.”\textsuperscript{36}

After the battle the English were informed that they had missed capturing Sassacus and other Pequot leaders by a day. Sassacus along with six other sachems, a few women, and a body guard of twenty men had left the main Pequot body at Quinnipiac after suspecting their kinsman Luz of spying. Sassacus’ group moved north along Housatonic River and west up the Ten Mile River into present-day eastern New York with the intention of seeking refuge in Mohawk territory. The Pequot were discovered by a contingent of Mahican and Mohawk warriors near the “Stone Church” in Dover Plains, New York. Sassacus’s party was surprised in their wigwams by their attackers. Sassacus was killed in the engagement and although some of the Pequot managed to escape they were quickly found and executed. The Mohawk sent Sassacus’s head and hands to Agawam (Springfield, MA) where they were sent downriver to Hartford before reaching Boston on August 5, 1637.\textsuperscript{37} The death of Sassacus effectively ended all Pequot resistance.

\textsuperscript{34} Mather, “Anonymous,” A Relation. P. 49.
\textsuperscript{35} Mather, “Anonymous,” A Relation. P. 49.
\textsuperscript{36} Mather, “Anonymous,” A Relation. P. 53.
Archeological Identification of the Battle of Pequot Swamp

While the primary sources associated with the Battle of Pequot Swamp present a number of challenges with respect to identifying the prospective location(s) of the battle events, the sequence of events, and their spatial correlates that characterized the battle present several plausible options for the location(s) of battlefield actions by integrating information from primary accounts, local oral history, land records, historical maps, aerial photographs, a walkover reconnaissance of prospective battlefield sites, and KOCOA analysis. The Pre-Inventory Research and Documentation project conducted by the MPMRC38 identified the Battlefield Boundary, English avenues of approach, Core Area, boundary of the swamp, and possible locations of the Sasqua village.

The Pequot Swamp Battlefield Boundary is expected to contain thousands of objects dating to the 18th through the 20th century reflecting centuries of land use after the Pequot Swamp battle from light industrial activity, farming, logging, and quarrying. These assemblages reflect a rich and complex land use history, but also complicate the identification of potential battle related objects. Additional complications will result from the many hundreds of more modern domestic objects associated with the many houses within the battlefield.

The challenge will be to distinguish 17th century battle related objects from objects (particularly iron) objects that date to later time periods. Fortunately, the MPMRC has conducted battlefield surveys on a number of Pequot War battlefields (Battle of Mistick Fort, Siege and Battle of Saybrook Fort, Battle of the English Withdrawal) and recovered hundreds of metal objects associated with Pequot War battlefields and Native domestic sites (e.g., brass buttons and buckles, iron kettle fragment, iron tool fragments, and iron architectural hardware such as nails, hinges, etc.), and light industrial and agricultural activities (e.g., ox and horseshoes, barbed wire, fence and post nails; quarry feathers and plugs, iron chain links, wedges).

Research Design

The Research Design outlined below incorporates the methods, procedures, and products identified in the FMHC RFP for Tasks 1-8. The NPS ABPP has issued a revised Battlefield Survey Manual (2016) that outlines standard methodologies to be employed in researching, documenting, and mapping battlefields. All NPS ABPP grantees are directed to use the manual.

The manual is designed to focus the attention of battlefield archeologists on a standard methodology to obtain reliable information that can be used by state historic preservation offices, local planners, and preservation advocates to protect and preserve battlefields. A standardized methodology also enables the NPS ABPP to compare information across all wars and sites. Although the manual was originally designed for documenting Civil War battlefields, it can be easily adapted to the challenges of conducting surveys on 17th century battlefields which are often characterized by incomplete and often contradictory historical information. The methods and procedures outlined in the NPS ABPP *Battlefield Survey Manuel* will be incorporated into the Research Design and the Scope of Work as identified by the FMHC.

The MPMRC proposes the following Research Design in order to complete the Site Identification and Evaluation of the Battle of Pequot Swamp. Specific tasks include: research the history of the battlefield site; develop a detailed land use history; conduct archeological field work within the Battlefield Boundary and Core Areas to locate and document the Battlefield Landscape and battle related archeological sites; conduct artifact cataloguing and analysis of all objects recovered from the Core Areas and battlefield landscape; map battle-related artifacts and positions of combatants and features on a USGS topographic map with GIS; integrate archeological evidence with historical research to delineate the boundaries of the Core Areas and Battlefield Boundary including; complete a final report of the battlefield survey to document findings complete with GIS mapping, object inventories and analyses, and battlefield reconstructions; and assess overall significance and site integrity and identify threats to battlefield sites with respect to the criteria for nomination to the National Register of Historic Places.

*Communication*

An important aspect of the project will be to effectively communicate ongoing results to the general public and particularly landowners within the Battlefield Boundary using in part the MPMRC’s website Pequotwar.org, list serves and regular battlefield updates via email addresses to consenting participants. At a minimum updates will be conveyed to the FMHC on a monthly basis. A priority in the communication process will be to continue to reach out to prospective land owners for permissions either through regular public informational meetings or personal communications. The FMHC, and knowledgeable individuals and organizations will be a critical
resource throughout the project as they may have knowledge and perspective of the Battle of Pequot Swamp that will greatly enhance the overall interpretation and reconstruction of battle events.

**Battlefield Archeology**

The discipline of Battlefield Archeology is concerned primarily with the identification and study of sites where conflict took place, and the archeological signature of the event. This requires information gathered from historical records associated with a battlefield including troop dispositions, numbers, and the order of battle (command structure, strength, and disposition of personnel, equipment, and units of an armed force during field operations), as well as undocumented evidence of an action or battle gathered from archeological investigations. The archeology of a battlefield allows battlefield archeologists to reconstruct the progress of a battle, assess the veracity of historical accounts of the battle, as well as fill in any gaps in the historical record. This is particularly important with respect to the Battle of Pequot Swamp as the historical record is often incomplete, inconsistent, and biased. Battlefield archeology seeks to move beyond simple reconstruction of the battlefield event, and move toward a more dynamic interpretation of the battlefield.39

**Battlefield Pattern Analysis**

Traditional battlefield interpretations and reconstructions rely primarily on historical information (e.g., battle accounts, narratives, diaries, etc.), occasionally augmented by oral histories and random collections of battle-related objects. These reconstructions tend to focus only on the spatial distribution of battlefield events which result in a static reconstruction of the battlefield, referred to Gross-Pattern Analysis. Douglas Scott, Richard Fox, and others have advocated an approach to battlefield archeology that moves beyond the particularistic and synchronic approach characteristic of Gross-Pattern Analysis in battlefield reconstructions.40 This approach, known as Dynamic-Pattern Analysis, interprets and reconstructs battlefields by


integrating discrete battlefield events and their archeological signatures into a cohesive spatial and temporal sequence.

