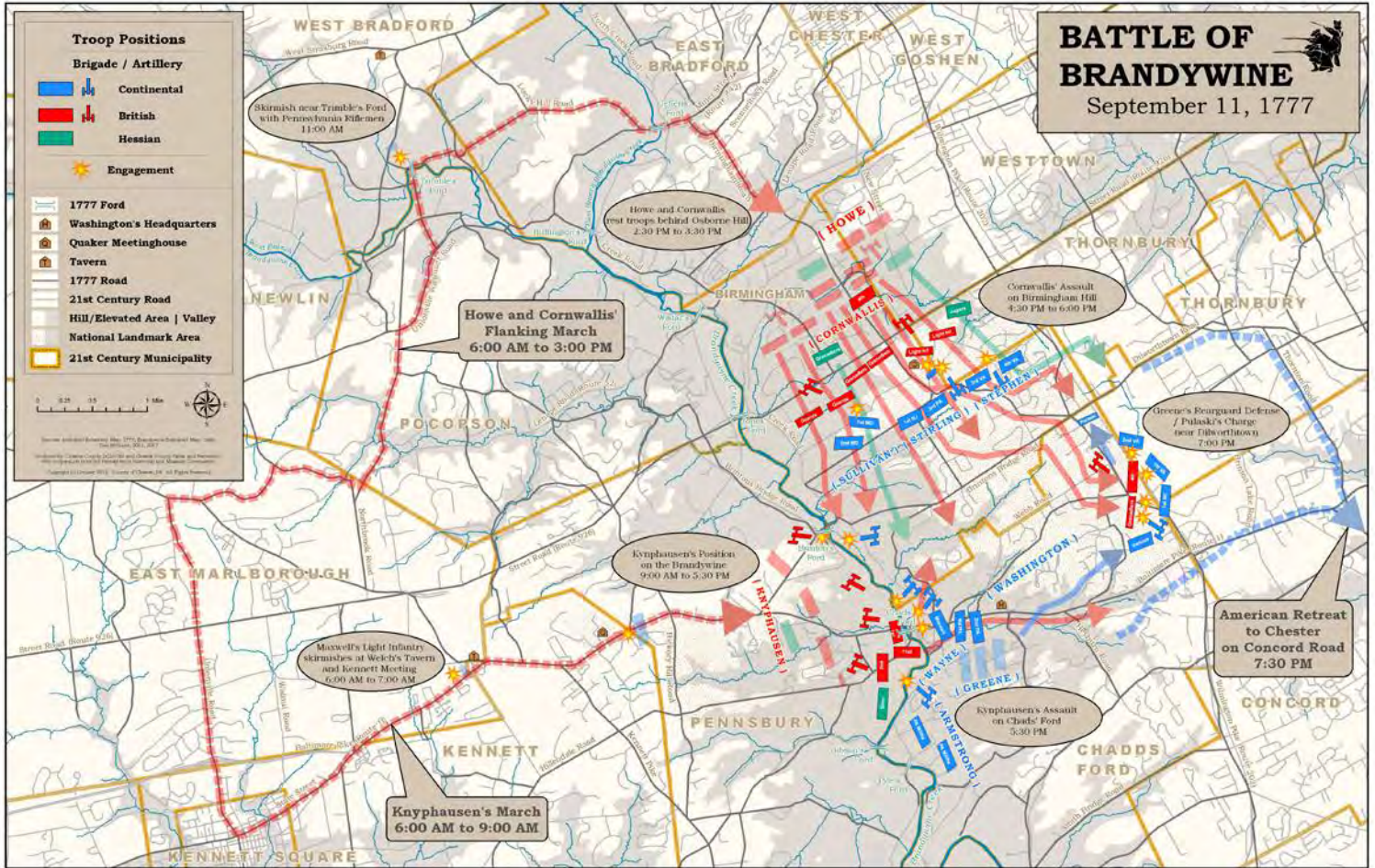# Battle of Brandywine

Animated Map and Atlas Project
Final Technical Report

December, 2010

by Chester County DCIS / GIS and Parks Department

U.S. Department of the Interior
National Park Service
American Battlefield Protection Program

Battle of Brandywine – Final Technical Report

December, 2010

1. Battle of Brandywine

The Battle of Brandywine was the largest single-day battle of the American Revolution, and although the Continental Army was driven from the field, George Washington demonstrated, for the first time, his ability to withstand a direct engagement with General Howe's army.

The battle, which took place on September 11, 1777 at Brandywine Creek in Chadds Ford, was Washington's attempt to block Howe from entering the colonial capital of Philadelphia. Howe managed to split his army and outflank Washington as demonstrated on the map in *Appendix A*.

After the battle, Howe continued his Philadelphia Campaign, marching into northern Chester County, where Washington again tried unsuccessfully to block him at the Battle of the Clouds. Days later Wayne's Division was routed at the Paoli Massacre as they tried to position themselves to harass Howe's rear.

By September 26, Howe managed to occupy Philadelphia, leaving Washington to spend the winter at Valley Forge.

Although Brandywine, and the Philadelphia Campaign, demonstrated a tactical victory for the British, Howe's lack of support for General Burgoyne's Northern Campaign in 1777 greatly contributed to a much more significant victory for the Continental Army in Saratoga, New York - seen by many as the turning point of the Revolution.

In the Spring of 1778, the British, now under General Clinton, left Philadelphia and returned to New York City in part to protect that city from America's new ally – the French.

2. Battlefield Preservation Timeline

Brandywine Battlefield Park was established as a 50 acre State Park in 1949. It is the location of the Ring House which served as Washington's Headquarters at Chadds Ford and is administered by the Pennsylvania Historical and Museum Commission.

In 1961 the ten square mile National Historic Landmark (NHL) at Brandywine Battlefield was established. The NHL boundaries were recommended for expansion in 1989 and again in 1992 to about fifteen square miles as shown in *Appendix B*. These are currently the accepted boundaries for planning purposes in Chester and Delaware Counties.

By the 1990's suburban development was starting to severely threaten land within the landmark. Recognizing this, the Brandywine Battlefield Task Force was formed to preserve the national landmark planning area, educate the public and to develop interpretation of the battle and its historic and physical setting. The Task Force includes representatives from the municipalities within the Landmark, Pennsylvania Historical and Museum Commission, National Park Service, Chester and Delaware Counties, Brandywine Conservancy, Chadds Ford Historical Society, Brandywine Battlefield Park Associates, Valley Forge National Historic Site and the Natural Lands Trust.

The fifty acre Sandy Hollow Heritage Park was established in 2001 at the site of some of the heaviest fighting of the day. This park is managed by Birmingham Township.

Around this time the non-profit the Friends of Brandywine Battlefield Park (aka the Brandywine Battlefield Associates), became actively involved with educational programs and tours based at the Brandywine Battlefield Park.

In 2007, the *Report to Congress on the Historic Preservation of Revolutionary War and War of 1812 Sites in the United States*, categorized the Brandywine Battlefield as one of thirty Priority I sites, and the ABPP established a Study Area, Core Area, and PotNR for the Brandywine Battlefield. See *Appendix C.*

Also, in 2007, the non-profit Brandywine Conservancy completed a multi-year preservation project that protected almost 500 acres of land in an area within the landmark known as the Meetinghouse Road Corridor – near the Birmingham Meetinghouse where major fighting occurred.

The Conservancy and its partners, including the Natural Lands Trust, managed to raise over $16,000,000 to finance four major conservation easements and a fee simple purchase within the corridor. The County of Chester, the National Park Service, and Commonwealth of Pennsylvania contributed in roughly equal portions to provide over two-thirds of the necessary funds. The remainder came from various public and private partners.

In 2009 the Pennsylvania Historical and Museum cut state funding to the battlefield park which led to reduced hours and services, as well as the removal of 80% of the museum's artifacts. At the time of this writing, the future of the historic site is unclear.

Also in 2009, the County of Chester was awarded an American Battlefield Protection Program grant to assist with battlefield preservation efforts within the entire landmark.

3. ABPP Grant Project

The ABPP project served to identify and inventory threatened parcels of land within the Brandywine Battlefield National Historic Landmark boundaries and incorporate them into the county's atlas of historic properties.

An animated map was created which graphically shows the movement of troops through the day of the battle. The animated map serves as both and educational tool and a planning tool. A DVD was also created to help educate the public and raise awareness about the battle's significance.

The Project Area for Chester County's 2009-10 project is based on the 2007 ABPP Study Area, with six zones of expansion described below and shown in *Appendix D*. The justification for this expansion is based on troop movements that our research has show occurred in these six areas.

a) Greene's rearguard defense
    This critical phase of the battle allowed Washington to retreat to Chester without any further harassment from the British.
b) Continental retreat through hamlet of Thornton / Concord Road
    The retreat through this area was witnessed by a number of local citizens and passes through an area where historic structures still exist.
c) British left flank at Birmingham
    Our research showed that Cornwallis' left flank extended a little further to the east than was previously thought.
d) Martin's Tavern / Marshallton
    Martin's Tavern was involved in the story of Cornwallis' flanking maneuver. The Continental patrol (under Ross) that first spotted the British were in that vicinity, as was another patrol (under Spear) that infamously reported no British activity in that region.
e) Kennett / East Marlborough encampment
    Our research shows that this area was where the British were encamped the night before the battle.
f) Knyphausen's morning march / Washington's southern position
    This portion of the battle occurred a little to the south of the 2007 study area.

The map shows that there are areas within the National Landmark that are not included in the 2007 Study Area – particularly in sections a, c, and f

4. Data Collection Methodology

Data was collected from a variety of sources. In all cases the digital data was entered into ESRI's ArcGIS formats.

a. Municipal Borders

Paper copies of the Municipal boundaries of 1777 were available from the Chester County archives. These were scanned in, and geo-referenced to create a 1777 municipal borders layer in GIS.

b. Road Network

Since no reliable road network map from 1777 was available, we devised a method using information available to us, which included the detailed 1873 Witmer municipal maps, the general county-wide Painter-Bowen 1847 map, and a number of 19th century landowner maps. These were all scanned in and geo-referenced in ESRI ArcMap. We also have in our archives road dockets going back to the 17th century which meticulously describe, in prose format, road alignments in terms of perches, metes and bounds.

We started by making a copy of the 2010 road centerline network, laying it on top of the Witmer maps, and deleting the road segments that did not correspond to roads on the Witmer maps. This gave us an accurately geo-referenced set of roads that existed in 1873 and still exist in 2010.

Roads that no longer exist in our current road network, but were on the Witmer maps, were plotted by hand – giving us a complete digital 1873 road network.

For each municipality in the project area, we then searched the Chester County road dockets prior to 1873 and plotted out every road, including abandoned "parts of roads". In many cases it was necessary to refer to the landowner maps which displayed names mentioned in the road dockets, and the 1847 Painter-Bowen map was used to double-check.

Since the docket descriptions were often vague, and obviously not geo-referenced, we did not want to use this newly created digital road docket network as our final product.

Instead, a copy of the 1873 digital road network was used as the starting point, which we then compared, using overlays, to the road docket network. Any "matching" road found in the road docket network with a court date between 1777 and 1873 was deleted from the 1873 road network, thus creating the 1777 road network.

Roads from the road docket network with a pre-1777 date were kept on the 1777 road network, but the alignments were altered, where appropriate, to match the docket description.

With this approach we have created a 1777 road network which maintains geo-referential digital accuracy as well as historical integrity.

c. Historic Resources

In order to inventory the historic resources within the project area, we used our national award winning methodology for data collection and creation of municipal historic atlases.

First, the municipal Historical Commission is contacted by Chester County's Heritage Preservation Coordinator and asked to provide a list of historic resources by address and tax parcel number. The Commission is provided with a black and white parcel atlas to assist them with this task, which is usually accomplished by using local volunteers to fill out Architectural Inventory Forms (AIF).

The AIF information is then entered into a comprehensive spreadsheet. The resources are categorized as described in section 5.b. by the Heritage Preservation Coordinator working in conjunction with the municipal Historic Commission.

A draft wall map is then generated for review by the municipality. Once approved, a final municipal atlas and wall map are generated in printed and digital forms.

A consolidation of the thirteen municipal atlases and wall maps within the project area has been created to demonstrate the historic resources of the Brandywine project area.

d. Troop Movements

After the discovery of the Archibald Robertson map by Thomas McGuire in the 2000's, many of the historic maps, particularly the Faden map were shown to be incorrect. Other maps were either too vague or too incomplete to use for the precision of mapping needed in this project.

Most of the troop positions, therefore, were taken from the first hand accounts documented in McGuire's Philadelphia Campaign book.

A series of troop positions were created in ArcGIS using time-stamps, which gave us reasonably accurate snapshots of the battle to the half hour. These snapshots were reviewed, altered, and ultimately approved by Professor McGuire during a number of face-to-face meetings.

Since no ESRI tool allows for the creation of graphically smooth video, the snapshots were exported from ArcMap and imported into Adobe Flash CS4. We were then able to create moveable boxes in Flash based on the half hour snapshots, and interpolate the movements along existing roads and/or known fields.

5. Products

The primary deliverables from the project are the Animated Map, the Brandywine Battlefield Historic Resource Atlas and wall map, the KOCOA maps, the educational DVD, and an Archeological Assessment map.

a. Animated Map

The interactive animated map was developed using Adobe Flash CS4 and runs as an html. It functions as both an educational / interpretive tool and a planning tool.

The animated map shows troop movements from dawn to dusk on September 11, 1777. The map has various possible backgrounds including a base map showing just roads and municipalities, a modern features map, an aerial view map, a property parcel map, and a map of the features of 1777.

