Natural Lands Trust

Brandywine Farm
East Bradford Township

Stewardship, Trails, and Limited Development Plan

JANUARY 2012

East Bradford Township, Chester County
(Tax parcels 51–7–16, 51–7–19, 51–7–119, 51–7–121)
95.8 acres

Natural Lands Trust ~ Hildacy Farm ~ 1031 Palmers Mill Road ~ Media, PA 19063 ~ 610-353-5587 ~ www.natlands.org

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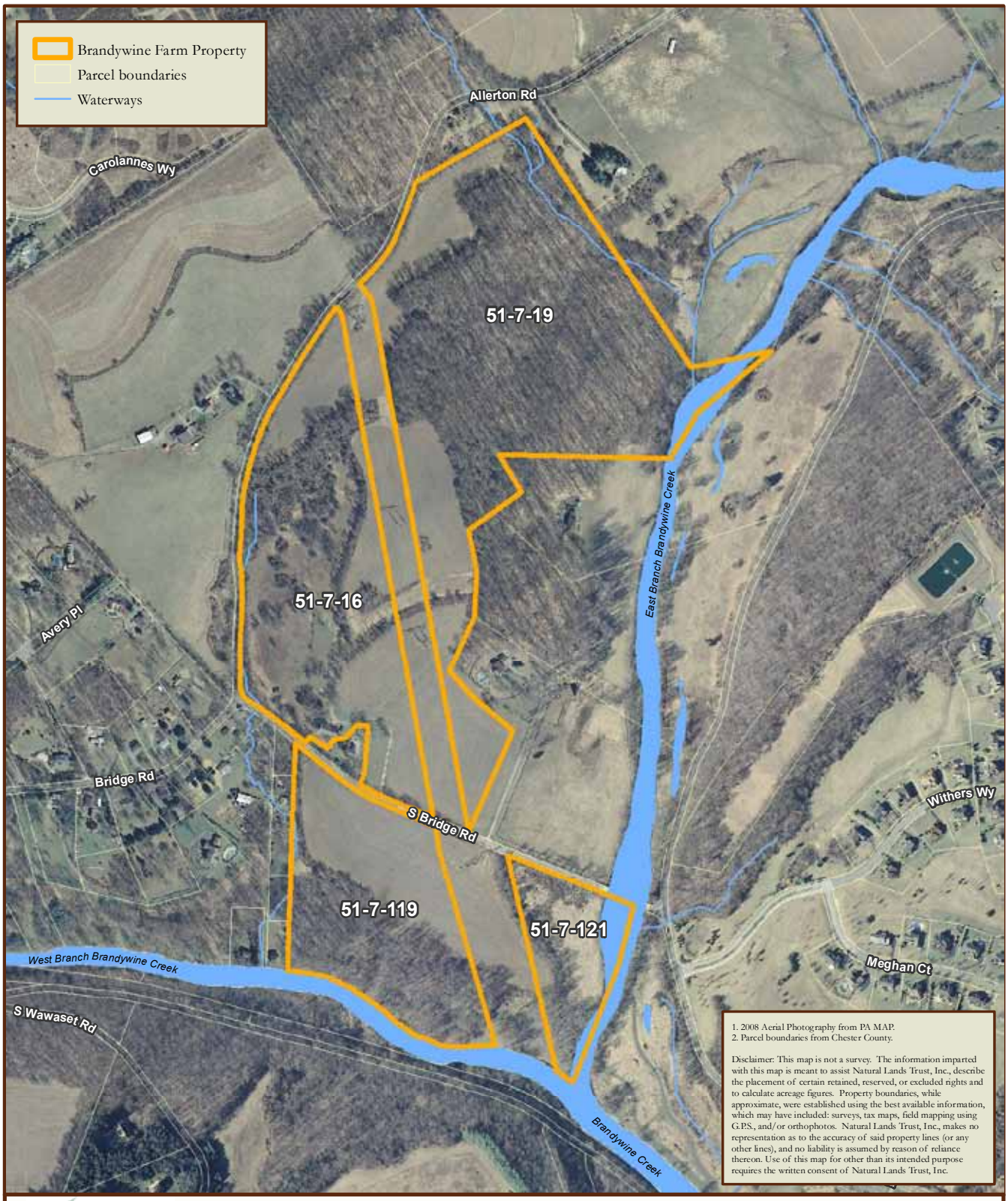

1. 2008 Aerial Photography from PA MAP.
2. Parcel boundaries from Chester County.

Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included: surveys, tax maps, field mapping using G.P.S., and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.

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2008 Aerial Photography

BRANDYWINE FARM PROPERTY

Tax ID: 51-7-19, 51-7-16, 51-7-119, 51-7-121 (+/- 95.8 acres)

East Bradford Township, Chestnut County, PA

N

0 300 600 Feet

Compiled By: MEB 09/29/11

Stewardship Plan

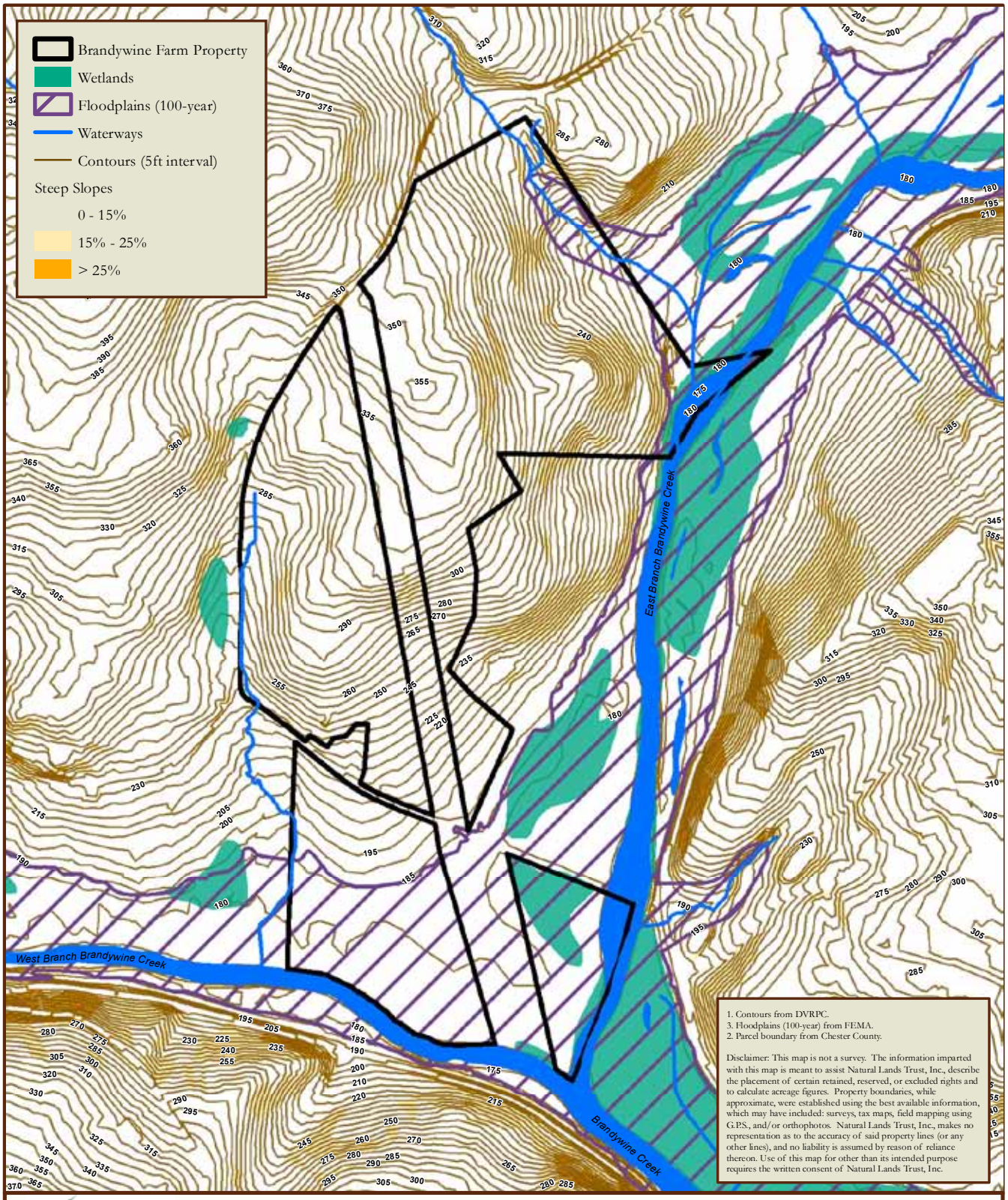
General Description of Natural Areas

The 95.8-acre Brandywine Farm property is divided into four parcels located north and south of Bridge Road (Route 842) and east of Allerton Road near the southern edge of East Bradford Township, Chester County (see **2008 Aerial Photography**). The property lies northwest of the confluence of the East Branch Brandywine Creek and West Branch Brandywine Creek and immediately west of the Township's Shaw's Bridge Park (~37 acres).

The property was acquired by East Bradford Township in April 2011 to (1) protect critical wetland habitat at the confluence of the East Branch Brandywine Creek and West Branch Brandywine Creek, and (2) expand the Township's Shaw's Bridge Park. The Township intends to retain ownership of the two parcels south of Bridge Road (51–7–119 and 51–7–121, 23.1 acres) and resell the two parcels north of Bridge Road (51–7–16 and 51–7–19, 72.7 acres). Prior to reselling the northern parcels, the Township will place a conservation easement on each parcel that will limit the number of proposed building lots and provide a trail right-of-way to connect the southern parcels to Allerton Road.

The northern parcels include agricultural fields, upland forests, a tenant house, a historic barn (listed in the East Bradford Township Historic Resource Survey and the National Register of Historic Places), a gravel driveway from Bridge Road, a section of the East Branch Brandywine Creek, and a tributary of the East Branch that flows near the northern boundary. The parcels south of Bridge Road include agricultural fields, a wetland forest, and wet meadows in the floodplain of the West Branch Brandywine Creek. Agricultural and large-lot residential land uses characterize the landscape surrounding the Brandywine Farm property. A PECO power line bisects the entire property from north to south and a gas pipeline crosses the southwestern parcel.

