

THE REVOLUTIONARY WAR BATTLE OF CHELSEA CREEK – GROUNDING THE HISTORICAL NARRATIVE THROUGH CULTURAL LANDSCAPE ANALYSIS

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The Battle of Chelsea Creek (May 27–28, 1775) is often overlooked as part of the siege of Boston. Today, the area encompassing the battlefield is a heavily modified urban-industrial landscape, and the associated development activities have severely obscured the major landscape features and archeological resources associated with the battle. With funding from the National Park Service’s American Battlefield Protection Program, a geospatial and temporal assessment of the location, extent, and preservation potential of the Chelsea Creek battlefield and its associated cultural resources was undertaken. By re-examining the documentary record and using GIS analysis, a digital elevation model, and a military terrain model (KOCOA), this investigation created a high-resolution spatial and temporal dataset of Boston’s historical landscape during the time of the American Revolution. The visualization and geospatial analysis of landscapes and significant historical events greatly enhances the understanding of temporal and spatial interactions between these events and the physical landscape upon which they occurred.

La bataille de Chelsea Creek (27 au 28 mai 1775) est souvent ignorée comme faisant partie du siège de Boston. Aujourd’hui, la région englobant le champ de bataille est un paysage urbain et industriel fortement altéré, et les activités d’aménagement associées ont gravement occulté les principales caractéristiques du paysage et les ressources archéologiques associées à la bataille. Grâce au financement du Programme de protection des champs de bataille américains du service des parcs nationaux, une évaluation géospatiale et temporelle du lieu, de l’étendue et du potentiel de préservation du champ de bataille de Chelsea Creek, et de ses ressources culturelles connexes a été entreprise. En réexaminant le dossier documentaire et à l’aide d’une analyse SIG, d’un modèle numérique de terrain et d’un modèle de terrain militaire (KOCOA), cette recherche a créé un set de données spatiales et temporelles de haute résolution du paysage historique de Boston à l’époque de la Révolution américaine. La visualisation et l’analyse géospatiale des paysages et des événements historiques importants améliorent grandement la compréhension des interactions spatiales et temporelles entre ces événements et le paysage physique dans lequel ils se sont produits.

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INTRODUCTION

Overshadowed by and sandwiched between the Battle at Concord and Lexington and the Battle of Bunker Hill, April 19 and June 17, 1775, respectively, the Battle of Chelsea Creek (also referred to as the Battle of Hog or the Battle of Noddles Islands) is often overlooked as part of the siege of Boston. On May 27, 1775, Provincial militia (at the early stages of the war, American forces still considered themselves to be British subjects, so should be referred to as “Provincial”) were dispatched to the northern edge of Boston Harbor (present-day Chelsea, East Boston, Revere, and Winthrop) to capture, drive off, and/or destroy supplies, livestock, and other forage stockpiled by British forces on the nearby Boston Harbor islands. British marines and armed vessels from Admiral Samuel Grave’s fleet, later joined by troops under General Thomas Gage, attempted to stop them. The British forces were unsuccessful. A major result of the battle was the capture and destruction of the armed schooner HMS *Diana* as well as British casualties (estimates vary widely). Thus, it became the first naval engagement of the Revolutionary War and an American victory. The loss of HMS *Diana* directly influenced and limited the use of Admiral Grave’s fleet during the subsequent Battle of Bunker Hill. The loss of livestock and hay deprived the British garrison in Boston of much needed supplies of food and fodder.

RESEARCH GOALS

The goals of this study were to undertake a comprehensive examination of the battle records, define the battlefield, and interpret the battle through a military terrain model referred to as KOCOA. The KOCOA system was developed by military experts to analyze and categorize defining features. Critical defining features are those that were significant in determining the ultimate outcome of the battle. In this phase of research, we were able to (1) identify, inventory, map, and evaluate battlefield features; and (2) examine the defining features using the ABPP KOCOA standards (Lowe 2000). By documenting the battlefield features and related components, we can define the extent and potential boundaries of the battlefield, identify potential threats, and facilitate interpretation of the battlefield for the public.

STUDY LOCATION

The Chelsea Creek Battlefield is located in the present-day municipalities of Boston (section known as East Boston), Chelsea, Revere, and Winthrop, Suffolk County, Massachusetts. It includes sections of USGS Quad Sheets Boston North (1991), Boston South (1987), and Lynn (1999). The central and unifying geographic feature is Chelsea Creek (also referred to as Chelsea River), which flows into the Mystic River as it meets Boston’s Inner Harbor. Today, the predominant use of the land area is industrial and commercial, with abutting high-density residential housing (single and multi-family dwellings) and limited open space (including reclaimed brown fields). Chelsea Creek is the main waterway serving chiefly petroleum, parking facilities, and road salt depots along its shore. Portions of the study area are on original land, but segments have been filled from the eighteenth century through the present. Previous filling of tidelands and the activities of dredging and construction related to industrial/commercial development of the adjacent shoreline characterize the threats.

HISTORICAL BACKGROUND

The Battle of Chelsea Creek is the name given to the military actions that occurred along Chelsea Creek in the area of Boston’s Inner Harbor, May 27–28, 1775 (McKay 1925). This battle received very limited treatment in both primary and secondary literature. Throughout May 1775, the Massachusetts Committee of Safety passed a number of resolutions calling for the removal and/or destruction of all supplies on Noddles and Hog Islands. Finally, sometime on May 25 or 26, General Ward convened a council of war to carry out this directive. The battle began as a large-scale livestock raid by Provincial

militia on Hog and Noddles Islands (present-day East Boston and Orient Heights). It quickly developed into what, in military terms, is referred to as a “meeting engagement,” when British marines landed on Noddles Island and pursued the militia north toward Hog Island. The marines were supported by HMS *Diana*, which moved up Chelsea Creek to intercept Provincial militia (Mastone et al. 2011; Tentindo and Jones 1978). The forward movement by British marines was stopped between the islands at Crooked Creek. With favorable winds and an incoming lunar tide, HMS *Diana*, with ten to twelve longboats in tow, continued up Chelsea Creek in pursuit of Provincial forces. Late in the evening, HMS *Diana* went aground at the head of the creek (present-day Revere) and came under heavy Provincial musket and cannon fire just as the tide started to fall and the winds died. The longboats were now used to tow HMS *Diana* downstream. Provincial militia continued to pursue HMS *Diana* downstream. This action culminated in a vicious encounter at Winnisimmet Ferry Ways (present-day Chelsea), where the HMS *Diana* was again attacked by hundreds of Provincial troops and artillery. The attack resulted in the grounding and abandonment of the HMS *Diana*, where she was subsequently looted and burned by Provincials forces. Even with loss of the armed schooner HMS *Diana*, there was sporadic fighting between Provincial and British forces through June 10 as raids on supplies continued (Brown et al. 2013). While specific events of the battle are presented below, a detailed discussion of the entire battle and the historic documents can be found in Brown et al. (2013) and Mastone et al. (2011).

An understanding of the events surrounding this battle is important within the larger context of the entire war. The Battle of Chelsea Creek is significant for the manifestation of a number of “firsts” in the American War of Independence (Bossom 1900; Brown et al. 2013; Mastone et al. 2011; Tentindo and Jones 1978):

1. The first planned offensive operation by Provisional forces that resulted in an engagement between opposing forces.
2. The first instance of military cooperation among the colonies; it was the first action undertaken by the Army of the United Colonies with raid’s commander from Connecticut and the militia from Massachusetts and New Hampshire.
3. The first use of artillery by the Provincials in the war.
4. The first naval engagement of the war.
5. The first American battle victory of the war due to the raid accomplishing its goal and the resulting capture of a British ship of war.

The Battle of Chelsea Creek should not be viewed only as a singular event, but as an integral component of the Siege of Boston. The siege is defined by three overlapping phases. The first phase was largely organizational, beginning with General Artemas Ward taking command of the provincial forces following Lexington and Concord, and ending with appointment of George Washington as Commander in Chief and the creation of the Continental Army in Cambridge on July 2, 1775 (Griffith 2002[1976]; Lancaster 1971). The second phase began when both armies realized that vital stores of livestock, fuel, and hay needed for the survival of the British garrison trapped in Boston lay unsecured on the islands ringing Boston Harbor (Frothingham 1849). The final phase was the actual military envelopment of the city of Boston marked by the Battle of Bunker Hill on June 17, 1775, the American occupation of Dorchester Heights, and finally the evacuation of Boston by the British on March 17, 1776 (French 1911; Frothingham 1849; Ketchum 1974).

RECONSTRUCTING THE 1775 LANDSCAPE

Recreating landscape features of this relatively little known event that took place over 225 years ago and, then, integrating them with historical source documents was only possible through the utilization of geographic information technologies. A high resolution GIS dataset and Citation Data Model (CDM) of the temporal and spatial features associated with the Battle of Chelsea Creek and the 1775 Boston

landscape map were developed. Base-level and battlefield maps were produced within the GIS through the integration of multiple data sources including, primary and secondary historical accounts, maps, high-resolution orthophotographs, and light detection and ranging (LIDAR) data (Maio et al. 2012; Mastone et al. 2011).

The Citation Data Model (CDM) provided the framework to organize and integrate historical records and geospatial data within a GIS. A CDM is a methodology that organizes and relates the historical sources to the points, lines, and polygons that make up vector GIS data (Frye 2008). The detailed CDM contains a variety of primary and secondary historical and cartographic sources. ESRI's online Mapping Center (Frye 2010) provided the template for the CDM. Each feature created on the map is linked to the source from which it was derived, and each source is assigned a unique identifier (Frye 2008). Physical landscape features, such as the shoreline and saltmarshes, are related to the historical map from which their spatial attributes were defined. The CDM also provides accountability in mapping (Maio et al. 2012).