Using both Gross-Pattern and Dynamic-Pattern Battlefield Analyses, the spatial and temporal dimensions of a battle are better defined by integrating the historical and archeological record into a process of battlefield reconstruction that seeks archeological and historical correlates of individual and unit behaviors. The historical record associated with battlefield events can be used to inform and test hypotheses of individual and unit actions and movements which can then be tested against the archeological record.

If individual and unit actions can be identified in battlefield accounts and their archeological signatures identified and tracked across the battlefield, a temporal dimension (sequencing) can be added to the battlefield analysis. Sequencing battlefield behaviors and actions requires constructing a detailed timeline of battlefield events and actions based on historical accounts. This timeline can then be used to develop hypotheses regarding the archeological correlates (signatures) of discrete battlefield events and behaviors. Once the beginning and end points of a behavior or action can be identified, individual and unit behaviors can be sequenced and the movement of individuals and units across the battlefield can be reconstructed. It is the ability to reconstruct battlefield events in both space and time that allows for a dynamic reconstruction of the battlefield. Individual actions and movements must be viewed in the aggregate, as unit actions and movements are aggregates of individual actions and movements. As such, individual actions are often subsumed in unit actions and movements, the basic unit of analysis of battlefield actions. While individual actions can sometimes be identified on the battlefield, it is generally the units and their actions which are integrated into a cohesive spatial and temporal sequence to reconstruct and interpret the battlefield.

Gross patterns are defined as the spatial aspects of unit behaviors. Dynamic patterns are defined as analytical techniques (primarily firearm signature analysis achieved through comparative analysis of distinguishing attributes of bullets and shell casings of modern firearms) which allow for the identification of individual firearms on the battlefield. Gross patterning relies on a synchronic approach to battlefield reconstruction – a spatial composite of battlefield events achieved by correlating the historical record with the archeological record, but without reference to time (i.e., movement). Battle events, as expressed by discrete artifact distributions are placed in space, but not ordered in time. Dynamic pattern analysis takes the composite of battle events
expressed in the archeological record and orders them in time through an ongoing assessment of the congruence of the historical and archeological records and by tracking the movements of individuals and units across the battlefield through firearms identification. Douglas Scott and Richard Fox developed the Post-Civil War Battlefield Pattern Approach during their study of the 1876 Battle of Little Bighorn (in Montana), which sought to investigate the behavioral dynamics on the battlefield.\(^{41}\) The foundation of the Post-Civil War Battlefield Pattern Approach is recognizing individual behavioral patterns, which is dependent on identifying singular positions and movements about the battlefield.

The key to a dynamic battlefield analysis as defined by Scott and Fox is modern firearm analysis that “allows resolution of individual positions and movements across the battlefield.”\(^{42}\) In the case of the Battle of Little Bighorn this was largely achieved through forensic ballistic analysis of thousands of bullets and cartridge cases which allowed researchers to track individual firearms across the battlefield. This integrated model of Gross Pattern Analysis and Dynamic Pattern Analysis has been the paradigm for Civil War and post-Civil War battlefield archeology and analysis since 1985. While this approach would not seem applicable to 17th century battlefields characterized by musket balls, in fact the approach has proven to be highly successful in the reconstruction and interpretation of Pequot War battlefields. Rather than focus on individual behavior patterns, the focus in 17th century battlefields is on unit or other discrete actions reflected in battlefield narratives that would leave a visible archeological signature on the battlefield. A dynamic reconstruction of battlefield events requires an ongoing assessment of the congruence of historical and archeological data in an effort to identify discrete groups or individual actions and movements on the battlefield in order to place them in a temporal framework. An integral part of this process is to place the battlefield and related sites in a broader cultural and battlefield landscape to better understand, interpret and identify battlefield events and sites. A cultural landscape is defined as a geographic area, encompassing cultural and natural resources associated with the historic battlefield event.\(^{43}\) The key aspect of this analysis is the reconstruction of the historic landscape and battlefield terrain associated with the battle to

\(^{41}\) Archaeological perspective on the Battle of the Little Bighorn; Fox and Scott, “Post-Civil War Battlefield Pattern.”

\(^{42}\) Scott, Archaeological perspective on the Battle of the Little Bighorn, P.148.

identify natural and cultural features present in the battlefield space and to determine how they were used by the combatants.  

**Battlefield Landscapes**

Battlefield Landscapes consist of those natural (e.g., hills, streams, valleys, etc.) and cultural (e.g., roads, gun emplacements, trenches, fortifications, etc.) features that defined the original battlefield landscape, but also include the nature and evolution of natural and cultural features over time and their impacts to the original landscape. In order to identify, document, survey, and map a battlefield, battlefield historians and archeologists must research all available and relevant historical accounts and identify the historic landscape that defined the battlefield in the field through terrain analysis and identification of natural and cultural features associated with the battlefield.

While battlefields are situated within the broader cultural landscape, battlefield reconstructions focus only on those cultural and natural features directly related to the battlefield. The United States military has developed a process for evaluating the military significance of the battlefield denoted by the acronym KOCOA (Key and Decisive Terrain, Obstacles, Cover and Concealment, Observation and Fields of Fire, Avenues of Approach and Retreat – see below).

**Battle of Pequot Swamp: Battlefield Patterns & Spatial Analysis**

The Dynamic Battlefield Pattern Approach, with its focus on modern firearm analysis, would not appear to be applicable to the interpretation and reconstruction of a 17th century battlefield such as the Battle of Great Falls, where the combatants used mostly muskets and bows, projectile types which are not generally amenable to modern firearm analyses. Nonetheless, Fox and Scott’s approach has great utility for all battlefield studies which seek to move beyond static historical reconstructions and attempts to identify and interpret the actions and movements which influenced the progression and outcome of the battle. The key to this analysis is the ability of battlefield archeologists to integrate the spatial dimensions of unit 

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actions into a temporal framework. This does not necessarily require identification of individual behaviors through modern firearm analysis, such as was done for the Battle of Little Bighorn.

In the case of the Battle of Pequot Swamp, this can be accomplished by identifying discrete unit, and sometimes individual actions and movements inferred from the historic record, KOCOA, and analysis of English and Allied Native tactics during the Pequot War. This information will be used to develop a battlefield timeline and anticipated archeological signatures for these events and actions. The recovered archeological signatures based on the nature and distribution of recovered battle-related objects will then be tested against the battlefield timeline and anticipated archeological signature. In this way, the recovered archeological signature can be placed in a temporal context and integrated into the sequence of battlefield actions and events. However, as is often the case with the nature of poorly or underdocumented 17th century battlefields this process requires a number assessments and reassessments to get the best possible ‘fit’ between the historical narrative and the archeological signature. A critical component of this process is ongoing discourse in the field on a daily and weekly basis between the battlefield team comprised of battlefield archeologists, metal detectorists, researchers, and military historians.