Headwater tributary to East Branch Brandywine



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Environmental Features

BRANDYWINE FARM PROPERTY

Tax ID: 51-7-19, 51-7-16, 51-7-119, 51-7-121 (+/- 95.8 acres)

East Bradford Township, Chestnut County, PA

N

0 300 600 Feet

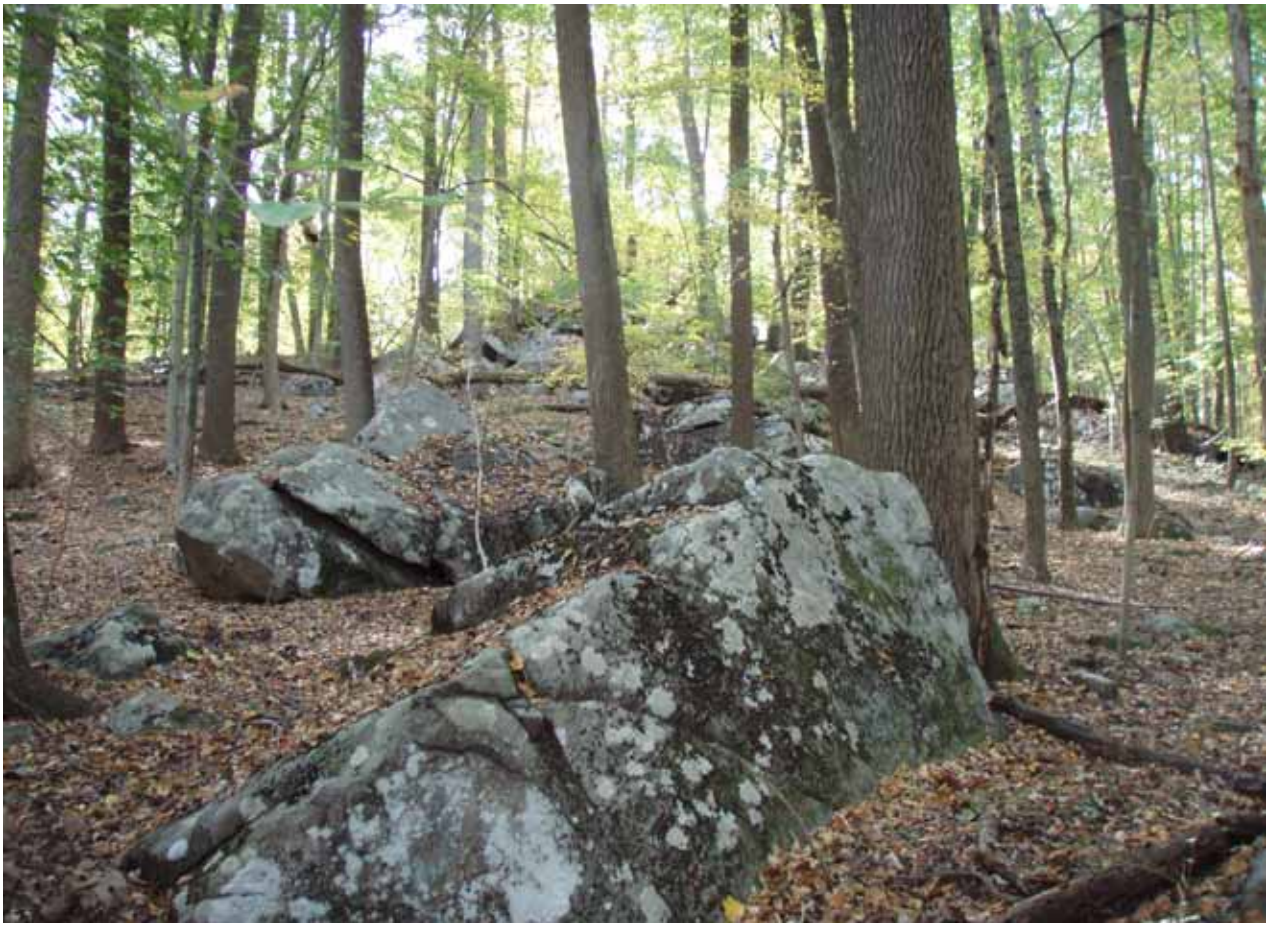
Compiled By: MEB 09/29/11

The topography of the property ranges from about 175 feet along the East Branch and West Branch Brandywine Creek, to about 355 feet at a hill crest east of the PECO power line in a northern parcel (see **Environmental Features map**). From this high point, the terrain slopes generally toward the two branches of the Brandywine Creek. The property is underlain by felsic gneiss and many large boulders—a few forming small caves—characterize the forested hillside in the northern part of the property.

The property has a history of crop farming and grazing dating back to at least the early 1900's (see **Historical Aerial Imagery 1937 and 1971**). The mature forest in the northern part of the property appears on 1937 Historical Aerial Imagery, suggesting this area was too steep and rocky to farm. An old road bed crosses part of this forest. According to Township residents, historical artifacts from Native American settlements have been found on the property near the confluence of the East Branch and West Branch Brandywine Creek.

This report addresses the stewardship, potential development, and public access to the site's natural features, including: (1) a description of the natural areas on the property, with particular focus on the general vegetation, (2) a summary of stewardship issues and opportunities, (3) general recommendations to address stewardship issues or fulfill stewardship opportunities, (4) recommendations for the location of house sites on the northern parcels that are sensitive to the viewshed along Allerton Road and the environmental features on the property, and (5) recommendations for trail corridors that allow public access throughout the property and connect the southern parcels with Allerton Road.

David Steckel, Andrea Stevens, and Rick Tralies of Natural Lands Trust conducted field inspections of the property on July 26 and October 18, 2011. During



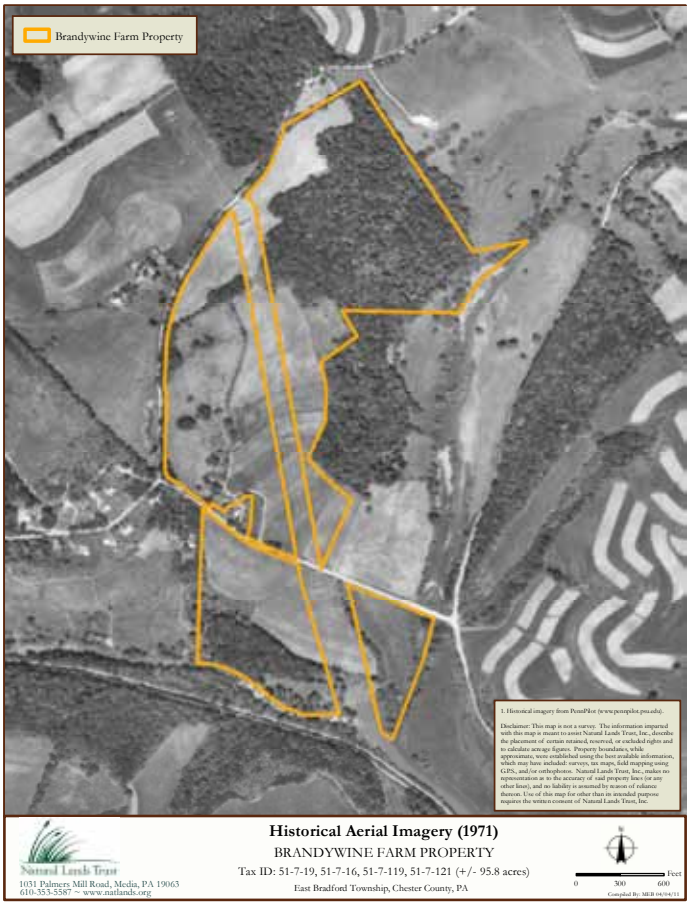
Outcrops in northern forest area

the first site visit, we were accompanied by Mandie Cantlin, Assistant Township Manager and Dave Redmond, member of the Township Trails Committee. We accessed the property from the gravel driveway to the northern parcels from Bridge Road. We took photographs and collected Global Positioning System (GPS) points of the natural features on the property during these site visits.

Water Resources

The property is located within the Brandywine Creek Regional Basin which is part of the Christina Basin that flows into the Delaware River. Parts of the East Branch Brandywine Creek occur within the eastern property boundary and the West Branch Brandywine Creek flows along the southern property boundary. Tributaries of the East Branch and West Branch Brandywine Creek flow near the northern property boundary and the western property boundary along Allerton Road (see **Environmental Features map**). The confluence of the East and West Branches Brandywine Creek lies at the southeastern property corner. The property is located within the Brandywine Scenic River Corridor which was designated by the Commonwealth in 1989.

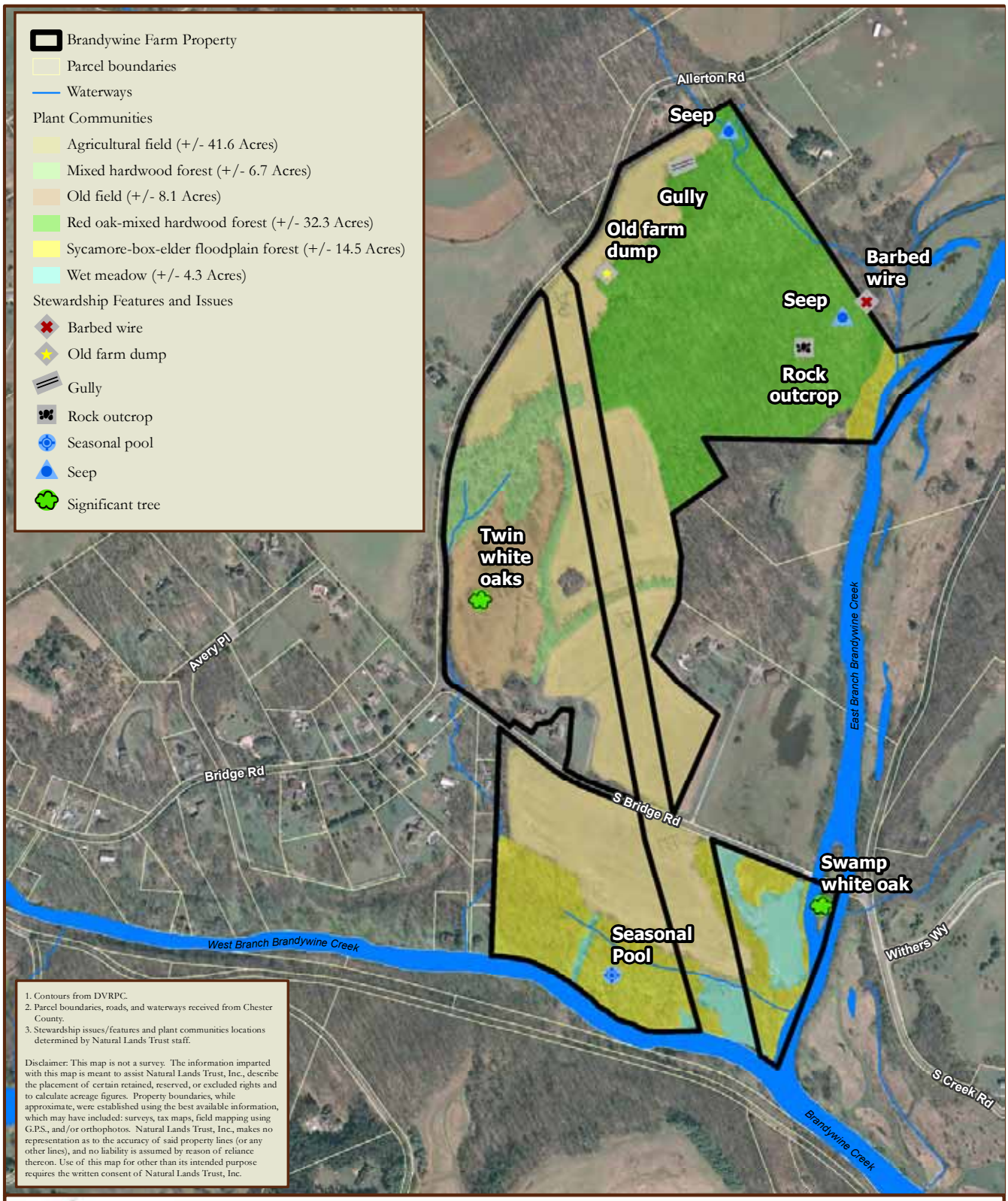
Extensive floodplain areas line the two branches of the Brandywine Creek and cover most of the southern two parcels (see **Environmental Features map**). One wetland site identified by the National Wetlands Inventory[1] occurs in the southeastern parcel on the property. Other wetland features noted during our site visits include a seep, a seasonal pool, and intermittent headwater streams.