Other layers are also available in the map, regardless of background, including fords, historic structures, municipal labels, and division labels. Individual units can be identified with a mouse-over.

The animated map has a clock which shows the approximate time of the troop positions, and a slidebar which can be used to move through time in either direction. A zoom capability is also included.

Three levels of security are available that limit the number of backgrounds. This was included so that publicly available copies don't show sensitive property parcel information that is important to planners.

The animated map is available to the public upon request in CD form.

b. Historic Resource Atlases

Various atlases were created for the individual municipalities with the project area. These atlases are intended to show historic resources at a property parcel level, which are color coded to show classifications:

Class I – On or eligible for the National Register of Historic Places
Class II – Locally significant historic resource
Class III – All remaining resources over 50 years old

The information from the individual atlases was consolidated to create an overall Battle of Brandywine Historic Resource Atlas and Wall Map shown in *Appendix E*. Historic resources that were built prior to 1780 and are still recorded as historic resources on the municipal atlases will be incorporated into the battlefield atlas.

c. KOCOA Maps

KOCOA is an acronym that stands for Key Terrain, Observation and Fields of Fire, Cover and Concealment, Obstacles, Avenues of Approach. Studying the KOCOA elements of a given battlefield is helpful for understanding how the unique landscape configuration can affect the outcome of a battlefield.

KOCOA maps were created based on terrain and troop positions. An overall KOCOA map shows the general movement of troops (avenues of approach and retreat), cover and concealment, obstacles, and significant fields of fire within the terrain of the area as it was in 1777. This map builds upon two other maps detailing the physical and cultural topography of the project area in 1777.

Three individual KOCOA Fields of Fire maps were created to show troop positions and fire-power at specific significant intervals of the battle. Four KOCOA Viewshed maps illustrate the view available to commanders leading up to the key intervals.

The KOCOA suite of maps can be seen in *Appendix F through Q*.

d. Educational DVD

The educational DVD is a recorded version of the public presentation. It incorporates sequences from the animated map along with descriptions of the American Revolution and the Philadelphia Campaign in order to set the context.

The DVD also includes special features such as 3-D Terrain Analysis and 3-D Historic Resource animation.

The DVD has classic historical artwork as well more recently produced art. Some period music has also been included.

This DVD in its current form is available upon request to the public, and is adequate for instructional purposes, but we recommend that it be considered for professional production and distribution to wider audiences.

e. Archeological Assessment Map

The Archeological Assessment map in *Appendix R* is based on the 1989 Cultural Resources Management Study by the Delaware County Planning Department. It shows areas of Archeological Potential (based on degree of development) and areas of Anticipated Deposits (where action occurred during the battle).

By juxtaposing the two metrics on one map we can help planners and archeologists determine the areas most likely to contain artifacts.

Due to the sensitive nature of archeological excavations, especially in residential areas, this map is not meant for public distribution. Anyone interested in this map should contact Chester County Planning or the PHMC.

6. Publicity

One of the requirements of the ABPP grant was to have at least two public meetings – one involving stakeholders, and the other with the general public.

Prior to the stakeholders meeting in March, 2010 at the Brandywine River Museum, preliminary versions of the animated map were shown to officials at the Pennsylvania Historical and Museum Commission and the Brandywine Battlefield Associates and to a gathering of over 100 people at the Radley Run Country Club located within the National Historic Landmark.

The stakeholders meeting included local elected government officials, Historical Commission members, Planning Commission members, representatives from the Brandywine Battlefield Associates and the Brandywine Conservancy, as well as a number of significant private landowners.

At this point interest in the presentation began to spread by word of mouth, and we started getting requests from groups within the community who wanted to see the presentation, which was improving as the products became more developed. The public seemed to be quite enthused about the animated map, particularly planners and Middle School teachers.

Other notable presentations were made to the Superintendent and staff of Valley Forge National Historical Park and members of the Paoli Battlefield Preservation Fund.

The final public presentation was made on November 30. About 60 people were in attendance. A majority of the group were Historic Commission members from the surrounding municipalities. An official from each of the ten surrounding municipalities was presented with a Historic Resource Atlas and Animated CD before our products were presented.

Throughout the grant period over 500 people from the Brandywine region viewed the presentation.

We have been contacted by the Philadelphia Chapter of the Sons of the American Revolution to make this presentation at their January meeting and the private Tower Hill School in Wilmington Delaware is also interested in having us present at a school assembly.

7. Recommendations

a. National Historic Landmark expansion

One of the most critical findings of the ABPP study was the large number of at-risk parcels, directly relating to the troop movements on September 11, 1777, which are not included in the current National Historic Landmark and are not designated as contributing historic properties by local planning efforts. It is therefore recommended that a review of the current Brandywine Battlefield National Historic Landmark boundaries be considered using "The Proposed Study Area for the Expanded Landmark Map"(see *Appendix S*). The Brandywine Battlefield Taskforce could undertake this review to determine if a nomination for an expanded National Historic Landmark for the Battlefield should be developed.

b. Regional Linkages

It is recommended that the *Revolutionary War Campaign of 1777 Loop* proposed by the Brandywine Battlefield Task Force in conjunction with municipal input be formally endorsed by both Chester and Delaware counties. This Loop concept is a regional planning effort that would provide regional linkages between significant Battlefield landscapes and historic sites. The Loop would provide pedestrian access along many of the roadways and other corridors that were used for troop movements. The Animated Map and Atlases can serve as the historical reference material to locate opportunities for historical interpretation along the proposed regional linkages. (Note the 1777 Loop concept is presented in *Appendix T.*)

This Loop would connect the Brandywine Battlefield Historic Site (BBHS) with Valley Forge National Historical Park and with the Paoli Battlefield Site and Memorial Grounds. Each of these sites is key to the Revolutionary War Campaign of 1777. As the primary public access point for the Brandywine Battlefield NHL, the BBHS serves as the southern gateway and trailhead for the 1777 Loop. The interpretive/visitors center would provide the opportunity for recreational users to view the animated map as part of their visit to the Loop, and so promote historical education to a wider segment of the public.

The archeological impacts of the proposed Loop can not be determined until a feasibility study is undertaken to determine preliminary alignments. Depending on funding availability for such a study, the timeframe would be a minimum of 2-5 years.

c. Educational Kiosks

It is recommended that educational kiosks displaying the animated map be developed and placed at the Brandywine Battlefield Historic Site, the 1704 House, the Brandywine Conservancy, and Brandywine Valley Visitors Bureau as well as possibly Valley Forge National Historical Park, Paoli Battlefield Site and Memorial Grounds, and municipal buildings. Some or all of these sites may want traditional map displays to compliment that animated map.

Additional background layers for the animated map should considered, especially some of the KOCOA maps produced for this grant.

In conjunction with the kiosks, a website should be developed to provide the interactive map and professionally produced version of the educational video to teachers who wish to utilize the information in the classroom. It is further recommended that Chester County Parks & Recreation incorporate the educational programming into their county-wide educational programming.

d. Brandywine Battlefield Preservation Plan

To follow up on this 2009-10 ABPP study, which focused on historic resources identification and mapping, it is recommended that Chester County develop a Brandywine Battlefield Preservation Plan that would encompass a Land Preservation component, a Master Plan

element, a Site/Public Access/Facilities planning element, and an Interpretative opportunities element.

It is recommended that the County work with the Brandywine Battlefield Task Force and the municipal leaders that worked with the ABPP team and were at the final public meeting on November 30, 2010. This would build on the already established knowledge base and enthusiasm of the municipal leadership developed during the ABPP grant process. A mapping component integrating the interactive map with the maps developed for the ABPP grant should be considered as a component of this planning process. The plan could also explore future relationships between the Brandywine Battlefield Historic Site (BBHS) with Valley Forge National Historical Park and with the Paoli Battlefield Site and Memorial Grounds. Each of these sites is key to the Revolutionary War Campaign of 1777

The geographic scope of this plan should include the Brandywine Battlefield National Historic Landmark area and areas identified as historically significant in this 2009-10 study. The timing of obtaining this grant for a Preservation Plan is critical considering the drastic financial and staffing cuts to the existing facilities discussed in section 2.

8. Bibliography and Credits

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Oral History

Thomas J. McGuire - 2010
The Pennsylvania Historical and Museum Commission - 2009

Artwork and Picture Credits

Pamela Patrick White and Bryant White of White Historic Art
Don Troiani, courtesy of the Historical Image Bank, www.historicalimagebank.com
Stephen Walsh, Great Britain
Friends of Martins Tavern, Marshalton, PA
Chadds Ford Historical Society, Chadds Ford, PA
Joe Gawinski, Chadds Ford, PA
Florida Institute for Instructional Technology

Music

Yankee Doodle - Chester County Studio Musicians, 2006
Grenadiers March – Grenadiers Guard Band, 1989
The World Turned Upside Down – Chumbawamba, 2008
Chester – Douglas Jimerson, 1998
Johnny Has Gone For a Soldier – Wallace House, 1970
Katy Cruel - The George Washington Royal Orchestra, 2009

with special thanks to

Friends of the Brandywine Battlefield
Brandywine Battlefield Task Force

Appendix

A. Battle Map
B. National Historic Landmark Boundaries
C. Brandywine Project Area
D. Project Area Expansion
E. Wall Map
F. KOCOA Topography
G. KOCOA Overall
H. KOCOA Cultural Topography
I. KOCOA Birmingham Hill Fields of Fire
J. KOCOA Birmingham Hill Viewshed
K. KOCOA Osbourne Hill Viewshed
L. KOCOA Chads' Ford Fields of Fire
M. KOCOA Chads' Ford Viewshed East
N. KOCOA Chads' Ford Viewshed West
O. KOCOA Dilworthtown Fields of Fire
P. KOCOA Dilworthtown Viewshed South
Q. KOCOA Dilworthtown Viewshed Southeast
R. Archeological Assessment
S. Proposed Study Area for the Expanded Landmark
T. 1777 Trail Loop

BATTLE OF BRANDYWINE
September 11, 1777

Troop Positions

Brigade / Artillery

🟦		Continental
🟥		British
🟩		Hessian
✴		Engagement

- 1777 Ford
- Washington's Headquarters
- Quaker Meetinghouse
- Tavern
- 1777 Road
- 21st Century Road
- Hill/Elevated Area | Valley
- National Landmark Area
- 21st Century Municipality

0   0.25   0.5   1 Mile

N W E S

Sources: Archibald Robertson Map, 1777; Brandywine Battlefield Map, 1989;
Tom McGuire, 2001, 2007

Produced by: Chester County DCIS-GIS and Chester County Parks and Recreation
with cooperation from the Pennsylvania Historical and Museum Commission

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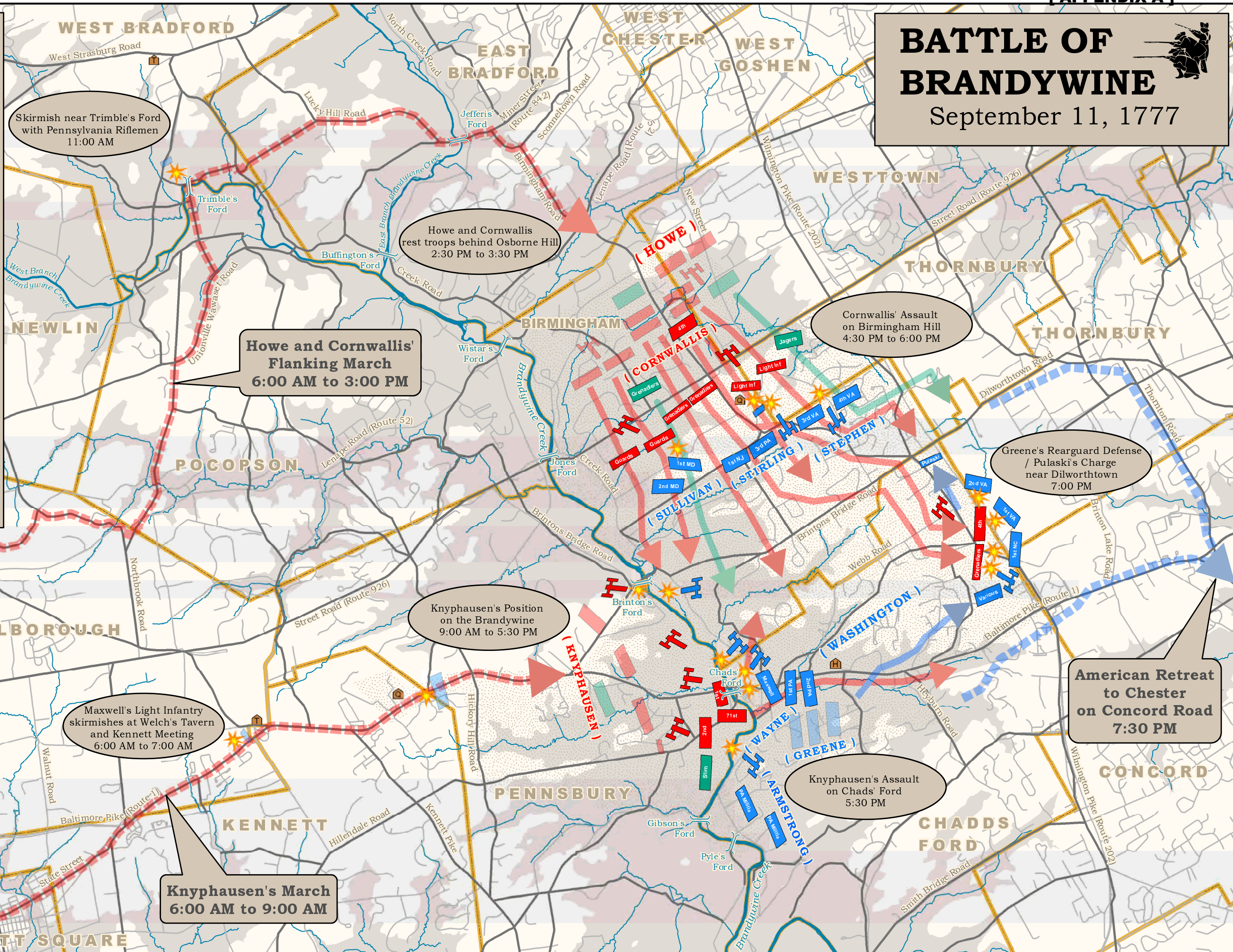
Skirmish near Trimble's Ford
with Pennsylvania Riflemen
11:00 AM