This methodology was highly successful in reconstructing the Battle of Mistick Fort, the Battle of the English Withdrawal, and the Siege and Battle of Saybrook Fort. However, given the nature of 17th century records associated with the Battle of Pequot Swamp, this process will require an ongoing assessment of the best congruence or ‘fit’ between the archeological and historical data (and vice versa). Previous experience in reconstructing 17th century battlefields has shown that the archeological record informs the historical records as often as the historical record informs the archeological record. The level of detail and refinement in identifying and sequencing 17th century battlefield events is not comparable to what can be achieved in Post-Civil War battlefields, but nonetheless can result in important insights into the nature and progress of a battle.

An analysis of the sequence of events, movements, and actions associated with the Battle of Pequot Swamp resulted in a preliminary battlefield events timeline (Table 1). In theory, all of these events, movements, actions, and terrain features should have a unique archeological signature based on the nature and distribution of battle-related objects. The greatest challenge in constructing a more detailed battlefield timeline will be to identify, contextualize, and integrate
the signatures from the movements and actions of the Native and English combatants that are not necessarily documented in primary sources.
Table 1 - *Battlefield Events Timeline* Battle of Pequot (Munnacommock) Swamp

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Action</th>
<th>Unit &amp; No. of Combatants</th>
<th>Location</th>
<th>Time &amp; Duration</th>
<th>Primary Resource</th>
<th>Anticipated Archeological Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crossing Mill River and climbing Mill Hill</td>
<td>Unknown Pequot Allied Non-Combatants and Warriors. Approx. 20 English Soldiers and Unknown Native Allies</td>
<td>Mill River and Mill Hill, Southport, CT</td>
<td>July 13, 1637; Approx. 12:00-12:30 pm</td>
<td>We then hastened our March towards the Place where the Enemy was: And coming into a Corn Field, several of the English espied some Indians, who fled from them: They pursued them; and coming to the Top of an Hill, saw several Wigwams just opposite, only a Swamp intervening, which was almost divided in two Parts.46</td>
<td>Low. Dropped English and Native personal items, clothing items.</td>
</tr>
<tr>
<td>2</td>
<td>Descending Mill Hill to Munnacommock Swamp</td>
<td>Unknown Pequot Allied Non-Combatants and Warriors. Approx. 20 English Soldiers and Unknown Native Allies</td>
<td>Mill Hill, Southport, CT</td>
<td>July 13, 1637; Approx. 12:30-1:00 pm</td>
<td>...a small Indian town seated by the side of an hideous Swamp (near the place where Fairfield or Stratford now stand) into which they all slipt as well Pequods as natives of the place, before our men could make any shot upon them, having placed a sentinel to give warning.47</td>
<td>Low. Dropped English and Native personal items, clothing items.</td>
</tr>
</tbody>
</table>

46 Mason in *Brief History of the Pequot War*. P. 15.
47 Hubbard, *Narrative of the Trouble with the Indians*. P. 130.
| 3 | Mason’s Company surrounds smaller part of swamp. Lt. Davenport’s men ambushed in swamp. | Approx. 30 Pequot Allied Warriors. Approx. 20 English Soldiers and Unknown Native Allies | Pequot (Munnacommock)Swamp, Southport, CT | July 13, 1637; Approx. 1:00-2:00 pm | Serjeant Palmer hastening with about twelve Men who were under his Command to surround the smaller Part of the Swamp, that so He might prevent the Indians flying: Ensign Davenport, Serjeant Jeffries & c. entering the Swamp, intended to have gone to the Wigwams, were there set upon by several Indians, who in all probability were deterred by Serjeant Palmer. In this Skirmish the English slew but few: two or three of themselves were Wounded: The rest of the English coming up, the Swamp was surrounded.  

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49 Mason in Prince Brief History of the Pequot War. Pp. 15-16.  
50 Mason in Prince Brief History of the Pequot War. P. 15.

| 4 | Remainder of English Allied Forces gradually arrive and surround swamp and open fire. Pequot Allied forces defend non-combatants in the center of the swamp. | Approx. 60-80 Pequot Allied Warriors. Approx. 160 English Soldiers and Unknown Native Allies | Pequot (Munnacommock)Swamp, Southport, CT | July 13, 1637; Approx. 1:00-5:00 pm | The rest of the English coming up, the Swamp was surrounded.  

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51 Mason in Prince Brief History of the Pequot War. P. 15.  

| 5 | A low in the fighting occurs as a Sasqua Sachem and English interpreter | Approx. 60-80 Pequot Allied Warriors. Approx. 160 English Soldiers and Unknown Native Allies | Pequot (Munnacommock)Swamp, Southport, CT | July 13, 1637; Approx. 5:00-8:00 pm | ...Tho. Stanton a Man well acquainted with the Indian Language and Manners, offered his Service to go into the Swamp and treat with them: To which we were somewhat backward, by reason of some Hazard and Danger he might be exposed unto: But his importunity prevailed: Who going to them, did in a short time return to us, with near Two Hundred old Men, Women and Children; who Delivered themselves to the Mercy of the English  

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49 Mason in Prince Brief History of the Pequot War. Pp. 15-16.  
50 Mason in Prince Brief History of the Pequot War. P. 15.
| 6 | Thomas Stanton parley and negotiate the surrender of non-combatants. | Combat occurs throughout the evening and into the early morning. Before dawn Pequot Allied forces break through English lines and escape. | Approx. 60-80 Pequot Allied Warriors. Approx. 160 English Soldiers and Unknown Native Allies | July 13-14, 1637; Approx. 8:00pm-4:00am | And so Night drawing on, we beleaguered them as strongly as we could. About half an Hour before Day, the Indians that were in the Swamp attempted to break through Captain Patrick’s Quarters’ but were beaten back several times; they making a great Noise, as their Manner is at such Times, it sounded round about our leaguer:

Whereupon Captain Mason sent Serjeant Stares to inquire into the Cause, and also to assist if need required; Capt. Traske coming also in to their Assistance: But the Tumult growing to a very great Heighth, we raised our Siege; and Marching up to the Place, at a Turning of the

Swamp the Indians were forcing out upon us; but we sent them back by our small Shot. We waiting a little for a second Attempt; the Indians in the mean time facing about, pressed violently upon Captain Patrick, breaking through his Quarters, and so escaped. They were about sixty or seventy as we were informed.52 | Moderate. Dropped English and Native personal items, clothing items. Impacted and Dropped Cuprous Arrow Points and Lead Shot |

51 Mason in Prince Brief History of the Pequot War. Pp. 16-17.
52 Mason in Prince Brief History of the Pequot War. P. 17.
Critical Defining Features and KOCOA Analysis

The overall goal of the archeological survey of the Battle of Pequot Swamp is to locate the historic and geographic extent of the battlefield(s), actions and sites on modern maps using GIS. Battlefield survey methods rely heavily on identification and analysis of a wide range of physical and cultural features using readily available resources such as USGS 7.5” series Topographic Maps, aerial photographs, historic maps, and walkover or “windshield surveys” – all of which are used to identify important terrain features and locations obtained from primary narratives or accounts of battlefields. There are three steps in this process: 1) identify battlefield landscapes; 2) conduct battlefield terrain analysis with KOCOA (Key terrain, Observation, Cover and concealment, Obstacles, Avenues of approach); and 3) Battlefield Survey (research, documentation, analysis, field visits, archeological survey, definition of Battlefield Study and Core Areas, assessment of integrity and threats to battlefields, and map preparation). As a result of this process, thirteen critical defining features have been identified at present (Table 2) and it is anticipated that others will be identified as the battlefield survey progresses.