[1] The National Wetlands Inventory, compiled by the US Fish and Wildlife Service, is a comprehensive mapping and inventory of wetlands in the US.

West Branch Brandywine Creek looking south

Tributary of East Branch Brandywine Creek along northern boundary


Brandywine Farm Property
Parcel boundaries
Waterways
Plant Communities
Agricultural field (+/- 41.6 Acres)
Mixed hardwood forest (+/- 6.7 Acres)
Old field (+/- 8.1 Acres)
Red oak-mixed hardwood forest (+/- 32.3 Acres)
Sycamore-box-elder floodplain forest (+/- 14.5 Acres)
Wet meadow (+/- 4.3 Acres)
Stewardship Features and Issues
Barbed wire
Old farm dump
Gully
Rock outcrop
Seasonal pool
Seep
Significant tree
Allerton Rd
Seep
Gully
Old farm dump
Barbed wire
Seep
Rock outcrop
Twin white oaks
Avery Pl
Bridge Rd
S Bridge Rd
East Branch Brandywine Creek
Swamp white oak
Seasonal Pool
West Branch Brandywine Creek
Withers Wy
S Creek Rd
Brandywine Creek
1. Contours from DVRPC.
2. Parcel boundaries, roads, and waterways received from Chester County.
3. Stewardship issues/features and plant communities locations determined by Natural Lands Trust staff.
Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included: surveys, tax maps, field mapping using G.P.S., and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.
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Stewardship Features and Issues
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Feet
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300
600
Compiled By: MTM 11/10/11

Plant Resources

The general plant communities on the property are described below with invasive non-native species highlighted in bold. The locations of these communities are shown on the **Stewardship Features and Issues map**. A botanical survey of the southern two parcels was completed by Jack Holt in 2009 (attached) and provides a comprehensive list of plant species on this part of the property.

Northern Parcels

A mature ***red oak-mixed hardwood forest*** covers much of the northern part of the property east of the PECO power line. The forest generally becomes more mature and less impacted by invasive species toward its interior. Dominant canopy species include red and white oaks (*Quercus rubra, Q. alba*), with less common shagbark and mockernut hickories (*Carya ovata, C. tomentosa*) and American beech (*Fagus grandifolia*). **Norway maple (*Acer platanoides*)**, red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), black walnut (*Juglans nigra*), bladdernut (*Staphylea trifolia*), hornbeam (*Carpinus caroliniana*), and sassafras (*Sassafras albidum*) occur in the understory. The shrub layer includes black-haw (*Viburnum prunifolium*), spicebush (*Lindera benzoin*), occasional southern arrowwood (*Viburnum dentatum*), and the invasive species **Japanese barberry (*Berberis thunbergii*)**, **winged euonymus (*Euonymus alatus*)**, and **privet (*Ligustrum* sp.)**. Vines such as the native grape (*Vitis* sp.) and **oriental bittersweet (*Celastrus orbiculatus*)** are often climbing into understory and canopy trees particularly along edges and in forest openings. **Porcelain-berry (*Ampelopsis brevipedunculata*)** was also seen along the edge of the red oak-mixed hardwood forest.

Red oak-mixed hardwood forest

Old farm road through the red oak-mixed hardwood forest

Jet bead in red oak-mixed hardwood forest

Solomon's-seal on boulder

Younger section of red oak-mixed hardwood forest

Groundcover species that occur on the rocky terrain of this forest include jack-in-the-pulpit (*Arisaema triphyllum*), Christmas fern (*Polystichum acrostichoides*), solomon's-seal (*Polygonatum pubescens*), ramps (*Allium tricoccum*), **Japanese stiltgrass** (***Microstegium vimineum***), **jet bead** (***Rhodotypos scandens***), and **garlic mustard** (***Alliaria petiolata***).

The Botanical Inventory for the Township (2010) identifies an Exceptional Natural Area[2] (ENA) immediately northwest of Brandywine Farm ("Allerton Road Woods") which is also described as a rich mature woodland and appears on the 1937 Historical Aerial Imagery.

Skunk-cabbage *(Symplocarpus foetidus)* ***seeps*** occur within the red oak-mixed hardwood forest along the tributary near the northern property boundary and at the northernmost property corner.

Areas of maturing ***mixed hardwood forest*** and ***hedgerows*** occur south and southwest of the red oak-mixed hardwood forest in the northern parcels. These fragments support black walnut, red ash (*Fraxinus pennsylvanica*), young honey-locust (*Gleditsia triacanthos*), black cherry (*Prunus serotina*), numerous vines, including grape, Virginia creeper (*Parthenocissus quinquefolia*), and **oriental bittersweet**, heavy growth of **multiflora rose** (***Rosa multiflora***), spicebush, **Japanese stiltgrass**, and poison ivy (Toxicodendron radicans). An intermittent headwater stream flows through the mixed hardwood forest where jewelweed (*Impatiens* sp.) and **privet** are common.

A small area of ***sycamore – box-elder floodplain forest*** occurs along the East Branch Brandywine Creek in the northeastern parcel, where a tributary flows into the Creek. The following section ("Southern Parcels") includes a description of the species in this forest.

The remaining, open areas in the northern parcels are covered with ***agricultural fields*** and former pasture which has reverted to ***old field*** habitat. The agricultural fields straddle the power line and are cultivated in a soybean-corn rotation. The old fields are covered with pasture grasses and various wildflowers such as Queen Anne's-lace (*Daucus*

Skunk-cabbage seep

Hedgerow between fields under power line

Maturing mixed hardwood forest

[2] An Exceptional Natural Area (ENA) is "an area composed of relatively intact, species rich, native plant dominated communities. ENAs are reservoirs of biodiversity".

carota), Indian-hemp (*Apocynum cannabinum*), common milkweed (*Asclepias syriaca*), and goldenrods (*Solidago* spp.). **Japanese honeysuckle (*Lonicera japonica*)**, blackberry (*Rubus* sp.), and **autumn-olive (*Elaeagnus umbellata*)** are common in and along the edges of the old fields, in addition to the invasive plants listed above in the hedgerows that are also encroaching into these open areas.

Two large white oaks (both are approximately 51" in diameter) occur in the middle of the old field and also appear on the **Historical Aerial Imagery** from **1937**.

Agricultural field along Bridge Road

Old field

Two large white oaks in old field

Intermittent headwater stream flowing through mixed hardwood forest

Southern Parcels

The forested areas in the floodplain on the southern parcels support a ***sycamore – box-elder floodplain forest***. Box-elder (*Acer negundo*), sycamore (*Platanus occidentalis*), ash (*Fraxinus* sp.), and silver maple (*Acer saccharinum*) are dominant canopy species in this forest, with less frequent **Norway maple**, red maple, bitternut hickory (*Carya cordiformis*), and pin oak (*Quercus palustris*). This forest also occurs on an island in the East Branch Brandywine Creek in the area of Bridge Road, and includes a notably large specimen of swamp white oak (*Quercus bicolor*). Silky dogwood (*Cornus amomum*) occurs near the creek. Stinging nettle (*Urtica dioica*) and **mile-a-minute weed (*Persicaria perfoliata*)** are frequent groundcover species. **Common reed (*Phragmites australis*)** is occasional in forest openings and near the power line. Intermittent headwater streams originate and flow through parts of the sycamore – box-elder floodplain forest and we found one seasonal pool in this area.

Wet meadows occur in the eastern and southeastern floodplain of the southern parcels, with a mix of grasses and wildflowers that includes reed canary grass (*Phalaris arundinacea*), goldenrods

Large swamp white oak on island in East Branch Brandywine Creek

Sycamore – box-elder floodplain forest

Seasonal pool in floodplain forest

Swamp milkweed in wet meadow

Intermittent headwater stream in floodplain forest

Wet meadow near Bridge Road invaded by red ash

(*Solidago* sp.), stinging nettle, common milkweed, swamp milkweed (*Asclepias incarnata*), cutleaf coneflower (*Rudbeckia laciniata*), and **Japanese hops** (***Humulus japonicus***). Young red ash (*Fraxinus pennsylvanica*) and black walnut (*Juglans nigra*) are encroaching into one of the wet meadows along Bridge Road.

The remaining open area in the southern part of the property is covered by an ***agricultural field*** that lies mostly above the floodplain immediately south of Bridge Road.

Rare Species

The 2009 Botanical Survey of the southern two parcels of Brandywine Farm (attached) documented the following uncommon species:

Cuscuta campestris	PA Threatened
Carex davisii	Special Population Species
Rumex altissimus	Rare in Chester County
Humulus lupulus	Only known population in East Bradford

The survey notes that "the location of the property at the confluence of the East and West Branches is unique, and its location upstream from high-quality wetlands at the south end of Shaw's Bridge Park [Shaw's Bridge South Floodplain Wetland Complex, an Exceptional Natural Area] also is significant."

The results of the Pennsylvania Natural Diversity Inventory (PNDI) Project Review identified two species on the property with a "Conservation Measure." These include cattail sedge (*Carex typhina*) and a species under the jurisdiction of the Pennsylvania Fish and Boat Commission (see attached PNDI Project Environmental Review Receipt).

Current Use and Stewardship

Brandywine Farm was acquired to protect critical habitat particularly near the confluence of the East Branch and West Branch Brandywine Creek, and to provide passive recreation opportunities (hiking, fishing, bird watching) with connections to Shaw's Bridge Park to the east. The property also serves as an important viewshed in the Township. Future uses of

Wet meadow in southern parcels

Wet meadow with flowering cutleaf coneflower

Agricultural field south of Bridge Road

Power line over agricultural field in northern parcel

the property may include providing additional parking for boaters and passive (e.g., trails) and active (e.g., playing fields in the northwest corner of the southern parcels) recreation facilities. Sustainable agricultural uses on the property are also being considered.