Creating the 1775 landscape base map was a critical component to our analysis. It serves as the foundation for the entire dataset and is crucial for the accuracy of the military terrain analysis and the mapping of defining features and potential archaeological resources. To achieve the desired accuracy, the 1817 and 1847 Coast Survey maps were used as the reference layer for all major landscape and topographic features. The most landward shoreline shown on 1847 Coast Survey maps is associated with the High Water Line (HWL) and was digitized to represent the 1775 shoreline within the GIS (BSC 2007; Mague 2008). In areas where the 1847 shoreline was not representative of the 1775 shoreline, the 1817 Coast Survey maps were used as the secondary source. The resulting shoreline served as a guide for georeferencing nonregistered historical maps. It was also the starting point for the digitization of spatial data shown on the Coast Survey maps representing aspects of the physical landscape (i.e., upland, rivers, and saltmarshes). The historic map from which each feature was digitized was cited within the CDM. In some cases, nonregistered historical maps were used to identify places.

While the physical landscape changed very little between 1775 and the Coast Survey of 1847, there was extensive development with respect to buildings, roads, and wharfs. As a major hub of colonial American commerce, Boston's coastal landscape had already undergone over 100 years of extensive modifications in the form of tideland filling, wharfs, and roads. Roads and other anthropogenic landscape features from the 1847 maps were digitized when they could be identified on the earlier nonregistered maps. Some features (wharfs, roads, buildings) shown on the base map likely post-date 1775 (Maio et al. 2012).

A digital elevation model (DEM) representing the 1775 topography was essential to carry out viewshed analysis and accurately depict contours on the base map. The DEM was produced through the integration of high-resolution light detection and ranging (LIDAR) data for the uplands and constant value raster grids representing the intertidal and marine areas. The use of modern data to depict the 1775 upland topography was appropriate given these areas have not been modified to a degree, which would affect our ability to accurately produce contours and carry out viewshed analysis. The existing "Upland" polygon feature class, digitized from the Coast Survey maps, was used to clip the 2002 LIDAR data (MassGIS 2003). The clipped LIDAR derived DEM covered only upland areas of the study site (Maio et al. 2012).

Extensive tidelands filling did not allow for the use of the LIDAR data in these areas. A single value DEM to represent the saltmarshes was therefore created with an elevation of 1.71 meters above sea level, obtained from the averaged elevation values from the LIDAR DEM in the area of the Belle Isle Saltmarsh Reserve (a protected relatively unmodified conservation area). This provides a proxy elevation for historical saltmarshes within the study area. Factoring in sea-level rise (approximately 0.63 meters), the resulting adjusted historical saltmarsh elevation value is 1.08 meters relative to the LIDAR dataset. Similar methods were used to create a raster layer for the local marine areas, setting its value to zero. The three separate DEMs (Upland, Saltmarshes, and Waterbodies) were then mosaicked together to represent the area's historical terrain. The DEM was used to create three meter contours and carry out viewshed analysis.

In addition, time series maps were produced to enhance the ability to understand and convey battlefield events. Each map portrays a temporal phase of the battle derived from the timeline of battle events. These series of events were divided into eight phases based on their spatial and temporal relationship and portrayed on an individual map. Individual features were created to display a time series of events occurring during each phase. This data was then overlaid on the historical base map (Mastone et al. 2011).

The results of the geospatial assessment of the area provided the requisite baseline to successfully carryout a military terrain analysis and guide interpretation (Figure 1). This information will aid in the assessment of present and future threats posed by further landscape modifications. For a more detailed discussion of the landscape reconstruction methodology, see Maio et al. (2012) and Mastone et al. (2011).

GROUNDING THE NARRATIVE

The primary accounts of this battle were often from nonlocals not familiar with the local landscape and place names. As a result, the location information from these accounts was often vague with features unnamed making it difficult to identify them on a map. The KOCO approach provided the means to reliably locate events on the battlefield.

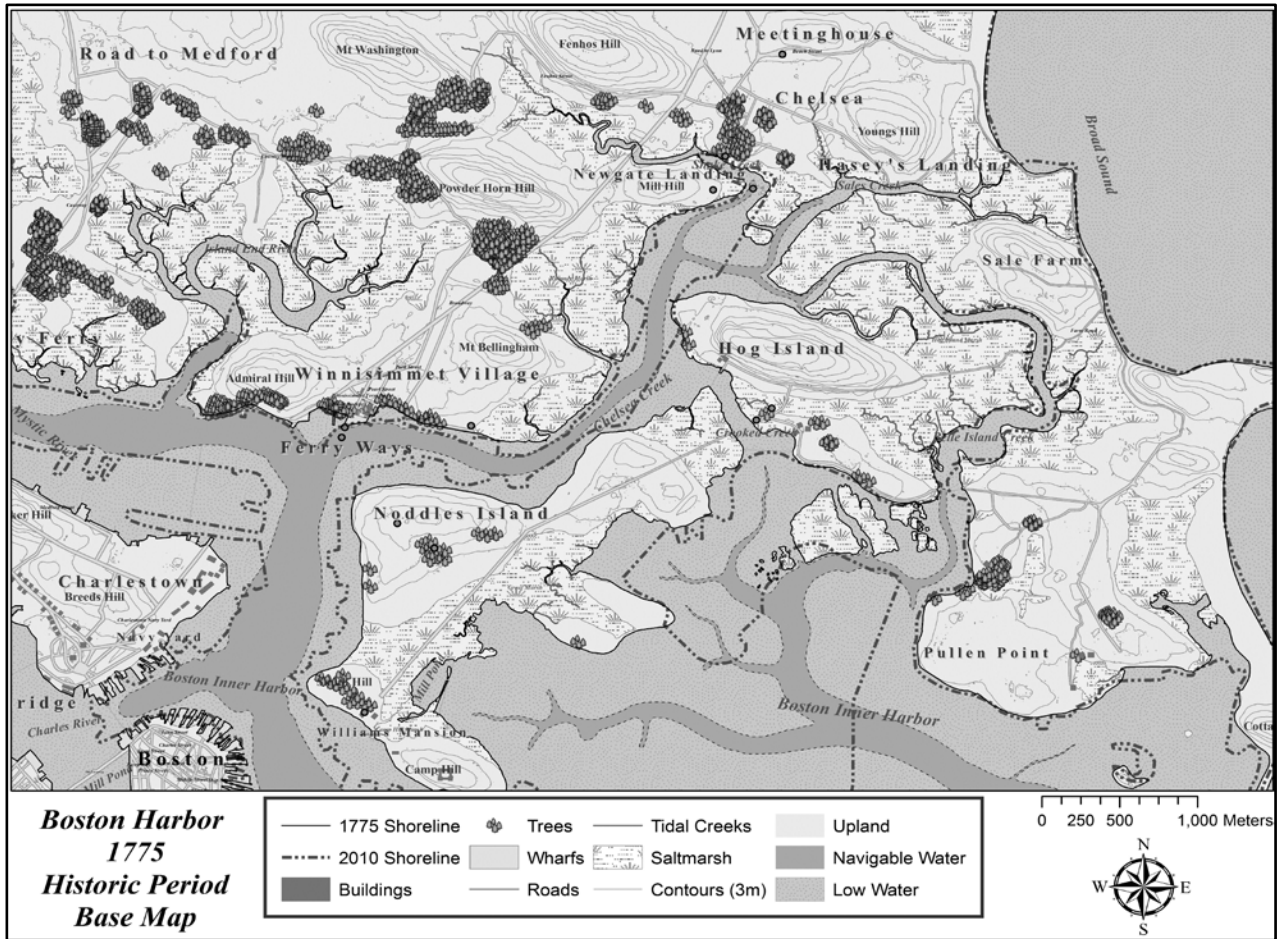


Figure 1. Boston Harbor 1775 Base Map.

The National Park Service (NPS) utilizes a standard method of military terrain analysis, called the KOCO A approach, to define the limits of historical battlefields. The KOCO A approach correlates significant terrain features recorded in historical accounts with terrain features that can be identified on the modern landscape in order to establish the boundaries of the battlefield. Significant terrain features may be natural or cultural in origin. These terrain features are organized and cataloged under the appropriate KOCO A components. KOCO A is an acronym that stands for **K**ey or Decisive Terrain; **O**bservation and Fields of Fire; **C**over and Concealment; **O**bstacles; **A**venues of Advance and Withdrawal (see Table 1). To facilitate interpretation of the Battle of Chelsea Creek, the map depictions in the utilized the reconstructed 1775 historic landscape for each of the various KOCO A components. Unfortunately, the level and detail of historical accounts does not allow us to further identify specific units (e.g., Massachusetts or New Hampshire militias).

Key Terrain

The broken topography of the Chelsea Creek Battlefield accentuated the importance of the high ground. Mill Hill and Noddle's Island Hill (West Head) were key terrain features that provided observation points with exceptional lines of sight over much of the battlefield. Firing positions at these elevations commanded important sections of the navigable channel of Chelsea Creek. These elevations also sat astride important roads that the contending forces used to approach and withdraw from the battlefield. Forces moving along these roads were able to use these heights to conceal their movements and provide cover during the battle. While a majority of the terrestrial landscape provided advantage to Provincial forces, the navigable water sheet of Boston Harbor, principally Chelsea Creek, must be viewed as key terrain for British forces. It provided a tactical advantage as both the principle means of conveyance for British forces and the firing platform for any British vessels. A review of the documentary record identified a number of general land features and a few specific locations by name associated with the battlefield.