Howe and Cornwallis
rest troops behind Osborne Hill
2:30 PM to 3:30 PM

Howe and Cornwallis'
Flanking March
6:00 AM to 3:00 PM

Cornwallis' Assault
on Birmingham Hill
4:30 PM to 6:00 PM

Greene's Rearguard Defense
/ Pulaski's Charge
near Dilworthtown
7:00 PM

Knyphausen's Position
on the Brandywine
9:00 AM to 5:30 PM

American Retreat
to Chester
on Concord Road
7:30 PM

Maxwell's Light Infantry
skirmishes at Welch's Tavern
and Kennett Meeting
6:00 AM to 7:00 AM

Knyphausen's March
6:00 AM to 9:00 AM

Knyphausen's Assault
on Chads' Ford
5:30 PM

(HOWE)
(CORNWALLIS)
(SULLIVAN)
(STIRLING)
(STEPHEN)
(WASHINGTON)
(KNYPHAUSEN)
(WAYNE)
(GREENE)
(ARMSTRONG)

Jagers
Grenadiers
Light Inf
Guards
1st MD
2nd MD
1st NJ
3rd PA
3rd VA
4th VA
2nd VA
1st VA
4th
Grenadiers
1st NC
Various
Pulaski
Maxwell
1st PA
2nd PA
71st
2nd
Stirn
PA Militia

WEST BRADFORD
EAST BRADFORD
WEST CHESTER
WEST GOSHEN
WESTTOWN
THORNBURY
THORNBURY
NEWLIN
POCOPSON
EAST MARLBOROUGH
PENNSBURY
KENNETT
KENNETT SQUARE
CHADDS FORD
CONCORD
BIRMINGHAM

Trimble's Ford
Jefferis' Ford
Buffington's Ford
Wistar's Ford
Jones Ford
Brinton's Ford
Chads Ford
Gibson's Ford
Pyle's Ford

West Strasburg Road
West Branch Brandywine Creek
North Creek Road
Lucky Hill Road
Miner Street (Route 842)
Sconnetown Road
Lenape Road (Route 52)
Birmingham Road
New Street
Wilmington Pike (Route 202)
Street Road (Route 926)
Creek Road
East Branch Brandywine Creek
Unionville Wawaset Road
Lenape Road (Route 52)
Brandywine Creek
Brintons Bridge Road
Dilworthtown Road
Webb Road
Brinton's Lake Road
Thornton Road
Baltimore Pike (Route 1)
Northbrook Road
Street Road (Route 926)
Hickory Hill Road
Harvey Road
Street Road (Route 926)
Unionville Road
Walnut Road
Kennett Pike
Hillendale Road
State Street
Baltimore Pike (Route 1)
Kennett Pike
Brandywine Creek
Smith Bridge Road
Wilmington Pike (Route 202)

Brandywine National Historic Landmark Boundaries

Landmark Boundary
- 1961
- 1989
- 1992

Sources:
1961 National Register of Historic Places Inventory - Nomination Form,
1992 NHL DelCo Study

WEST BRADFORD

WESTTOWN

THORNBURY

POCOPSON

THORNBURY

BIRMINGHAM

PENNSBURY

CONCORD

EAST MARLBOROUGH

CHADDS FORD

KENNETT
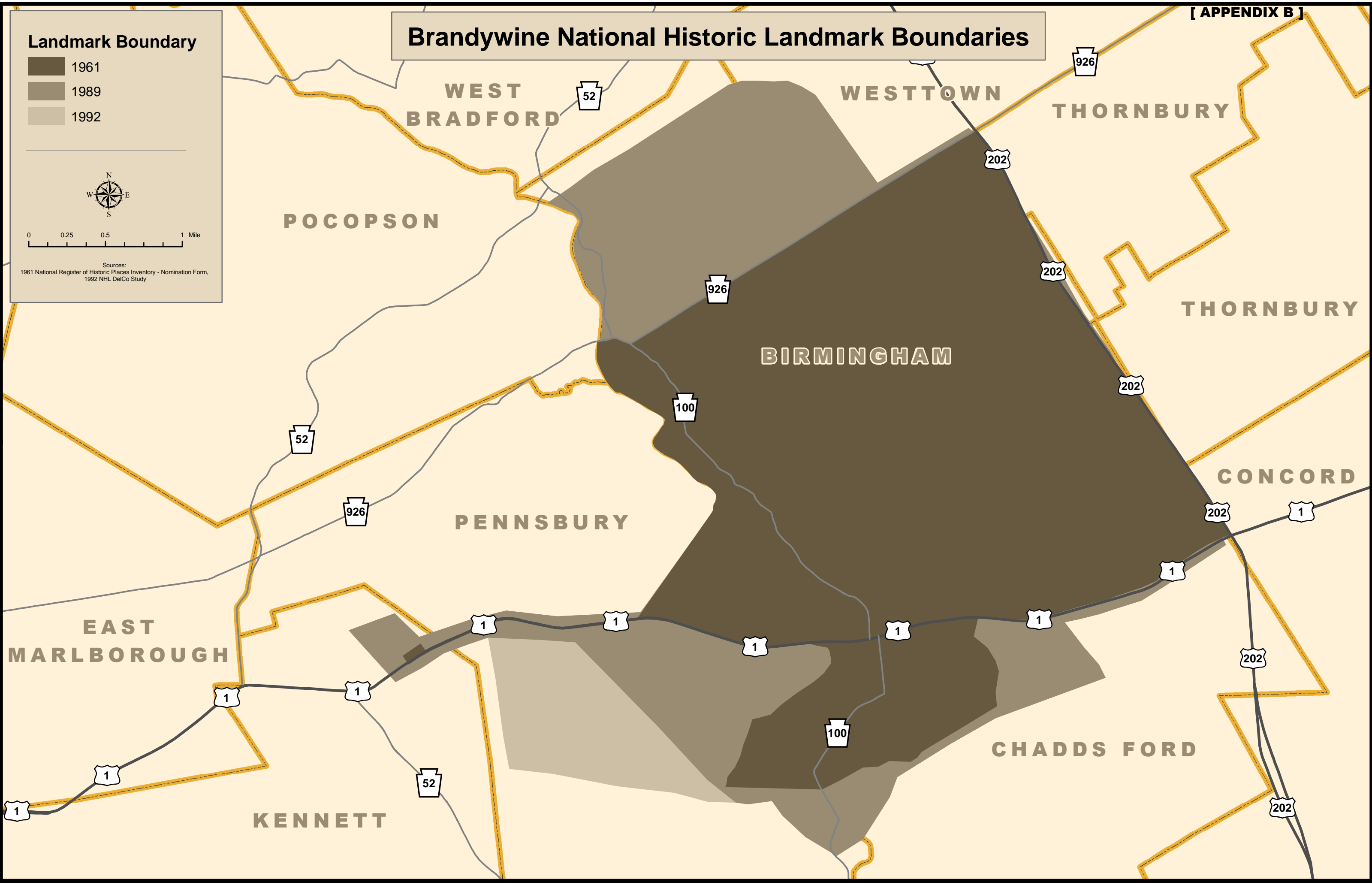
BATTLE OF BRANDYWINE
2009-2010
ABPP Grant Project Area

Legend:
- 2009-2010 ABPP Project Area
- 2001 ABPP Study Area
- 2001 ABPP PotNR
- 2001 ABPP Core Area
- National Landmark Area
- 1961 National Landmark Area

ABPP Study Area

The Study Area represents the historic extent of the battle as it unfolded across the landscape. The Study Area contains resources known to relate to or contribute to the battle event: where troops maneuvered and deployed, immediately before and after combat, and where they fought during combat. Historic accounts, terrain analysis, and feature identification in form the delineation of the Study Area boundary. The Study Area indicates the extent to which historic and archeological resources associated with the battle (areas of combat, command, communications, logistics, medical services, etc.) may be found and protected. Study Area boundaries are positively identified through research and field survey, regardless of present integrity.

ABPP Core Area

The Core Area represents the areas of fighting on the battlefield. Positions that delivered or received fire, and the intervening space and terrain between them, fall within the Core Area. Frequently described as "hallowed ground," land within the Core Area is often the first to be targeted for protection. The Core Area lies within the Study Area.

ABPP PotNR

Unlike the Study and Core Areas, which are based only upon the interpretation of historic events, the Potential National Register (PotNR) boundary represents ABPP's assessment of a Study Area's current integrity (the surviving landscape and features that convey the site's historic sense of place). The PotNR boundary may include all or some of the Study Area, and all or some of the Core Area. Lands within PotNR boundaries should be considered worthy of further attention, although future evaluations may reveal more or less integrity than indicated by the ABPP surveys.

American Battlefield Protection Program (ABPP)
National Park Service, U.S. Dept. of the Interior
September 2007
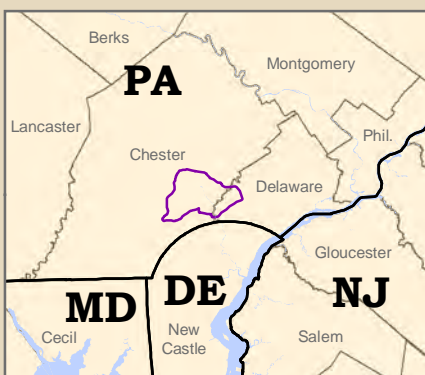
Brandywine Battlefield Historic Landmark Task Force   November 10, 2009; May 10, 2010

0   0.25   0.5   1 Mile

WEST CHESTER
WEST BRADFORD
EAST BRADFORD
EAST BRADFORD
NEWLIN
POCOPSON
WESTTOWN
THORNBURY
THORNBURY
BIRMINGHAM
EAST MARLBOROUGH
CONCORD
CHADDS FORD
PENNSBURY
KENNETT
KENNETT SQUARE

PA
Berks
Montgomery
Lancaster
Chester
Phil.
Delaware
MD
DE
NJ
Cecil
New Castle
Gloucester
Salem

Legend:

1777 Roads
Landmark Area

Proposed Expansion
- A
- B
- C
- D
- E
- F

Original Study Area

BATTLE OF BRANDYWINE
2009-2010
ABPP Grant
Proposed Project Area Expansion

Map labels: WEST BRADFORD, EAST BRADFORD, WESTTOWN, THORNBURY, THORNBURY, NEWLIN, POCOPSON, BIRMINGHAM, CONCORD, EAST MARLBOROUGH, CHADDS FORD, KENNETT, PENNSBURY, KENNETT SQUARE

Expansion area labels: A, B, C, D, E, F

BATTLE OF BRANDYWINE Historic Resources
National Historic Landmark & 2009-2010 ABPP Project Area

Legend:
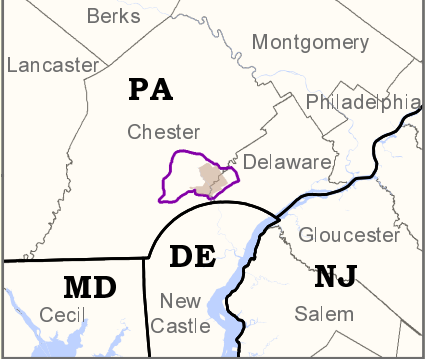
☆ Brandywine Battlefield Historic Site

➤ Troop Movements on September 11, 1777

National Landmark Area

▢ 2009-2010 American Battlefield Protection Program Project Area

Parcel with Historic Resource (Displayed by class)

Class 1 — On National Register or Eligible for National Register

Class 2 — Municipal Designation of Local Historic Significance

with Extant Building Circa Pre-1780

N
W — E
S

0   0.5   1 Miles

Date of Production: November 2010

Berks
Lancaster   Montgomery
PA   Philadelphia
Chester   Delaware
MD   DE   NJ
Cecil   New Castle   Salem
Gloucester

WEST BRADFORD   EAST BRADFORD   WESTTOWN   THORNBURY
NEWLIN   POCOPSON   BIRMINGHAM   THORNBURY
EAST MARLBOROUGH   CONCORD   CHADDS FORD
KENNETT   PENNSBURY
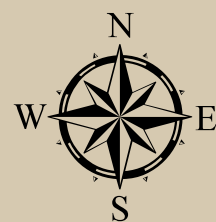KENNETT SQUARE
NEW GARDEN
DELAWARE