Restrictions

A grant under the Land and Water Conservation Fund (LWCF) assisted with the acquisition of the southern parcels and included funding constraints associated with the recreational use of the property. The Township has a right-of-way agreement with PECO requiring the right-of-way and adjoining Township property be managed under one use (e.g., if haying, it should continue under the power line). Other uses in the right of way would require a permit from PECO.

Stewardship Issues, Opportunities and Recommendations

The following stewardship issues and opportunities were observed during the site visits to Brandywine Farm on July 26 and October 18, 2011. They are described in the context of two overall stewardship goals for the natural areas on the property: (1) to provide a safe and enjoyable environment for passive recreation and educational opportunities; and (2) to protect and enhance plant communities that support resident and migratory wildlife. We have provided a summary of issues and opportunities for the stewardship of the property that are followed by general recommendations to address the issue or fulfill the opportunity. Following the recommendations in this report, we include a table showing stewardship priorities with an implementation schedule and a list of potential funding sources for stewardship projects in the Township.

Invasive Plants

A ubiquitous problem encountered in the stewardship of natural lands in southeastern Pennsylvania—and increasingly recognized as a threat worldwide—is the presence of invasive plant species. An invasive species is one that rapidly spreads and outcompetes multiple native species, chiefly because of the absence of predators, pathogens, and herbivores that keep it in check in its native range. Most invasive plants are particularly well adapted to colonize disturbed areas. In southeastern Pennsylvania, disturbance from human activities, particularly sprawl, coupled with the rich horticultural history of the southeastern counties, has afforded numerous invasive species the opportunity to become well established throughout the region. Even though the occasional immigration of new species into plant communities is a normal process, the current high rate of introduction—fueled by the planting of exotic (non-native) species for horticulture, wildlife management, and erosion control—is threatening the

Vines on edge of mixed hardwood forest

Edge tree toppled by vines

integrity of native plant communities and lowering native biodiversity. Not only do invasive plants alter the makeup of the plant communities on a site, but they also may affect soil chemistry and hydrology and are usually less beneficial to wildlife than the native plants they replace, contributing further to the loss of biodiversity.

The forest edges and hedgerows in the northern parcels of Brandywine Farm are most impacted by invasive plants because of the higher availability of light. Vines such as **oriental bittersweet** and grape are commonly seen climbing into canopy and understory trees in these areas. Aggressive vines can greatly raise a tree's vulnerability to blowdown through the increased weight (that elevates the tree's center of gravity) and by the vast increase in surface area (that acts to collect wind, ice, and snow). Vines can also smother tree seedlings and prevent them from reaching the canopy to replace trees felled by old age, windthrow, or pathogens.

Invasive shrubs are common in the old fields, mixed hardwood forest, and hedgerows in the northern parcels. **Norway maple** is occasional in the red oak-mixed hardwood forest and the floodplain forest. This species shades the forest floor beneath its canopy to an extent that prevents the growth of most other plants. Herbaceous invasive species (e.g., **Japanese stiltgrass, garlic mustard**) are spreading through the red oak-mixed hardwood forest. Reed canary grass and **common reed** are invading the wet meadows and forest gaps in the floodplain.

Since the diversity of native species in a system is vital to providing suitable habitat for resident and migratory wildlife, as well as providing an enjoyable environment for community residents, we suggest the following measures to control invasive plant species at Brandywine Farm. In general, it is best to address invasive plant control with a *top-down* (starting in the canopy and working down through understory, shrub, and groundcover layers), *least-first strategy* (starting in the least impacted areas). Priority areas for invasive species management on the property are the red oak-mixed hardwood forest, the floodplain forest, and headwater streams and seeps.

When considering invasive plant control, it is important to keep in mind that *effective control of invasive plants, especially in the understory, shrub, and groundcover layers of the forest, will only be possible if implemented in conjunction with a deer management program* (see "Forest Sustainability" section below). It is also important to note that the extensive edge area and seed sources in the region and the prolific nature of these plants guarantee that even with complete eradication on the Brandywine Farm property, invasive species can quickly reestablish themselves as a serious stewardship problem if not monitored and addressed on a regular basis.

RECOMMENDATIONS

The following invasive management recommendations for the Brandywine Farm property are listed in general order of priority. The "Invasive Vegetation Management" section of Natural Lands Trust's *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)* also provides guidelines for monitoring and controlling invasive plants typical of the southeastern Pennsylvania landscape.

- Cut vines on canopy trees, starting in the more intact interior of the mature red oak-mixed hardwood forest and moving to the forest edges. **Oriental bittersweet** vines should be cut and the cut stump treated with a systemic herbicide, if possible. Care should be taken not to cut poison ivy or Virginia creeper vines on the property. These are native species that benefit wildlife

and rarely become large enough to compromise canopy trees. Because grape vines are beneficial for native wildlife, only cut these vines when they are compromising the structural integrity of native trees. Cut stumps of grape vines can be left to resprout.

- Manage **Norway maple** in the red oak-mixed hardwood forest and the floodplain forest with a basal bark application of triclopyr (e.g., Garlon 4) herbicide and basal oil. We recommend using a 20–30% mix of triclopyr in basal oil applied in a 12-inch band around the base of the trunk, avoiding runoff. Depending on the season, it may take time for this treatment to work; for example, a winter application may result in leaf out in spring, followed by defoliation. Once the trees are dead, they can be cut down (if they pose a potential hazard for visitors) without stimulating suckering or left as snags for wildlife habitat (see "Wildlife Enhancement" section below).

Vines on edge of mixed hardwood forest

Norway maple in red oak-mixed hardwood forest

- Manage **garlic mustard** in the red oak-mixed hardwood forest by pulling, bagging, and removing plants from the site before seed set in the spring. This is a good spring activity for volunteers of all ages.
- Remove or treat the **common reed** in gaps in the floodplain forest. Plants can be managed by (a) cutting in the fall for at least two sequential years then removing cut materials from the site; and/or (b) cutting and injecting individual culms (stems) with a glyphosate herbicide suitable for aquatic use (e.g., Rodeo).
- Improve the structural integrity of the red oak-mixed hardwood forest, the mixed hardwood forest, and the floodplain forest by managing invasive shrubs, such as **winged euonymus, privet**, and **Japanese barberry**. These species can be cut to the stump and a glyphosate herbicide applied to the cut stump. Alternatively, after cutting, shrubs can be left to resprout and the young foliage treated with a glyphosate herbicide. If herbicide is not used, shrubs can be excavated and pulled out, although soil disturbance should be kept to a minimum to prevent conditions favorable for future invasions.
- In gaps where invasive shrubs and trees have been removed, replant with native species to improve wildlife value and protect exposed soils from erosion. The following native tree and shrub species would be appropriate choices for planting:

Red oak-mixed hardwood forest
Red oak
White oak
Sassafras
Bladdernut
Black-haw
Southern arrowwood
Hornbeam

Sycamore – box-elder floodplain forest
Silver maple
American sycamore
Ash
Slippery elm
Red maple
Silky dogwood
American elder

Headwater streams and seeps
Buttonbush
Silky dogwood
Winterberry

Additional native species options and habitat preferences are listed in the "Native Plant Materials" section of Natural Lands Trust's *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)*.

- Protect newly planted trees from deer browse using tree shelters for plants less than 6 feet in height. For trees over 6 feet in height, tree wraps limit damage from buck rubbing. Newly planted shrubs should be protected with wire fencing.
- Manage **Japanese stiltgrass** in the red oak-mixed hardwood forest by hand-pulling or weed-whipping before flowering and seed set in August and September. This should be repeated for several years to deplete the seed bank of this persistent annual grass.

Any volunteer or contractor used for invasive plant control should be able to distinguish native species from invasive species (e.g., **Norway maple** from sugar maple, **oriental bittersweet** from native vines). Application of herbicides should only be undertaken by someone with a pesticide applicator's license.

Japanese stiltgrass (upper right) competing with the native ramps (lower left)

Forest Sustainability

Deer overabundance is a problem that affects most natural areas in our region. The habitat value of forests is greatest where there is an extensive unbroken canopy of mature trees with a diversity of native understory species that includes shrubs and herbaceous plants. Deer impact forest health by consuming seeds (particularly acorns) and browsing on seedlings, shrubs, and herbaceous plants. As population density increases, this activity can adversely affect populations of other wildlife species, especially songbirds, through a decrease in plant species and structural diversity within the forest.

Currently, deer overbrowsing is having a moderate to heavy impact on regeneration in the red oak-mixed hardwood forest and the sycamore – box-elder floodplain forest on the Brandywine Farm property. Shrub and groundcover layers are moderately browsed and non-native invasive shrubs are more dominant than native shrubs in some areas (deer generally avoid non-native invasive shrubs). Gaps in the forest lack any advance regeneration. We also noted signs of deer browsing in the agricultural fields on the property. High deer populations are not only a threat to forest sustainability and agricultural operations, but also to human health. Deer are a host to black-legged ticks, the primary vector of Lyme Disease.

The Township oversees a regulated archery hunting program on several Township-owned lands. Brandywine Farm will be open for hunting for the first time under Township ownership in the fall of 2011.

The recommended deer density to allow for adequate tree regeneration is 20 deer per forested square mile (one deer per 32 acres). However, to perpetuate a healthy native forest with a diversity of native shrubs and wildflowers, the recommended deer density is 10 deer per forested square mile (one deer per 64 acres). With approximately 50 acres of forest cover, the Brandywine Farm property can sustainably support only one deer.

Gap in mature forest with no advance regeneration

Our recommendations for addressing the impact of deer overbrowsing are provided below. Additional information about Natural Lands Trust's deer management program and deer management opportunities are included in the "Deer Management Options" section of Natural Lands Trust's *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)*.

RECOMMENDATIONS

- Encourage hunters to preferentially remove does to lower and maintain a sustainable deer density on the property.
- To prevent adjacent properties from becoming sanctuaries during the hunting season, work with neighbors when coordinating and overseeing the hunting program.
- In order to avoid potential conflicts with users, post signs during the hunting season to make visitors aware of the use of the property by hunters and to take appropriate precautions. Signs should also explain why hunting contributes to forest health and the importance of checking for ticks during and after visiting natural areas.
- The ongoing education of the public about the effects of overabundant deer will be critical to the success of an effective deer management program in the Township. One option to visually demonstrate deer browsing impact is the installation of small (10 meters square) exclosures in forest areas. The growth of vegetation within these exclosures is often dramatically different than in surrounding areas with unrestricted access by deer. One or two exclosures (with accompanying interpretive signage to educate the public about the importance of reducing the deer population to maintain forest health) could be installed in the red oak-mixed hardwood forest on relatively flat ground and within view of a trail. The setup and monitoring of deer exclosures is a valuable educational exercise that could be undertaken by local schools and colleges.

Browsed soybeans

Heavily browsed beech sprouts

Water Quality

The property should be carefully managed to protect and enhance the water quality of on-site and downstream water resources associated with Brandywine Creek, including headwater streams, seeps, and seasonal pools, and to realize the many wildlife benefits and ecosystem services these resources provide.