Table 1. KOCO A Terrain Analysis Definitions (U.S. Army 1990, 1994, 2003)

KOCO A Component	Definition	Example
Key or Decisive Terrain	Any locality or area, the seizure of which conveys a military advantage to a combatant.	High ground, open fields.
Observation and Fields of Fire	The ability to see over a particular area and acquire targets.	High ground, open fields.
Cover and Concealment	Cover is protection from the effects of fire. Concealment is protection from observation.	High ground, buildings, vegetation, fortifications, ditches, ravines, gullies, embankments.
Obstacles	An obstacle is any natural or artificial obstruction that disrupts movement.	Bodies of water, marshes, ditches, ravines, walls, dense vegetation.
Avenues of Advance/ Withdrawal	The route a force can use to reach its objective or withdraw from an area.	Roads, railroads, paths, dry creek beds.

Winnisimmet Village/Winnisimmet Ferry: In 1631, the General Court of Massachusetts granted the right to operate a ferry between Winnisimmet (present-day Chelsea) and Boston to Thomas Williams. Williams located his ferry landing near the base of Admiral's Hill at the foot of Broadway. After his death, operation of the ferry passed to Samuel Maverick. In 1634, Richard Bellingham (future Governor) purchased land at Winnisimmet and the rights to the associated ferry. Bellingham moved the ferry landing east to the foot of Winnisimmet Street near the present Fitzgerald Shipyard in Chelsea (Chamberlain, 1908). While there were several landings and slipways along the Chelsea waterfront, Winnisimmet Ferry continued to occupy this location until its closure in the early twentieth century and the decisive engagement of the battle took place here.

Winnisimmet Village and Ferry became a strategic location with the closure of the Port of Boston. In April 1775, Vice Admiral Samuel Graves records, "I have also hired a small Sloop of 25 Tons which I have placed between Noddles Island and the Main near Winnisimmet Ferry; through this passage I find much Smuggling has been carried as it is extremely convenient and near to the two Towns" (Clark 1964:59–60). This sloop is likely the HMS *Britannia* that was engaged at Winnisimmet Ferry coming to the aid of the HMS *Diana* during the battle.

Winnisimmet Village and Ferry was particularly key terrain for Provincial forces. The decisive engagement of the two-day battle was fought here, culminating in the grounding and burning of the HMS *Diana* (ADM 1/5307; Anon 1775a; Anon 1775b; Barker 1774–1776; Graves 1775b). John Dawson, sailing master of the *Diana*, testified that "the Tide notwithstanding set us on the ferry ways at Winnisimmet -The Rebels all this time keeping a very hot fire upon us from the Houses behind Walls and other Covers" (ADM 1/5307). Farnsworth (1775–1779:80–81) recorded in his journal: "At night March^d, to Winnisimit ferry whare thare was A Schooner and Sloop Afiring with grate fury on us thare But thanks be unto god that gave vs the Victry at this time for throu his Providence the Schooner that Pla^d upon us the day before run Aground and we Sot fiar to hur And Consumed hurt hare And the Sloop receved much damage."

Mount Bellingham: Mount Bellingham is a drumlin feature roughly encompassed within the triangle created by Broadway, Central Avenue, and Eastern Avenue in Chelsea. This hillock was included in Bellingham's 1634 purchase of land at Winnisimmet (Chamberlain et al. 1908). The role of this key terrain feature during the battle is unclear. If utilized by the Provincials, Mount Bellingham would have provided an excellent line of sight to observe the British position on Noddles Island Hill (see observation below). Roads from Medford and Winnisimmet Ferry converge near Mount Bellingham's base allowing for the possibility that this is the knoll referred to in the account of James Stevens (below).

Mill Hill: Mill Hill is a useful example for the role of key terrain features in the Battle of Chelsea Creek. It is a small drumlin feature lying easterly of Broadway in Chelsea and adjacent to the Slade Tide Mill in Revere, across Snake Creek from the rise of ground identified as "Chelsea Neck" by McKay (below). This key terrain feature provided the Provincial militia with a firing position that enabled them to catch the *Diana* in a crossfire with elements positioned on Chelsea Neck. Stevens related that his party arrived:

Within a quarter of a mile of the fery & then halted & our ofisers went to louk out to place the canon they went round by the water while they come in sight of the sconer when as son as the regerlers saw our men they fired on them then the firing Begun on boath sides & fired very worm there come a man & ordered us over a nol rit into the mouths of the canon we got on the top of the nol & the grap shot & canon bauls com so thik that we retreated back to the rode & then marcht down to the fery [Stevens 1775–1776:45–46].

While primary source material relative to the battle is sparse and few locations are expressly named, Mill Hill is a better fit than Mount Bellingham for the knoll described by Stevens and is likely the first position occupied by Putnam on his arrival in Chelsea (Stevens 1775–1776).

Chelsea Neck: McKay (1925:13) relates that the “high ground, easterly of Powderhorn Hill and lying in Revere, north of Snake Creek, thence around into Winthrop was in the early days called Chelsea Neck, since the lay of swamps and creeks converted it into the semblance of a strip of land.” It was on this key terrain feature that Stark and Nixon deployed their men in line of battle as described above (Anon 1775b). Chelsea Neck likely included the Newgate/Yeaman House where battle eyewitness Elizabeth Hasey reported seeing a Provincial cannon position (Chamberlain 1908). Chelsea Neck together with the Slade Tide Mill and Mill Hill formed a dangerous cul-de-sac that exposed the *Diana* to Provincial fire from three directions and threatened to trap her in upper Chelsea Creek.

Hog Island (Orient Heights): Hog Island occupied a strategic position between Noddles Island and the Chelsea Mainland. The dominate terrain feature characterizing Hog Island was a 152-foot drumlin (Orient Heights) that provides a nearly 360° view of the battlefield. In 1775, the island was owned by Oliver Wendell, a resident of Kingston, and Jonathan Jakson of Newburyport, who were content to leave the running of the farm to manager William Harris (Anon 1775b). A letter from H. Prentiss to Oliver Wendell dated May 12, 1775, bears testimony to the position in which Harris found himself on Hog Island. Prentiss related that “Mr. Harris is very uneasy, the people from the Men of War frequently go to the Island to Buy fresh Provision, his own safety obliges him to sell to them, on the other Hand the Committee of Safety have thretned if he sells anything to the Army or Navy, that they will take all the Cattle from the Island, & our folks tell him they shall handle him very rufly” (Prentiss 1775). At 11:00 a.m. on the morning of May 27, Stark and Nixon crossed Belle Island Creek from the Sales Farm and began liberating the livestock on Hog Island (Anon 1775b; De Guines 1775). Estimates list 300 to 400 sheep, together with horses and cows, were taken from the Island. During mid-afternoon, a detachment of 30 men, including Corporal Amos Farnsworth, crossed to Noddles Island. Their actions came to the attention of British Captain John Robinson aboard the HMS *Preston* touching off the Battle of Chelsea Creek (Robinson 1775a). Control of Hog Island allowed Provincial forces to maintain communications with the Chelsea Mainland during early phases of the battle.

Hog Island Marsh: In 1775, Hog Island Marsh was a 50-acre area tideland separating Hog Island and Noddles Islands. Crooked Creek (also called Crooked Lane) was a tributary of Chelsea Creek that bisected this marsh. A rudimentary road crossed this marsh linking Hog Island and Noddles Island to the Chelsea Mainland. Crooked Creek could only be forded at low tide, making Hog Island Marsh a key terrain feature during the battle. Provincial control of Hog Island Marsh allowed for easy communication between the main body of militia on Hog Island with the 30 man detachment that included Amos Farnsworth on Noddles Island. A sharp engagement (see below) took place here as British Marines advanced upon the Farnsworth detachment (McKay 1925; Sumner 1858; Tentindo and Jones 1978). Today, the boundaries of Hog Island Marsh can be delineated as an area of low-lying filled tide lands lying southeast of the rise of Orient Heights (Hog Island) in East Boston.

Noddles Island Hill/West Head: The place name “Noddles Island Hill” appears in accounts of the battle as the location of the British artillery position. In “A Circumstantial Account Of The Late Battle At Chelsea, Hog Island, &c,” the author records that during the burning of the *Diana* “a heavy cannonading was begun, at Noddles Island hill, with the 12 pounders upon the provincials” (Anon 1775b). William H. Sumner (1858) identifies West Head as that hill. Possession of this key elevation conveyed two distinct advantages to the British. First, it provided an excellent view over much of the Chelsea shoreline and Chelsea Creek. Second, the British artillery position here commanded both a key segment of Chelsea Creek and Winnisimmet Ferry (see Observation and Fields of Fire below). This artillery position could provide cover to British vessels as they ceased operations and withdrew from Chelsea Creek.

Noddles Island/Smith Hill: The Smith Hill place name does not appear in any account of the battle. However, this was a key terrain feature for the British as the location of the British naval storehouses, wharf, and mansion house occupied by Henry Howell Williams (Sumner 1858; Tentindo and Jones 1978). Graves’s desire to protect the vital stores housed on Smith Hill prompted him to act once the Provincial threat was known. Smith Hill was an important British staging area throughout the battle. There is evidence that the *Britannia* tied up to the wharf with many casualties after being badly damaged during the

battle (Clark 1964:606–607). Smith Hill became the Provincial objective during subsequent actions on Noddles Island from May 29 to June 10. Williams’s mansion and naval cooperage was burned on May 29–30 (Noddles Island Papers 1775–1814; see Massachusetts Historical Society, 1909–1910). The naval storehouse was burned on June 10 (Tentindo and Jones 1978).