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area

KOCOA 1777 Terrain Analysis:
Topography and Key Terrain

(KOCOA: Key Terrain; Observation and Fields of Fire; Cover and Concealment; Obstacles; and Avenues of Approach and Retreat)
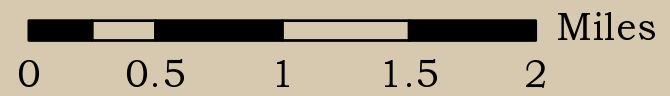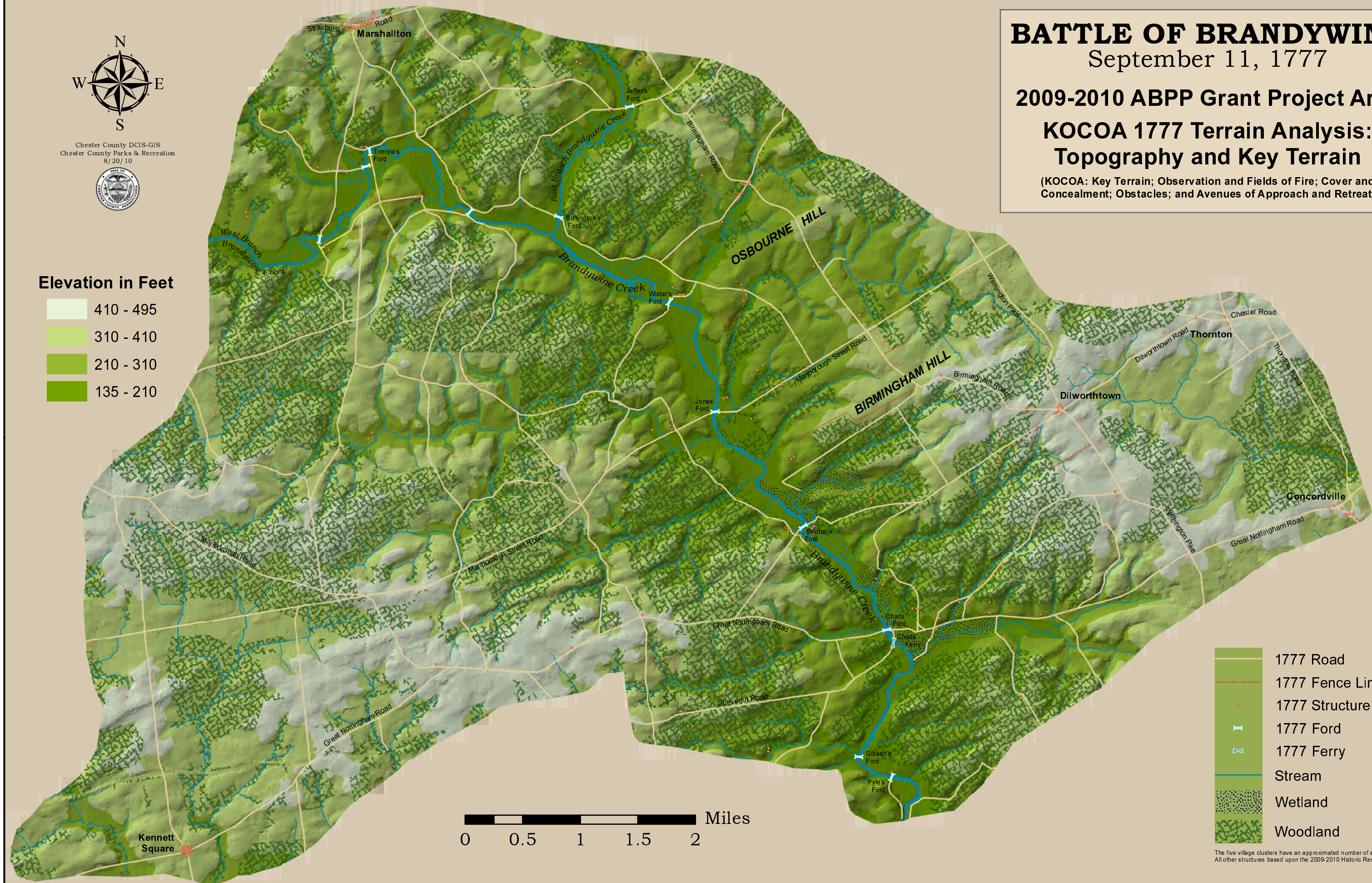
Chester County DCIS-GIS
Chester County Parks & Recreation
8/20/10

Elevation in Feet

- 410 - 495
- 310 - 410
- 210 - 310
- 135 - 210

Legend

- 1777 Road
- 1777 Fence Line
- 1777 Structure
- 1777 Ford
- 1777 Ferry
- Stream
- Wetland
- Woodland

The five village clusters have an approximated number of structures.
All other structures based upon the 2009-2010 Historic Resource Atlas Project.

Miles
0   0.5   1   1.5   2

Map labels:
Strasburg Road, Marshallton, Jefferis' Ford, Trimble's Ford, East Branch Brandywine Creek, Birmingham Road, OSBOURNE HILL, West Branch Brandywine Creek, Buffington's Ford, Brandywine Creek, Wistar's Ford, Wilmington Pike, Chester Road, Thornton, Dilworthtown Road, Thornton Road, BIRMINGHAM HILL, Birmingham Road, Dilworthtown, Jones' Ford, Marlborough Street Road, Concordville, Marlborough Road, Brinton's Ford, Marlborough Street Road, Great Nottingham Road, Brandywine Creek, Wilmington Pike, Great Nottingham Road, Chads' Ford, Chads' Ferry, Starvegut Road, Gibson's Ford, Pyle's Ford, Great Nottingham Road, Kennett Square

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis
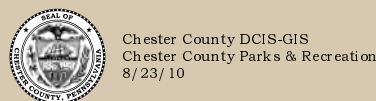
(KOCOA: Key Terrain; Observation and Fields of Fire; Cover and Concealment; Obstacles; and Avenues of Approach and Retreat)

09:00-11:00
Howe and Cornwallis' Crossing of West Branch of Brandywine Creek at Trimble's Ford

11:15-14:00
Howe and Cornwallis' Crossing of East Branch of Brandywine Creek at Jefferis' Ford

14:30-15:30
Howe and Cornwallis rest and conceal troops behind Osbourne Hill

15:30-17:00
Sullivan positions/partially conceals troops on wooded ridge of Birmingham Hill

17:30-19:00
Greene conceals troops in woods south of Dilworthtown for rearguard defense

16:30-18:00
Cornwallis' Assault on Birmingham Hill

19:00-19:30
Greene's Rearguard Defense near Dilworthtown

19:30
Continental Retreat to Chester

06:00-15:00
Howe and Conwallis' Flanking March

06:00
British Army Camped at Kennett Square

06:00-09:00
Knyphausen's March

17:30-18:30
Knyphausen's Assault on Chads' Ford/ Crossing of Brandywine Creek

Elevation in Feet

- 410 - 495
- 310 - 410
- 210 - 310
- 135 - 210

N
W E
S

Miles
0   0.5   1

Chester County DCIS-GIS
Chester County Parks & Recreation
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Cover and Concealment

Large area of Terrain Used during Battle for Cover/Concealment

1777 Structure

The five village clusters have an approximated number of structures.
All other structures based upon the 2009-2010 Historic Resource Atlas Project.

Obstacles

- Stream
- Major Stream with Limited Ford Crossing
- 1777 Fence Line
- Wetland
- Woodland

Avenues of Approach and Retreat

- 1777 Road
- 1777 Ford
- 1777 Ferry
- Ford Utilized by Attacking British Army
- Approach Route of Attacking British Army
- Route of Retreating Continental Army

Observation and Fields of Fire

Key Point of Observation

Zone of Engagement

2 Continental 3 Pound Guns 4000 foot range 30 degree sweep

2 British 12 Pound Guns 5300 foot range 30 degree sweep

Artillery Position Fields of Fire at Key Points of Battle

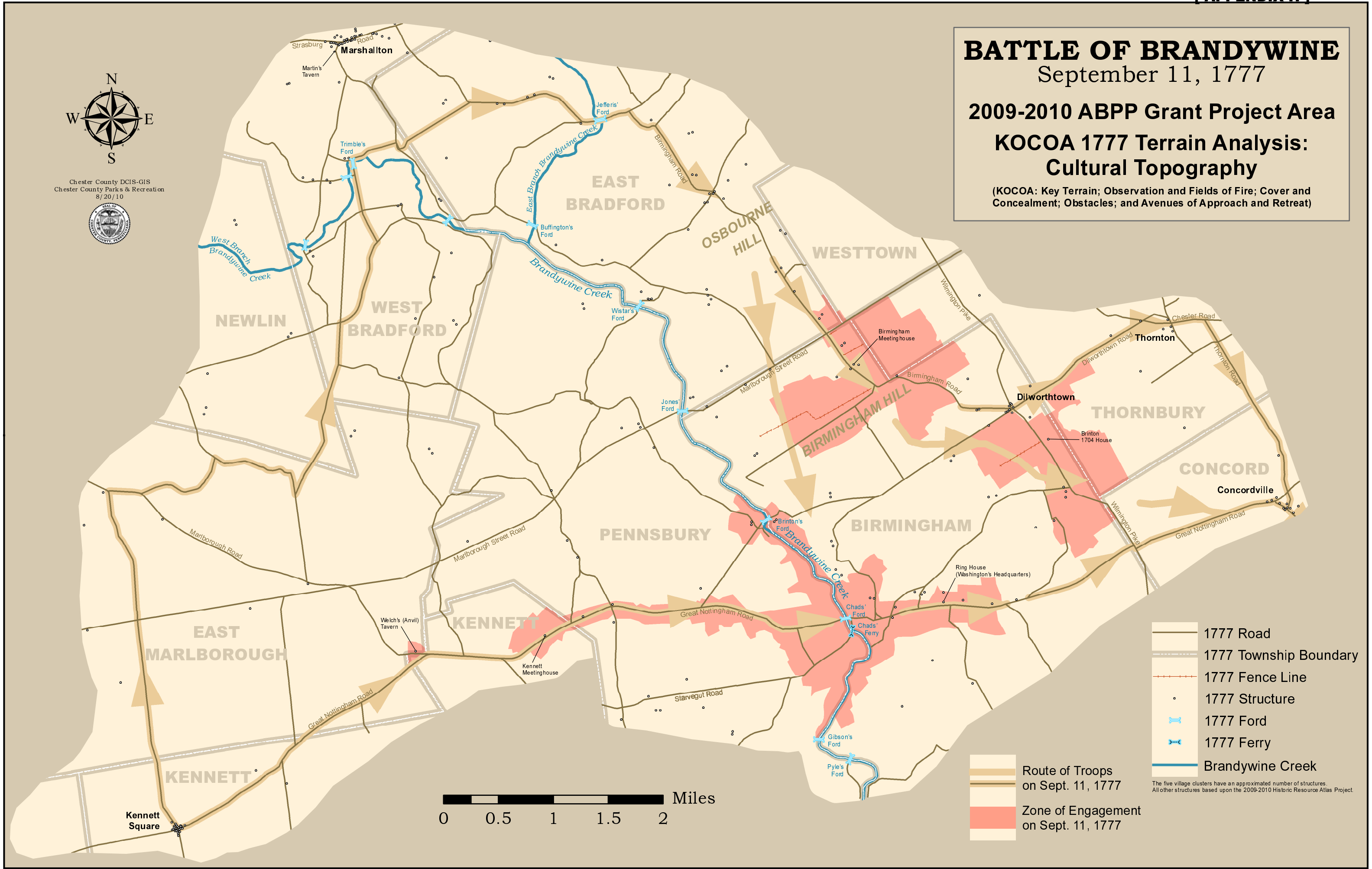**BATTLE OF BRANDYWINE**
September 11, 1777

2009-2010 ABPP Grant Project Area

**KOCOA 1777 Terrain Analysis:
Cultural Topography**

(KOCOA: Key Terrain; Observation and Fields of Fire; Cover and
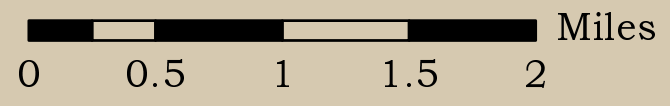Concealment; Obstacles; and Avenues of Approach and Retreat)
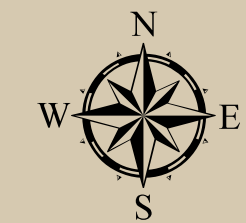
Chester County DCIS-GIS
Chester County Parks & Recreation
8/20/10

Legend:
- 1777 Road
- 1777 Township Boundary
- 1777 Fence Line
- 1777 Structure
- 1777 Ford
- 1777 Ferry
- Brandywine Creek
- Route of Troops on Sept. 11, 1777
- Zone of Engagement on Sept. 11, 1777

The five village clusters have an approximated number of structures.
All other structures based upon the 2009-2010 Historic Resource Atlas Project.