RECOMMENDATIONS

- Contact the Chester County office of the Natural Resources Conservation Service (NRCS, John Metrick, West Chester Field Office, 610-696-0398, ext. 3, or John.Metrick@pa.usda.gov) to develop a Conservation Plan for the agricultural fields on the property that will provide guidance in the use of best management practices. The Conservation Plan should include recommendations for channeling the erosion that has created a gully in the northernmost field.
- Plant trees as necessary to ensure at least a 100-foot buffer along all intermittent and perennial streams.

Gully erosion along edge of northern agricultural field

Rare Plants and Natural Features

The 2009 Botanical Survey of the southern parcels documented several rare/uncommon species on the property that should be monitored. In addition, the two large white oaks in the old field in the northern parcels provide a natural and scenic amenity that should be protected as a focal point on the property.

RECOMMENDATIONS

- Monitor on an annual basis, if possible, the condition and potential impacts of the rare/uncommon plants documented in 2009 botanical survey of the southern parcels.
- Buffer the two large white oaks in the old field on the northern parcels to protect a focal point on the property. Ideally, no disturbance, including trails, should occur within 50 feet of the trees' drip lines.
- Hire an arborist certified by the International Society of Arboriculture (IBA) to assess the large oak trees and prune, as needed, to maintain tree health.

Native Meadow Reclamation

Native meadows are characterized by a diverse structure and composition of short and tall grasses and native wildflowers that provide feeding and nesting habitat for declining grassland birds (e.g., Eastern Meadowlark, Bobolink) and small mammals, as well as nectar sources for numerous butterflies and other insects. Native meadow species are naturally adapted to the soils and climate of our region and can, if necessary, survive on very little rain (and no irrigation). Once established, native meadows usually require just one mowing each year to limit encroachment by trees and shrubs. Occasional spot herbicide treatments are often necessary to manage invasive species.

There is a growing consensus that a large open landscape (hundreds of acres) with diverse cover types in patches of various sizes, including warm- and cool-season grasslands[3] and wildflower-dominated meadows is the preferred habitat for grassland birds. Structural diversity—created by planting a patchwork of meadow types, each with a mix of species—produces cover for the greatest variety of grassland and meadow wildlife species. Agriculture (row crops, pasture, hay fields) without hedgerows can be a compatible economic land use within a mosaic of native grasslands and meadows intended to provide wildlife habitat. The old field in the western part of the northern parcels on Brandywine Farm offers a good opportunity for native meadow reclamation.

Wet meadows also provide essential habitat for wetland birds, small mammals, and amphibians. The diversity of the wet meadows in the southern parcels could be enhanced through annual mowing.

RECOMMENDATIONS

- Enhance the wildlife value of the old field and the wet meadows on the property by mowing on a once-yearly schedule in March. Mowing will reduce woody vegetation encroachment and promote native species diversity in these habitats. Competition for native grasses and forbs in the old field will be reduced. Mowing at this time of year minimizes impact on the nesting and foraging activities of native wildlife (birds, small mammals, butterflies) and often allows for easy equipment access if the ground is still frozen.
- Remove the short hedgerow bordering a small old field and east of the longer, narrow hedgerow on the northern parcels. This will provide more contiguous open areas for attracting grassland birds to the property.
- If any of the agricultural fields are not needed for farming in the future, consider converting these

Old field in northern parcels

[3] Warm-season grasses are those species that flower and put on most of their growth during the warmer summer months and grow in clumps that offer shelter, travel corridors, and patches of bare soil suitable for ground-nesting birds; cool-season grasses flourish in the cooler spring and fall seasons.

fields to native meadows to enhance wildlife habitat value. Site preparation would include an herbicide treatment followed by planting of seeds using a no-till drill. For more information about establishing and managing native meadows, see the "Meadow Management" section of Natural Lands Trust's *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)*.

Wildlife Enhancement

Additional opportunities for enhancing wildlife habitat on the Brandywine Farm property are described below:

RECOMMENDATIONS

- Leave dead down wood within the forests as it serves as the base of the forest food web and a nutrient reservoir for living trees. Dead standing trees (snags) should also be left if they are located in areas that are not heavily used by the public. Snags benefit wildlife by providing cavities and loose bark for nesting and shelter, perching sites, and decaying wood for numerous insects that provide food for woodpeckers and nuthatches. See attached article *Critter Condos – Managing Dead Wood for Wildlife* for more information about these wildlife enhancements.
- Consider installing nesting boxes for Eastern Bluebirds and American Kestrels in the old field. Bluebirds and Kestrels nest in tree cavities, but in the absence of these natural niches, these species readily adopt nest boxes to raise their young and reduce competition for cavities with other birds. See two attached articles for more information: (1) *Artificial Nesting Structures* published by the Natural Resources Conservation Service Wildlife Habitat Management Institute and the Wildlife Habitat Council, and (2) *Managing Habitat for American Kestrels* Pennsylvania Wildlife Fact Sheet No. 13.

Hazards, Debris, and Aesthetics

In roadside boundary areas on the property that are tree-covered (e.g., a short stretch of Allerton Road and sections of Bridge Road), there is a potential for hazard trees. As a landowner, the Township is responsible for preventing trees and branches from falling into the adjacent right of way on the bordering roads through the monitoring and removal of hazard trees (trees that due to structural defects could fall in part or whole on a "target" such as a road, residence, or person). See the "Hazard Tree Monitoring Program" section in Natural Lands Trust's *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)* for information about procedures for hazard tree monitoring.

Small amounts of debris from past farming activities and flooding remains on the property. Some of this residue presents an eyesore and potential hazard for future visitors, particularly "free-range" children.

Dead and down wood in red oak-mixed hardwood forest

Bridge Road

RECOMMENDATIONS

- Monitor roadside boundaries and potential high use areas for hazard trees by foot once each year and following severe storms. Ideally, a certified arborist should be hired to complete this task and address any identified hazards through pruning or removal. Morris Arboretum in Philadelphia offers courses on identifying hazard trees.
- Remove barbed wire fencing near the northeastern property boundary.
- Remove surface debris of the old farm dump and debris washed onto the property from flooding along the Brandywine Creek.
- Provide additional screening along a hedgerow separating a potential house site and future trail corridor by planting white pine and Eastern red-cedar in the hedgerow.

Boundaries

Proper maintenance of boundaries is an important stewardship priority on open space parcels. These undeveloped properties are often subject to unwarranted (and frequently unintentional) use by neighbors (e.g., dumping of yard waste) due to poorly marked boundaries.

RECOMMENDATION

- The boundaries of the southern parcels—to be retained by the Township—should be posted to prevent encroachment issues and to inform passing motorists along Bridge Road about the location of Township open space. Signs could be small (3 ¾" x 3 ¾", 0.12 gauge aluminum diamond shape signs can be purchased through Voss Signs: www.vosssigns.com) and should indicate Township ownership. Posting every 50–100 feet is adequate and particularly important where the property abuts private land.

Hedgerow separating potential house site (left) and future public trail area

Environmental Education and Volunteers

The diverse mosaic of natural communities, the scenic landscape, and plans for a trail corridor through the Brandywine Farm property provide good opportunities to connect the community to their natural surroundings and provide meaningful volunteer and educational experiences. The following suggestions could enhance educational opportunities on the property.

RECOMMENDATIONS

- Consider installing a kiosk at future parking areas (Bridge Road and Allerton Road) to display a trail map, photos of wildlife, and upcoming volunteer events.
- Invite Township residents to participate in natural areas stewardship projects. Schedule "workdays" on environmentally friendly days such as Earth Day or Arbor Day. Include the property in East Bradford's Community Day and Trails Day. Volunteers, including local scout troops, hunters, horseback riders, and mountain bike clubs could be recruited to assist with projects recommended in this report, including:
  - » Cutting vines from trees
  - » Pulling **garlic mustard**
  - » Planting native species
  - » Installing deer exclosures
  - » Building, installing, and maintaining a kiosk
  - » Building and installing nesting boxes
  - » Maintaining future trails
  - » Removing surface debris
  - » Posting signs during hunting season
- Encourage local schools, environmental groups, and birding groups to schedule walks on the property when trails are constructed.

Debris at top of old farm dump in the red oak-mixed hardwood forest

Debris along the Brandywine Creek floodplain

Stewardship Priorities and Implementation Schedule

PRIORITY[1]	STEWARDSHIP RECOMMENDATIONS	COVER TYPES	NORTH PARCELS	SOUTH PARCELS	SEASON	WHO COULD IMPLEMENT?
Invasive Plants						
1	Cut vines on canopy trees	Red oak-mixed hardwood forest, Mixed hardwood forest	•		Anytime	Volunteers
1	Manage **Norway maple**	Red oak-mixed hardwood forest, Floodplain forest	•	•	Fall	Municipal staff [2] or contractor
1	Manage **garlic mustard**	Red oak-mixed hardwood forest	•		Early Spring	Volunteers
2	Remove or treat **common reed**	Floodplain forest		•	Fall	Municipal staff or contractor
2	Manage invasive shrubs in forest	Red oak-mixed hardwood forest, Mixed hardwood forest Floodplain forest	•	•	Fall	Municipal staff or contractor
2	Replant gaps with native shrubs and trees	Red oak-mixed hardwood forest Mixed hardwood forest, Floodplain forest	•	•	Spring or Fall	Volunteers
2	Manage **Japanese stiltgrass**	Red oak-mixed hardwood forest	•		Late Summer to Early Fall	Municipal staff
Forest Sustainability						
1	Encourage hunters to preferentially remove does	Red oak-mixed hardwood forest, Mixed hardwood forest, Floodplain forest	•	•	Early Fall	Municipal staff (oversees)
2	Work with neighbors when coordinating hunting program	---			Anytime	Municipal staff (oversees)
1	Post signs during hunting season for visitors	All	•	•	Early Fall	Municipal staff or volunteers
3	Install deer exclosures	Red oak-mixed hardwood forest	•		Winter	Volunteers
Water Quality						
1	Develop a Conservation Plan for the agricultural fields	Agricultural fields	•	•	Anytime	NRCS staff
1	Plant trees to buffer streams	Mixed hardwood forest, Floodplain forest	•	•	Spring or Fall	Volunteers

[1] 1 = high priority (implemented within 1-3 years); 2 = mid-priority (implemented within 3-5 years); 3 = low priority (implemented within 5-10 years);

[2] Must have PA Pesticide Applicator Certification to apply herbicides on public property

Stewardship Priorities and Implementation Schedule (Continued)