Chelsea Creek (Chelsea River) Navigable Water: Chelsea Creek (Chelsea River) extends roughly two miles from its mouth near the Meridian Street Bridge east and north to Mill Hill, where it becomes Snake Creek. This waterway served as an avenue of approach and withdrawal for the Royal Navy. Any vessels traversing the waterway could act as movable firing positions throughout the battle. Lack of Provincial control of this key terrain feature necessitated their long circuitous line of march in approaching and withdrawing from the battlefield. Conversely, British control of this feature dictated the course of British actions. Admiral Graves’s orders for HMS *Diana* were for that vessel to pursue and cut-off Provincial forces as they withdrew up Noddles Island to Hog Island and back to the mainland (Graves 1775b). Thus, the navigable channel of Chelsea Creek is included as a key terrain feature for the British.

Observation and Fields of Fire

This component is characterized by the ability of the combatants to see over a particular area and acquire targets of the opposing force (Figure 2).

Observation

Key terrain features provide a point of observation. These locations are not simply high ground or unobstructed views. Rather, they are places from which critical observation took place and are recorded. These points of observation can best be explained by referencing the maps that follow (Figure 2). The view sheds or lines of sight from each point are illustrated, and shaded areas denote what was visible to a person standing at that observation point.

British naval vessels are included here as individual movable observation points. Captain John Robinson of the HMS *Preston* was the first to record seeing Provincials at approximately 2 o’clock in the afternoon “on Noddles Island destroying some hay” (Robinson 1775a). From the position of the HMS *Preston*, Captain Robinson observed Provincial activity on West Head.

Mount Bellingham: The exact role Mount Bellingham (described above) played in the battle is unclear. If utilized by the Provincials, Mount Bellingham would have provided an excellent line of sight to observe the British position on Noddles Island Hill (see Observation below). Roads from Medford and Winnisimmet Ferry converge near Mount Bellingham’s base, suggesting the possibility this may be the knoll referred to in the account of James Stevens (above).

Mill Hill: Mill Hill is a small drumlin feature lying easterly of Broadway in Chelsea and adjacent to the Slade Tide Mill in Revere. Mill Hill juts out into Chelsea Creek, providing good lines of sight over upper Chelsea Creek. This position enabled Provincial troops to see up Sale Creek, Belle Island Creek, and down Chelsea Creek as far as Hog Island. This feature is most likely the knoll referred to in the account of James Stevens (above) (Figure 2).

Noddles Island Hill (West Head): Noddles Island Hill/West Head provided an excellent view over much of the Chelsea shoreline and Chelsea Creek. British marines positioned here could see northeast up Chelsea Creek as far as its bend at Mill Hill. During daylight, this viewshed allowed the British to observe Provincial movements along the key Provincial position at Winnisimmet. During the night of May 27–28, the British used West Head to observe the progress of the *Diana* as she attempted to extricate herself from upper Chelsea Creek. The British placed an artillery battery at this position in an attempt to cover the *Diana*’s withdrawal (see below).

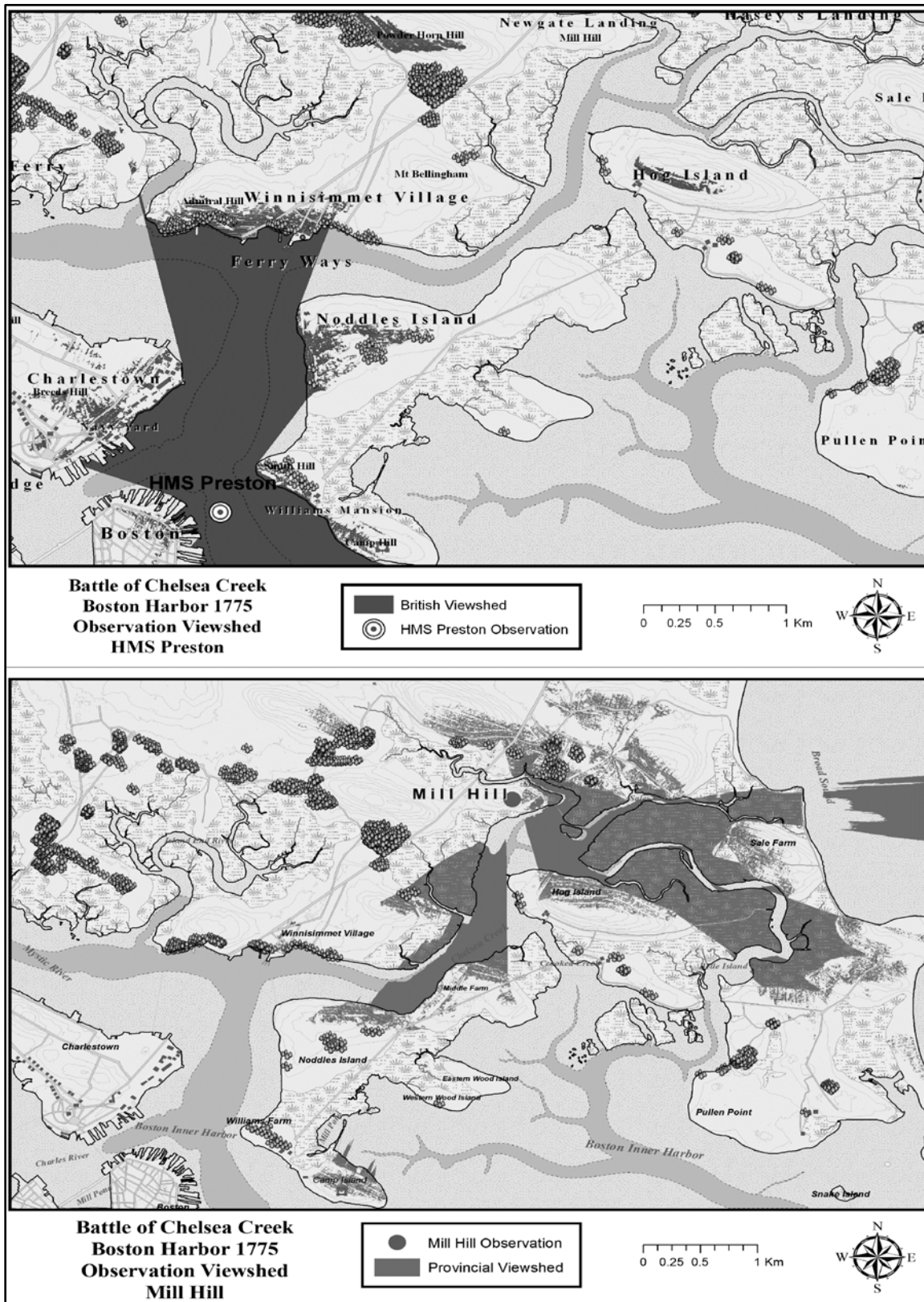


Figure 2. KOCOAs observation viewshed.

Hog Island Summit: The entire battlefield is observable from the summit of Hog Island (today, Orient Heights section of Boston). While there is no record of Provincial forces occupying this location, it offers a commanding view of the entire battlefield. These vistas enhanced our understanding of KOCOAs-derived features and aided in our understanding of battlefield events. Certain defining features now obstructed by filling and development activities still had a visible signature on the landscape. For example, the now-filled course of Crooked Creek was clearly discernible as low topography clearly coinciding with its predicted location.

Fields of Fire

The approximate firing positions for Provincial and British forces are depicted on Figure 3. Small arms fire was depicted with a maximum effective range of 100 meters. The range of cannon fire is quite variable given the diversity of cannon ratings and gun crew skills. The effective range was averaged to be depicted as 1,000 yards. The prevailing direction of fire is depicted in direction of opposing forces.

Fields of fire include, but are not limited to, key terrain and observation points. Provincial artillery positions at the Newgate/Yeaman House and at Winnisimmet Ferry were located to command the main channel of Chelsea Creek. These locations are mentioned in both Provincial and British accounts (ADM 1/5307; Stevens 1775–1776). The British artillery position is mentioned in several accounts as being on West Head (Anon 1775a; Anon 1775b; Graves 1775a; Sumner 1858); it was hoped that artillery position would provide cover to British vessels as they ceased operations and attempted to withdraw from Chelsea