Miles
0   0.5   1   1.5   2

Map labels: Marshallton, Martin's Tavern, Strasburg Road, Jefferis' Ford, Trimble's Ford, East Branch Brandywine Creek, West Branch Brandywine Creek, EAST BRADFORD, Buffington's Ford, Birmingham Road, OSBOURNE HILL, WESTTOWN, Birmingham Meetinghouse, Wilmington Pike, Chester Road, THORNTON, WEST BRADFORD, NEWLIN, Wistar's Ford, Brandywine Creek, Marlborough Street Road, BIRMINGHAM HILL, Dilworthtown Road, Dilworthtown, THORNBURY, Brinton 1704 House, Jones Ford, CONCORD, Concordville, PENNSBURY, BIRMINGHAM, Marlborough Road, Brinton's Ford, Ring House (Washington's Headquarters), Great Nottingham Road, Marlborough Street Road, Welch's (Anvil) Tavern, KENNETT, Chads' Ford, Chads' Ferry, Wilmington Pike, EAST MARLBOROUGH, Kennett Meetinghouse, Starvegut Road, Gibson's Ford, Pyle's Ford, KENNETT, Kennett Square
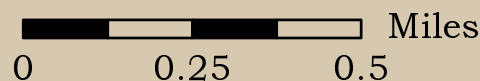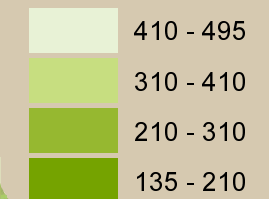
BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

Fields of Fire
During Order of Battle at Birmingham Hill
17:00, September 11, 1777

Chester County DCIS-GIS
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10/20/10

N W E S (compass rose)

Miles
0   0.25   0.5

Legend

Elevation in Feet
- 410 - 495
- 310 - 410
- 210 - 310
- 135 - 210

- 1777 Road
- 1777 Fence Line
- 1777 Structure
- 1777 Ford
- 1777 Ferry
- Stream
- Wetland
- Woodland

Troop Positions

Brigade / Artillery
- Continental (blue)
- British (red)
- Hessian (green)

Fields of Fire
- British 12 Pound Guns 5300 foot range 30 degree sweep
- Continental 3 Pound Guns 4000 foot range 30 degree sweep
- Brigade/Regiment Musketry 900 foot range 30 degree sweep (Continental / British)

OSBOURNE HILL

BIRMINGHAM HILL

Birmingham Road

(Cornwallis)

3rd
4th

Grenadiers

Marlborough Street Road

Grenadiers Grenadiers

Two 12-Pound Gun Battery

Light Inf

Light Inf

Jagers
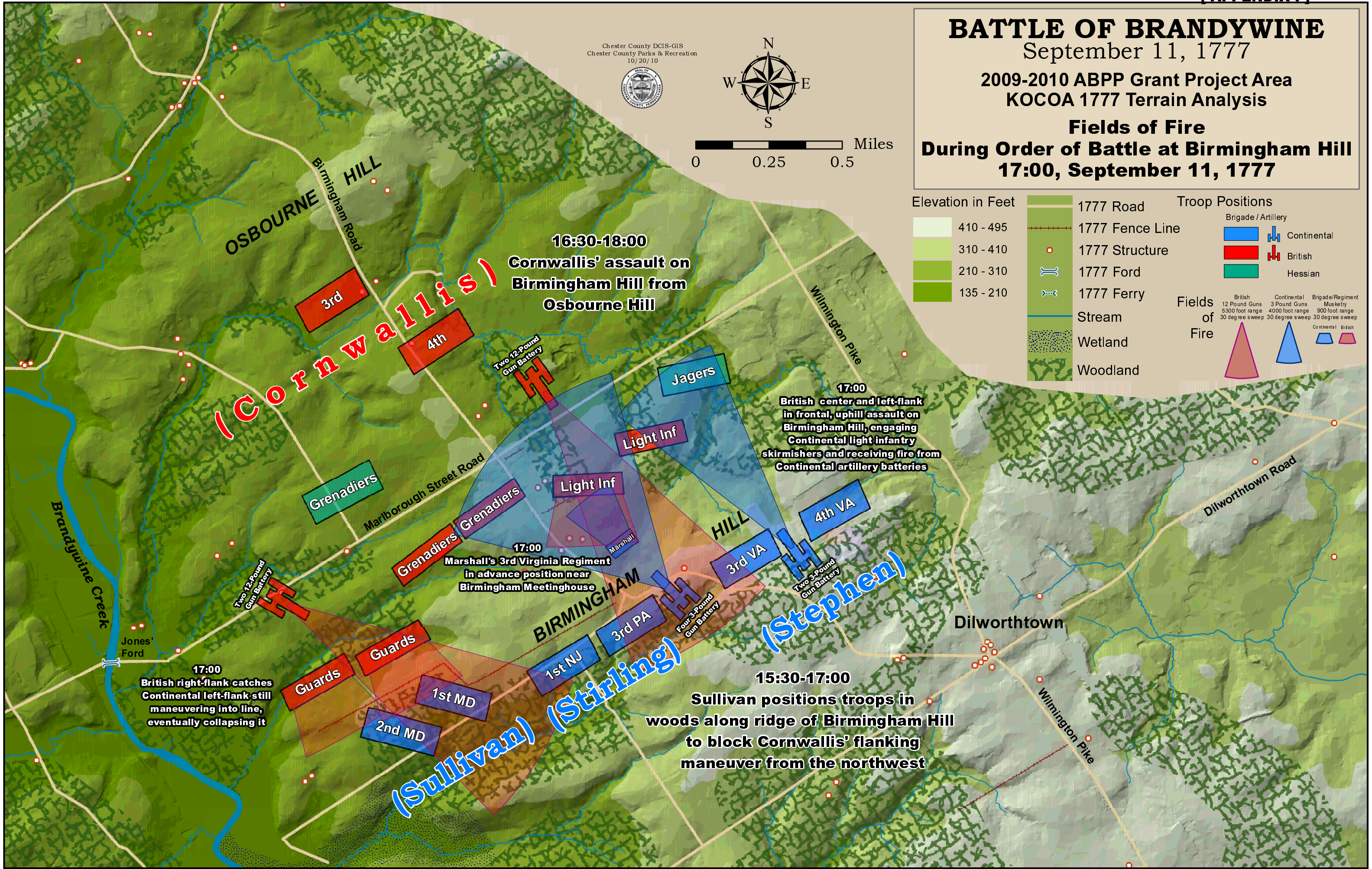
16:30-18:00
Cornwallis' assault on Birmingham Hill from Osbourne Hill

17:00
British center and left-flank in frontal, uphill assault on Birmingham Hill, engaging Continental light infantry skirmishers and receiving fire from Continental artillery batteries

17:00
Marshall's 3rd Virginia Regiment in advance position near Birmingham Meetinghouse

Marshall

BIRMINGHAM HILL

4th VA

3rd VA

3rd PA

1st NJ

Four 3-Pound Gun Battery

Two 3-Pound Gun Battery

(Stephen)

Dilworthtown

Wilmington Pike

Dilworthtown Road

Brandywine Creek

Jones' Ford
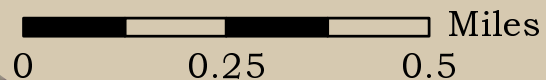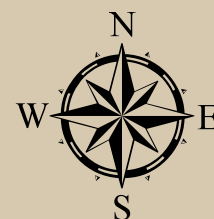
Two 12-Pound Gun Battery

Guards Guards

1st MD

2nd MD

(Sullivan) (Stirling)

17:00
British right-flank catches Continental left-flank still maneuvering into line, eventually collapsing it

15:30-17:00
Sullivan positions troops in woods along ridge of Birmingham Hill to block Cornwallis' flanking maneuver from the northwest
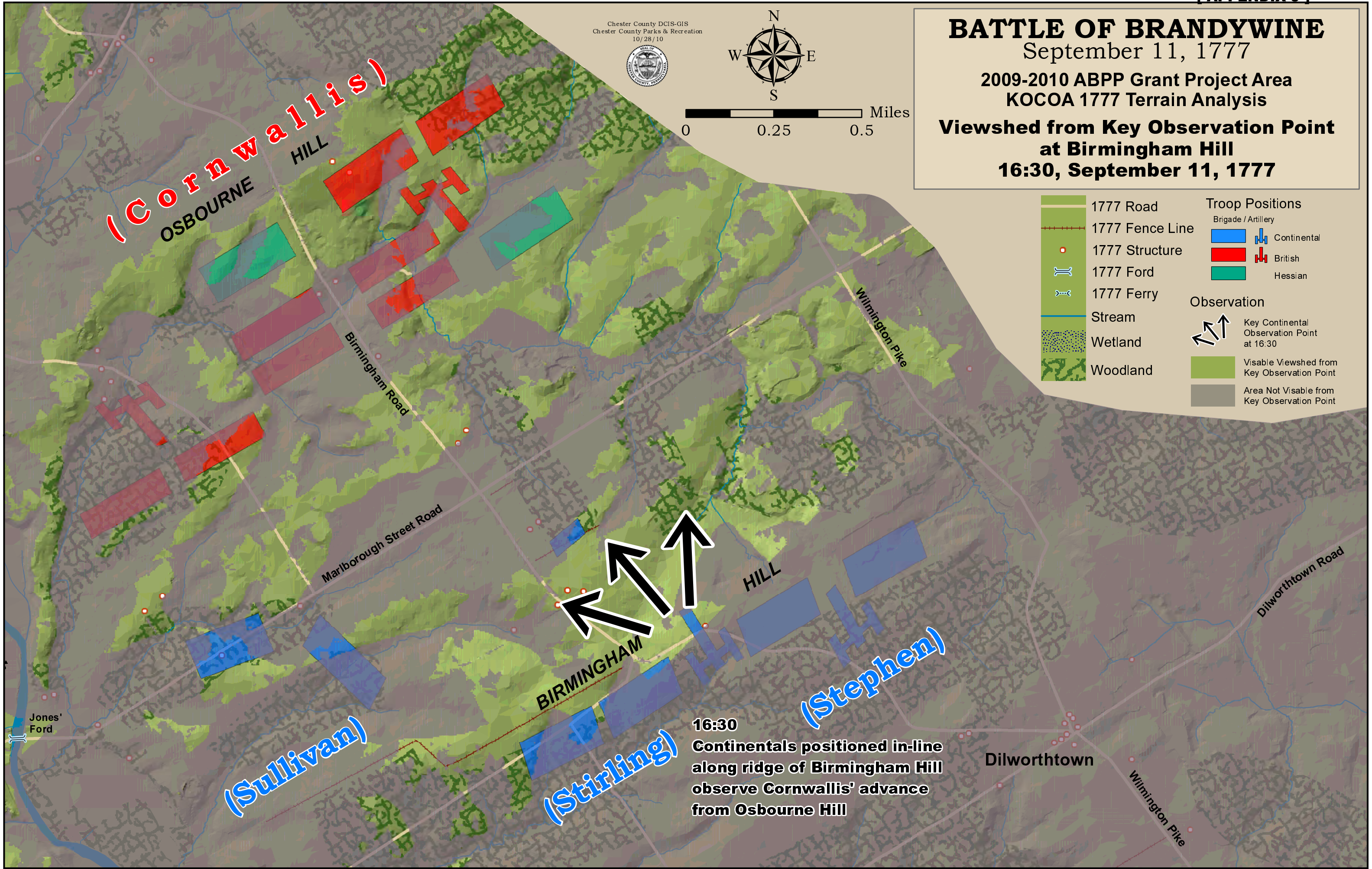
Wilmington Pike

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

Viewshed from Key Observation Point
at Birmingham Hill
16:30, September 11, 1777

Chester County DCIS-GIS
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10/28/10

N
W E
S

Miles
0   0.25   0.5

Legend

1777 Road
1777 Fence Line
1777 Structure
1777 Ford
1777 Ferry
Stream
Wetland
Woodland

Troop Positions
Brigade / Artillery

Continental
British
Hessian

Observation

Key Continental
Observation Point
at 16:30

Visable Viewshed from
Key Observation Point

Area Not Visable from
Key Observation Point

(Cornwallis)

OSBOURNE HILL

Birmingham Road

Marlborough Street Road

Wilmington Pike

BIRMINGHAM HILL

(Sullivan)

(Stirling)

(Stephen)

Jones' Ford

Dilworthtown

Wilmington Pike

Dilworthtown Road

16:30
Continentals positioned in-line
along ridge of Birmingham Hill
observe Cornwallis' advance
from Osbourne Hill

16:30
Cornwallis observes Continentals
positioned in-line along
ridge of Birmingham Hill
as he orders British advance
from Osbourne Hill

(Cornwallis)

OSBOURNE HILL

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Chester County Parks & Recreation
10/28/10
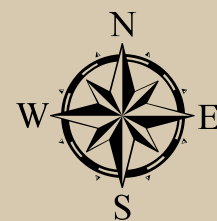
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W · E
S
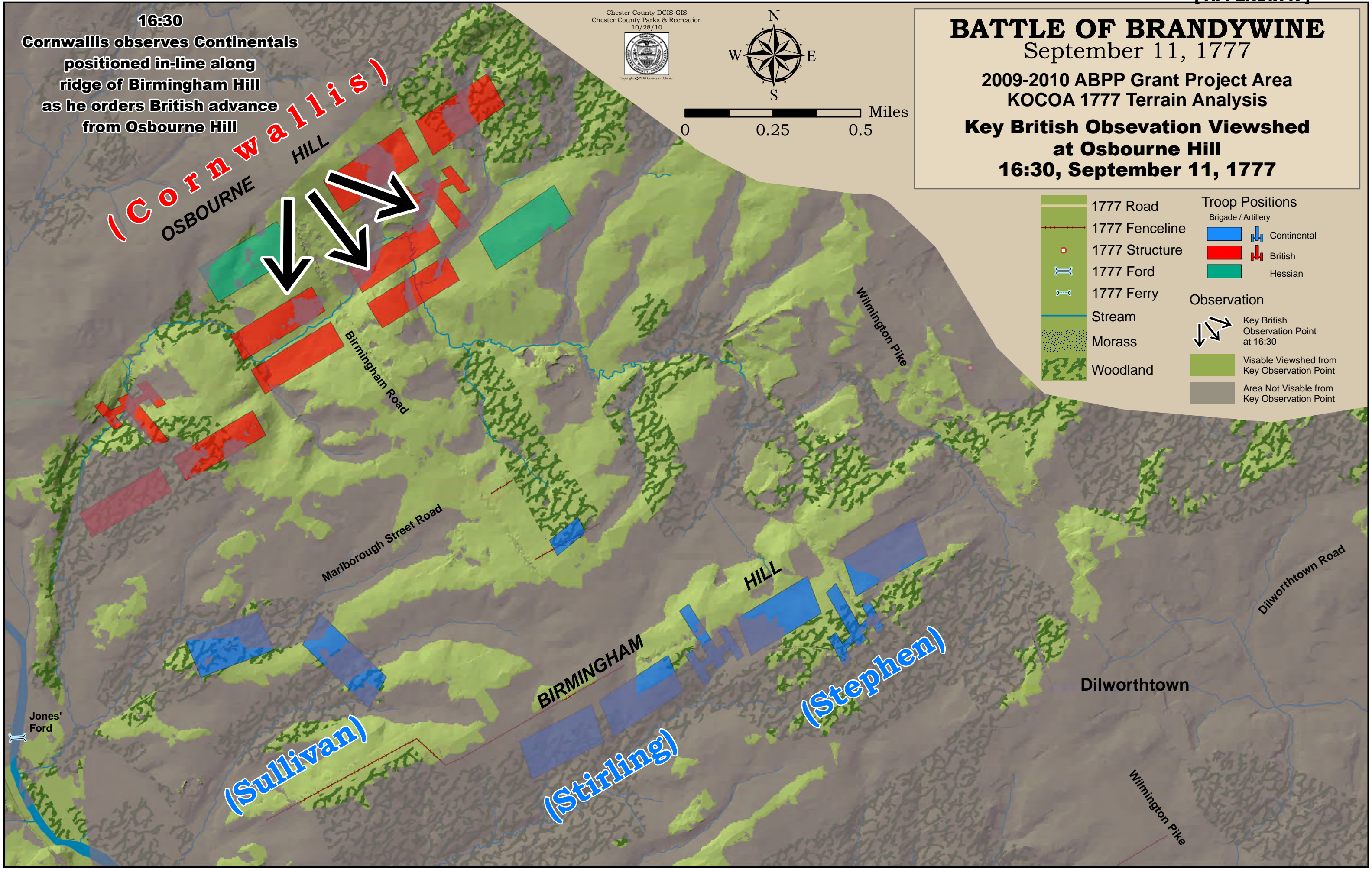
Miles
0   0.25   0.5