PRIORITY[1]	STEWARDSHIP RECOMMENDATIONS	COVER TYPES	NORTH PARCELS	SOUTH PARCELS	SEASON	WHO COULD IMPLEMENT?
Rare Plants and Natural Features						
2	Monitor rare/uncommon plants	Floodplain forest, Wet meadows		•	Summer	Municipal staff or contractor
1	Buffer the two large oaks	Old field	•		Spring or Fall	Municipal staff
1	Hire arborist to assess two large oaks	Old field	•		Anytime	Municipal staff/ arborist
Native Meadow Reclamation						
2	Mow old field and wet meadows once each year	Old field, Wet meadows	•	•	March	Municipal staff
2	Remove short hedgerow east of a small field (northern parcel)	Mixed hardwood forest	•		Anytime	Municipal staff
2	Consider converting agricultural field(s) to native meadows	Agricultural fields	•	•	Spring-Fall	Municipal staff or contractor
Wildlife Enhancement						
1	Leave dead down wood and snags in forests	Red oak-mixed hardwood forest, Floodplain forest	•	•	All seasons	Municipal staff (oversees)
2	Install nesting boxes for Bluebirds and American Kestrels	Old field, Agricultural fields	•		Late Winter	Volunteers
Hazards and Debris						
1	Monitor roadside boundaries and potential high use areas for hazard trees	---	•	•	Late Winter-Early Spring	Municipal staff
1	Remove barbed wire fencing near northeastern boundary	Red oak-mixed hardwood forest	•		Spring-Fall	Municipal staff
2	Remove farm dump surface debris and floodplain debris	Red oak-mixed hardwood forest, Floodplain forest	•	•	Anytime	Volunteers
2	Provide screening along hedgerow separating potential house site and future trail corridor by planting white pine and Eastern red-cedar in hedgerow	Mixed hardwood forest	•		Spring or Fall	Volunteers

Stewardship Priorities and Implementation Schedule (Continued)

PRIORITY[1]	STEWARDSHIP RECOMMENDATIONS	COVER TYPES	NORTH PARCELS	SOUTH PARCELS	SEASON	WHO COULD IMPLEMENT?
Boundaries						
1	Post boundaries of southern parcels that are retained by the Township	---		•	Fall-Winter	Municipal staff
Environmental Education and Volunteers						
3	Install kiosks at future parking areas	---	•	•	Spring	Volunteers
3	Invite residents to participate in stewardship projects	All	•	•	Spring-Fall	Municipal staff (oversees)
3	Encourage local groups to schedule nature walks	All	•	•	Spring-Fall	Municipal staff (oversees)

Potential Funding Sources for Stewardship Projects in East Bradford Township

POTENTIAL FUNDER	PROGRAM
PA Department of Conservation and Natural Resources (DCNR) *Contacts:* Carolyn Wallis 215-560-1182 Fran Rubert 215-560-1183	*Community Conservation Partnership Program*
	PA Recreational Trails Program
PA Department of Environmental Protection (DEP)	*Environmental Education Grants Program*
	Growing Greener Watershed Grants
	Nonpoint Source Implementation Program (Section 319)
PECO *Contact:* Holly Harper, Green Region Program Administrator 610-353-5587	*Green Region Open Space Program*
Local Corporations	*Corporate Charitable Giving Programs*
	Employee Volunteer Programs

Trails and Limited Development Plan

Layout Plan

East Bradford Township has the unique opportunity to combine development, conservation and recreation, all within the Brandywine Farm property. The property, which is divided by a PECO right-of-way and Bridge Road, is actually four separate parcels. These divisions present opportunities, such as pre-made trail corridors, and obstacles, such as road crossings. The site features a diversity of natural resources and cultural features. A ridgeline forest, featuring numerous large rock outcrops, dominates the northernmost third of the site. Successional old fields have sprouted in the western portion of the site. Agricultural fields form a spine through the center of the site. The Brandywine Creek cradles the parcels along the southern and eastern boundaries.

The Brandywine Farm property contains just under 100 acres. This area is more than adequate to provide multiple uses, including a limited amount of development. The site lies within the Township's R-1 Residential District. Although the site is not ideal for development due to abundant natural resources, a private developer could propose numerous 3-acre lots on the site. For the Township's purposes of generating income through the development of lots, balanced with conservation and recreational use of the site, it appears that proposing three (3) home sites is ideal. These sites have been carefully planned based on site visits, study of aerial photographs and location of important natural resources.

The varied landscapes of the Brandywine Farm property provide an excellent backdrop for a recreational trails system. The steep slopes, rolling hills and rock outcrops can lend challenging terrain. The bright sunshine in the open old fields and agricultural fields will contrast nicely with the cool shade of the woodlands. The bubbling, gurgling Brandywine Creek will drown out the highway noise from Bridge Road. Potential connections to Shaw's Bridge Park to the southeast and the PECO right-of-way which extends north, could position the Brandywine Farm property as an important piece of a larger trails network. See the **Layout & Trails Plan** at the end of the report.

Proposed Building Lots

While the Township is interested in designating building areas, it also is extremely sensitive to preservation of the natural and cultural resources on the site. East Bradford has a look and a feel to its landscapes. Visitors traveling East Bradford's byways should be greeted by woodlands, streams and agriculture—not by the face of suburban development. In proposing the three house sites, preservation of natural resources and visual impact of the proposed dwellings were carefully considered. Additionally, feasibility and attractiveness of each lot site were also considered.

At first glance, it appears that siting three houses within the open fields at the northernmost portion of the site would be a no-brainer. However, site visits reveal the prominence of the existing PECO towers and unexpectedly steep topography. The PECO tower located in the middle of the northern fields visually dominates its surroundings. Any homes sited in this area would need to be far enough away that landscaping could be used to visually screen the view of the tower. Additionally, homes would need to be far enough from the lines to buffer the intermittent crackling of the lines.

The topography in the northern fields mimics that of the rest of the site. A ridge runs through the center, providing a high point. Unfortunately, the PECO tower is sited on the relative high point, on top of the ridge, making it even more visually imposing. The fields slope down to the northeast and southwest. To the southwest, the fields slope moderately, providing one potential home site. The fields also slope moderately to the northeast, providing one additional home site. However, the northeastern-most portion of the fields, which appears on an aerial photograph to be an ideal home site, actually slopes down quite steeply. The area has the feel of a hollow—below all of its surroundings, accepting runoff from much of its surroundings. If a traditional developer owned this property, they would very likely place the stormwater basin here. As it sits low, below its surroundings, this location is not appropriate for a home.

Lot # 1

Lot # 1 is proposed in the westernmost portion of the site, both north and uphill from the existing outparcel, barn and ranch house. Here, mature trees, remnant hedgerows, rise up from the successional old fields which blanket most of the hillside. Two majestic white oaks that grew within an open pasture for at least the last century stand taller than their surroundings. These trees, along with the hedgerows, create a natural delineation for a 2-acre +/– home site. The lot would extend to include a greater area, but the existing hedgerows on this hillside could be used to delineate the private living area associated with the home, from the publicly accessible remainder of the lot.

In accordance with the recommendations included in the stewardship plan, the two white oaks should be protected. The deed for this house lot should include restrictions prohibiting disturbance of the roots of these trees. These restrictions should prohibit the erection of sheds, patios, playground equipment, pools and other structures within 50' of the trees' driplines.

By using the existing driveway, which accesses Bridge Road, a beautiful entry sequence could be created. A homeowner would arrive to mature trees, meadows, and an historic barn. The existing driveway and its potential extension would require some grading, but does generally follow the existing contours along the hillside. This layout would also eliminate the need for another cut and access to Bridge Road.

The proposed location of Lot # 1 would provide privacy for the lot owner, as it is surrounded by trees and set up on the hillside. It would be difficult to see from a vehicle traveling on Bridge Road. It is important to note that the home should be sited on the side of the hill, rather than on the top of the ridge. The top of the ridge, the area with the best views out of the site, should be kept in the publicly accessible areas, so that all can enjoy the best views.

The property line separating Lots # 1 & 2 should be established from Allerton Road to the western side of the PECO right-of-way. The line should be proposed far enough to the north so as to include the old fields within Lot # 1. This would allow the owners of Lot # 1 to maintain the old fields as meadows if they wish, as they would have the best access to them. Should these old fields be included in Lot # 2, the owners would need to access the old fields through Lot # 1 or bring equipment through the woodlands in order to maintain the fields. Establishing the property line in this area would also allow a buffer to the large oaks to be established on Lot #1.

Lot # 2

The second home site could be located in the western end of the northern fields. A distance of

Lot # 1 would have limited visibility from Bridge Road, providing privacy and maintaining the character of the road.

The existing driveway can be used to provide access to the proposed Lot # 1. The proposed Yellow Trail would run alongside it, at the top of the bank.

approximately 500' could be established between the proposed home and the existing PECO tower, though some strategically planted evergreen trees would be necessary to further screen the tower. Existing vegetation and grade along Allerton Road would screen the house from the road, thereby preserving the existing character of the road. The proposed driveway could be aligned with the existing Bedwell Farm driveway. Alternatively, it could meander through the field to create a more beautiful entry sequence, using an access location with better sight distance or requiring less grading and tree removal.

Lot # 3

The third lot could be placed in the north central portion of the northern fields. This area is sloped, but not too steeply. This portion of the existing agricultural field is somewhat triangular in shape. The shape would allow a house to be placed such that the existing woodland edge could screen out the PECO tower. The grade and existing vegetation would provide screening from Allerton Road, making the house largely invisible from the road. A new driveway would be required to access Allerton Road, unless it is determined that sharing the existing PECO driveway would be possible and favorable.

Additional Lands

The existing PECO right-of-way, which runs through the center of the site, makes dividing the site into neat and tidy lots much more difficult. It would be ideal to draw lot lines which divide the house sites and keep each resource on a single lot. For instance, if each meadow or old field could be kept on one lot, it would make it much easier to maintain. However, due to the existing right-of-way, it is likely that the resources will be divided amongst different owners. The hillside fields may end up divided amongst three owners, making it difficult to manage potential lease agreements with famers or others wishing to use the land.

One potential way to mitigate this issue would be to offer or sell portions of the northeast parcel to the neighbors. This parcel is wider to the north, containing the woodlands. The southern portion of the site forms a tail, a long, narrow strip extending to Bridge Road. This portion of the site contains fields, woodlands and hedgerows. It would be difficult for the owners of Lot # 3 to maintain this portion of the site. It may be more desirable to offer this portion of the site for annexation to the neighboring Gray and David/Resko properties.

Overall Trails Layout

A good trail system must provide visitors with options and interest. The Brandywine Farm property provides opportunities for both. The variety of trails through the rolling hills and across steep slopes let the visitor choose the difficulty of their walk. The open agricultural fields let visitors bask in the sunshine on a crisp and cool day, while the woodlands provide refuge from the summer heat. Amateur geologists may be intrigued by the rock outcrops and boulder fields in the northern portion of the site, while fisherman will seek out access to the Brandywine Creek in the south. Birdwatchers should enjoy the entire site, finding hawks and vultures soaring over the agricultural and old fields, while wading birds linger in the floodplains of the Brandywine. The proposed trail system can provide different experiences for every visitor.