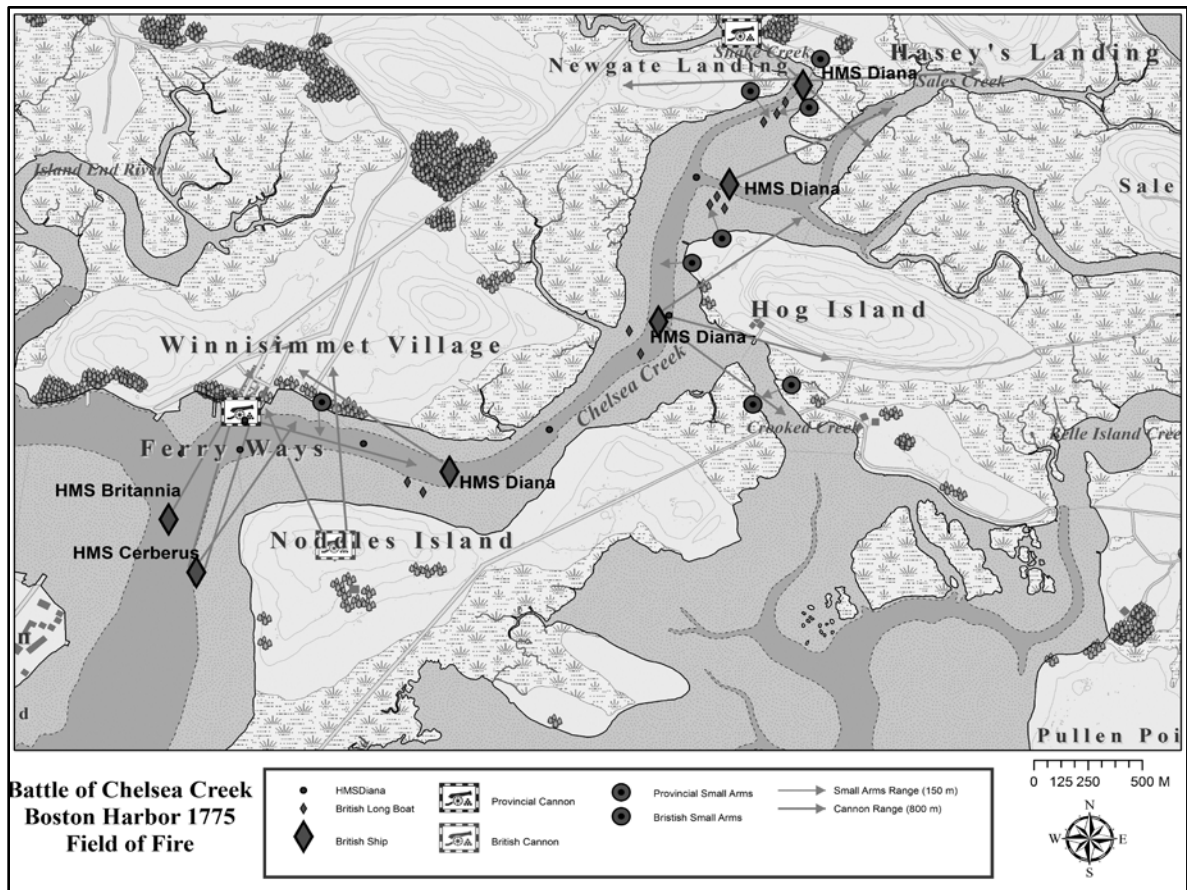


Figure 3. KOCOAs fields of fire.

Creek. Provincial small arms fire came from several positions. The crew of the HMS *Diana* reported coming under musket fire from “the Houses behind Walls and other Covers” as they made their way past Winnisimmet Village (ADM 1/5307). They also reported taking small arms fire from Noddle’s Island, Hog Island, and the Main (ADM 1/5307). British naval vessels could act as movable firing positions throughout the battle with their fields of fire dictated by their location. Farnsworth wrote of the skirmish: “I with five men got of the horse And Before we got from Noddels island to hog island we was fir^d upon by a Privatear Schooner (Farnsworth 1775–1779:81).” Fields of fire and predominant direction of fire are delineated (Figure 3).

Cover and Concealment

Cover is protection from the effects of fire. Concealment is protection from observation. Provincial forces used key terrain features and Winnisimmet Village as cover (ADM 1/5307; Stevens 1775–1776). They also used the marshes along Chelsea Creek as cover. The small inlets and ditches made by feeder streams provided ready-made trenches that the Provincials used as cover. The engagement between Corporal Amos Farnsworth’s detachment and Royal Marines at Crooked Creek (Hog Island Marsh) illustrates the use of these trenches. Farnsworth wrote, “We Crost the river and about fifteen of us Squated Down in a Ditch on the mash and Stood our ground. And thare Came A Company of Regulars on the marsh on the other side of the river And the Schooner: And we had A hot fiar until the Regulars retreated. But notwithstanding the Bulets flue very thitch yet thare was not a Man of us kil^d (Farnsworth 1775–1779:81).”

By contract, British forces did not have the same terrain features available to them or failed to take advantage of them. British military doctrine required the use of linear formations with firing by platoon to make best use of their shoulder arms (Nardo 2003). There is no evidence that they acted contrary to this doctrine at Crooked Creek. The sailors in the vessels making their way up Chelsea Creek were equally exposed. HMS *Diana*’s crew was fairly well protected from Provincial small arms fire. It was not until the *Diana* grounded and the Provincial artillery could make their position that it became untenable. However, the sailors in the longboats trailing *Diana* were not well protected. At least two seamen from the HMS *Somerset* were killed as they tried to tow the *Diana* out of the upper reaches of Chelsea Creek (LeCras 1775).

The same terrain features that offered cover to Provincial forces served to conceal their movements from British observers. The few roads in the area tended to wind their way around the base of high terrain. Elevations like Mount Bellingham, Mill Hill, and Hog Island (Orient Heights) lay between the roads and British observation points. Provincial forces moving along these roads at night were invisible to British ships in the harbor. It was not until 2:00 p.m. on May 27 when Provincial troops set fire to hay and houses on Noddle’s Island, that the British became aware of what was happening (Robinson 1775a).

Obstacles

An obstacle is any natural or artificial obstruction that disrupts movement.

Chelsea Creek: Chelsea Creek and its tributaries comprise the major obstacles confronting Provincial forces. British naval vessels controlled Boston Harbor, making it impossible for the Provincials to utilize any vessels. For example, Graves purchased the 25-ton sloop HMS *Britannia* and strategically positioned it in the mouth of Chelsea Creek for the express purpose of interdicting vessel traffic in and out of the creek (Clark 1964:59–60). British control of the waterways necessitated the long circuitous avenue of approach used by Provincial forces across the tributaries of Sale, Belle Island, and Crooked Creeks. Negotiation of these tributaries required close coordination with low tide (Bossom 1900; McKay 1925; Sumner 1858; Tentindo and Jones 1978). The British were not so limited, as Lieutenant Graves was simply ordered to “sail as high as possible to prevent [the Provincials] Escape” (Graves 1775a).

While water bodies provided a clear natural obstacle to Provincial forces, the effects of a falling tide created tidal flats. Exposed tidal flats may have facilitated the movement of individuals by providing additional crossing points and uncovering marsh land that could provide cover and concealment. However, soldiers herding captured livestock would have experienced trouble negotiating the soft muddy terrain with animals in tow.

Belle Island Creek: Belle Island (Isle) Creek was a meandering tributary of Chelsea Creek that separated Hog Island (Orient Heights) from the Chelsea Mainland. The extensive bordering marsh was used as pasture and for harvesting salt hay since the 1600s. The creek itself was easily fordable at low tide at crossing places below the Sale Farm and above Pullen Point. Between 10:00 a.m. and 11:00 a.m. on May 27, 1775, Colonels Stark and Nixon, with their men, made the crossing from Sale Farm while the tide was still high (Anon 1775b; De Guines 1775; Ehret 2011). Captured livestock, the raid's objective, could only cross at low water. This necessitated an earlier crossing and careful coordination with the low tide to remove the captured animals.

Crooked Creek/Hog Island Marsh: Crooked Creek, a tributary of Chelsea Creek, separated Hog Island (Orient Heights) from Noddles Island (East Boston). It was wider and deeper than Belle Island Creek and together with the bordering Hog Island Marsh presented formidable obstacle to Provincial movement. A rudimentary road connecting Noddles Island with Hog Island did provide a ford only traversable at low tide. A 30-man detachment of Provincial militia, which included Corporal Amos Farnsworth, crossed from Hog Island to Noddles Island during mid-afternoon on May 27, correlating well with the estimated low tide at 3:37 p.m. (Farnsworth 1775–1779). This detachment had to conform their movements with low tide or risk being stranded on Noddles Island. As this detachment negotiated Hog Island Marsh on their return from Noddles Island, they came under fire first from the HMS *Diana* and then from the Royal Marines sent in pursuit. Once across Crooked Creek, Farnsworth, with 14 men, formed a rear guard using a ditch as a natural fortification. The short, sharp engagement that followed resulted in at least two British casualties (Farnsworth 1775–1779).

Avenues of Advance and Withdrawal

The route a force can use to reach its objective or withdraw from an area can have a major impact on the course of action and the capabilities of the opposing forces. Topographic and cyclical environmental conditions (e.g., tides; Table 2) proved to be factors directly affecting the movement of Provincial and British forces. The respective avenues of advance and withdrawal are indicated on the map in Figure 4.