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

**Key British Obsevation Viewshed
at Osbourne Hill
16:30, September 11, 1777**

1777 Road
1777 Fenceline
1777 Structure
1777 Ford
1777 Ferry
Stream
Morass
Woodland

Troop Positions
Brigade / Artillery

Continental
British
Hessian

Observation

Key British
Observation Point
at 16:30

Visable Viewshed from
Key Observation Point

Area Not Visable from
Key Observation Point

Birmingham Road

Wilmington Pike

Marlborough Street Road

Dilworthtown Road

BIRMINGHAM HILL

Dilworthtown

Jones' Ford

(Sullivan)

(Stirling)

(Stephen)

Wilmington Pike

Legend

	1777 Road
	1777 Fenceline
	1777 Structure
	1777 Ford
	1777 Ferry
	Stream
	Morass
	Woodland

Chester County DCIS-GIS
Chester County Parks & Recreation
10/20/10
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(Cornwallis)

Grenadiers

17:45
Cornwallis' right-flank in
advance after action
on Birmingham Hill

Guards

Guards

1st NJ

2nd MD

1st MD

(Sullivan)

17:45
Sullivan's Troops in
retreat from Birmingham Hill

(Greene)

2nd VA

1st VA

17:45
Greene preparing rearguard
defence to slow Cornwallis'
left-flank advance
from Birmingham Hill

1st NC

Great Nottingham Road

Wilmington Pike

Brinton's
Ford

Two 12-Pound
Gun Battery

Two 3-Pound
Gun Battery

Brandywine Creek

17:45
The Queen's Rangers use the
base of the hill at Chads' Ford as
cover as they advance on the main
continental artillery emplacement

Wilmington Pike

(Knyphausen)

Two 12-Pound
Gun Battery

Two 12-Pound
Gun Battery

Two 3-Pound
Gun Battery

Two 3-Pound
Gun Battery

Chads'
Ford

QR

Chads'
Ferry

1st

Maxwell

1st PA

2nd PA

Great Nottingham Road

Great Nottingham Road

Elevation in Feet

	410 - 495
	310 - 410
	210 - 310
	135 - 210

2nd

Two 6-Pound
Gun Battery

71st

(Wayne)

17:30-18:30
Kynphausen's Assault
on Chads' Ford/
Crossing of Brandywine Creek

Stirn

Two 3-Pound
Gun Battery

PA Militia

PA Militia

**Fields
of
Fire**

Brigade/
Regiment
Musketry
900 foot range
30 degree sweep
Continental   British

Continental
3 Pound Guns
4000 foot range
30 degree sweep

British
12 Pound Guns
5300 foot range
30 degree sweep

Troop Positions
Brigade / Artillery

	Continental
	British
	Hessian

BATTLE OF BRANDYWINE
September 11, 1777

**2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis**

**Fields of Fire
During Order of Battle at Chads' Ford
17:45, September 11, 1777**
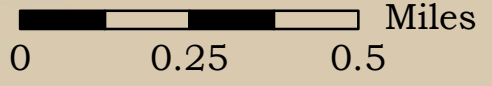
N
W E
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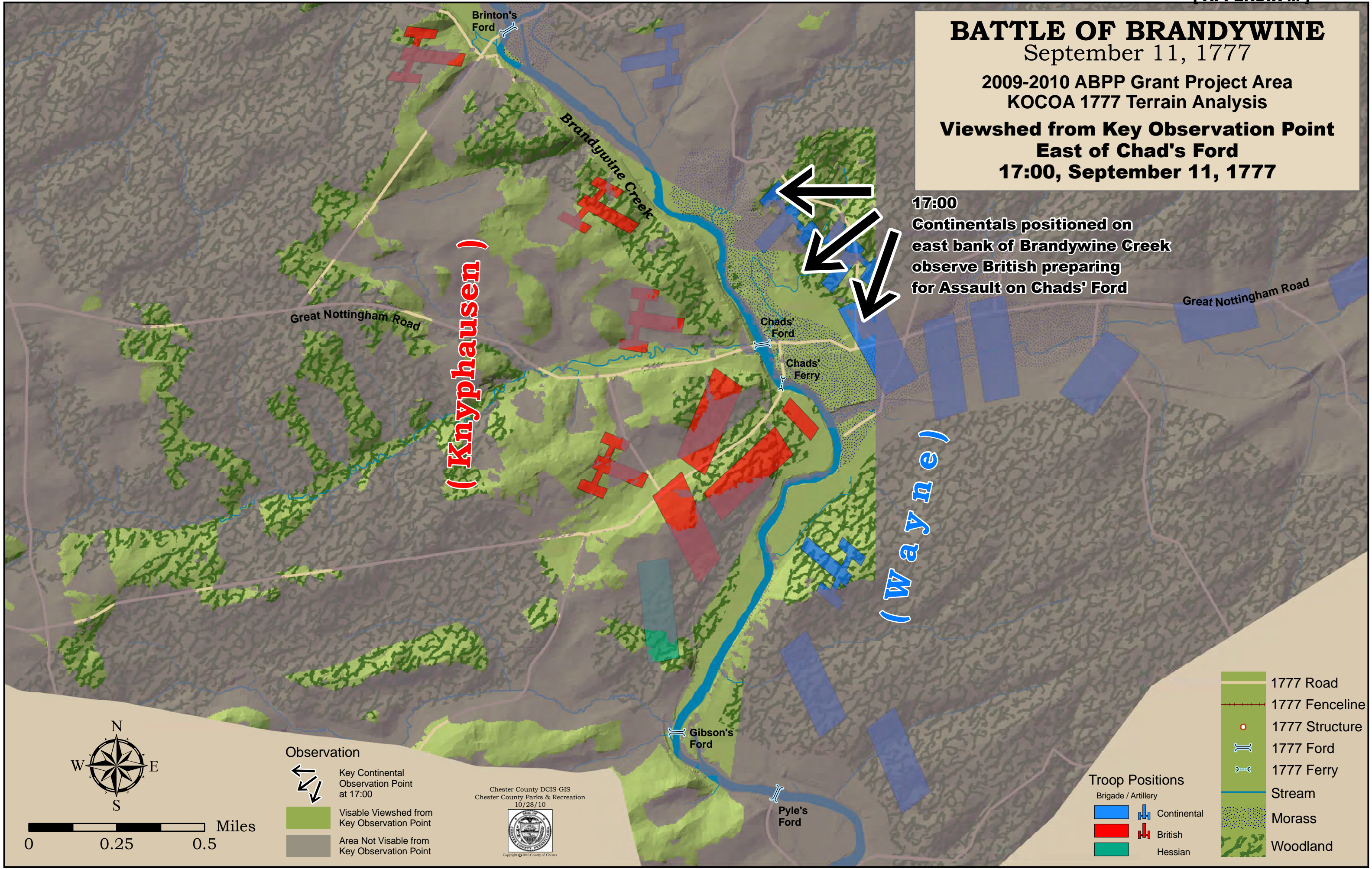
Miles

0   0.25   0.5

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

**Viewshed from Key Observation Point
East of Chad's Ford
17:00, September 11, 1777**

17:00
Continentals positioned on
east bank of Brandywine Creek
observe British preparing
for Assault on Chads' Ford

Brinton's Ford

Brandywine Creek

Great Nottingham Road

(Knyphausen)

Chads' Ford

Chads' Ferry

Great Nottingham Road

(Wayne)

Gibson's Ford

Pyle's Ford

N
W   E
S

Observation

Key Continental
Observation Point
at 17:00

Visable Viewshed from
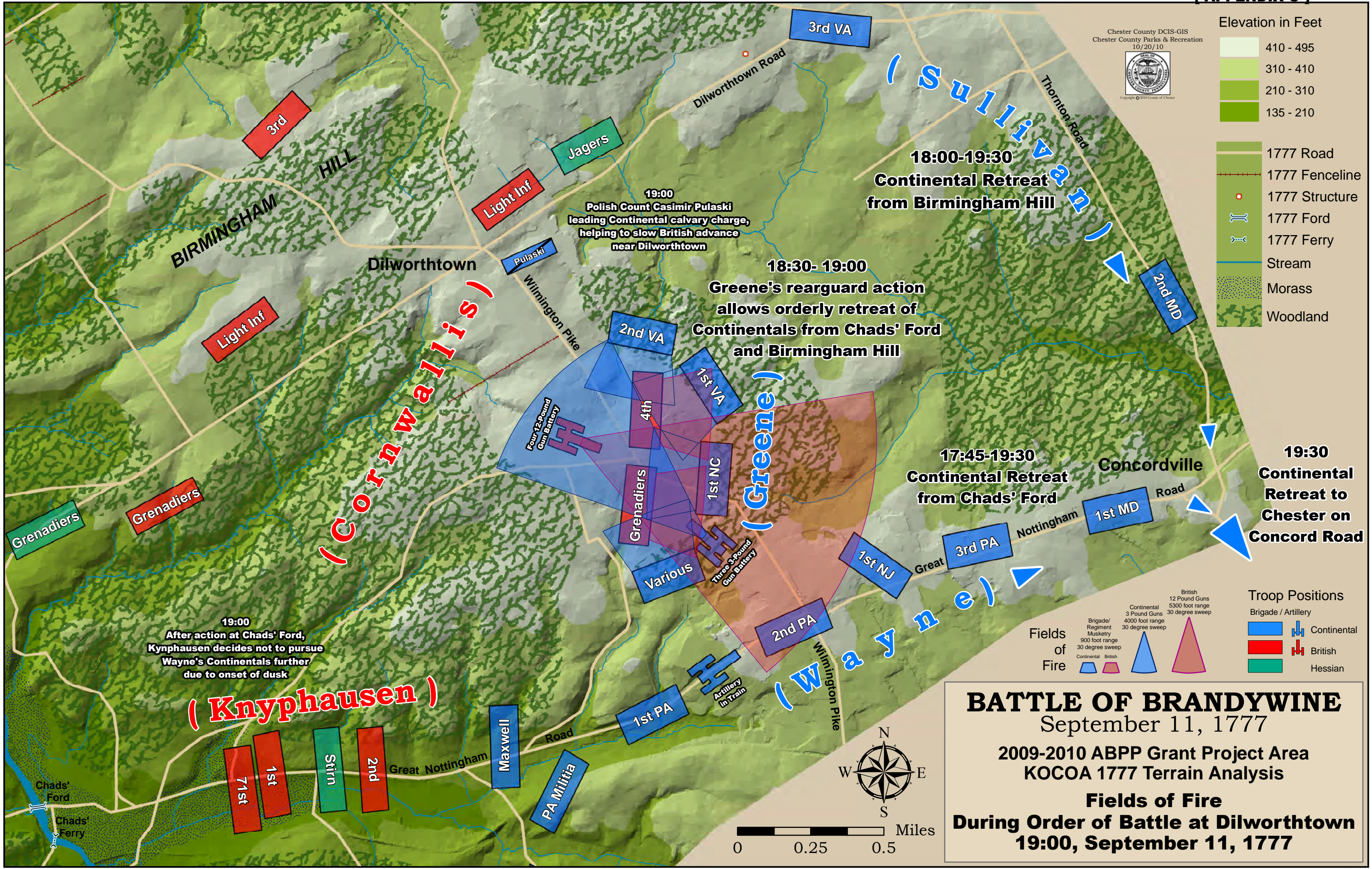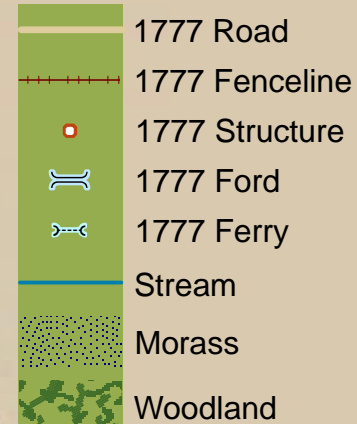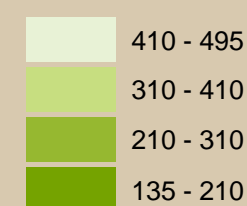Key Observation Point