Aside from providing access to the site's features, this trail system also must respect the existing outparcel, neighboring lots and the three proposed home sites. At Natural Lands Trust's own preserves, we plan trails a minimum of 100' from neighboring properties. While we can never completely eliminate the possibility of visitors wandering off trails and onto neighboring properties, we've found that this minimum distance does greatly reduce these conflicts. For the Brandywine Farm property, the trails have been planned a minimum distance of 100' from existing property lines and 200' from each proposed home site.

When planning the home sites, preservation of the Creek and Allerton Road viewsheds was very important. While the trails themselves will have little impact on these viewsheds, planning for parking and access considers their effect on the existing roads as well. Fortunately, two premade access and parking areas exist at the PECO towers. The PECO area off of Allerton Road could be used as a small parking area providing access to the northern portions of the north parcels. The PECO tower area off of

Bridge Road could provide parking and access to the southern portion of the north parcels and the parcels south of Bridge Road. Use of these areas would preserve the existing viewsheds and eliminate the need for additional road cuts and grading. However, each of these areas is currently very informal and uncontrolled. The southern area is also wet. Each area would require some stabilization, formalization and general improvement. Perhaps if the township offers to maintain or improve these areas, PECO could be convinced to allow use of these areas.

If it is found that the PECO parking areas may not be used for site user parking, alternative locations will need to be pursued. At the north end of the site, it appears feasible to establish a driveway just northeast of the existing PECO driveway. By placing another driveway in close vicinity to the PECO driveway, it may be possible to reduce the amount of necessary grading, as that area of the site has already been shaped to accommodate one driveway.

The parking area could be tucked into the small field due east of the tower. The shape of the existing woodlands would completely screen the parking area from Lot # 3. Lot # 2 would likely have partial views of the parking area. Landscaping associated with the parking area should be planned to help screen out views from Lot # 2. Visitors using this parking area would exit their cars and be just a few steps away from a beautiful view of the southern Chester County landscape.

In the southern portion of the site, it will be more difficult to establish an alternative parking area, due to steeper banks along Bridge Road and prevalent floodplains and wetlands. Aerial photos and site visits would lead one to believe that the southeastern parcel would be suitable for a parking area. However, the entire parcel is covered in floodplain. It appears that the southwestern parcel soils would better support a parking area. This would require major grading in order to create a safe driveway entrance. Sight distance on Bridge Road would also be a major concern.

Another alternative would be to expand the existing parking at Shaw's Bridge Park and make installation of a bridge over the Brandywine a higher priority. This option may not be viable if the southern portion of Brandywine Farm is developed for active recreation. Maintenance and equipment vehicles may need direct access to the site.

Regardless of location, minor grading and landscaping would be appropriate to screen the parking areas from existing and proposed homes. Fencing and gates will be needed to accommodate farm equipment and to prevent vehicular access to the right-of-way, farm fields and other private properties. Stormwater management measures may also be necessary at the parking areas.

The Proposed Trail System

A spine and loop pattern has been used to provide trail users with a variety of experiences on site. A single spine trail (yellow) will take visitors from the northern parking area at Allerton Road, through the agricultural fields, along the ridge, across Bridge Road, through the riparian forest at the Brandywine Creek and finally to the site of the proposed bridge. A series of smaller loop and connector trails form ribs, coming off the spine trail. While this trail system will not provide access to every corner of the site, it will provide access to the majority of features on site.

The Yellow Spine Trail

The yellow trail forms the spine of the trail system. It follows many of the existing vegetation lines and crisscrosses its way along the ridge in order to maintain a manageable grade. It begins at the northern parking area and culminates at the proposed bridge site.

The sloped nature of the site will provide beautiful views, but will require the yellow trail to be constructed with numerous climbing turns.

The yellow trail begins along Allerton Road, at the northern parking area. From the parking area, this trail traverses the hill, then crisscrosses the ridge, working its way back down, through the fields to Bridge Road. The management of the agricultural fields will play a key role in the implementation of this section of the trail. Should these fields remain in agricultural production, the meandering, climbing section may be moved closer to the edge of the woodlands in order to reduce conflicts with farming. If this is the case, the meanders would need to be reduced and additional drainage techniques such as nicks and dips would be needed to assure that erosion doesn't wash the trail out.

Should these fields be converted to meadows or other naturalized vegetation, a meandering, climbing trail as shown on the map would be appropriate. Thick grasses and naturalized vegetation would help reduce any erosion by soaking up the runoff. The trails could simply be mowed into the meadow. These are easily moved from season to season in order to avoid wet areas or simply to keep the trail system fresh.

The trails shown on the attached plans are conceptual, based on ten-foot contours. It appears that climbing turns can be utilized to maintain a reasonable grade on the trail, approaching 10% at some points as it meanders down the hill. Where the trail meets the hedgerow which crosses the meadow, it cuts through the vegetation, turns through the meadow and follows the existing drainage berm. From the berm, the trail runs alongside the existing driveway, then turns and runs beneath the canopies of the trees along Bridge Road. The trail would pause at a crossing point at Bridge Road, near the existing driveway serving the David/Resko property.

Connecting the northern and southern parcels of the Brandywine Farm property is very important, as this connection can be a major link in a larger trail system, as well as making the two halves of the Brandywine Farm property more attractive destinations. Bridge Road is a significant obstacle, but one which must be crossed by the Yellow Spine Trail. A trailhead for the yellow spine trail and the proposed parking area at the PECO tower are across Bridge

The Yellow Trail could follow the existing hedgerow, which will provide shade for visitors while they enjoy the view of the hillside meadow above.

The area adjacent to the existing driveways will provide the best crossing location, connecting the sites across Bridge Road.

Road from each other. This area is approximately 900' from the intersection of Bridge and Creek Roads to the east, and approximately 650' from the curve in Bridge Road to the west. While the Township's engineer should review site surveys to determine clear sight distances, it appears that this area may be suitable for a crossing.

A crossing in this area should be well marked. Signage and lighting should accompany a painted crosswalk. Other items such as trail markers could also be used to signify a crossing point. Changes in the color or texture of the asphalt leading up to the crossing point could be used to alert drivers of the crossing. Rumble strips may be effective, used similarly to toll booth approaches.

The character of the Yellow Spine Trail south of Bridge Road may be significantly different than that of the trail on the north side of the road. This area features more gently rolling hills, rather than steep slopes. The floodplains are low, flat and very wet. Woodlands, agricultural fields and a meadow inhabit these areas.

The southern portion of the Yellow Spine Trail would begin at the PECO parking area. It would then move through the open field into the riparian woodlands to the south. This portion of the trail should NOT hug the edge of the Brandywine Creek. Streamside trails often contribute to bank erosion and sedimentation. Conversely, where streams are already eroding, streamside trails can eventually be undercut and dropped into the stream, destroying the trail. This trail should meander through the woodlands, providing glimpses of the stream. This tease, seeing and hearing the Creek only at certain points, will make the access points to the stream all the more interesting. Where the Yellow Spine Trail exits the woodlands, it crosses the PECO right-of-way. There, it crosses a small wet meadow and meets the East Branch Brandywine Creek at a potential bridge location.

The PECO right-of-way and gas pipeline easement both cut through the site, creating access points to the Brandywine Creek, which wraps around the southern and eastern edges of the site. The right-of-way and easement are each kept free of trees and

Pedestrian access points are proposed at the banks of the Brandywine. No boat access or other high impact uses are proposed here.

thick vegetation in these areas, providing readymade access points to the Creek. Where the Yellow Spine Trail crosses the easement and right-of-way, it provides opportunities to create spur trails to the water's edge. These access points are not envisioned as heavily designed or constructed. No boat launches, viewing decks or other structures are proposed.

The Blue Loops

In the northern parcels, a series of loops and connector trails will provide access to meadows and woodlands from the Yellow Spine Trail. One loop provides an alternative path through the central field. Another meanders through the woodlands. A connector trail traverses both fields and woodlands, connecting the two aforementioned loops.

For visitors most interested in staying in the sunshine, the Blue Meadow Loop is the best option. This loop trail veers off the yellow spine trail and makes its way around the central agricultural field. The trail generally follows the contours and hugs the woodland edge in some locations. This gives the trail extra interest, as walkers here can view the meadows to the west, but also look up into the canopies of the edge trees, or peer into the woodlands. This trail rejoins the Yellow Spine Trail at the existing hedgerow.

Another loop provides access directly to the woodlands from the proposed northern parking area and the Yellow Spine Trail. The northern end of this Blue Woodland Loop trail begins at the edge of the woodlands adjacent to the proposed parking areas. The other end exits the woodlands along an existing piece of trail, which then enters the central field. In between, the proposed trail loops around relatively flat grounds, providing an easy hike through upland woodlands.

The Blue Connector Trail runs from the Blue Meadow Loop to the Blue Woodland Loop, through the woodlands. The southern end of this trail uses an existing stretch of trail and opening in the edge of the woods. On hot days, this trail will save visitors a few extra minutes in the sun. It follows the contours of the side of the ridge and provides a relatively flat course. Should the agricultural fields be returned to production, or the meandering yellow trail should be removed for some other reason, this connector trail could be an alternate route for the Blue Meadow Loop. At its northern terminus, it connects to the Blue Woodland Loop and the Purple Woodland Loop at a four way trail intersection.

The Purple Woodland Loop

Within the woodlands, a large loop trail is proposed. The understory here is relatively thin, which should make establishing trails here manageable. It should also provide views within the woodlands. Visitors may

Points of interest are created where trails pass from meadows into woodlands and provide views of a diversity of resources.

be able to see birds or other wildlife in the forest. The trail also traverses interesting geologic features such as large outcrops and boulder fields. Hikers may also be able to hear the Brandywine Creek from portions of the trail. However, the trail does not descend all the way down to the Creek. The portion of the site which contains this stretch of the Creek is very close to neighboring properties. Bringing visitors to this portion of the site would likely lead to accidental trespassing. As the Brandywine Creek is more easily accessible in the southern portion of the site, with fewer opportunities for trespassing, users wishing to access the Creek should be encouraged to visit that portion of the site. Additionally, the grades leading down to the Creek are very steep. Maintaining a trail here could be very difficult. Erosion of a trail here could lead to direct sedimentation of the Creek.

The Existing Woodland Trail

Within the woodlands on the northern portion of the site, a large loop trail exists. It is currently blazed with blue paint. Portions of this trail can be used to establish the proposed trail system. However, much of the existing trail is badly eroded and rutted. Its surface is dangerous as the ruts pose the threat of spraining an ankle or twisting a knee. The main problem areas appear to be "fall line trails." These are trails which run perpendicular to the contours, or straight up and down a slope. By running straight down a slope, fall line trails become natural conduits for runoff, offering the path of least resistance. These types of trails are quickly eroded, turned into swales and eventually badly rutted. The lower portions of these trails tend to collect sediment, dropped out of the water as it slows.