Provincial Advance: The Provincial advance to Noddle's Island and Hog's Island basically conformed to the long established Old County Road or Road to Salem. Some Provincial forces may have taken a

Table 2. May 1775 Tide Predictions (High and Low Waters), Boston, Massachusetts, Datum MLLW, Standard Time (NOAA, National Ocean Service)

Date – Day	Time	Height	Time	Height	Time	Height	Time	Height
23 – Tue	0542 H	10.3	1200 L	–0.1	1822 H	10.2		
24 – Wed	0030 L	0.4	0646 H	10.1	1259 L	0.1	1921 H	10.4
25 – Thu	0132 L	0.2	0748 H	10.0	1355 L	0.1	2017 H	10.6
26 – Fri	0230 L	–0.1	0846 H	10.0	1448 L	0.2	2108 H	10.8
27 – Sat	0324 L	–0.3	0940 H	10.0	1537 L	0.3	2155 H	10.9
28 – Sun	0413 L	–0.4	1028 H	9.9	1623 L	0.4	2239 H	10.9
29 – Mon	0458 L	–0.5	1114 H	9.8	1707 L	0.5	2321 H	10.8
30 – Tue	0541 L	–0.4	1157 H	9.7	1750 L	0.7		
31 – Wed	0002 H	10.6	0623 L	–0.2	1239 H	9.5	1832 L	1.0

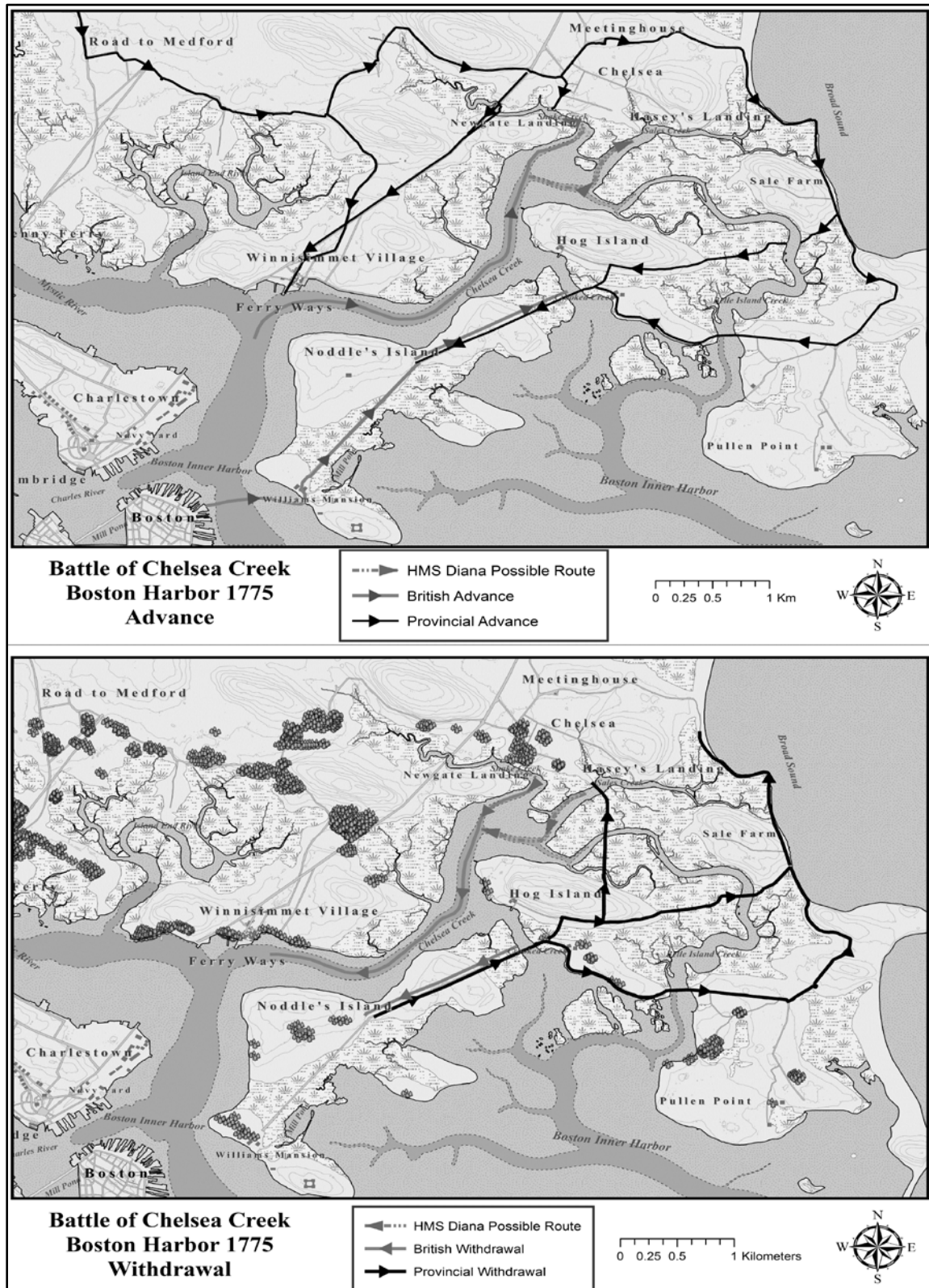


Figure 4. KOCO routes of advance and withdrawal.

more direct farm road from the Chelsea Meetinghouse to the Sale Farm during the morning of May 27 (Bossom 1900; McKay 1925; Tentindo and Jones 1978). The line of march was concealed from British observation by darkness and terrain.

Tidal conditions would have affected the Provincials' movement across the marsh surrounding Hog Island. While there was a rudimentary road network linking Noddle's Island with Hog Island and the Chelsea Mainland in 1775, there were no bridges. Crossings of Belle Isle Creek and Crooked Creek would have to be coordinated with low tide. Crossings were made at natural fording places and their control was essential for Provincial troops. Individual soldiers could cross marshes, tidal flats, and shallow creeks with little difficulty, but it would have been impossible to negotiate this terrain with large numbers of livestock. Proper coordination with tidal fluctuations was a key factor in the Provincial success at Chelsea Creek.

British Advance: British forces advanced along two paths. Marines were landed at the wharf/ferry landing associated with the Williams Mansion on Noddle's Island and moved overland in pursuit of the Provincials. This route roughly conforms to present-day Saratoga Street in East Boston. At the same time, the HMS *Diana*, with ten or twelve longboats in tow, proceeded up Chelsea Creek in an attempt to block Provincial withdrawal (Bossom 1900; McKay 1925; Tentindo and Jones 1978).

An incoming spring or lunar tide, which exceeded mean high water by 10 feet (Figure 3), and favorable winds greatly facilitated HMS *Diana*'s movement into the upper reaches of Chelsea Creek and allowed the possibility of the vessel entering Sales Creek (Hassey's Landing) and/or Snake Creek (tide mill). While Chelsea Creek is generally navigable, this advancing lunar tide provided a much wider channel and deeper channels for Sale and Snake Creeks.

Provincial Withdrawal: The Provincials withdrew along the same line of march as they approached, except for one significant difference. While one party of Provincials withdrew with the captured livestock along the road back to the Chelsea Meetinghouse, another party moved through the marshes and engaged the *Diana*. This interpretation is based upon testimony from the *Diana*'s crew and reports of spent munitions found around the tide mill at the head of Chelsea Creek (ADM 1/5307; Chamberlain 1908).

While HMS *Diana* could move upstream taking advantage of tidal flow, the incoming tide would have hindered Provincial withdrawal through the marshes. As a result, the main body of these troops and their captured livestock moved along the Beach Road and back to the farm path across the marsh after crossing Crooked Creek. Their destination was the Chelsea Meeting House. Given that *Diana* remained under small arms fire, some Provincial troops must have moved along the western edge of Hog Island.

British Withdrawal: After the brief engagement at Crooked Creek, British land forces withdrew along their previous route of advance. These British Marines camped on Noddle's Island for a few days following the battle (Chads 1775; Robinson 1775b).

The rising tide and the becalming of the winds directly affected the movements of HMS *Diana*. The *Diana*'s advance placed her above the head of Chelsea Creek, likely in Snake Creek or perhaps as high as the tide mill. The advantages of the extreme high tide were quickly lost once Lieutenant Graves made the decision to withdraw from Chelsea Creek. As the *Diana* came about in preparation for her return, the wind slackened. The incoming tide, which had previously facilitated *Diana*'s advance, now threatened to ground her within easy reach of Provincial forces occupying both banks of the creek (Bossom 1900; McKay 1925; Tentindo and Jones 1978). The vessel's movements were now dependent upon the ability of the accompanying long-boats to tow it downstream. Local tradition has the *Diana* grounding first at the head of Chelsea Creek, opposite Mill Hill, before grounding again for the final time at the Winnisimmet Ferry Ways. As the *Diana* reached a point opposite Winnisimmet Ferry, Provincial forces in buildings and behind stone walls concentrated their fire on the sailors manning the long-boats. This fire compelled the long-boats to cast off, leaving the *Diana* to drift westward (by this time, the tide was now going out once again) and ground on a sand bar near the ferry ways (ADM 1/5307).

CRITICAL DEFINING FEATURES

While each component of the KOCOA analysis illustrates features of the battlefield, critical defining features are those that were significant to the outcome of the battle. Certain less obvious environmental conditions, such as tides and winds, are factors to be considered as they can have an effect upon KOCOA components. The lack of precision in the documentary record made it difficult to identify the defining features on the actual battlefield. By subjecting the battle narrative to a KOCOA analysis, we were able to reasonably identify the location of key features on our geo-referenced reconstructed 1775 landscape (Figure 5). Using the geo-referenced 1775 landscape, we were able to derive relatively accurate locations for the KOCOA identified features of the battle. These locations were then depicted and relocated in the study area through Google Earth. A preliminary field investigation was limited to visual inspection of the entire study area by windshield and opportunistic walkover survey.

The locations within the study area identified as critical defining features or potential core areas and subjected to field investigation (visual inspection only) are described below.

Rear guard action at Crooked Creek: The engagement along Crooked Creek involved both British land and naval forces and Provincial troops. A rear guard of Provincial troops took cover in a ditch on the Hog Island shore of Crooked Creek. This rear guard, including Corporal Amos Farnsworth of Colonel William Prescott's Regiment, and 14 men of the 30-man detachment sent to Noddle's Island, engaged British marines at the creek (Farnsworth 1775–1779:81). This location became the northern limit of British land forces advancement. After this encounter, British land forces withdrew toward the center of Noddle's Island. The land phase of British operations effectively ends, except for artillery bombardment from West Head.