Area Not Visable from
Key Observation Point

Chester County DCIS-GIS
Chester County Parks & Recreation
10/28/10

Miles
0   0.25   0.5

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1777 Road
1777 Fenceline
1777 Structure
1777 Ford
1777 Ferry
Stream
Morass
Woodland

Troop Positions
Brigade / Artillery

Continental
British
Hessian

Brinton's
Ford

Brandywine Creek

Great Nottingham Road

Great Nottingham Road

Chads'
Ford

Chads'
Ferry

(Knyphausen)

17:00
Kyphausen observes
Continentals positioned
on east bank of
Brandywine Creek
as British troops
position for Assault
on Chads' Ford

(Wayne)

Gibson's
Ford

Pyle's
Ford
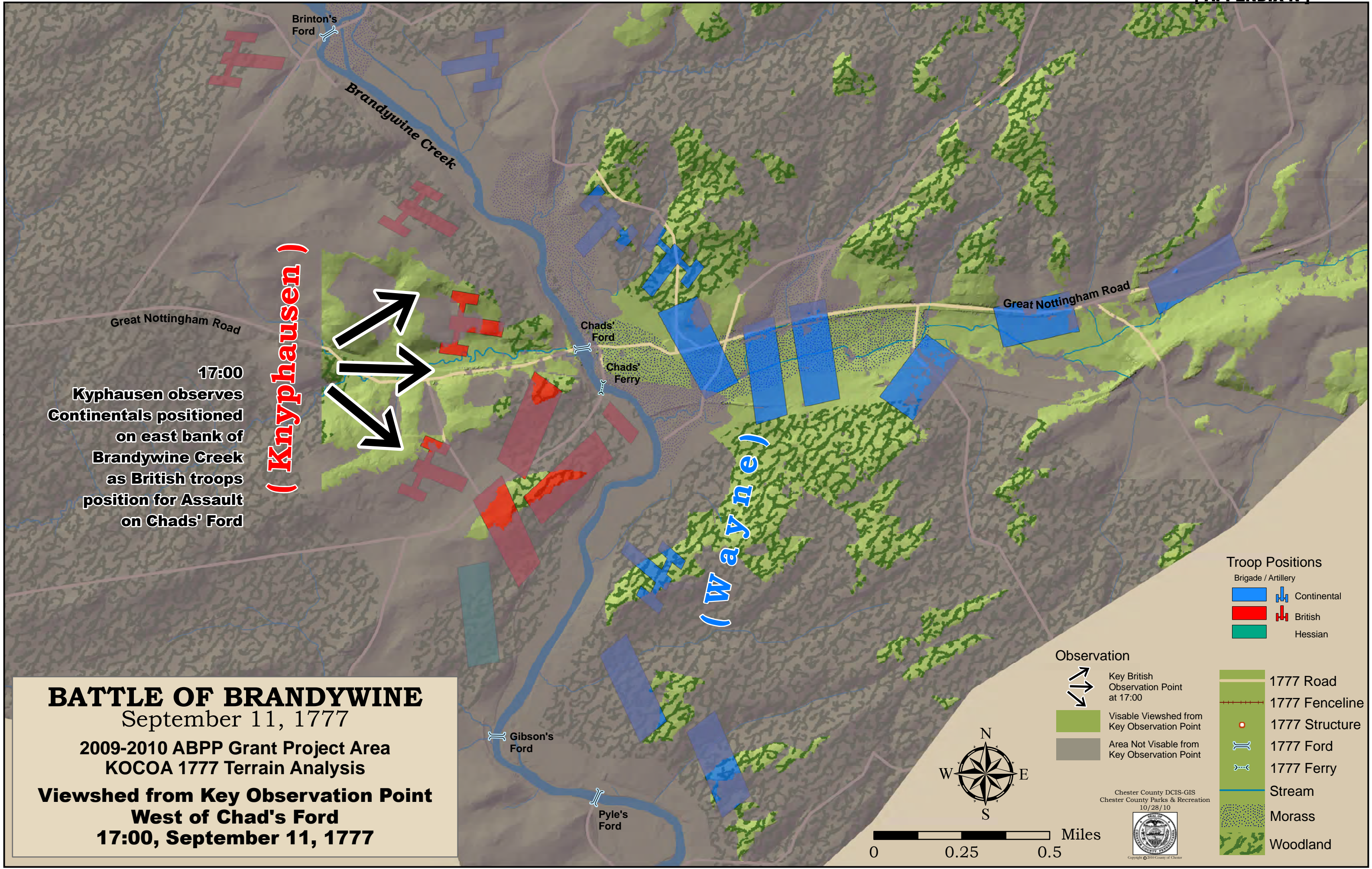
BATTLE OF BRANDYWINE
September 11, 1777

**2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis**

**Viewshed from Key Observation Point
West of Chad's Ford
17:00, September 11, 1777**

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Chester County Parks & Recreation
10/28/10

Troop Positions

Brigade / Artillery

Continental

British

Hessian

Observation

Key British
Observation Point
at 17:00

Visable Viewshed from
Key Observation Point

Area Not Visable from
Key Observation Point

1777 Road

1777 Fenceline

1777 Structure

1777 Ford

1777 Ferry

Stream

Morass

Woodland

N
W   E
S

Miles
0   0.25   0.5

Chester County DCIS-GIS
Chester County Parks & Recreation
10/20/10

Elevation in Feet

	410 - 495
	310 - 410
	210 - 310
	135 - 210

- 1777 Road
- 1777 Fenceline
- 1777 Structure
- 1777 Ford
- 1777 Ferry
- Stream
- Morass
- Woodland

3rd VA

3rd

Jagers

Light Inf

BIRMINGHAM HILL

Dilworthtown Road

Thornton Road

18:00-19:30 Continental Retreat from Birmingham Hill

(Sullivan)

Light Inf

Dilworthtown

Pulaski

19:00
Polish Count Casimir Pulaski leading Continental calvary charge, helping to slow British advance near Dilworthtown

18:30- 19:00
Greene's rearguard action allows orderly retreat of Continentals from Chads' Ford and Birmingham Hill

2nd MD

(Cornwallis)

Wilmington Pike

2nd VA

1st VA

4th

Four 12-Pound Gun Battery

(Greene)

1st NC

Grenadiers

Various

Three 3-Pound Gun Battery

17:45-19:30 Continental Retreat from Chads' Ford

Concordville

19:30 Continental Retreat to Chester on Concord Road

Grenadiers

Grenadiers

1st MD

1st NJ

Great 3rd PA Nottingham Road

(Wayne)

2nd PA

Wilmington Pike

19:00
After action at Chads' Ford, Kynphausen decides not to pursue Wayne's Continentals further due to onset of dusk

Artillery in Train

1st PA

(Knyphausen)

Maxwell Road

PA Militia

Great Nottingham Road

71st

1st

Stirn

2nd

1st PA

Chads' Ford

Chads' Ferry

Fields of Fire

Brigade/Regiment Musketry 900 foot range 30 degree sweep
Continental | British

Continental 3 Pound Guns 4000 foot range 30 degree sweep

British 12 Pound Guns 5300 foot range 30 degree sweep

Troop Positions

Brigade / Artillery

		Continental
		British
		Hessian

W N E S — Miles
0   0.25   0.5

BATTLE OF BRANDYWINE
September 11, 1777

**2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis**

**Fields of Fire
During Order of Battle at Dilworthtown
19:00, September 11, 1777**

Dilworthtown Road

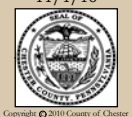Thornton Road

(Cornwallis)

Dilworthtown

(Greene)

18:30
Cornwallis' advance right-flank
is engaged with Continental
remnants retreating from
Birmingham Hill; Greene's
Continentals positioning in woods
southeast of Dilworthtown are
concealed to them

Wilmington Pike

Great Nottingham Road

Wilmington Pike

Great Notti...

Observation

Key British
Observation Point
at 18:30

Visable Viewshed from
Key Observation Point

Area Not Visable from
Key Observation Point

Troop Positions

Brigade / Artillery

Continental

British

Hessian

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

Viewshed from Key Observation Point
South of Dilworthtown
18:30, September 11, 1777

Chester County DCIS-GIS
Chester County Parks & Recreation
11/1/10

1777 Road
1777 Fenceline
1777 Structure
1777 Ford
1777 Ferry
Stream
Morass
Woodland

N W E S

Miles
0   0.25   0.5

Observation

Key Continental Observation Point at 18:30

Visable Viewshed from Key Observation Point

Area Not Visable from Key Observation Point

Troop Positions

Brigade / Artillery

Continental

British

Hessian

(Cornwallis)

Dilworthtown

Dilworthtown Road

Thornton Road

Wilmington Pike
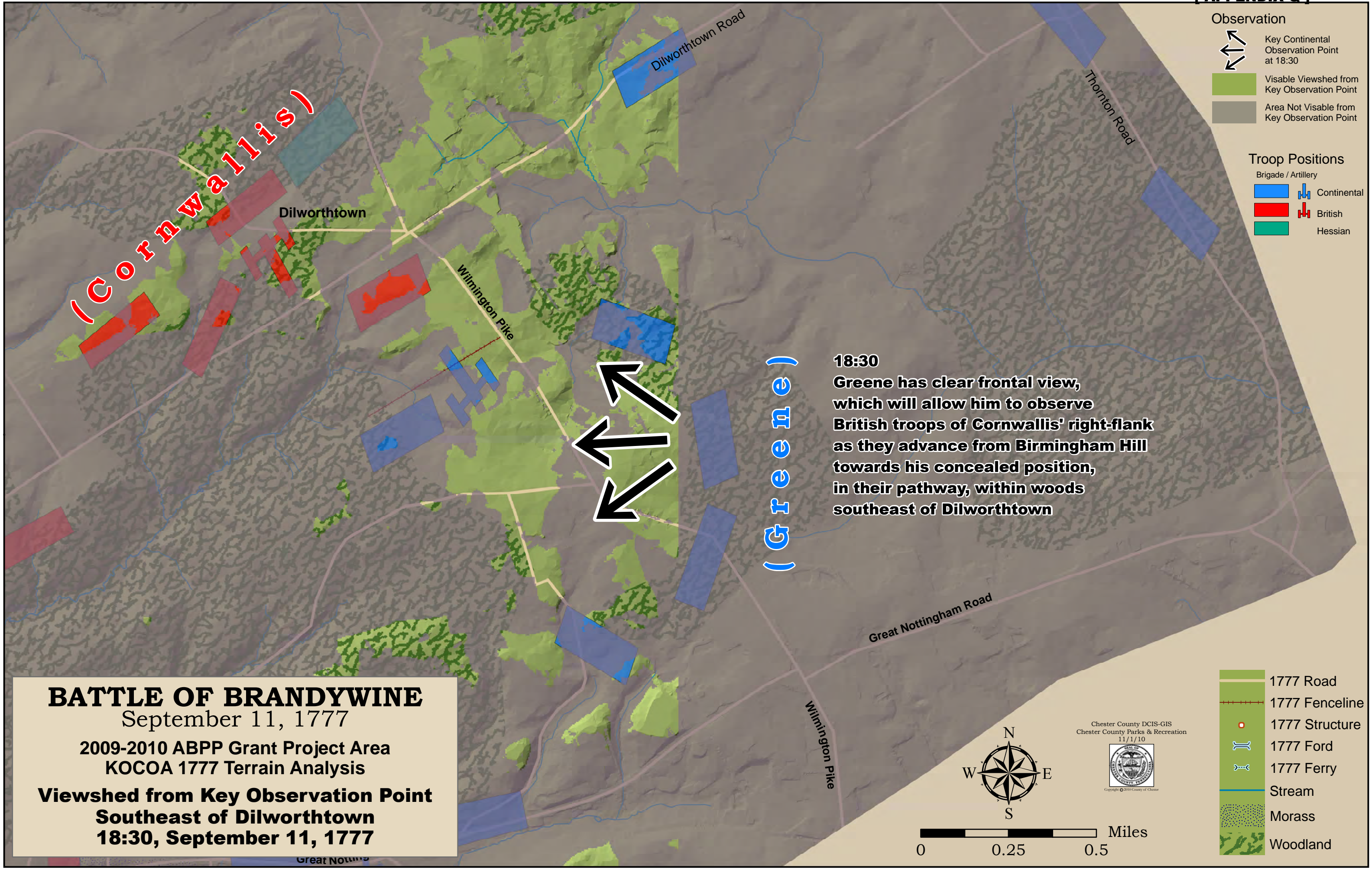
(Greene)

18:30
Greene has clear frontal view, which will allow him to observe British troops of Cornwallis' right-flank as they advance from Birmingham Hill towards his concealed position, in their pathway, within woods southeast of Dilworthtown

Great Nottingham Road

Wilmington Pike

Great Nottins

BATTLE OF BRANDYWINE
September 11, 1777

2009-2010 ABPP Grant Project Area
KOCOA 1777 Terrain Analysis

Viewshed from Key Observation Point Southeast of Dilworthtown 18:30, September 11, 1777

Chester County DCIS-GIS
Chester County Parks & Recreation
11/1/10

N
W   E
S

Miles
0   0.25   0.5

1777 Road
1777 Fenceline
1777 Structure
1777 Ford
1777 Ferry
Stream
Morass
Woodland

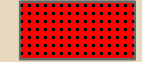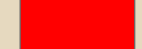# Brandywine Battlefield Archeological Assessment