KOCOA Evaluation and Analysis

The United States military has developed a process for evaluating the military significance of the battlefield denoted by the acronym KOCOA; Key and Decisive Terrain, Observation and Fields of Fire, Cover and Concealment, Obstacles, Avenues of Approach and Retreat. The NPS ABPP requires the KOCOA approach for all documentation and implementation grants. An important aspect of KOCOA analysis is to identify defining features of the battlefield landscape – aspects of the landscape that are mentioned in battlefield accounts and influenced the nature and progress of the battle. Defining features may be natural (e.g., Mill River, swamps, boulders, ridges) or cultural (e.g., Sasqua Village, roads/paths) and are assessed and evaluated to determine their effect on the process and outcome of the battle. Critical defining features are mapped using GPS and GIS, and surveyed using remote sensing (metal detection and electrical resistivity), and archeological testing and excavation.

Prospective battlefield and ancillary site locations were identified by analyzing and integrating information from the following sources; primary accounts, local oral history, local and institutional artifact collections, land records, historical maps, aerial photographs, site visits, archeological excavation and KOCOA analysis. Battlefield landscapes consist of natural features (hills, streams, valleys, etc.) and cultural features (trails, fortifications, villages, etc.) that define
the original battlefield landscape and also reflect the evolution of these features over time and their impacts to the original landscape. In order to identify, document, survey and map a battlefield, historians and archeologists must research all available and relevant historical accounts and identify the historic landscape that defined the battlefield in the field through terrain analysis and identification of natural and cultural features associated with the battlefield.

**Terrain Analysis**

Terrain analysis is a critical aspect of battlefield surveys, so much so that the NPS ABPP require all grant recipients to use KOCOA (Key terrain, Observation, Cover and concealment, Obstacles, Avenues of approach), a military terrain model the U.S. Army developed to evaluate the military significance of terrain associated with a battlefield. By studying the military applications of the terrain using KOCOA, a battlefield historian or archeologist can identify the landscape of the battlefield and develop a basis for judging the merits and flaws of battle accounts. KOCOA components include:

**Key Terrain and Decisive Terrain** - Key Terrain is any ground which, when controlled, affords a marked advantage to either combatant. Two factors can make terrain key: how a commander wants to use it, and whether his enemy can use it to defeat the commander’s forces. Decisive Terrain is ground that must be controlled in order to successfully accomplish the mission.

**Observation and Fields of Fire** - Observation is the condition of weather and terrain that allows a force to see friendly and enemy forces, and key aspects of the terrain. Fields of Fire are areas where weapons may be covered and fire into from a given position.

**Cover and Concealment** - Cover is protection from enemy fire (e.g., palisade, stone wall, brow of a hill, wooded swamp), and Concealment is protection from observation and surveillance (e.g., ravines, swamps, intervening hill or wood).

**Obstacles** - Obstacles are any features that prevent, restrict, or delay troop movements. Obstacles can be natural, manmade, or a combination of both and fall into two categories: existing (such as swamps, rivers, dense wood, town or village) and reinforcing (placed on a battlefield through military effort).
Avenues of Approach and Withdrawal - An avenue of approach is the route taken by a force that leads to its objective or to key terrain in its path. An Avenue of Withdrawal is the route taken by a force to withdraw from an objective or key terrain.

Table 2 - Critical Defining Features. Battle of Pequot Swamp

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Relevance to Battle</th>
<th>Field Comment</th>
<th>KOCOA Analysis</th>
<th>Integrity Assessment</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terrain and Topographical Features</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mill River</td>
<td>Present day Southport , CT</td>
<td>English Allied forces pursued fleeing Pequot across the Mill River. Immediately west of the river is the steep eastern slope of Mill Hill.</td>
<td>Moderate Residential; Low Industrial; Public Roads &amp; Bridges; Highway; Moderate Woodland</td>
<td>Obstacle, Avenue of Approach Pequot &amp; English</td>
<td>Moderate Residential Development , Woodland</td>
<td>Within Battlefield Boundary</td>
</tr>
<tr>
<td>Mill Hill</td>
<td>Present day Southport , CT</td>
<td>English Allied forces climbed to the heights of Mill Hill in pursuit of fleeing Pequot and for a better viewshed of the surrounding countryside. From there they identified a Native village below near a swamp.</td>
<td>Dense Residential; Public Roads; Moderate Woodland</td>
<td>Key Terrain, Observation , Obstacle, Avenue of Approach Pequot &amp; English</td>
<td>Moderate Residential Development , Woodland</td>
<td>Within Battlefield Boundary</td>
</tr>
<tr>
<td>Munnacommock Swamp</td>
<td>Present day Southport , CT</td>
<td>Pequot Allied forces and local Native groups sought shelter in the swamp while warriors mounted a defense against their attackers.</td>
<td>Heavily Developed; Dense Residential; Dense Commercial; Public Roads; Highway</td>
<td>Key Terrain, Observation , Obstacle, Avenue of Approach Pequot &amp; English</td>
<td>High Residential Development , High Commercial Development , Woodland, Open Space</td>
<td>Within Core Area</td>
</tr>
<tr>
<td>Sasqua River</td>
<td>Present day Southport , CT</td>
<td>The Sasqua Village and swamp lay east of the Sasqua River. Any Pequot warriors retreating to the west would cross the river.</td>
<td>Moderate Residential; Low Industrial; Public Roads &amp; Bridges;</td>
<td>Obstacle</td>
<td>Moderate Residential Development , Woodland</td>
<td>Within Core Area</td>
</tr>
</tbody>
</table>
### Identifying Battle Locations

Several prospective battlefield and ancillary site locations were previously identified in the final report of the Pre-Inventory and Documentation project by integrating information from the following sources: primary accounts, local oral history, local artifact collections, land records, historical maps, aerial photographs, site visits, and KOCOA analysis. All of these sources were used to reconstruct battlefield events, identify battlefield and site locations, and delineate potential boundaries. It is likely that additional battle events and sites will be identified as fieldwork progresses. The testing of known and additional locations which may contain battle-related objects is entirely dependent on landowner permissions. It is anticipated that additional landowner permissions will need to be obtained as the battlefield survey progresses.