The precise location of British and Provincial forces along Crooked Creek is conjecture based on the primary descriptions and the geo-referenced reconstruction of the location of ditches/small feeder creeks and the path crossing Crooked Creek. Our analysis placed this location in the vicinity of today's Orient Heights Square at the intersection of Saratoga and Boardman Streets (Figures 4 and 5). The historic creek bed is discernible as low-lying filled tidelands. Much of it is occupied by City of Boston athletic fields with adjacent roads slightly elevated above it. Architectural styles are typified by early twentieth-century wooden multistory apartment dwellings, commonly referred to as triple-deckers and public housing projects. Fill and building activities may have significantly reduced the likelihood of site preservation; the firing positions of the opposing forces would only be discernible by spent musket shot.

Winnisimmet Village and Ferry Ways, Grounding of Diana: The 1775 Winnisimmet Ferry Landing lies on the Chelsea (western) side of Chelsea Creek at its confluence with the Mystic River and Boston Harbor. Winnisimmet Village is a prominent location for Provincial forces throughout the battle. The movements of HMS *Diana* parallel the progress of the battle. The flowing bottom lands of Chelsea Creek became obstacles to *Diana*'s progress as they became exposed due to the falling tide. HMS *Diana* was subjected to intense small arms fire as she entered and exited the creek. In the latter phases of the battle, Provincial cannon were placed at the ferry landing and brought to bear against the vessel. The grounding, capture, burning, and final resting place of HMS *Diana* is described as being at the Winnisimmet Ferry Ways (Barker 1774–1776; Stevens 1775–1776). Lieutenant Barker (1774–1776) places *Diana* on the mud flats as 60 yards off the ways. The capture and destruction of this vessel effectively ends British naval operations in this battle. It is the defining event of the battle—the first loss of a British naval vessel and first American combat victory of the American War of Independence.

This section of Chelsea and Chelsea Creek is now densely developed. It is a combination of brick residential structures (brownstones), factory buildings, shipyard, and petroleum storage depots (tank farms). The end of the current Winnisimmet Street is the location of the late-nineteenth/early-twentieth-century ferry landing. The current seawall is a cut granite structure. This area is not completely exposed at low tide.

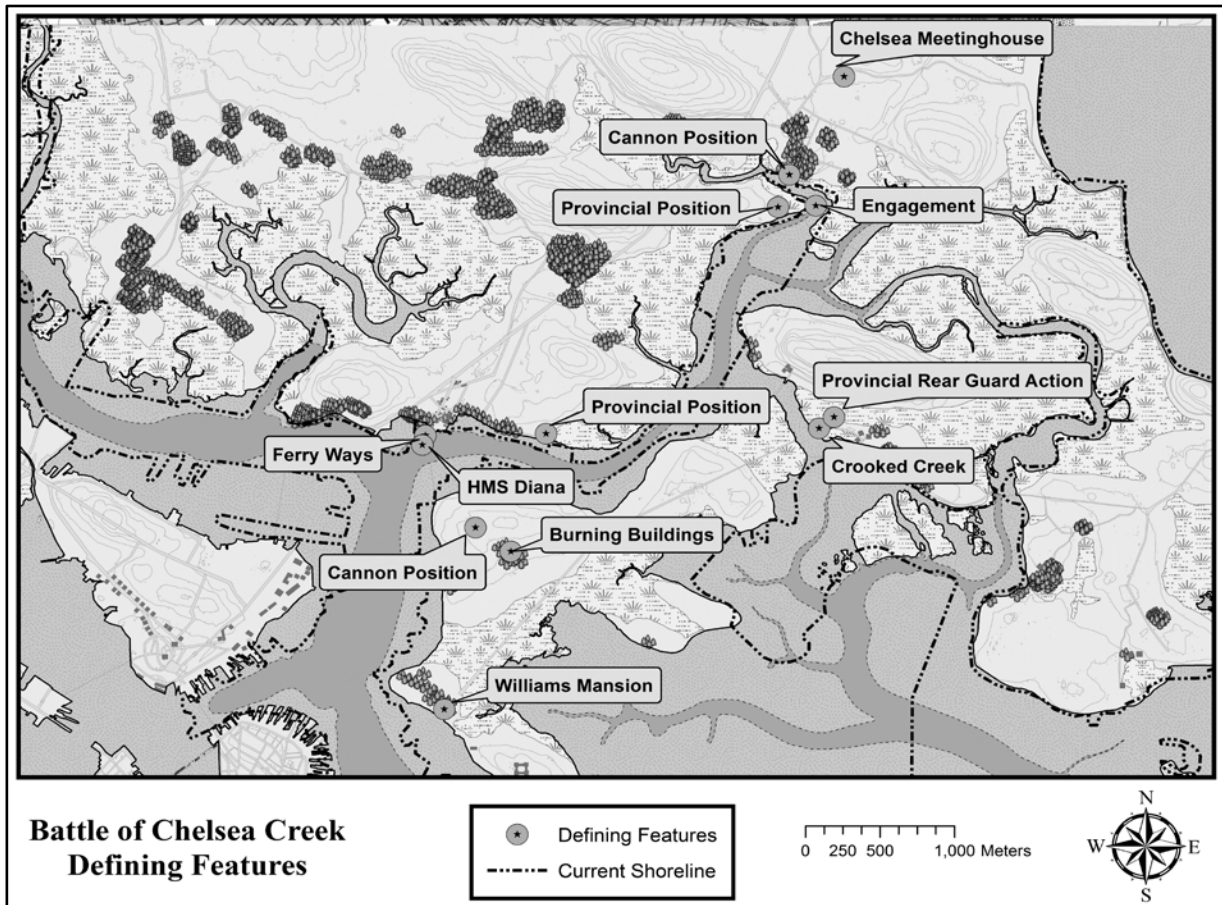


Figure 5. Defining features.

Questions remain as to the precise location of the 1775 shoreline, the ferry landing, and the extent of dredging in that vicinity. Additional historical map research, ground-truthing, intensive archaeological sampling, and geophysical surveys should be undertaken to identify the extent of disturbance as well as locate battle event cultural signatures such as spent musket shot, grape shot, cannon balls, and remains of *HMS Diana*.

Placement of troops in firing position (including cannons): In examining potential fields of fire, a number of locations were identified for the placement of Provincial small arms fire. With the exception of Winnisimmet Village/Ferry Ways and Crooked Creek, the remaining locations of engagement cannot be located with precision. The location of Provincial and British artillery batteries is conjecture. However, one eyewitness account places the initial use of Provincial cannon at the Newgate/Yeamans house. The suspected location of the Newgate/Yeamans house is under the Revere Beach Parkway. Given the extent of road construction activities, any site preservation is highly unlikely.

Visual inspection of the western and northern shoreline along the head of Chelsea Creek revealed numerous modern ceramic (not clay) spheres and glass marbles. Due to chemical discoloration and location, they have been commonly misidentified as musket and grape shot. Firing positions, if preserved, would only be discernible by musket, grape, and cannon shot.

Mill Hill/Chelsea Neck: The confluence of Snake (Mill) Creek and Sale Creek at the head of Chelsea Creek is bounded by Chelsea Neck and Mill Hill. This area forms a natural cul-de-sac where *HMS Diana* was trapped when the tides began to fall and the winds deadened. The area of “Chelsea Neck” is

mentioned as a Provincial firing position in the June 8, 1775 *New York Journal* article entitled "A Circumstantial Account Of The Late Battle At Chelsea, Hog Island, &c" (Anon 1775b). "Chelsea Neck," however, was not a commonly used or recognizable name. Robert D. McKay (1925:13) calls this area Chelsea Neck. His description corresponds to the vicinity around the Slade Tide Mill. Battle eyewitness Elizabeth Hasey confirmed that the Provincials did indeed have a cannon position in the front yard of the Newgate/Yeamans House, which stood a short distance from the tide mill (Chamberlain 1908). Cannon balls and grape shot were reportedly recovered from this general area.

Today, this area is a densely packed urban residential neighborhood. Architectural styles are typified by early-twentieth-century wooden multistory apartment dwellings, commonly referred to as triple-deckers, public housing, and single-family residences. The coastal area around Mill Hill is occupied by an industrial site closed to public access. On the edge of the battlefield in this area are two National Register Properties, Revere Beach Parkway and the Slades Spice Mill site, which are not associated with this battle.

West Head of Noddles Island: Two battle events occurred in the area of West Head on Noddles Island (East Boston). One is the barn burnt by Provincial troops and spotted by HMS *Preston*. The other is the position of the British artillery batteries which fired on Winnisimmet Village.

As derived from geo-referencing the historic maps, the probable location of Yeamans' barns was placed along the northern slope of West Head (McKay 1925; Sumner 1858; Tentindo and Jones 1978). Smoke from these burning barns was spotted by HMS *Preston* and thus alerted British forces to the presence of Provincial forces on Noddles Island. There were no detailed descriptions of these structures. The area is currently comprised of densely spaced multistory structures and a brick-faced church. Development activities have significantly reduced the likelihood of site preservation.