Archeological Potential and Anticipated Deposits

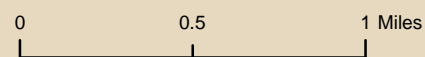based on 1989 Cultural Resources Management Study

Brandywine Landmark Area

Archeological Potential

- High
- Medium
- Low
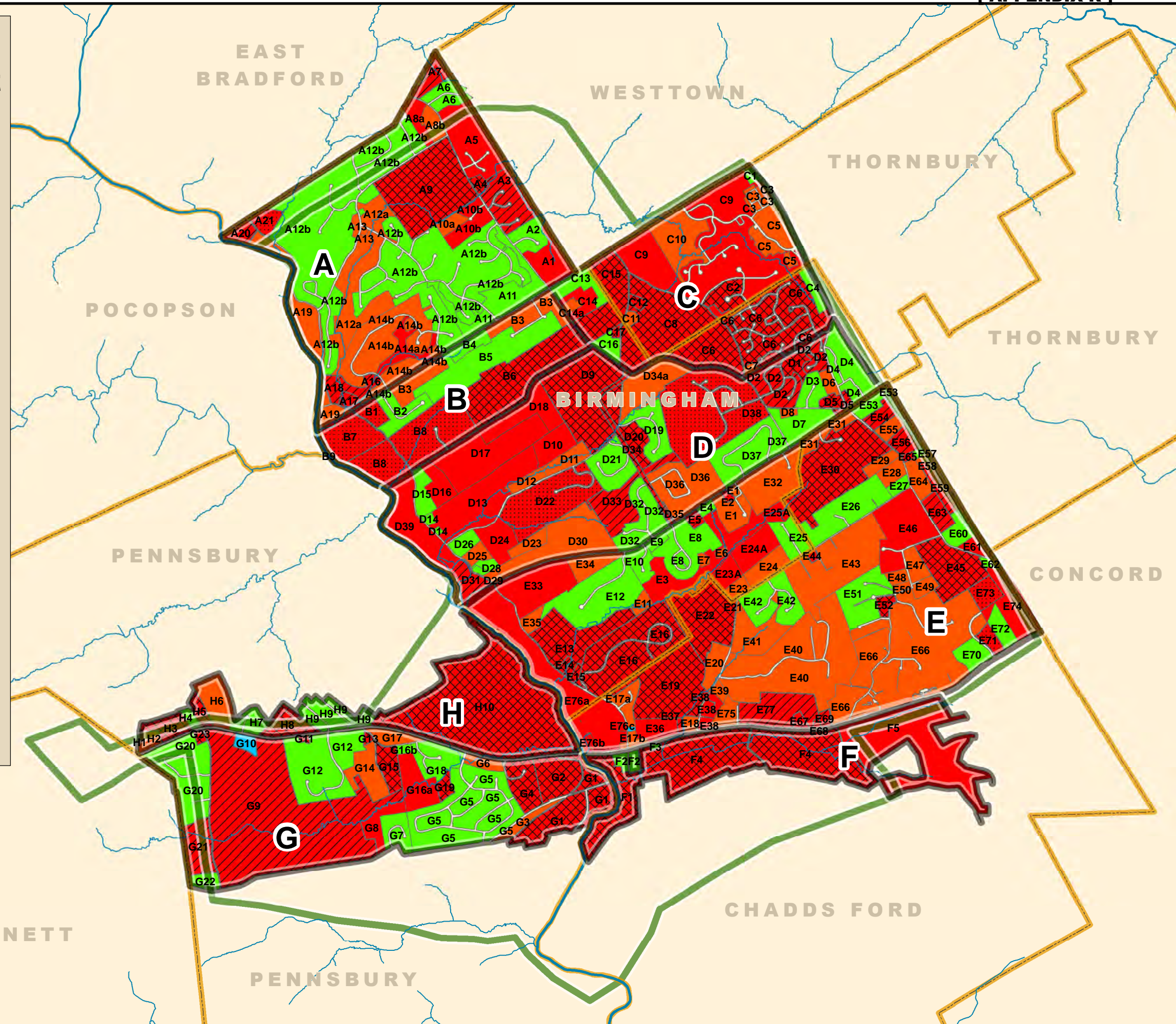- Protected

Anticipated Deposits

- Major
- Some
- Little or None
- Undetermined

0   0.5   1 Miles

Based on the August 1989, Brandywine Battlefield National Historic Landmark
Cultural Resources Management Study

version 1.0, November 2009

BATTLE OF BRANDYWINE

September 11, 1777
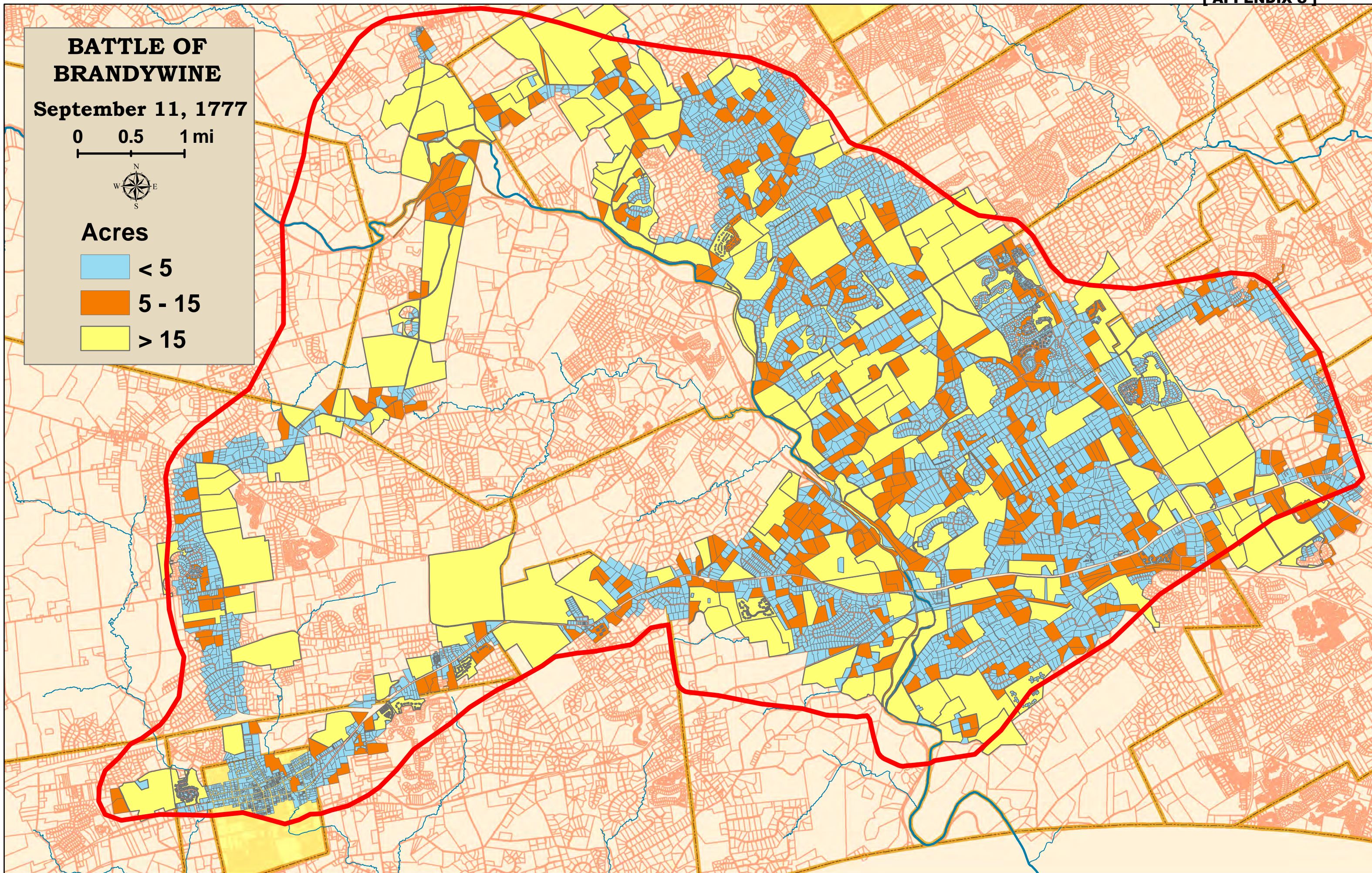
0   0.5   1 mi

Acres

< 5

5 - 15

> 15

Map 3
Revolutionary War Campaign of 1777 Loop Concept

Battle Path Concept Study

This map was digitally compiled for internal maintenance and developmental use by the County of Chester, Pennsylvania to provide an index to parcels and for other reference purposes. Parcel lines do not represent actual field surveys of premises. County of Chester, Pennsylvania makes no claims as to the completeness, accuracy or content of any data contained hereon, and makes no representation of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor are any such warranties to be implied or inferred, with respect to the information or data furnished herein.

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Legend

- The 1777 Loop Concept
- British Troop Movements
- Continental Troop Movements
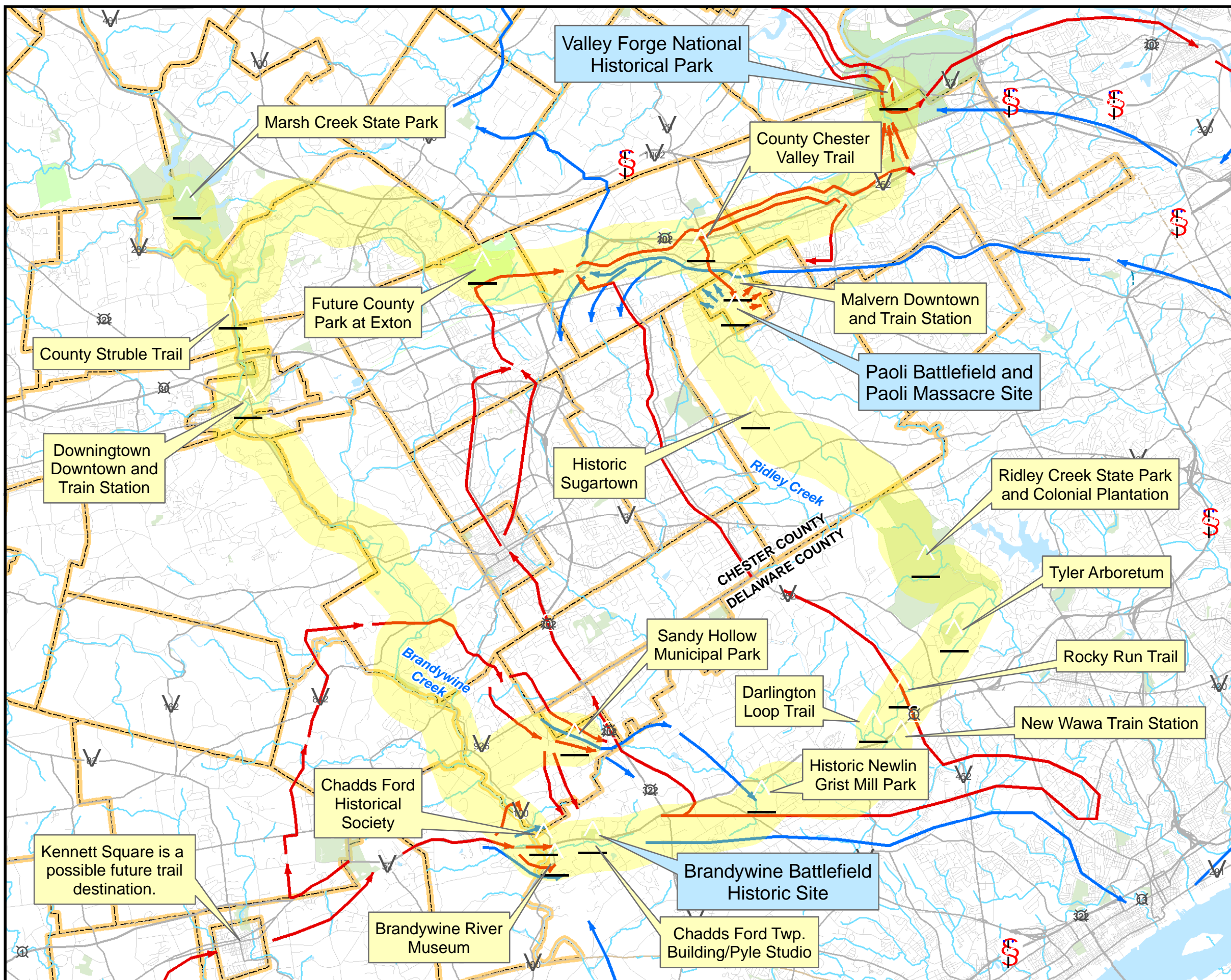- Major Parks
- Municipalities
- Key Destinations

1: 126,720

1 inch = 2 miles

0 1 2 4 Miles

August 2010

Source: Chester County Planning Commission, 2010

Map Labels

- Valley Forge National Historical Park
- Marsh Creek State Park
- County Chester Valley Trail
- Future County Park at Exton
- Malvern Downtown and Train Station
- County Struble Trail
- Paoli Battlefield and Paoli Massacre Site
- Downingtown Downtown and Train Station
- Historic Sugartown
- Ridley Creek
- Ridley Creek State Park and Colonial Plantation
- Tyler Arboretum
- CHESTER COUNTY
- DELAWARE COUNTY
- Sandy Hollow Municipal Park
- Rocky Run Trail
- Darlington Loop Trail
- New Wawa Train Station
- Brandywine Creek
- Historic Newlin Grist Mill Park
- Chadds Ford Historical Society
- Kennett Square is a possible future trail destination.
- Brandywine River Museum
- Brandywine Battlefield Historic Site
- Chadds Ford Twp. Building/Pyle Studio