### Battlefield Resources

Identifying the nature, location, and extent of battlefield resources are critical components in documenting and reconstructing the battlefield terrain and events associated with the battle of Pequot Swamp. The Pre-Inventory and Documentation Plan report identified a number of battlefield resources, but these identifications were based on documentary research and a very limited walkover. It is anticipated that a more intensive walkover survey combined with the recovery of battle-related objects associated with terrain features will identify a number of additional battlefield resources. Four types of battlefield resources are expected within the Battle of Pequot Swamp Battlefield Boundary: Natural Features, Cultural features, Military Engineering Features, and Battle-related Artifacts.
Natural Features

The natural terrain or topography of the Pequot Swamp battlefield landscape is defined primarily by the drainage pattern and relative elevation. Important terrain features within the battlefield landscape that would be expected to potentially contain battle-related objects include swamps and wetlands and high and well-drained ground adjacent to swamps and wetlands. Nuances of the terrain that may have influenced the battle may not be apparent until battle-related artifacts are recovered. It is also important to assess how much the terrain has changed since the battle event. For instance, have streams been diverted or channeled? Have swamps and bogs been drained or filled? Have battlefield terrain been destroyed or altered to a significant degree by road construction and development? Assessment of the impacts and integrity of battlefield terrain will be an important aspect of the battlefield survey.

Cultural Features

Cultural features are elements of the historic landscape created by humans. The cultural landscape influenced the location and direction of battle. Road networks (in this case paths and trails) determined the collision of combatants and influenced the direction and speed that military units could travel to reach or withdraw from the battlefield. An abandoned and cleared horticultural field adjacent to wetlands provided both protection and a clear field of fire for the Native and English combatants. Cultural resources are susceptible to decay and alteration: domestic structures such as wigwams disappear; fields grow up; new roads cover or bypass old trails and paths, and natural vegetation can obscure old trails and paths. Often historical research can guide the battlefield archeologist to remnants of these features, or at least their possible location. However, as is often the case with poorly or under documented 17th century battlefields, the nature and distribution of battle-related artifacts serve as the best sources of documentation on the location of battle events and associated cultural features and key terrain features.

The cultural landscape contained within the Pequot Swamp Battlefield Landscape was the result of thousands of years of Native land use, including horticulture, and forest management. At the time of the battle there were no English settlements in the area. The cultural landscape also consisted of Native domestic sites/villages including the Sasqua village along the west side of the Pequot Swamp.
Military Engineering Features

Military earthworks (e.g., field fortifications, entrenchments, trenches) constructed by soldiers or laborers are an important resource for understanding a battle event. Surviving earthworks often define critical military objectives, key terrain, opposing lines of battle, and no man’s land. There is little or no evidence of military engineering features such as palisades or otherwise fortified places present at the time of the Battle of Pequot Swamp. The Pequot Swamp adjacent to the Sasqua village essentially served as a fortification or place of refuge.

Battle-related Artifacts

The recovery of artifacts associated with the Battle of Pequot Swamp will be the most significant component of the battlefield survey. Undisturbed patterns and relationships among soil layers, artifacts, features, and sites convey important information about past events and connect the physical reality of the battle to its broader landscape. Seventeenth century Colonial battlefields such as Pequot Swamp are often poorly or under-documented by 17th century historians or chroniclers of the battle compared to later eighteenth and nineteenth century battles. What little information is available often provides very little detail on the nature and progression of the battle and the locations of battle events, and contemporary sources are often biased, incomplete, contradictory, and unreliable. In addition, there is rarely a Native account of the battle and therefore the battle narratives do not provide a Native perspective on battle events. The nature and distribution of battle-related artifacts are often the only source of reliable information available to reconstruct many aspects of the battlefield. Most defining features identified in historic documents and in the field are archeological resources found beneath the surface, which provide evidence of the actions that took place; soldiers waiting or tending horses, fighting, attacking or defending villages or fortifications, or moving to attack or retreat. The artifactual evidence associated with battle events is used to:

- Verify troop movements and transportation methods (i.e., horse, wagon, supply trains, etc.)
- Map out battle actions in time and space to interpret and reconstruct a battle’s progress
- Reveal previously unrecorded facets of the battles
- Confirm locations of villages or structures, roads and paths
- Verify or disprove long-believed myths or “official” accounts
- Understand the effects of the battle on noncombatants
- Offer a more complete picture of the life of Native and Colonial soldiers in camp and in battle
Battlefield Preservation

The first step toward battlefield preservation is defining exactly where the battlefield is on the ground and what remains to preserve of the battlefield. This requires establishing a boundary of the battlefield on a map. The boundary must be historically defensible; historical and/or archeological evidence and source materials must show that the boundaries encompass legitimate historic resources. Battlefield areas should be defined as objectively as possible to include the salient places where events occurred and important landmarks, and should accurately reflect the extent of the battle. The initial survey should include all known historic resources associated with the battle. Once the battlefield survey is completed and the final battlefield map marked with defining features and boundaries, informed preservation decisions can be made. The battlefield survey should result in the definition of three boundaries:

- Battlefield Boundary, which encompasses the ground over which units maneuvered in preparation for combat
- Core Area, which defines the area where the most significant combat occurred, and
- Potential National Register Boundary (PotNR), which contains only those portions of the battlefield that have retained integrity.

Battlefield Survey

The goal of battlefield survey is to identify and document the historic and geographic extent of battlefields on modern maps, determine site integrity (as defined in National Register Bulletin 40: Guidelines for Identifying, Evaluating, and Registering America’s Historic Battlefields), provide an overview of surviving resources, and assess short and long term threats to integrity. Specific steps involved in this process include:

- research the battle event;
- develop a list of battlefield defining features;
- visit the battlefield;
- locate, document, and photograph features;
- map troop positions and features on a USGS topographic quadrangle;
- define battlefield boundary and core engagement areas for each battlefield;
- assess overall site integrity and threats;
- define a potential National Register boundary for the battlefield; and
- complete documentation.
The battlefield survey of the Battle of Pequot Swamp will focus on identifying the locations of battlefield(s), sites, actions and movements of combatants, and acquiring a representative sample of battle-related artifacts to reconstruct battle events as well as to determine site boundaries and assess site integrity. An important step in this process will be to analyze the defining features, battles, actions, and sites associated with the Pequot Swamp battlefield according to KOCOA standards and determine the effect these features had on the outcome of the Great Falls battle. The defining features from battles actions and sites will be categorized into critical, major, and minor defining features. The critical defining features will be mapped, using GPS and GIS technology, surveyed using geophysical equipment (e.g., metal detectors, Ground Penetrating Radar, Electrical Resistivity), and if non-metallic objects are anticipated select areas (particularly the site of the Sasqua Village) will be archeologically tested using 50cm x 50cm shovel test pits and 1m x 1m excavation units.