The location of British artillery batteries is conjecture based on the primary descriptions and the assumption they were placed on high ground. The area of West Head was identified as the firing point for British artillery. In "A Circumstantial Account Of The Late Battle At Chelsea, Hog Island, &c," the author records that during the burning of the *Diana*, "a heavy cannonading was begun, at Noddles Island hill, with the 12 pounders upon the provincials" (Anon 1775b). William H. Sumner's (1858) *A History of East Boston* identifies that hill as West Head. Possession of this key elevation conveyed two distinct advantages to the British. First, West Head provided an excellent view over much of the Chelsea shoreline and Chelsea Creek. Second, the British artillery position here commanded both a key segment of Chelsea Creek and Winnisimmet Ferry.

While we know Admiral Graves placed two 3-pound naval cannons, and General Gage placed two 12-pound field artillery pieces, at this battery, there is no mention of fortifying this temporary gun position. This position was manned for only two to three days. There is no evidence for structures being built or of counter battery fire from Winnisimmet Village, such as spent cannon shot, reported in this area. The location of the summit (high point) of West Head was derived from geo-referencing the historic maps. This area is characterized as densely packed urban residential neighborhoods and the heavily modified grounds of East Boston High School. Architectural styles are typified by early twentieth-century wooden multistory apartment dwellings, commonly referred to as triple-deckers. Construction activities have significantly reduced the likelihood of site preservation.

Williams Mansion and Wharf: The mansion and associated wharf/ferry landing was the jumping-off point for the land advance of British forces on Noddles Island. After the battle, one source, an anonymous ship captain from Maine being detained on Noddles Island, has British casualties departing from this location. The unnamed captain related that "he was shocked to see the blood running out of the scuppers [of the *Britannia*]; there was a number of dead and wounded lying on deck, but the survivors did not care to tell how many (Clark 1964:607)." The house was later destroyed by subsequent actions by Provincial forces on May 29, 1775 (Graves 1775a; Williams 1775).

The probable location of the Williams Wharf and Mansion derived from geo-referencing the historic maps is in what is now known as the Maverick Square section of East Boston. The approximate location of these historic structures is under the street adjacent to the surface entrance to the subway station.

Substantial subway terminal construction, extensive urban infrastructure, and local redevelopment activities have significantly reduced the likelihood of site preservation.

Chelsea Meeting House: The Chelsea Meeting House is a key location for Provincial troop assembly throughout this battle. Provincial militia under the command of Nixon and Stark used the Meetinghouse as a staging area. The 600 militia men halted here for a rest and breakfast before making their successful raid on Hog and Noddle's Islands. After withdrawing with livestock, they regrouped and rested here before proceeding to Winnisimmet for the final engagement with HMS *Diana*.

The current structure is listed on the National Register of Historic Places as Church of Christ, originally constructed in 1710. The structure and site have been continually used and heavily modified over the intervening years. The structure was turned 90 degrees on its site in 1856. The area has been heavily disturbed, including building realignment, filling, and landscaping, significantly reducing the likelihood of site preservation.

CONCLUSION

The lack of battlefield delineation and identification of its related archaeological components is a major threat in itself to the preservation of any battlefield. The absence of reliable location and condition data severely hinders the ability to identify potential adverse impacts from development activities. For the Battle of Chelsea Creek, this was especially true. In addition, ongoing and potential threats from expanded dredging, shore-side redevelopment, and new construction can adversely impact now buried and/or undocumented terrestrial components of the battlefield as well as underwater (HMS *Diana*). These development activities obscure, damage, or destroy the major landscape features of the battlefield, archaeological resources associated with the battle, and any attempts to recovery the historic landscape and restore the view shed of the battlefield.

Six core areas (Figure 5) within the battlefield study area were visually inspected: Williams Wharf and Mansion, West Head of Noddles Island, Crooked Creek, Mill Hill/Chelsea Neck, Winnisimmet Ferry Landing, and Chelsea Meeting House. Many of these areas exhibit a high level of disturbance and extensive development since 1775. However, three core areas were identified as having potential for site preservation and more intensive investigation: Crooked Creek engagement area, Mill Hill/Chelsea Neck engagement area, and Winnisimmet Ferry Landing with the HMS *Diana* grounding site.

A main objective was to determine the boundaries of the battlefield for the Battle of Chelsea Creek. We were able to accurately relocate major landscape features such as shore lines, wetlands, and roads. By filtering the battle narrative through the KOCO and tying it to the location of these historic features, we were able to define the physical limits of battle events and related movements. Much of our proposed boundaries for the Battle of Chelsea Creek follow the 1775 transportation network for that area. Areas specifically excluded from the proposed boundaries were the initial line of march for Provincial forces from Medford to Chelsea Meeting House. The movement of troops off the routes of march cannot be reliably discerned.

A major project goal was to identify the preservation potential of the defining features associated with the battle. The majority of the "battlefield" has been heavily impacted by development. We have identified a narrow region where cultural resources may be preserved either on the active harbor floor or under several meters of fill. In some cases, potential archaeological sites may remain preserved and accessible under fill and/or beneath open space areas. Other areas that have been dredged or heavily industrialized may be inaccessible.

This study has identified that the areas with the greatest potential for containing remnant archaeological features associated with the battle include Crooked Creek (East Boston), Mill Hill/Chelsea Neck (Chelsea and Revere), and Winnisimmet Ferry Ways/HMS *Diana* (Chelsea) (Figure 6). A more detailed topographic and land use analyses coupled with additional ground-truthing, intensive archaeological sampling, and geophysical surveys within core areas would be necessary to conclusively identify preserved locations containing the defining features of the battle.

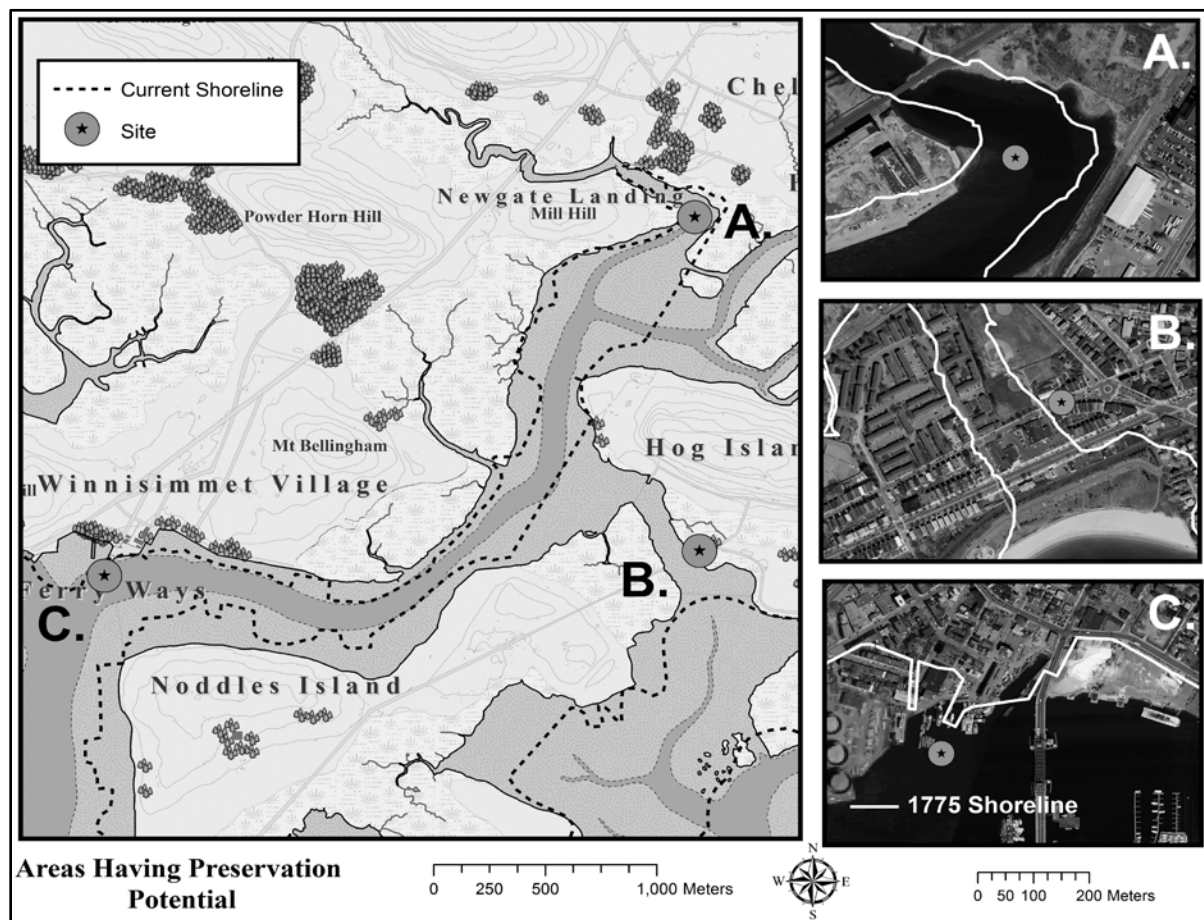


Figure 6. Sites with preservation potential.

The primary historical sources described above contained a number of time cues and locational information that initially permitted only a general reconstruction of the battle. The majority of battle participants were not from the local area and the majority of the landmarks they describe are not actually named. However, when these same sources were examined using KOCOAs, the results could be grounded on the landscape of 1775 and today. KOCOAs proved to be a powerful interpretive tool when evaluating the historical record in concert with the reconstructed historical landscape. It provided a richer, more complete history of the Battle of Chelsea Creek, the establishment of study and core areas, and the identification of site locations.

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