The fall line sections of the existing trail should be closed and rehabilitated as understory vegetation. Closure of these sections should include filling of the ruts, modifying upslope drainage, if needed, and replanting on the bare soil. If a closed trail still looks like a trail, people will continue to use it, thereby continuing to damage the site. The goal in closing a trail is to make it appear that no trail was ever there.

The existing blue trail is also plagued by boundary issues. A portion of the trail actually leaves the Brandywine Farm parcel along the boundary shared with Allerton Farm. Another section of the trail brings hikers to a clearing which connects to the Gray property. While the trail doesn't actually leave the property here, it provides users with a point of interest which can lead to trespassing on a neighboring property, purposely or accidentally.

The proposed Purple Woodland Loop seeks to provide the interest of the existing trail while

The boulder fields and large rock outcrops within the woodlands provide points of interest along the woodland trails.

The woodlands on the site feature relatively thin floor and shrub layers, which make it easier to establish trails.

remedying its problems. It is proposed to generally follow the contours, creating a moderately sloping trail. It is also planned to stay a minimum of 100' from the property boundaries.

The Green Loop

Potential future uses play an important role in planning the green loop on the southern parcels. The Township may wish to use the open fields here to establish athletic fields. The fields may be converted to meadows or remain in agricultural production. Trails can be established which can be easily adapted to any of these uses.

Portions of the existing woodland trail follow fall lines which has caused the trail to act as a swale for runoff.

The character and type of trails proposed in the existing agricultural field can be chosen based on the use of the site. Should the agricultural fields be converted to meadow, the trails should simply be mown into the site. However, should the site be converted into an active recreation based park, the trail could be paved. The trails could double as vehicular paths. Maintenance crews could use the paths to access the athletic fields.

Paved trails could also be used by walkers and runners as a workout track. It appears that it may be possible to plan the Green Loop so that it measures ½ mile with the Yellow Spine Trail crossing through it to create a ¼ mile loop as well. Setting standard distance intervals for these loops may attract people wishing to measure their walk or run. Additionally, paved loops here will provide active recreation opportunities for people who may be unable to hike the slopes and terrain which are present on the rest of the site. Parents or grandparents waiting for soccer practice to end would have the chance to use the site for themselves, rather than just sitting in their cars and waiting.

Floodplains

The majority of the southern parcels are within the Brandywine floodplain. Wetlands and hydric soils are also present. Therefore, this portion of the

Portions of the existing blue trail, such as this entrance to the woodlands, should be retained as part of the proposed trail system.

Points of interest are created where trails pass from meadows into woodlands and provide views of a diversity of resources.

site should be expected to be very wet on a regular basis. This will very likely require portions of the trail system to be closed on a regular basis, possibly seasonally. If seasonal closure isn't an option, tread stabilization with either large, flat stones or layered, crushed stone may be necessary. It appears that a trail in the woodlands in the south would be manageable. However, the small meadow to the east should be largely avoided, as it is within the floodplain and has both hydric soils and wetlands present. Additional on-site spot adjustments should be conducted in order to avoid any seasonal wet areas.

Connections

Allerton Farm

The equestrian facility to the northeast of Brandywine Farm could provide a future connection to the Brandywine-Struble Greenway. However, Allerton Farm is a private property and any trails proposed on the property would require the consent of the landowners. Should the Brandywine-Struble Greenway hug the Brandywine Creek at this location, it would make sense to connect the Brandywine Farm trails to it. The grade approaching the Brandywine Creek where it enters the site is relatively steep. It appears that it may be easier to maintain a trail into Allerton Farm to the north of the creek. From there, the trail could traverse the flatter land on Allerton Farm and connect to the Greenway offsite.

West Branch Brandywine Creek

The southern parcels of the Brandywine Farm are well situated to make connections to any regional trail which may be established along the Brandywine Creek in the future. The land is flat and forested, with no rock outcrops, steep slopes or other impediments. Numerous private properties exist to the west of the site. These landowners would have to consent to any connections, but a spur could be established from the Yellow Spine Trail to extend into these properties.

To the east, the southern parcels of the Brandywine Farm property are adjacent to Shaw's Bridge Park. This presents a great opportunity for the Township to connect the newly acquired open space to the established park. Additionally, Shaw's Bridge Park could be connected to a larger trail system along the Brandywine in the future. However, the Brandywine

The existing right-of-way and easement provide glimpses of the Brandywine from the Yellow Trail, enticing visitors to use the spur trails to access the Creek.

Creek presents a significant obstacle to connecting Brandywine Farm to Shaw's Bridge Park. A relatively large pedestrian bridge would be necessary to cross the Creek. As the footers of the bridge on either side of the creek would be within the floodplain, substantial engineering and permitting would be necessary. However, based on a site visit and study of aerial photos and other base information, it appears that the southern end of the small wet meadow would be a good location for a proposed bridge. On the Shaw's Bridge Park side of the Creek, the proposed bridge could land in the vicinity of the intersecting paved trails.

This location would leave the confluence of the two branches of the Brandywine Creek unencumbered. A bridge too close to the confluence could have a greater effect on erosion and sedimentation. It would also be a visual barrier. The confluence is an interesting area of the creek and shouldn't be overwhelmed by a pedestrian bridge. Placing the bridge further to the north allows it to be somewhat hidden in the vegetation, creating a more pleasant experience for those traversing the bridge or viewing it from the shores.

While a pedestrian bridge will be expensive and design and permitting will be time consuming, it does appear to be the safest option. The alternative connection, bringing pedestrians over the existing Bridge Road bridge, appears difficult. While the bridge itself has a sidewalk on the north side, along the westbound lane, there are no connecting sidewalks. Due to the grades along the road, it would be extremely difficult to install them. Currently, traffic moves at high speeds here, through an expansive, largely uncontrolled intersection. It appears that major redesign would be necessary to accommodate pedestrians at the Creek and Bridge Roads intersection in order to connect the sites with the existing bridge.

The PECO Right of Way

To the north of the Brandywine Farm parcels, the PECO right-of-way could be used to access other trail systems and open spaces. Should the Township wish to explore the possibility of creating a wider trails network following the rights-of-way, this stretch could be used to create a trail from the Brandywine Farm property to Natural Lands Trust's Stroud Preserve and possibly to the East Branch Brandywine Creek Trail. The rights-of-way do cross numerous private properties, so negotiations would likely be required both with PECO and each of these landowners in order to establish a trail.

Conclusion

Open space preservation, recreation and land development are typically at odds when it comes to land use. At Brandywine Farm, the three uses can be integrated in a way which each complements the others. The limited land development and public access will facilitate the creation of easements to preserve the open space. Trails for recreation will be created within the preserved open space. The preserved open space will make the three development lots more valuable and more beautiful. The convergence of these three uses gives East Bradford Township a win-win-win situation at the Brandywine Farm.

Natural Lands Trust

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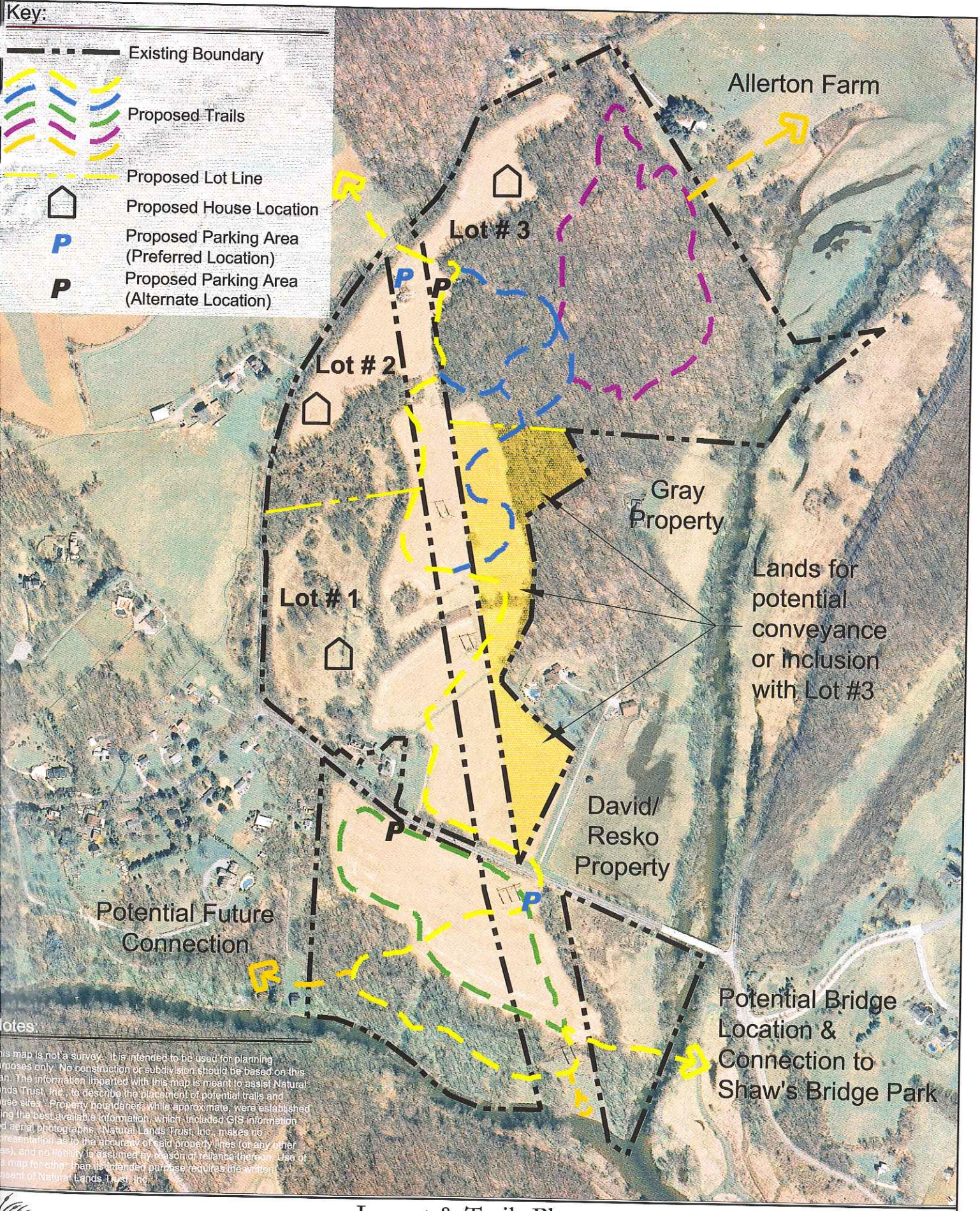

Notes:

This map is not a survey. It is intended to be used for planning purposes only. No construction or subdivision should be based on this map. The information imparted with this map is meant to assist Natural Lands Trust, Inc., to describe the placement of potential trails and house sites. Property boundaries, while approximate, were established using the best available information, which included GIS information and aerial photographs. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.

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Layout & Trails Plan
Brandywine Farm
East Bradford Township
Chester County, PA

Feet
0 250 500 1000

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