Fieldwork will consist of an initial walkover reconnaissance and visual inspection of the battlefield followed by archeological investigations in the form of metal detector surveys and archeological survey and excavation. Other remote sensing methods (e.g., Ground Penetrating Radar, Electrical Resistivity) may be conducted within the village area to better define features and disturbances. Metal detector surveys are necessary to associate the battlefield events to identifiable locations and to acquire physical evidence (i.e., musket balls, brass arrow points, military accoutrements, etc.) to document troop positions, actions and sites, define battlefield boundaries, refine Battlefield and Core Area Boundaries, and assess site integrity. A defining feature may be any feature mentioned in battle accounts that can be located on or in the ground, including both natural terrain features and man-made structures (e.g., domestic structures). The KOCOA system has been developed by military experts to analyze defining features, focusing primarily on key terrain but also with consideration for historic structures and sites that were significant to the battles. Key terrain, obstacles, cover and concealment, observation points and avenues of approach and retreat are the five categories into which a defining feature can be placed. One of these five criteria must be met in order for a feature to be classified as a “defining feature.”

Research & Field Methods

Prior to the initiation of fieldwork all primary historic records, secondary sources, diaries, previous research files, and tribal oral histories and traditions will be reviewed to re-familiarize
battlefield archeologists with the broader historical and contemporary cultural and historical context of the Great Falls battle, as well as to develop a more site specific context for the overall battle and discrete actions. Staff members of the MPMRC, the battlefield survey team including, archeology consultants and metal detectorists with extensive experience on 17th century battlefields, and students from the University of Connecticut Archeological Field School in Battlefield Archeology will comprise the personnel conducting the majority of the fieldwork at the Battle of Great Falls.

Site Identification & Documentation

The historical and archeological research program for the Battle of Pequot Swamp will focus on the Battlefield Boundary and the Pequot Swamp and Sasqua Village Core Areas. The battlefields Core Areas encompass distinct physiographic features (e.g., Mill Hill, Pequot Swamp and adjacent high ground, etc.), sites (Sasqua Village), and battlefield actions and movements. The survey of the battlefield will consist of four phases which will often happen simultaneously throughout the research and field program, as real time information from laboratory analysis is needed to continuously assess the nature and evolution of the battlefield to make appropriate field decisions.

Field Methodology

Fieldwork will be conducted in four phases adapted from and adjusted to suit the needs of the 17th century Pequot Swamp battlefield; 1) Orientation Phase, 2) Inventory Phase, 3) Recovery Phase, and 4) Laboratory and Evaluation Phase. These phases will be conducted concurrently and fieldwork will be guided by the work plan outlined below.

Orientation Phase

The Orientation Phase includes: making contact with landowners and acquiring permissions; conducting additional historical research (in particular deed research to reconstruct land use patterns), visual inspection of the Battlefield Boundary and Core Areas, establishing spatial references with GPS and total station, and conducting Viewshed analysis.

Spatial Reference – The first step in determining the precise geographic location of artifacts (provenience) and mapping cultural and terrain features will be to establish a permanent grid or referencing system over the Battlefield Boundary and Core Areas. A GIS data base will
be constructed to aid in the collection, maintenance, storage, analysis, and output of spatial data and information. In its earliest stages, the GIS database will consist of 2-ft. contour base maps of selected areas with terrain features, hydrology, and soils. Through the course of the field season the GIS database will expand to include property information (boundaries, ownership) stone walls and stone structures, modern features such as roads and disturbed areas, and all battle-related sites, artifacts, and features. To establish provenience throughout the project area a combination of methods will be utilized. The first step will be to develop a procedure so that all cultural materials and features identified within the Core Areas can be assigned a unique spatial reference. A conceptual 1-meter grid will be established over the 2-ft. contour base maps with the intent of eventually identifying portions of the grid in real space. A Global Positioning System (GPS) will aid in this process. A GPS is a series of orbiting satellites such that at any given time and place at least four are within range of any position on Earth’s surface. By determining the distance from the four satellites, the receiver can calculate its precise location in horizontal and vertical space in a process called trilateration. Current technology can potentially achieve (rarely realized however) up to 10-centimeter accuracy and sometimes even less. However, in reality there are many factors such as tree cover, aspect of availability, and position of satellites that sometimes caps accuracy minimally to a 2-5 meter range (and sometimes 10m if there is tree cover) depending on conditions and the time of day. This level of accuracy would not be acceptable to map concentrations of objects either from battle actions or those associated with domestic sites where accuracy within 50-cm must be achieved. In previous projects, experience has shown that GPS readings, even with 5-meter accuracy, is sufficient to map battle-related objects that are widely distributed over a relatively large area (acres) but is not sufficient to map and interpret actions and activities that occurred within one quarter acre or less. In these instances a total station will be used to physically establish a grid on the ground to ensure accuracy within 50-centimeters.

The first step in integrating a localized grid into the “conceptual” GPS grid will be to establish one or more permanent datum points in a fixed and permanent location such as the corner of a stone wall. Multiple GPS readings will be taken at the datum(s) over several days and at different times of the day. These points will then be plotted on a geo-referenced map which will exhibit a clustering of the GPS readings into a bulls-eye pattern. The center of this bulls-eye will be the datum point for that particular area. A grid will then be constructed in GIS across the
localized area by establishing parallel and perpendicular polyline transects at 1-meter intervals and coordinates will be assigned based on a Cartesian system (e.g., N150 E200). To make directional measurements easier, the grid will be oriented towards true north (14.6 degrees west of magnetic north in west-central Massachusetts). The result will be a physical grid established over any given survey area and provenience on any given artifact can then be determined to the nearest 50- centimeters or less.

The actual grid(s) will be established by setting plastic stakes on northing and easting transects at 10-meter intervals. The use of plastic (versus metallic) inhibits interference with metal detectors operating in close proximity. The grid will be established over any area where metal detecting or archeological fieldwork will take place. Each stake will be labeled by their Cartesian coordinates (e.g., N25 E100). Shovel Test Pits, trenches, and excavation units will be placed along established grid lines. Metal detector finds will also be provenienced using established grid lines.

**Viewshed Analysis** - Viewshed Models can be developed using elements of KOCOA and GIS. Identified cultural and terrain features can be geo-referenced and integrated into cumulative Viewshed Models. A Viewshed is a raster-based map of individual “cells” in which from each cell a straight line is interpolated between a source point and all other cells within an elevation model to find whether or not the cell exceeds the height of the three dimensional line at that point. Therefore, the result of each calculation is either positive or negative. If the result is positive (1) then there is a direct line of sight, if it is negative (0), there is no line of sight.53

The resultant Viewshed Models can illustrate locations that could be seen from various vantage points such as the elevations on Mill Hill as well as those from the perspective of the Sasqua (Figures 2 & 3). Viewshed Models provide insight into what locations the combatants could see from particular positions and potentially predict possible village and battlefield locations. The Viewshed Models are extremely useful for conceptualizing the battlefield landscape and identifying key terrain, avenues of approach and retreat, obstacles and areas of concealment and observation. This analysis will be performed on a number of prospective locations at Mill Hill and lower elevations adjacent to Pequot Swamp.

Figure 3. Viewshed from Sasqua Village Southwest Corner of Fairfield Swamp.

Inventory Phase

Walkover Reconnaissance — A walkover reconnaissance survey will be conducted throughout the battlefield landscape and Core Areas for which permission has been granted. It is anticipated that additional landowner permissions will be necessary through the duration of the project as the battlefield landscape continues to evolve. The purpose of the walkover in the battlefield Core Areas will be to assess the nature and integrity of the terrain, in addition to the identification of artifacts present on the surface.

Metal Detection — A metal detector is a remote sensing device designed to locate subsurface metallic items based on the differential electrical conductivity of metallic objects. All metal detectors include a handle, search coil, cable, and metal box that contains the battery, tuning apparatus, and in more recent detectors, a computer that provides the ability to program the detector for certain kinds of metals, digital readouts of metal type, and possible metal depth. All metal detectors work on the same general principle. An electromagnetic field produced from
the search coil, when held at ground surface, penetrates the earth in a cone shape emanating downward from the coil. Coils are available in a variety of sizes designed to provide preferences with regard to depth, discrimination, and precision in pinpointing object locations. Generally, larger coils are more effective for locating deeply buried objects; potentially an important factor in some areas of the battlefield with deep topsoils. It is anticipated that much of the battlefield terrain will be characterized by deeply plowed soils in the terrestrial portion of the battlefield and deeply buried objects below the swamp matrix and water in the Pequot Swamp. Larger coils are less effective in discriminating between metals (i.e., brass and lead from iron), a critical consideration where non-battle-related metallic artifacts often constitute 95% of the assemblages on any given landscape.

Different metal detector models and technologies (e.g., Whites vs. Mine Lab) also vary in their operating frequency and therefore their relative effectiveness in identifying certain kinds of metals under varying conditions. Therefore, some metal detectors are more effective in identifying ferrous objects and others brass, silver and copper and others lead, nickel and gold. Different metals produce different phase responses in metal detectors, allowing the instrument to effectively discriminate among different types of metals. One common manifestation of this response is the Visual Discrimination Indicator (VDI), which quantifies the phase response of each metal into a numerical category for the operator. The broadest VDI is the assignment of negative numbers for ferrous metals and positive numbers for non-ferrous metals. Generally, two different technologies characterize the various brands of metal detectors, Very Low Frequency (VLF) and Pulse Induction (PI) units. VLF units have superior discrimination capability, compared to PI units, which generally have better depth capabilities. Factors that affect the results of a metal detector survey are the experience of operators, soil and weather conditions, Electronic emissions, and the variable qualities of metal detecting equipment which all can affect the detectorists ability to discriminate between metals, detect at various depths and in different weather conditions. The variability in metal detectors should be considered an advantage in battlefield surveys and every effort will be made to utilize as many different brands and types of metal detectors as possible.

**Sampling Fraction and Transect Orientation** – The field methodology that will be utilized will consist of establishing a grid of 10m x 10m blocks across any given search area. Within these blocks, 1-meter wide transects oriented north-south and east-west will be marked
with flagging tape and multiple operators and different detectors will sweep within each orientation. Experience has shown that metal detector sweeps in different orientations (north-south, east-west) and by different detectorists employing different technologies are necessary to identify a representative sample of objects within a block. It is often the case that cuprous objects can be “hidden” behind ferrous objects and can only be located by detecting along different orientations. Identified metallic objects will be excavated and left in place and the location flagged.

**Recovery Phase**

The recovery phase will consist of two sequential steps, artifact recovery, and recording of identified artifacts. A recovery team will make tentative identifications of each object, bag the object, and record information on provenience (GPS or grid coordinates), object, operator, technology, etc. on a standard metal detective field form (Appendix III) and on a specially design application on an IPad. The degree of provenience recorded and the treatment of the object will be based on a three-tiered system. The third tier, consisting of modern objects such as aluminum foil, pop tabs, wire nails, etc.), will be provenienced to the nearest 5-meters, recorded on a field form, and placed in a discard bag for disposal. The second tier consists of generally all pre-modern artifacts (prior to the last 25 years) that are clearly not battle-related but can provide important information on land use (e.g., ox shoes, quarrying feathers and wedges, chain links for hauling logs and quarry blocks, and axes and wedges for logging). These objects will also be provenienced to the nearest 5-meters and recorded on a field form, and placed in plastic artifact bags and returned to the MPMRC for further analysis and inventory. Some of these objects will be radiographed after additional inspection and analysis to determine if they are battle-related artifacts.

The first tier of artifacts are identified in the field as possible or most likely battle-related artifacts (e.g., dropped or impacted musket balls, hand wrought horse shoes, and dropped or broken equipment such as horse tack, gun parts, brass arrow points). These objects will be recorded to the nearest 50-centimeters, placed in a plastic artifact bag, and returned to the MPMRC for further analysis and inventory.

Prior to the commencement of fieldwork, a strategy for data collection will be developed predicated on the need to inventory a large number of battle and non-battle related objects on a daily basis by multiple crews while ensuring consistency of data recording. A FileMaker Go
application was developed for IPads and employed in previous battlefield surveys. These applications provided a way to record data, interact with maps, take photos, and log GPS coordinates from a single, convenient interface. In addition to the IPad application, hard copy metal detection field will also be used to ensure reliability in data recording. The File Maker application has automated data entry, data validation, and the ability to centralize all records into a single location on a daily basis. While GPS data are generally only accurate to within a few meters on most devices, the use of GPS PRO antennas linked to each IPad achieved accuracy to within 50 centimeters 90% of the time. GPS points recorded on mobile devices were later rechecked with a Trimble RTX GPS device to ensure continued accuracy. This process provided enough precision to document the general locations and boundaries of archeological resources and connection to external, higher grade GNSS devices when necessary.

**Archeological Testing & Remote Sensing**

The archeological field studies will utilize two standard archeological techniques; 50cm x 50cm shovel test pits placed at 5-meter intervals and 1m x 1m excavation units. The purpose of archeological testing will be to recover non-metallic domestic artifacts associated with the Sasqua Village. Non-metallic objects in these contexts could include domestic objects such as flaked and ground stone tools, ceramics (Native and European), and animal and plant remains as well as battle-related artifacts such as gunflints.

Remote sensing potentially consisting of ground penetrating radar (GPR), electrical resistivity, and magnetometers which could be employed to investigate below ground features and anomalies associated with the battlefield and domestic sites and to assess the nature and extent of disturbance.
Laboratory and Evaluation Phase

Real-time laboratory analysis will be an important component of fieldwork, as the immediate (within two to three days) results of assessment and identification of recovered metallic (primarily ferrous) artifacts will be necessary to determine if they are battle-related – an assessment often difficult to make in the field. The rapid and correct identification of (most often ferrous and cuprous) battle-related artifacts is crucial to guide and direct ongoing field operations. Laboratory analysis of potential battle-related objects recovered from the field and returned to the MPMRC for assessment and analysis will involve three sequential steps: initial examination, radiography, and conservation to remove extraneous oxide. Initial artifact examination will consist of cleaning the artifact with a soft brush to examine it by eye, as well as examining the artifact with a low-powered binocular microscope.

In many instances, the nature and age of the artifact cannot be determined from just an initial examination. If further examination is required, the next step will be to take several radiographs (XRays) of the object with different exposures and orientations. The most important aspect of laboratory analysis and research of battle-related artifacts will be the ongoing assessment and analysis of primarily ferrous objects through X-Ray Analysis. Most recovered ferrous objects are highly degraded (although interestingly 17th century hand wrought iron much less so) and not easily unidentifiable. X-Ray Analysis will be performed as soon as possible so battlefield staff can quickly assess if the object is hand-wrought, and what the artifact might be.

Figure 4 – Example of utility of X-Ray technology. Features invisible to the naked eye become visible in a radiograph image.
In an X-Ray, hand-wrought objects exhibit a distinct “layering,” or strata, from being folded over so many times in the manufacturing process (Figure 4). If the artifact is hand wrought, standard conservation procedures will be employed to clean the artifact to better discern its function.

X-Ray Analysis can also capture many features on the artifact, such as drill holes and breaks otherwise undetectable thereby greatly facilitating the identification process. Hand-wrought artifacts are considered a potentially excellent indicator of a 17th century battle-related artifact (not withstanding 18th and early 19th century hand-wrought artifacts from other land use activities such as field clearing or farming). If the artifact is determined to be hand-wrought, additional X-Rays may be taken under different exposures to reveal any additional features (perforations, breaks, etc.) that would aid in identification. The final step in the identification (and conservation) process will be the removal of extraneous oxide using air abrasion. The extraneous oxide often concealed features that would aid in the identification of the artifact.

It is anticipated that a wide range of metallic objects will be recovered from the archeological survey within the battlefield landscape. These objects will include musket balls, horseshoes, tack, broken, lost, and discarded equipment, etc. A wide range of domestic metallic objects are expected associated with the Peskeompskut Village. It is also anticipated that the battlefield survey will recover a large number and variety of non-battle related objects such as. ox and horse shoes, chain links, wedges, quarry plugs, nails, etc. that will have to be identified and catalogued as well. Unfortunately these objects have to be recovered as any given area will have to be swept multiple times and objects left in the ground can complicate the identification of additional battle-related objects. All recovered objects will be identified and entered into a central database.

Recovered artifacts will be cleaned, identified, and catalogued, and the location of each item plotted on the GIS base maps. All artifacts will be assessed for conservation needs in the field and laboratory. Metallic battle-related objects of brass, iron, lead, and pewter will undergo a full conservation process and sealed in airtight containers with silica gel to ensure their long-term preservation. This work will be performed in the archeology and conservation labs of the MPMRC. All artifacts will be curated according to National Park Service standards in the MPMRC until the FMHC determine their final disposition.
Treatment of Human Remains

Should any human remains be unexpectedly encountered during any phase of the project, MHC state and federal policy will dictate their handling. If human remains or suspected human remains are encountered, all work will cease. The Connecticut State Historic Preservation Office requires that whoever encounter human remains should notify the state or local police and the regional medical examiner about the discovery and location. If the Medical Examiner determines the remains are more than 100 years old the State Archeologist will be notified. If the State Archeologist determines that the remains are Native American, the Connecticut Native American Advisory Group is notified.

NAGPRA and ARPA Procedures

The NPS ABPP requires that all consultants working on NPS ABPP funded battlefield projects adhere to the regulations and procedures outlined in the Archeological Resources Protection Act (ARPA; 1979) and the Native American Graves Protection and Repatriation Act (NAGPRA; 1990). These federal laws that seek to protect archeological resources and Native American burial sites on public or tribal land from disturbance or destruction.

Final Report

The final phase of the battlefield survey is to document the findings in a technical report complete with GIS mapping, object inventories and analyses, and battlefield reconstructions. A final report will be generated upon completion of all fieldwork, artifact analysis and geophysical analysis. The report will describe the project, site, historical significance, site integrity, and will address the research goals, questions and answers to those questions. The sections of the report will include (but are not limited to):

1) Title Page
2) Table of Contents
3) Introduction
   Including: site description, historical background, and a KOCOA description
4) Materials and Method
   Description of various geophysical, geographic, and archeological tools and methodology used in data collection, photography and mapping techniques, and artifact collection methods
5) Analysis
Description of analytic techniques employed in the archeology laboratory and the computer and technology assisted techniques used to process the GPS and geophysical data

6) Assessment
Combines data gathered in the field and in the laboratory to address the research questions and goals, and will consider future research. Assessment of integrity and significance with respect to the criteria for nomination to the National Register of Historic Places

7) Conclusion

8) References
Appendix I – Project Timeline 2017-2018

PROJECT SCHEDULE
Site Identification and Documentation Project
Battle of Pequot (Munnacommock) Swamp
Mashantucket Pequot Museum & Research Center

2018

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**Task 2:** Prepare and submit CT SHPO permit | | X | | | | | | | | | | |
**Task 3:** Conduct additional military and Colonial history research, | X | X | X | | | | | | | | | |
**Task 4:** a walkover survey of the battlefield | X | X | X | | | | | | | | | |
**Task 5:** Disseminate primary sources & revised battlefield timeline to Battlefield Advisory Board | | | | | | | | | | | | | X |
**Task 6:** Coordinate a public planning process, | | | | | | | | | | | | | X |
**Task 7:** Conduct metal detector surveys & other remote Sensing surveys as needed | X | X | X | X | X | X | X | X | X | | | |
**Task 8:** Conduct laboratory cataloging, analysis, & conservation | X | X | X | X | X | X | X | X | | | | |
**Task 9:** Prepare GIS map of project area using NPS battlefield survey data dictionary | | | | | | | | | | X | X | X |
**Task 10:** Submit Draft Technical Report | | | | | | | | | | | | | |
**Task 11:** Submit Revised Technical Report | | | | | | | | | | | | | |
**Task 12:** Submit final technical report | | | | | | | | | | | | | |

PROJECT SCHEDULE
Site Identification and Documentation Project  
Battle of Pequot (Munnacommock Swamp)  
Mashantucket Pequot Museum & Research Center  
2019

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Appendix II – Data Collection
Metal Detecting Field Form

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Additional Notes: