New Hartford Recreation Commission
New Hartford Open Space Preservation Commission
New Hartford Conservation Commission

Brodie Park South
Environmental Baseline Report
Natural Ecology and Water and Soil Resources
Niles Road, New Hartford, Connecticut

May 2010

Harry White, Sean Hayden, and Michael Morin
Northwest Conservation District
Torrington, Connecticut

Northwest Conservation District

Northwest Conservation District

1185 New Litchfield Street, Torrington CT 06790
Telephone (860)-626-7222, email – jeancronauer@conservect.org

May 13, 2010

Town of New Hartford
Recreation, Open Space Preservation, and Conservation Commissions
530 Main Street, P.O. Box 316
New Hartford CT, 06057

Environmental Baseline Report for Brodie Park South, New Hartford

Dear Commission Members,

The Northwest Conservation District has completed the Environmental Baseline Report for the property known as Brodie Park South. Specifically, we compiled a report providing information described in a Letter of Agreement dated April 6, 2010. The professionals that spent a number of days on the property collecting environmental data included a soil scientist, a forest ecologist, and a cartographer. They have compiled a report that includes photos and resource maps that summarizes the existing conditions on the property as interpreted through their professional experiences. They have also provided recommendations on environmental protection issues if any land-use changes are proposed.

The Northwest Conservation District appreciates this opportunity to assist the Town of New Hartford with their environmental decision-making. Please contact us if you need any further assistance in studying alternative proposals for the use of this ecologically valuable property.

Sincerely,

Jean Cronauer
Executive Director – Northwest Conservation District

Brodie Park South

New Hartford, Connecticut

New Hartford Recreation Commission
New Hartford Open Space Preservation Commission
New Hartford Conservation Commission

May 2010

Table of Contents

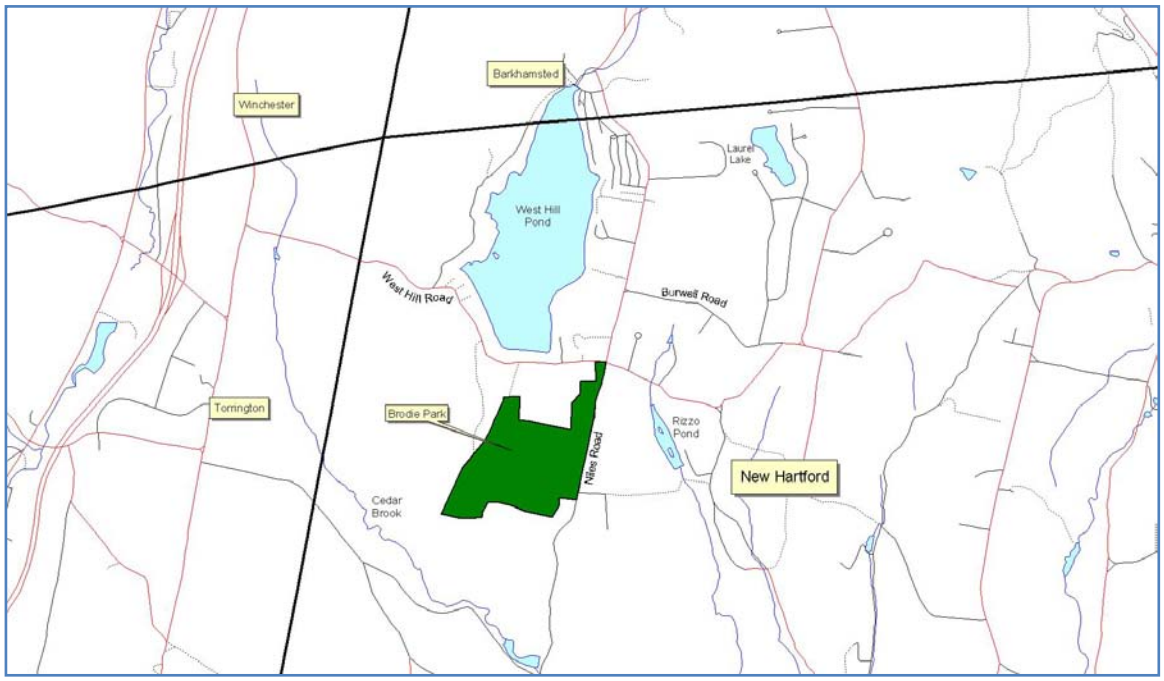
1. The Natural Ecology of Brodie Park South

Niles Road, New Hartford, Connecticut

Harry White, Ecologist

Overview

Brodie Park South (N41°51'57", W73°02'27") is an outstanding 152-acre forest, field, and upland-wetland mosaic in the Nepaug River sub-basin of the Farmington River watershed in New Hartford, Connecticut. The property is owned by the Town of New Hartford and is important for its diverse and intact habitats, provision of ecosystem services, passive recreational use, and outstanding scenic value. Landscape connectivity is excellent as the preserve lies in the vicinity of over 800 acres of protected lands in a rural areas network that includes Cedar Swamp and West Hill Pond. As a natural area, the site provides a wide range of benefits to the public and wildlife in Northwestern Connecticut including clean water and air, a place for refuge or exploration, and an opportunity to protect a natural ecosystem matrix in perpetuity.

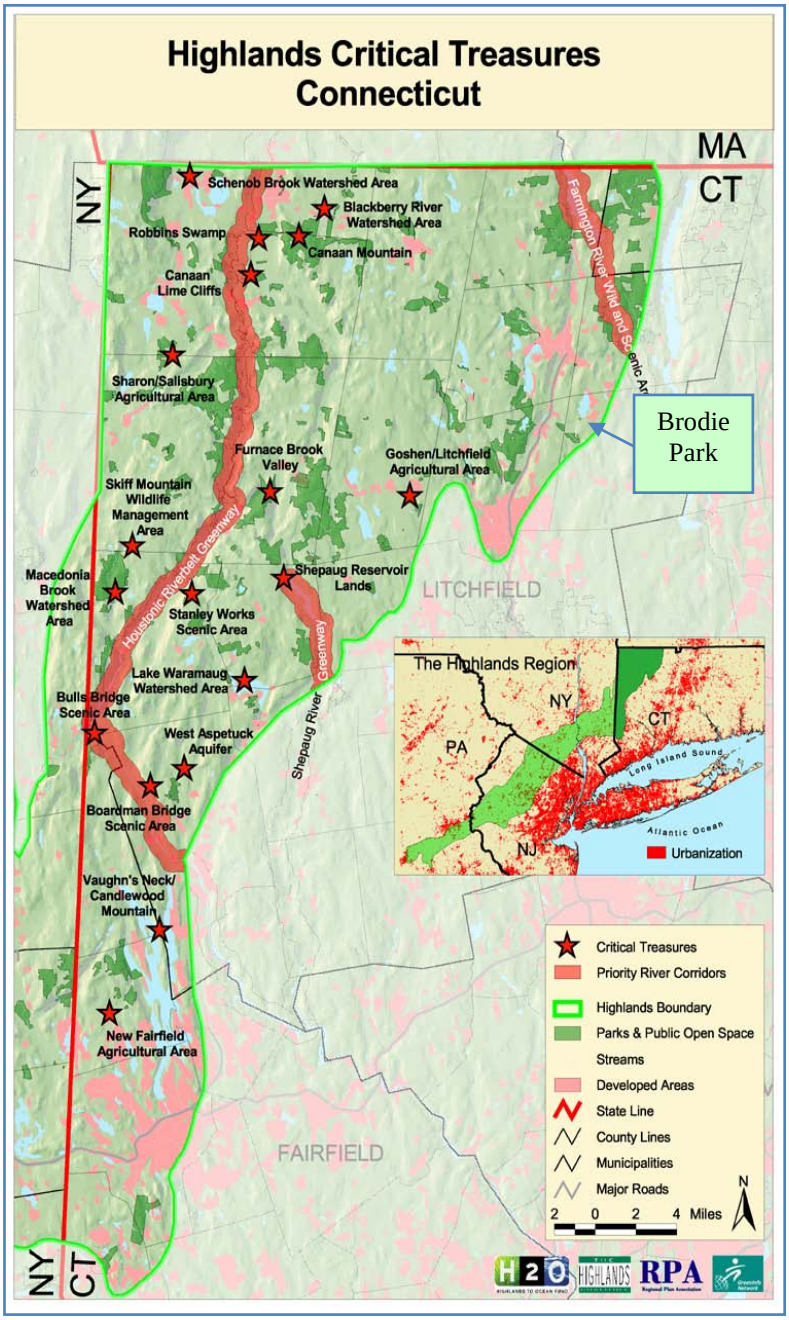


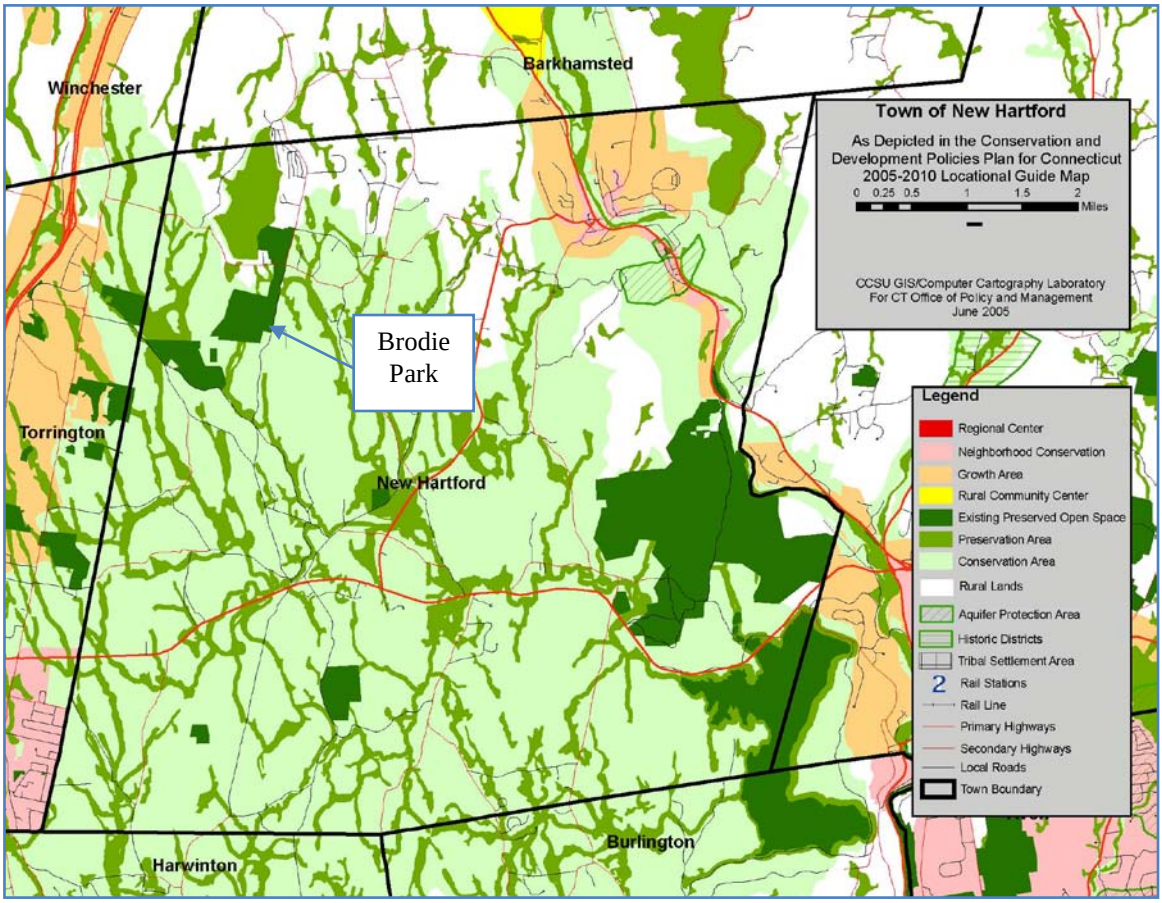
Location (all maps north up)

This component of the study was commissioned to document the ecological attributes of Brodie Park South as the Town of New Hartford explores possible alternative uses of the property, particularly in the field compartment along Niles Road. Current land use includes the maintenance of lawn and grassland habitats in the fields and forestry in the wooded uplands. The site is used for passive recreation and includes the 2.5-mile Kearney Trail. Some of the potential uses include the development of game fields, the construction of a senior center, and the permanent protection of the parcel through the use of conservation easements.

Landscape Setting and Significance

The property is located in the Northwestern Uplands of Connecticut and within the Highlands Region of the Northeastern United States. The Highlands encompasses "the last green sward" (Klemens, 2005) of comparatively rural lands that extends from eastern Pennsylvania to the Catskills of New York to the Northwestern Hills of Litchfield County. The Highlands Conservation Act, passed by Congress in 2004, describes the Highlands as being of national significance and worthy of protection. Since the landscape has been highly partitioned due to historic and contemporary land use patterns, and the rapidly increasing cost of land, conservation at all scales is generally accomplished through the vision of the residents of the region's towns and the generosity of individual landowners.



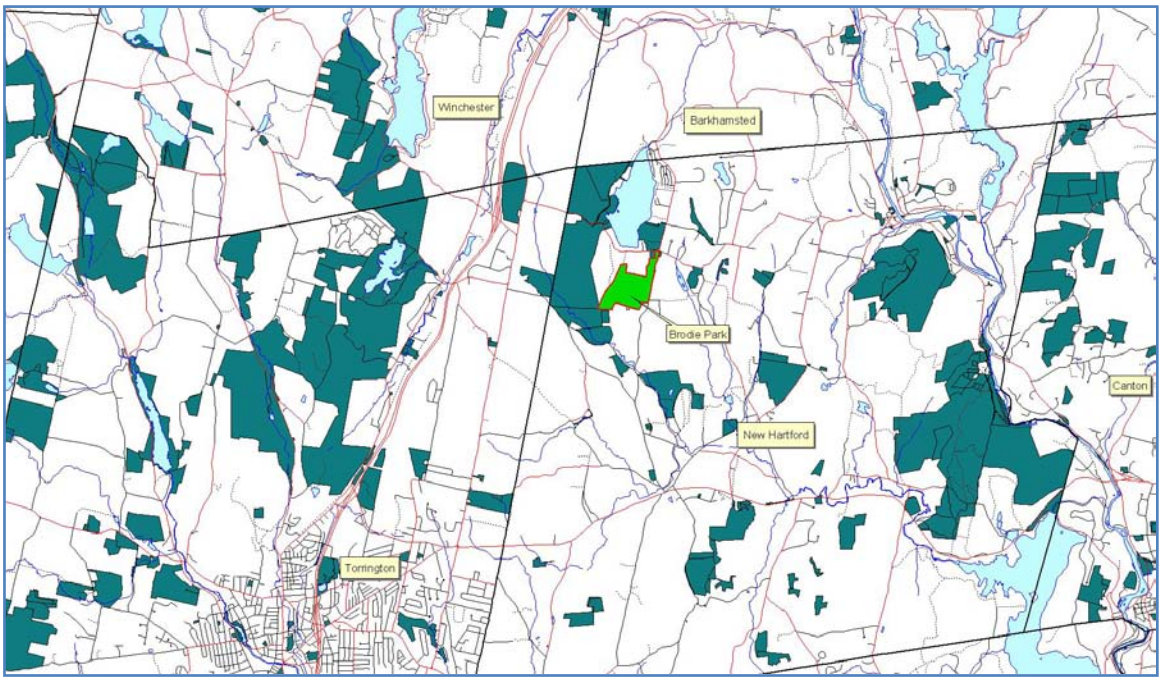


Town of New Hartford Map, Conservation and Development Policies Plan for Connecticut, 2005

Connecticut's Conservation and Development Policies Plan (2005) identifies the Northwestern Uplands as harboring much of the state's remaining agricultural and wild land and identifies Brodie Park in its entirety as Existing Preserved Open Space, although there is apparently no permanent legal conservation protection in place. The plan also identifies the precise location of Brodie Park as a Preservation Area, the highest statewide classification of land sought for conservation. Preservation Areas are lands that protect significant resource, heritage, recreation, or hazard-prone areas by avoiding structural development. Through their long-term management, such areas contribute to the state's need for environmental quality and food, fiber, water, and other resources by ensuring that any changes in use are compatible with identified conservation values. The preservation of Brodie Park advances the plan by protecting fields, woodlands, water quality, wildlife habitat, and the rural aesthetic. Additionally, the plan identifies the site's landscape position as a Conservation Area, and urges the protection of such lands that contribute to the state's need for food, fiber, water, habitats, and other resources and environmental qualities. The legal protection of Brodie Park would permanently conserve areas of terrain that are not compatible with sound development while protecting upland wetlands and their adjacent slopes from decline by septic system insult. Such protection would also advance the plan's and the State Legislature's goal of protecting 21% of our land as open space by the year 2023 (Connecticut General Statutes Section 23-8(b)). Finally, by conserving over 3100LF of intermittent stream corridors and wet bottomlands, the effort would advance the state goal of protecting, preserving, and maintaining inland wetlands and watercourses (CGS 22a-36).

At the landscape/ecosystem scale, Brodie Park provides a strong habitat set and transition area for ildlife. Of exceptional significance is the parcel's location within a 1200-acre roadless

block. There are also 800 acres of protected land near the park in a network that extends north into areas west of West Hill Pond. Block size has a direct impact on the vitality of natural predator populations and protected connectivity reduces the risk to organisms that must range across the landscape. Larger blocks contain a greater variety of habitats, habitat specialists, and larger-bodied organisms than smaller parcels. Thus, a Brodie Park conservation initiative would advance preservation efforts and natural resource protection at national, state, and local levels, and at ecoregional, landscape, and habitat scales. A conservation initiative would also satisfy the Increase Open Space Protection action item in the 2005 Town of New Hartford Plan of Conservation and Development page 4-8 that states "There is no better way for New Hartford to promote environmental health, protect community character and enhance the quality of life than to preserve as much land as possible as committed open space".



Protected Areas Context of Brodie Park (blue parcels = DEP-identified conservation lands)

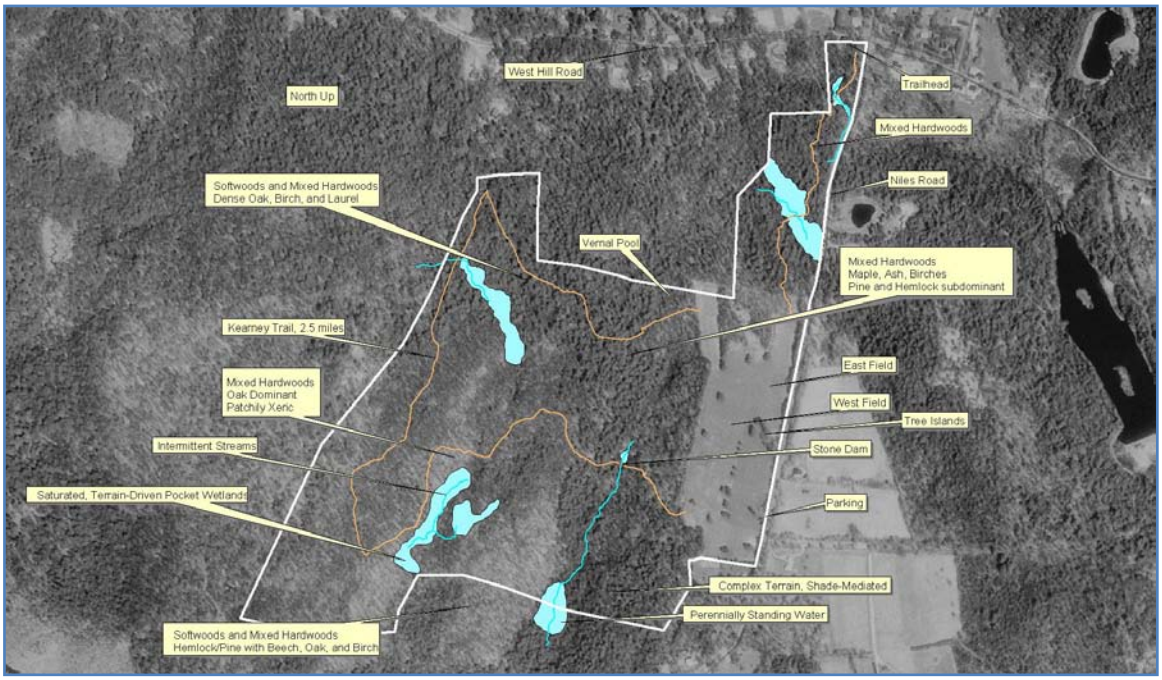
Current Land Condition

The parcel is located in a wooded and rural landscape with extensive protected-areas coverage. The locale is primarily settled along narrow country roads and typifies the rural aesthetic with stone wall-lined byways, open fields, and pockets of unbroken forest compartments. The parcel is composed of forest (133 acres) and field (19 acres) and captures an extensive block of northern transitional woodland of the *Quercus alba – Quercus rubra – Carya* spp. forest alliance (USFS Forest Class I.B.2.N.a.27) and other alliances. The *Quercus prinus* forest alliance (USFS Forest Class I.B.2.N.36) is well represented across the dry rocky highpoints. The shady, rich draws and ravines harbor the A*cer saccharum – Betula allegheniensis – Fagus grandifolia* alliance (USFS Forest Class I.B.2.N.a.4) with extensive eastern hemlock (*Tsuga canadensis*) and eastern white pine (*Pinus strobus*) coverage.

The upland forest of Brodie Park harbors excellent native woodlands that were last logged by the Town of New Hartford in 2005-2006. Canopy gaps and remnant skid roads are evident across the parcel. A rather unexpected and important finding was the lack of a significant non-native invasive species community in the forest compartment. At least eight upland pocket wetlands provide a rich diversity of flora and fauna at Brodie Park. 3000LF of intermittent stream

corridors connect some or all of these wet habitats. A woodland vernal pool area is found beyond the northwestern reach of the fields and a perennial stream and a perched swamp are located in the southern reach. Most of the non-native invasive species on the property are found at the forest-field ecotone.

The lower, field reach is occupied by a grassland matrix consisting of two well-managed subcompartments and several tree islands. The west field is about 10.2 acres in extent and is currently managed for grassland birds via the use of delayed mowing practices. The east field is about 8.8 acres in extent and is managed by regular mowing. Both subcompartments exhibit intact, deep turf substrates with no evidence of erosion or soil degradation. Historic sugar maples line Niles Road and sap lines for maple syrup production extend across many of these individuals. Stone walls are a common element along the roads and deep inside the forest, a testimony to the agricultural legacy of the land.



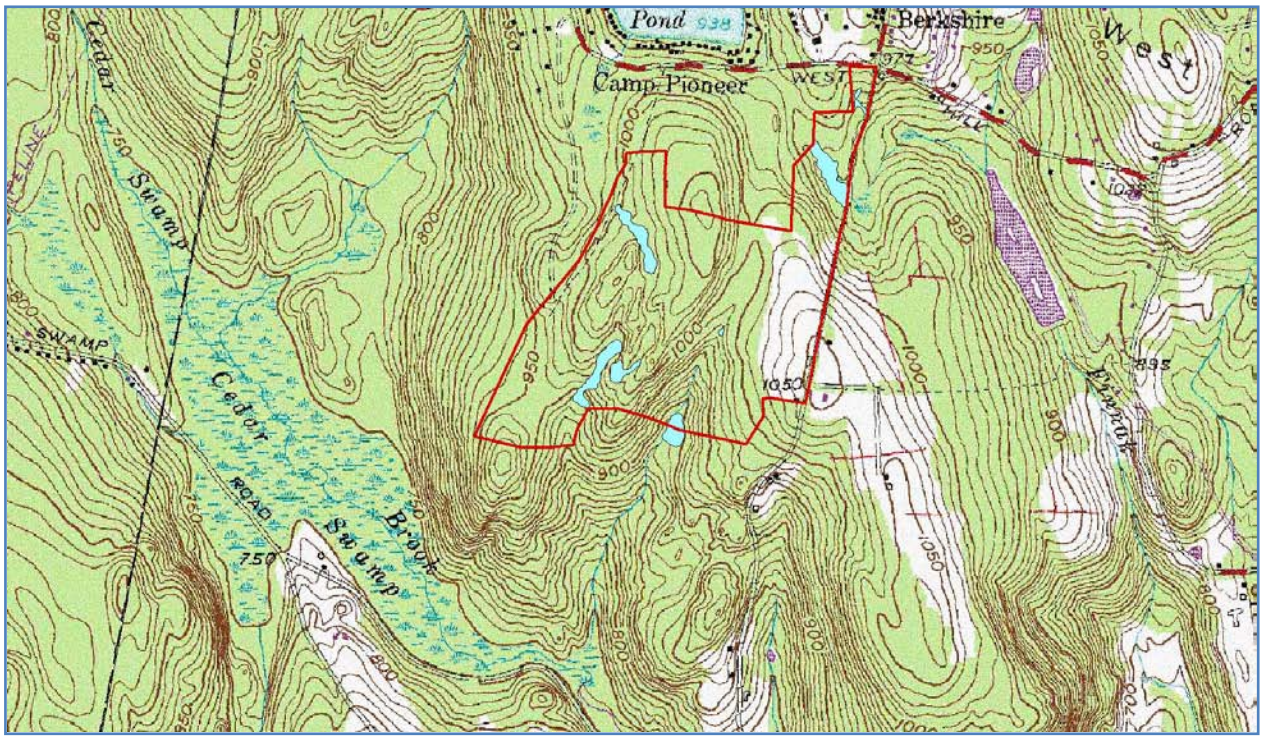
Aerial Ortho-photograph Depicting Brodie Park Features

The soil underlying the field compartment is primarily USDA Prime Farmland Soil, a designation assigned by U.S. Department of Agriculture for land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustainable high yields of crops when treated and managed according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and comparatively few rocks. They are permeable to water and air, not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

The Prime Farmland designation establishes a parcel's conservation value for its contribution to the preservation of optimal farmland resources, the maintenance of local economic diversity, the protection of habitat quality, and the establishment of greenbelts and other protected networks. Left unmanaged through the fledging period, the robust grasslands produced on USDA Prime Farmland Soil support outstanding bobolink (*Dolichonyx*

oryizivorous), eastern meadowlark (*Sturnella magna*), and red-winged (*Agelaius phoeniceus* blackbird production. Bobolink is present on the parcel, with the individuals heard in a May inspection having just returned from their Argentina wintering grounds, 5000 miles to our south. The species has high site fidelity and thus perpetual generations are fostered by maintaining the delayed mowing practice. The most robust of grasslands harbor source populations that produce individuals that will radiate out to sub-optimal habitat sites elsewhere on the landscape.

The tree islands provide structural and functional diversity to the fields. Norway spruce (*Picea abies*) is the dominant element and it provides important habitat resources for red squirrel (*Tamiasciurus hudsonicus*) and snowshoe hare (*Lepus americanus*), the latter species of which is returning to Northwestern Connecticut. Spruce provides excellent cover for birds utilizing the fields during insect hatches, when predators such as the barred owl (*Strix varia*) (observed here under dawn skyglow) exploit their crepuscular feeding behavior. At the northern end of the field compartment, a large tree island is composed of young mixed northern hardwoods, eastern hemlock, and eastern white pine. A mowed trail circumnavigates this feature that is heavily utilized by birds of prey, neotropical migratory songbirds, large-bodied predators, and a variety of mammalian prey species.



Site and Landscape Topography

Topography

Site topography is one of the major habitat drivers at Brodie Park. The highest elevation, 1060’ ASL, is found along the north central reach on a broad rocky summit under a mixed woodland cover. The lowest elevation, 880’ ASL, is located at the outflow of the forested swamp along the southern boundary. Additional summits that reach to 1040’ ASL are found in the west-central reach. Patchy outcrops and subsurface bedrock formations foster more xeric habitats due to the presence of shallow soils with lower water retention capacity. The steepest slopes are in the southern reach that harbors a complex series of compact wet ravines and draws that descend toward the south end of the nearby Cedar Swamp. The northeastern compartment features an

outstanding wet ravine in a bedrock-driven microsite. The fields and the woodlands in the north central reach generally feature gentle slopes and more mesic soil conditions.

A veery enjoying a cold spring morning at Brodie Park.

Wildlife Utility

Brodie Park South is an 152-acre matrix of diverse habitats that harbors a wide variety of flora and fauna. Most importantly, it is the realm of the bobcat (*Lynx rufus*), a top predator whose presence is an indicator of ecosystem health, stability, and biodiversity. As a mosaic of forest, field, edge, wetland, and riparian corridors, the property meets all of the life history needs of this important animal that is recovering from the overtrapping and land clearing activity of the past. The park's woodlands also provide measures of isolation in the realms of microtopographic complexity and distance from settlements that facilitate bobcat production. Bobcat scat was observed in the southern forest reach on a ledge under a mixed hemlock-hardwood canopy, where it undoubtedly feeds on prey fueled by the unit's ample oak crop.

Eastern coyote (*Canis latrans*) is present at Brodie Park, favoring the open edge of the field and the old skidroads that offer opportunities for prey ambush. A young coyote was observed in the northwestern reach of the field by the large tree island. Coyote are important regulators of the deer (*Odocoileus virginianus*) population and their presence ensures the maintenance of robust botanical productivity in the woodland units.

Fresh black bear (*Ursus americanus*) scat (photo, left) and debarked trees were observed in the vicinity of the southwestern wetland. A strongly territorial animal, black bear are omnivorous and take advantage of the insect populations that reside in decaying wood. Brodie Park's

compactly heterogenous terrain and patchily dense cover provide ample denning sites and refugia for this charismatic species that is of no threat to trampers who remain conscious to the fact that they are visitors to the homeland of the bear.

A box turtle was encountered in the northern reach of the mowed grassland compartment. It is a State Species of Special Concern in Connecticut. This once common reptile resides here near the northern limit of its range, where evolutionary forces have their greatest influence on adaptation. It is highly sensitive to disturbance in the forms of logging, deforestation, and development, with most perishing because of the destruction of their nesting, sunning, feeding, and hibernation areas. As these habitats are lost, pregnant females must increase their nesting range, bringing them into fatal contact with automobiles during road crossings. Brodie Park provides the moist bottomland and open deciduous forests that serve as optimal habitats for this important reptile in decline.

The park is a robust bird habitat complex by any measure. As previously mentioned, bobolink and barred owl were sighted here in May, along with veery (*Catharus fuscescens*) (observed in a forested wet draw), wild turkey (*Meleagris gallopavo*) (observed in the robust oak stand of the northern forest reach), northern cardinal (*Cardinalis cardinalis*) (song heard at field edge), least flycatcher (*Empidonax minimus*) (observed near height of land), black-capped chickadee (*Poecile atricapillus*) (observed in the tree islands), red-winged blackbird (song heard in the fields), wood thrush (*Hylocichla mustelina*) (song heard in a forested wetland), downy woodpecker (*Picoides pubescens*) (observed in the lower northern woodland reach), eastern towhee (*Pipilo erythrophthalmus*) (observed foraging in the forest-field ecotone), American crow

(*Corvus brachyrhynchos*) (observed in the mowed grassland), and red-tailed hawk (*Buteo jamaicensis*) (observed over the fields). The presence of wood thrush is especially important as the species has its highest reproductive success in larger woodland patches; the literature indicates that forest blocks like that at Brodie Park produce surplus individuals that range out across the landscape. The unmowed field area meets the habitat requirements of bobolink, a State

Species of Special Concern, although there is a significant risk of nest predation (in field and forest) by house cats (*Felis catus*) from homes in the area. It is important to remember that house cats are a non-native, plentiful, and highly effective predator species and their impact on bird populations in the US alone has been estimated to exceed 10 million kills per year. Finally, the fields and edge ecotone can provide excellent habitat for the American kestrel (*Falco sparverius*), a State Threatened Species, if provided with nest boxes placed 15 feet above ground on trees or on nest poles at separations of at least 1500LF. Dead trees (snags) make excellent, clear supports.

A vernal pool is located in the northeastern reach of the larger western forest block. This is a critical habitat for amphibians including wood frogs (*Rana sylvatica*), eastern newts (*Notophthalmus viridescens*), two-lined salamanders (*Eurycea bislineata*), and dusky salamanders (*Desmognathus fuscus*). Vernal pools are woodland wetlands that fill seasonally and attain their maximum water levels and volumes in the spring for at least a period of two months. They dry up annually or every few years, at least to the point of exposing the soil (although it may remain saturated). Vernal pools lack connections to perennial surface waters but are intimately connected to their forest. Trees contribute to the pool's energy budget, help maintain cool water/microclimate temperatures, and affect pool hydrology. Annual inputs of leaves and twigs support a detritus-based food web. It is most important to maintain a dense, native forest canopy in their vicinity as the fauna that are dependent on these systems (primarily amphibians and insects) hatch in response to thermal cues, and their growth rates are closely tied to water temperature. Vernal pools are very susceptible to damage from logging (in several dimensions) and other disturbances and thus a special management zone should be created to partition the area from future manipulation.

Brodie Park South SPOT Satellite Orthophotograph

Floristic Communities

For the purpose of description, the parcel is divided into two habitat sets:

I. The Fields
II. The Forest Compartments

I. The Fields

The field area is managed in two compartments: the eastern (regular mowing) compartment and the western (delayed mowing) compartment. Their floristic communities share many common elements. Both are densely populated with native and non-native grasses and herbaceous species including annual bluegrass (*Poa annua*), sweet vernal grass (*Anthoxanthum odoratum*), indian grass (*Sorghastrum arvenaceum*), and Kentucky bluegrass (*Poa pratensis*). Timothy (*Phleum pratense*), a non-native cool-season grass, is common in the west compartment and is an important feed-hay component. Reed canary grass (*Phalaris arundinaceae*), switchgrass (*Sorghastrum nutans*), and little bluestem (*Schizachyrium scoparium*) are also more prevalent in the west compartment. The suite of nitrogen-fixing legumes includes alfalfa (*Medicago sativa*), red clover (*Trifolium pratense*), and white dutch clover (*Trifolium repens*). The biodiversity of the grasslands is a rich resource that meets the needs of a wide range of seed consumers, foragers, insectivores, and predators.

Differential mowing practices prevent the succession of the field to forestland and allow almost half of the field to be available for passive recreation while maintaining habitat availability for neotropical migratory grassland birds, butterflies (order: Lepidoptera), small mammals, and birds of prey in the other half. Additional benefits gleaned by leaving unmowed patches include an increase in biodiversity and an enhancement of the flux of energy into the upper food web via the perpetuation of rodent and insect overwintering cover. Such practices will benefit American kestrels, northern harriers (*Circus cyaneus*), red-tails, and insectivorous birds.

West Field, View N

Seasonally wet patches in the fields foster additional diversity. The cycle of saturation and desaturation facilitates the diffusion of oxygen into the soil and supports robust microbe populations, enhancing nutrient availabilities and the rate of nitrogen fixation. Such conditions support higher soil fertility, more rapid nutrient cycling, and add biodiversity. The delayed-mowing grassland also supports small patches of meadowsweet (*Spirea alba*), sphagnum moss (*Sphagnum palustre*), and joe-pye-weed (*Eupatorium maculatum*).

East Field, View NNW

The edges of the fields and the tree islands are occupied by old-field species and include common milkweed (*Asclepias syriaca*), cow vetch (*Viccia cracca*), goldenrod (*Solidago* spp.), black-eyed susan (*Rudbeckia hirta*), chicory (*Cichorium intybus*), yarrow (*Achillea millefolium*), coreopsis (*Coreopsis* spp.), Queen Anne's lace (*Daucus carota*), and evening primrose (*Oenothera lamarckariana*). Non-native invasive multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), oriental bittersweet (*Celastrus orbiculatus*), and Japanese barberry (*Berberis thunbergii*) are present in the field-woodland ecotone. There is some evidence of active invasives management to varying degrees along the edges. Barberry presents the greatest threat to the forest because the species is very shade tolerant and allelopathic (i.e., it chemically suppresses the health and fecundity of its competitors). It can rapidly spread through forest habitats, occupying growing space and displacing native plant species leading to a collapse in biodiversity. There is also growing evidence that the spread of tick-borne Lyme Disease may be facilitated by Japanese barberry because its dense, spiny thicket habit provides significant (but non-native) predator protection to deer mice (*Peromyscus maniculatus*). Thus, for a number or reasons, management of the forest edge to suppress exotic-invasive species should be part of regular maintenance at Brodie Park South.

II. The Forest

The project area is located in the Transition Hardwoods Ecoregion of the Northeast. Transition hardwoods, also called transition hardwoods-white pine-hemlock or white pine-hemlock-hardwoods, contain species characteristic of zones to the north (northern hardwoods) and to the south (central hardwoods). The transition hardwoods vegetation zone forms a band extending from the coasts of Maine and New Hampshire through Massachusetts and northern Connecticut into southern New York and central Pennsylvania. Transition hardwood forests are characterized by the presence of maple (*Acer* spp.), oak (*Quercus* spp.), beech (*Fagus grandifolia*), birch (*Betula* spp.), hickory (*Carya* spp.), ash (*Fraxinus americana*), and formerly, chestnut (*Castanea dentata*). White pine and hemlock are the characteristic conifers of the region.

The terrain of the forest compartment is fascinating and its heterogeneity drives differences in floristic assembly. Outcrops, rock bands, benches, slopes, and small valley and ravine features are all present. Such variety creates a mosaic of forest stands due to differences in solar radiation loading and water availability. Three main community types are thus expressed in the woodlands of Brodie Park: dry hilltop habitats, mesic midslope habitats, and wet bottomland/ravine habitats. Logging operations have extensively perforated the forest canopy in many locales, creating a mosaic of light regimes that fosters the growth of shade-intolerant species such as eastern white pine and paper birch (*Betula papyrifera*), elements that would otherwise only be present in treefall gaps created by natural disturbance. The woodlands can be characterized as a third-growth ecosystem because of its past history of agricultural use and subsequent harvest rotations.

The hilltop community type is found on the upslope positions particularly in the vicinities of the 1060'ASL summit in the northwestern reach and on the subsummits to the south. The relative deficiency in the availability of water due to shallow and rocky soils is a profound driver of performance in these stands. The trees tend to be smaller in stature and more widely spaced than elsewhere on the property. Slow-growing chestnut oak (*Quercus prinus*) dominates the driest microsites in the western reach. It is an interesting oak species in that it is shade intolerant and will die back and resprout from its stumps. Black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), white oak (*Quercus alba*) (the state tree), red maple (*Acer rubrum*), and pignut hickory (*Carya glabra*) run to 14" to 16" DBH (although typically smaller). Even though diametrically small, one black oak was cored and determined to be almost 100 years old. Many of the oaks show multi-stem/coppice architecture, having regenerated from stumps created in long past logging operations. Eastern white pine attains the supracanopy position in several upland locations whilst eastern hemlock is relegated to

patches in the subcanopy. Huckleberry (*Gaylussacia baccata*) and lowbush blueberry (*Vaccinium* spp.) are patchy in the understory that also includes dense patches of mountain laurel (*Kalmia latifolia*), Connecticut's state flower, and striped maple (*Acer pensylvanicum*). The understory plants do not bloom profusely or set ample fruits in these shady habitats, however. Pennsylvania sedge (*Carex pensylvanica*) is well distributed here and little bluestem (*Andropogon scoparius*) is present especially in the vicinity of outcrops. Several blowdowns were found, the result of trees rooting in shallow, rocky soils. Coarse woody debris loads are ample due to material felled and left in place during the last logging rotation. Standing and downed dead wood is an important structural and functional habitat element at Brodie Park as it provides nesting spaces and refugia, harbors moisture, supports decomposer and pollinator communities, aids nutrient cycling, builds soils, and affects carbon sequestration. There is life in dead trees.

Midslope communities lie below the summits and high lands. Increased tree density and size are the most immediate visual manifestations of the higher level of available moisture. Northern red oak (*Quercus rubra*) (occasionally to 30" DBH), black birch typically to 12" DBH, hickory to 20" DBH, sugar maple (*Acer saccharum*) to 20" DBH, and white oak (occasionally to 24" DBH) excel here. Black birch is not particularly common in the undisturbed areas because its small seeds require bare ground to regenerate; it is recruiting strongly in the bright gaps of harvest sites as are black cherry (*Prunus serotina*) and paper birch. Eastern hemlock (very occasionally to 30" DBH) is present in a variety of densities from spotty to dominant, with the most dense hemlock stands present in the west-central and northern reaches and in the shady wet draws that run through the southern reach. Hemlock is occasionally expressed as exceptional supracanopy specimens mixed with dense microstands of sapling and pole stock recruits. In places, mountain laurel forms a continuous shrub layer to five feet in height that can only be navigated by finding game trails. Striped maple, witch hazel (*Hamamelis virginiana*), hobblebush (*Viburnum alnifolium*), flowering dogwood (*Cornus florida*), and hophornbeam (*Ostraya virginiana*) are present in the understory.

A few of the largest, oldest hemlocks have been snapped off by wind due to weakening associated with the hemlock woolly adelgid (*Adelges tsugae*), an introduced pest that is differentially afflicting the hemlock population of the Eastern United States. The writer believes that the largest trees are more greatly affected because of their more frequent use by birds that transport the adelgid around the landscape. Other large hemlocks at Brodie Park appear to be robust and withstanding the epidemic and site quality is probably a factor in survival. Adelgid-mediated weakening has also made the hemlock population more susceptible to the non-native elongate hemlock scale

(*Fiorinia externa*). Hemlock is of great ecological importance in Southern New England because it is the climax species of the forest. Contrary to initial concerns, there remains hope that the hemlocks will ultimately survive this unintended consequence of global commerce.

The co-occurrence of red oak and white oak at Brodie Park is important from a wildlife perspective. White oak is a preferred food for a wide variety of animals because its acorns are sweeter and have a higher protein content than red oak acorns. However, white oak germinates soon after the late summer acorn rain, and thus it is generally unavailable through the winter. In contrast, red oak germinates after the winter. Therefore, wildlife species are able to harvest the highest value foods to build winter reserves, and survive thereafter on less optimum, but plentiful foods. From an energetics perspective, the robust seed production of this forest maintains an ample prey community that in turn supports bobcat and other charismatic megafauna at the top of the food web. It is a critically important place for top predators especially in the context of the greater landscape.

Wet bottomland draws and ravine habitats with intermittent to perennial stream elements are scattered across at least eight sites at Brodie Park. Rock ravines and draws are typically cooler and more humid than the surrounding landscape and feature associations more common to the North Country. Here, this habitat type features a mixed coniferous-deciduous canopy dominated by eastern hemlock (*Tsuga canadensis*) in a matrix of white ash (*Fraxinus americana*) to 18” DBH, red maple (*Acer rubrum*) to 12” DBH, American beech to 10” DBH, black birch (*Betula lenta*) to 12” DBH, and northern red oak (*Quercus rubra*) to 18” DBH. Yellow birch (*Betula allegheniensis*) to 10" DBH is growing well in some of the best conditions on the property (i.e., deeper soils and a favorable moisture regime). The understory is patchily thick with the offspring of the canopy species as well as with clusters of hay-scented fern (*Dennstaedtia punctilobula*) and an occasional Canadian yew (*Taxus canadensis*). The stream systems tend to be intermittent with the exception of the small brooks that drain into the pocket swamp of the southernmost reach and the pocket swamp in the northeastern corner. There is probably significant subterranean flow in the intermittent corridors throughout the year.

All of the riparian elements feature narrow thalwegs, a profusion of surface stones, feeder seeps, moss and liverworts (Division: Bryophyta), and patches of skunk cabbage (*Symplocarpus foetidus*), indian poke (*Veratrum viride*) (a common skunk cabbage associate with exceptional soil-holding capacity), and cinnamon fern (*Osmunda cinnamomea*) (fiddleheads). The water features provide critical habitat and niche services to many plant and animal species. They are structurally and functionally distinct from, yet integrated with, the surrounding forestland.

Riparian-stream areas are comprised of various components including the water influence zone (i.e., the watershed), the terrestrial or streamside vegetation zone, and the aquatic zone. Many vertebrate species inhabit or utilize riparian areas for all or part of their life cycles. It has been written that 75% of New England vertebrates are found within 300LF of water habitats. While birds use these areas as migrating, nesting, and feeding areas, mammals, reptiles, and amphibians are attracted to the riparian zone for food, water, and cover from unfavorable environmental conditions or predation. Brooks are especially important because they serve as linear corridors that facilitate the movement of wildlife across the greater landscape, as is evidenced by the concentration of game tracks and trails in the vicinity of all of the site's wetland runs.

The seasonally and perennially wet areas foster outstanding amphibian habitat that it is free of piscine predators that inhabit larger brook systems. They also serve as mating sites during the spring and fall woodland amphibian mating migrations. The forest gaps/wetland/hemlock covert is good habitat for ruffed grouse (*Bonasa umbellus*) that use cinnamon fern as a preferred food. Clearly, the park's woodlands support a robust community of New England flora and fauna.

<u>Development Implications: An Ecological Perspective</u>

There are local initiatives concerned with the conversion of the grassland compartment. Such development includes the construction of a senior center and the creation of ball fields, among other possible uses. This activity would cause a shift in structure and function in the floral community (and a decline of simple area) leading to the loss of grassland-bird habitat specialists including the bobolink from the western field unit. The loss of tall goundcover would also reduce habitat availability for prey species and the predators that feed upon them.

The current management regime at Brodie Park provides a measure of isolation and a gradual transition between Niles Road and the forest; the conversion of the grasslands to active recreation conditions would eliminate this buffer. The literature indicates that activities near field edges can affect the quality of habitats for up to 300LF into the forest (not considering potential impacts from night lighting). The expected outcome of the installation and use of active recreation facilities and a senior center would be a decline in human-sensitive species and an increase in generalist species and non-native invasives within the boundaries of Brodie Park South.

The possible use of pesticides, herbicides, and fertilizers on recreational fields would be a distinct threat to aquatic systems in the lower watershed. There are also aesthetic, rural, and sprawl issues that lie beyond the scope of this work.

Ecological Synthesis

Brodie Park South captures a large block of an ecologically important landscape. The variety and richness of its habitats fulfill the niche requirements of many species and contribute to the robustness of populations beyond its boundaries. Its riparian units provide the highest water quality and support woodland and aquatic wildlife. The parcel's location within a larger forest block allows for the existence of larger-bodied animals with large home ranges, adding complexity and thereby enhancing ecosystem resilience. Brodie Park South is a unique place that provides both a refuge for nature and opportunities for passive recreation.

2. The Water and Soil Resources of Brodie Park South

Niles Road, New Hartford, Connecticut

Sean Hayden, Resource Conservationist and Soil Scientist, NCD

Overview

The Town of New Hartford Recreation Commission, Open Space Preservation Commission, and the Conservation Commission asked the Northwest Conservation District (NCD) to compile a baseline environmental report of the 152-acre town-owned parcel known as Brodie Park South. This section of the study describes the surface waters and soils of the property as they relate to development. Various uses have been proposed for the land including ball fields with associated parking and facilities and a senior center on the front portion of the site abutting Niles Road. Our goal is to provide the Town of New Hartford with the current environmental and to offer some comments and recommendations to consider when determining the future uses of this parcel.

Surface Water Quality Classification

The surface water quality standard/rating for all open water features on and down-gradient of the site are given the highest rating of "AA". The Connecticut Department of Environmental Protection assigns this classification to only the cleanest of the state's streams and surface water features. The "AA" water quality standard indicates that the CT DEP is potentially considering (or proposing) the watercourse to serve as a drinking water supply and/or, that it is a tributary to a drinking water supply as outlined in the Long Range Plan for the Management of Water Resources pursuant to Section 25-5b of the Connecticut General Statutes. No land use activities that would potentially degrade this water quality rating may take place in the watersheds of "AA" rated streams. The surface waters that pass through the mature forested headwater wetland systems at Brodie Park are certainly responsible for protecting the high water quality rating. If permanent land use changes are proposed for this parcel, a rigorous soil erosion and sediment control plan as well as a thorough stormwater quality management plan would be required to protect this highest of water quality ratings (see *Stormwater Quality Management Considerations* and *Soil Erosion and Sediment Control Considerations* sections, below).

Stormwater Quality Management Considerations

The pollutant components and concentrations entrained in stormwater runoff generated by a variety of land-use practices are very well documented. This includes the pollutants contained in stormwater runoff from athletic fields as well as parking lots and buildings. Equally well documented are the effectiveness of most stormwater treatment measures that renovate (remove) pollutants contained in stormwater runoff. Therefore, an area of no less than one-fifth the size of the disturbed areas should be set aside for stormwater quality renovation structures and measures. The area set aside for renovation should be located on well-drained soils on gentle slopes at least 150LF from wetland soils and existing open water resources.

The technical resources listed below contain key information about the concentrations of pollutants entrained in stormwater runoff for most land uses and the pollutant-removal efficiencies of specific stormwater management practices. The list of resources is in no way complete but it will serve as an excellent starting point for design engineers involved with any land-use changes on the property.

1. National Stormwater Quality Data Base (NSQD), version 1.1 – 9/4/05 Meastre and Pitt
2. National Urban Runoff Program (US EPA 1983)
3. Center for Watershed Protection (www.cwp.org)
4. University of New Hampshire Stormwater Center 2005, 2007, 2009 Annual Reports
5. National Pollutant Removal Performance Database, 2nd Edition, March 2000
6. National Pollutant Removal Performance Database, Version 3, September 2007
7. International Stormwater Best Management Practice Database (ASCE/EWRI) 10/07
8. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (CT DEP, 2002)
9. Bioretention Manual - Department of Environmental Resources, Prince Georges County, Maryland
10. UCONN Cooperative Extension Rain Garden Manual www.sustainability.uconn.edu/landscape/05-rain_gardens.html
11. CT LID Inventory by NEMO clear.uconn.edu/tools/lid/lid_search.asp
12. UCONN Cooperative Extension - Jordan Cove www.cag.uconn.edu/nrme/jordancove

The Town of New Hartford is in the process of drafting a set of Low Impact Development Regulations. If a Brodie Park South project is proposed, the development proposal should be designed to the new Low Impact Development standards.

If ball fields or any facilities that require irrigation are constructed, a strategy to protect the quality of surrounding wetland and water resources must be employed. The most favorable method would be to capture and recycle stormwater runoff for irrigation. This strategy has been used successfully on an 18-hole golf course here in Litchfield County. Using captured stormwater runoff for irrigation should always be considered first before town or well water sources are considered.

Soil Resources Assessment (see USDA NRCS Soils Chart on p. 25)

I. Wetland Areas

There are approximately 11 acres of wetlands on the property accounting for 7.2% of the total land area (152 acres) of Brodie Park South. The wetland soils mapped by the USDA on the property are coarse-grained and do not accurately depict conditions on the land. Wetlands soils are illustrated in some locations where there are no wetland soils, and many wetlands soils exist on the property that are not shown on the USDA soil maps. Therefore, NCD sent a wetland soil scientist and a cartographer to the property with a GPS data collector to survey the property and delineate the wetland soil areas more accurately (see Environmental Conditions Map). Please note that the wetland delineation performed by NCD is not a substitute for a comprehensive wetland delineation that would be required if any land-use change is proposed for the property. A comprehensive wetland delineation involves a certified soil scientist extracting soil samples and tying flags in the field along the wetland/upland soil interface. A surveyor can then accurately locate the flags and the wetland/upland margin on an A-2 level surveyed property map.

Additionally, environmental data published by the CT DEP does not show the presence of a number of intermittent watercourses that drain the southern and western portions of the parcel. Therefore we field-located a number of wetlands, potential vernal pools, and intermittent watercourses with a GPS unit and employed GIS to illustrate them on the Environmental Resource Map. The shallow to bedrock and dense glacial till soils of the western half of the site support a number of perched wetlands and potential vernal pools with intermittent watercourses draining them during heavy precipitation events.

II. Upland Soils

The upland soils on the property are either soils that are shallow to bedrock (located on the western half of the property) or soils underlain with a dense glacial till creating a shallow perched water table (eastern half of the property). Sloping soils that are shallow to bedrock and contain dense glacial till in the subsoil are highly erodible. If a significant land-use change is proposed for this property, the erosion and sediment control plan should be reviewed by a Certified Professional in Erosion and Sediment Control (CPESC). Also, the erosion and sediment control program should be drafted using the 2002 CT Guidelines for Soil Erosion and Sediment Control (CT DEP, 2002) as a guide. It is important to note that once the existing, stabilizing cover vegetation is removed from these soils, it will be extremely difficult to control soil movement.

III. Soil Erosion and Sediment Control Considerations

All soils on the parcel have developed on moderate to steep slopes and are underlain with either dense glacial till or bedrock. This makes the site extremely susceptible to soil erosion. The following strategies should be employed to ensure that any proposed land-use change activities will have no negative impacts on wetland soils and stream water quality during construction:

1) Implement all of the requirements of the CT DEP General Permit for Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities;
2) Require the Soil Erosion and Sediment Control Plan be reviewed by Certified Professional in Erosion and Sediment Control (CPESC); and
3) Require that all applicable erosion and sediment control concepts detailed in the in the 2002 CT Guidelines for Soil Erosion and Sediment Control be implemented on the site.

Our experience has shown that it is critical to focus on the three resources listed above. NCD has been asked to assist with a number of catastrophic failures resulting in serious natural resource damage associated with the construction of ball fields. Athletic field projects on sloping land can be very problematic because of the large cuts and fills required to level the land. The sheer amount of open/exposed and disturbed soils during certain phases of construction can be staggering. Ball field projects require a strict phasing schedule that limits the area of exposed soils to minimize soil erosion problems.

IV. USDA Prime Farmland Soils

The US Department of Agriculture classifies a select few soil series as "Prime Farmland Soil" and "Statewide Important Farmland Soil" (see *Brodie Park South – USDA/NRCS Soils Table*). These soils have the best combination of physical and chemical properties for producing

food and livestock feed. In general, they have an adequate and dependable moisture supply, favorable temperature and growing season, acceptable acidity and alkalinity, and few rocks. Prime farmland soils also are not saturated with water for long periods of time. These favorable soil characteristics, combined with local climatic conditions, make Connecticut's prime farmland soils ideal for agriculture, with some of the highest non-irrigated soil productivity rates in the world.

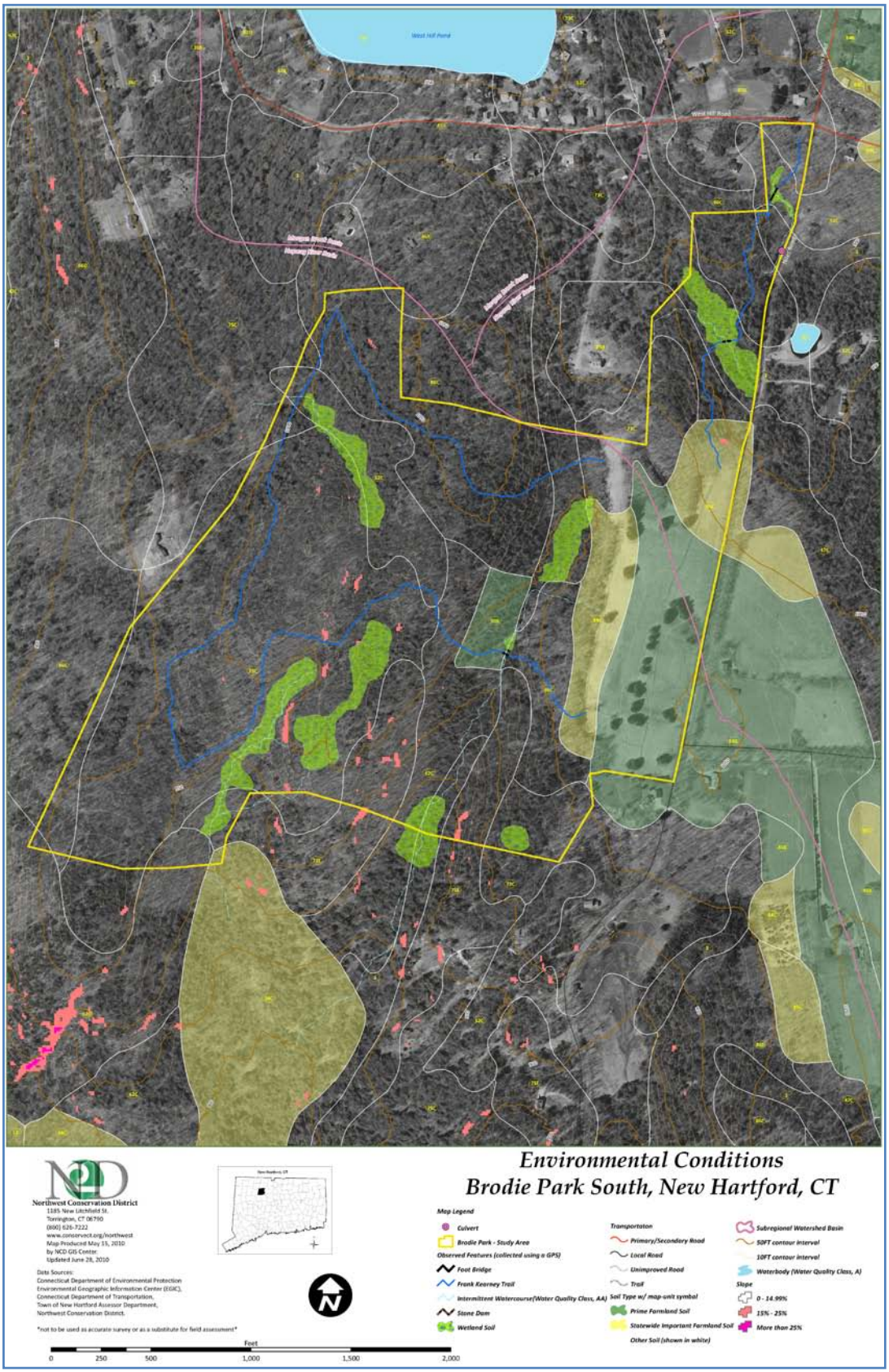
The Northwest Conservation District has been actively working with farmland preservation organizations to conserve this valuable, dwindling, and non-renewable natural resource. Prime farmland soil areas have been attracting attention in Northwestern Connecticut because of negative trends in both national and global food production industries. More and more, we are looking to our "back yards" for food production because of uncontrolled and unresolved food contamination issues both in the US and from food imported from other countries. In addition, escalating energy and transportation costs also make it more attractive to produce food locally. Locally grown food supports local economies much more than imported foods. As fresh water resources in the western US keep declining, farmers and food producers are looking back to the prime farmland soil areas of the Northeast because our adequate natural rainfall supports farming with high crop production yields (Connecticut receives 40 to 50 inches of rain per year).

The combined coverage of "Prime Farmland Soil" and "Statewide Important Farmland Soil" types in Litchfield County is approximately 12% of the land area. The Town of New Hartford has a high concentration of prime agricultural soil, with coverage exceeding 23% of the town. Of the 152 acres of Brodie Park South, 26.2 acres are classified as either "Prime Farmland Soil" or "Statewide Important Farmland Soil" and thus 17% of the park is outstanding agricultural land. The prime agricultural land is located on the eastern half of the property and is mostly the unforested areas visible along Niles Road. While the land being considered for a ball field complex may be currently worth more to the town as an active recreational facility, it is not a stretch to predict that the intrinsic value of prime agricultural soils as farmland may soon exceed its value as ball fields. I believe this is one of the reasons why "Support and Preserve Agricultural Land and Farming" is an action item in the 2005 Town of New Hartford Plan of Conservation and Development. This action item also states that "New Hartford must be proactive in protecting farmland and Farming", as well as, "Keep Farmland a high priority for open space acquisition." It is important to note that once prime agricultural soils have been disturbed and converted to an alternative use (ex, converted to ball field or developed for town

facilities), it will never again have the qualities characteristics that define USDA prime farmland again. Once lost, the unique characteristics that define these soils as prime for agricultural uses can never be recreated.

Conclusion

There are approximately 16 different soil types that occupy the parcels known as Brodie Park South. A brief description of each soil type is provided in a table titled "Brodie Park South – USDA/ NRCS Soils Table" (attached). If any land used changes are proposed for the park it will be important to assess the capabilities and limitations of the soils that may be disturbed. Only then can a project be designed that is protective of down gradient wetland soils and water resources. Attached is a mapped titled "Environmental Conditions, Brodie Park South New Hartford, CT" which shows the general location of each of the soils types that exist in the park.



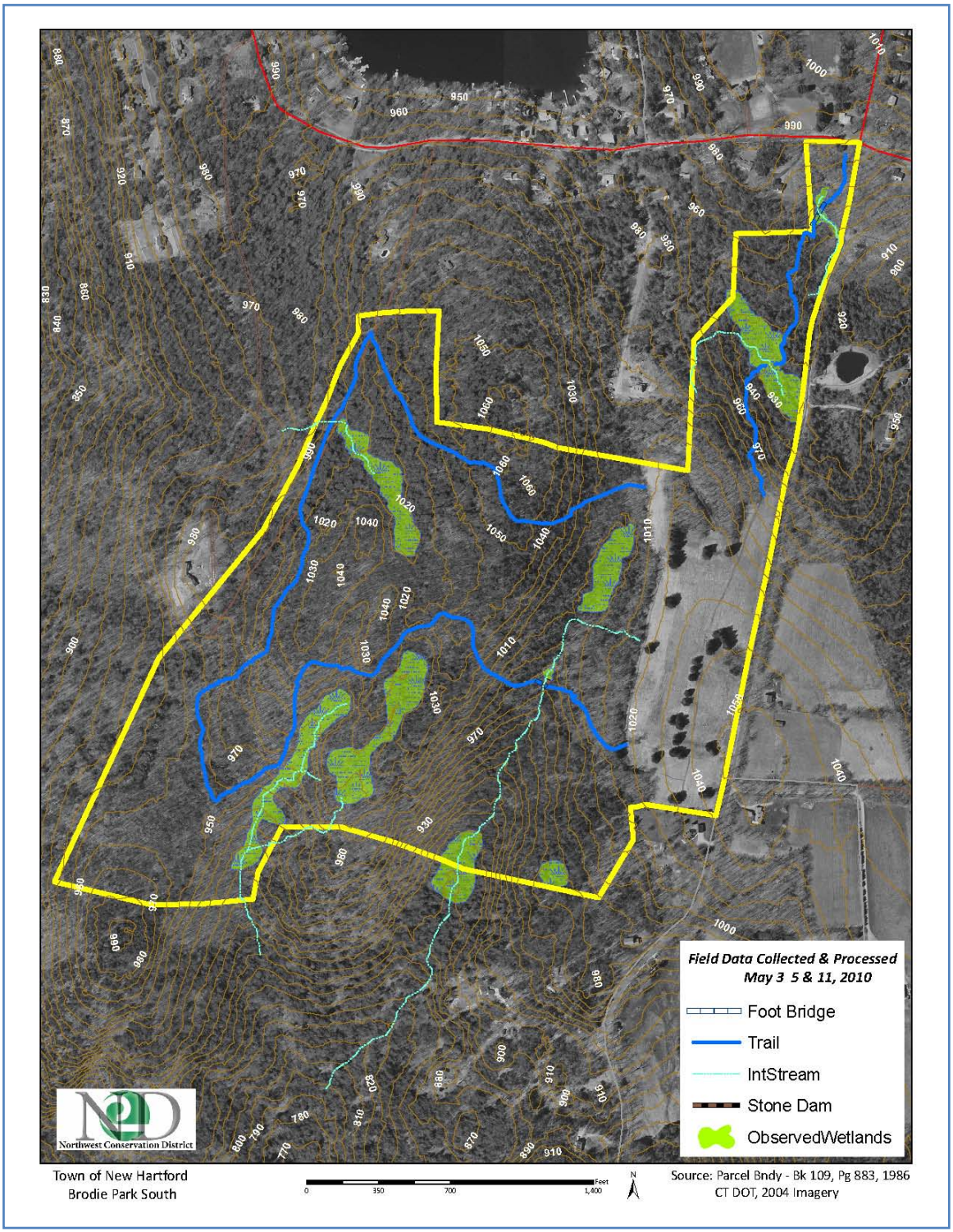
GIS: Michael Morin

Brodie Park South - USDA/NRCS Soils Table

NRCS Soil Symbol	NRCS Soil Name	Characteristics/Hydric	Characteristics/Farmland	Acres
3	Ridgebury, Leicester, and Whitman soils, extremely stony	Poorly drained/Hydric soil	Other	8.96
34C	Merrimac sandy loam, 8 to 15 percent slopes	Somewhat excessively drained	Statewide Important Farmland Soil	0.10
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	Moderately well drained	Other	0.17
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	Moderately well drained	Other	0.01
50B	Sutton fine sandy loam, 3 to 8 percent slopes	Moderately well drained	Prime Farmland Soil	2.53
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	Moderately well drained	Other	8.34
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	Well drained	Other	7.40
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	Well drained	Other	1.30
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	Well drained	Other	58.60
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	Well drained	Other	5.76
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	Well drained	Other	0.94
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	Well drained	Other	3.85
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	Well drained	Prime Farmland Soil	13.10
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	Well drained	Statewide Important Farmland Soil	9.80
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	Well drained	Other	3.32
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	Well drained	Other	28.20

Source: Table assembled by NCD GIS Center using Connecticut DEP/NRCS Soils data table

Northwest Conservation District



NCD Field Data Map

GIS/GPS: Michael Morin

Glossary of Technical Terms

Area-species relationship – as the size of a protected area increases, it tends to harbor more species.

ASL – height above sea level.

Aspect – compass orientation of land, i.e., a hillside with a southern aspect faces south.

Charismatic megafauna – larger-bodied animals of fur and feather that make one take notice.

DBH – tree diameter at breast height; a standard forestry measure of tree size.

Drumlin – a compact, linear hill created by and aligned with glacial flow.

Ecotone – the place where two or more habitats meet, ex., where a field's edge meets forest.

Exotic-invasive species – non-native, introduced species that typically outcompete native species.

Flux – the import and export of physical and biological elements into and out of a system.

Fragipan – a water-impervious but fragile soil layer that is often found in the subsoil.

Gap-phase dynamics – treefalls create gaps, allow light to enter, and new plants initiate to fill the gap.

Low-slope – landscape position near the bottom of a slope, above the bottomland and below the upslope.

Natural disturbance regime – the principal forces and landscape patterns of disturbance (here, wind).

Pattern and process – patterns are compositional and structural aspects; processes are functional attributes.

Pleistocene – the period of time from 1.6M to 10k years ago, ending at the end of the last ice age.

Propagules - typically, seeds. Propagules can be moved across the landscape by animals (ingest/adhere).

Residual stand – the group of trees left standing after a forestry operation.

Released trees – formerly suppressed trees, now liberated. "Release trees" are those cut to release others.

Riparian zone– the surrounding habitat that directly influences, or is influenced by, a stream.

Selection system – forestry technique wherein groups of trees are removed, mimicking natural disturbance.

Selective cutting – poor logging practice also known as highgrading: cut the best and leave the rest.

Shelterwood – forestry technique wherein large trees are left behind to provide seeds to the residual stand.

Stand – a compartment of trees in a certain location and/or with a common attribute set.

Substrate – the forest floor.

Snags – standing dead trees, important for wildlife. There is life in dead trees.

Suppressed trees – trees in the understory that live in the shade, waiting for a canopy gap to bring light.

Surficial geology – the material that lies over bedrock; typically the result of the Wisconsin glacier.

Tilth – the physical character of soil; soil with good tilth is uncompacted, porous, healthy.

Thermodynamics (glacial) – organizing behavior of a glacier across landscapes to facilitate flow.

Till – glacial deposits of boulders, stones, and gravel, often sorted by the action of glacial meltwater.

Wisconsin glacier – the ice shield that covered much of east and central USA at the end of the Pleistocene.

Wolf tree – a large woodland tree with thick lower branches that grew up in open land.

About the Authors:

The Water and Soil Resources of Brodie Park South
Sean Hayden

Sean Hayden holds a BS degree in Renewable Natural Resource Management and Engineering from the University of Connecticut. His resume includes work in ecological and human health risk assessment in Connecticut as well as service in agroforestry with the Peace Corps in Kenya. Hayden is the Resource Conservationist and Soil Scientist with the Northwest Conservation District and has served the towns of Northwestern Connecticut for over 11 years. His responsibilities include wetland delineation, natural resource mapping, sediment and erosion control plan certification, stormwater quality management plan reviews, construction inspections, and the design and implementation of municipal commission education/training programs. A widely known professional throughout the region, Hayden is a Certified Professional in Erosion and Sediment Control (CPESC #2181) and a Connecticut Certified Soil Scientist.

The Conservation Ecology of Brodie Park South
Harry White

Harry White holds a Master of Forestry degree from the Yale School of Forestry and Environmental Studies with specializations in forest ecosystem health, conservation biology, preserved areas management, and restoration ecology. His academic resume includes research work in forest pathology at Acadia National Park with the National Science Foundation and the Department of Forest Ecosystem Science of the University of Maine at Orono. He is the author of the Traprock Wilderness Recovery Strategy, an award-winning plan to protect the traprock ridges of Connecticut's Central Valley. A consulting ecologist working with several land trusts and landowners, White was the Staff Ecologist and Director of Land Conservation at the Weantinoge Heritage Land Trust, the largest trust in the state with 10,000 acres, for the past 12 years. His areas of expertise encompass stewardship, ecological analyses, management plans, habitat restoration, acquisitions, operations management, and outreach. Born and raised in Connecticut, White has been active in the technical aspects of natural and traditional working lands management and preservation since 1990.

GIS/Cartography and GPS Operations at Brodie Park South
Michael Morin

Michael Morin holds a BA degree in Geography from the University of New Hampshire. He is the staff cartographer/ GIS analyst with the Northwest Conservation District. Mr. Morin's areas of expertise include project management, cartographic design and layout, database/GIS data creation, GIS data management and analysis, GPS data collection and management, and IT computer network management. He has experience working in municipal and regional planning environments and has held GIS manager, GIS analyst and Associate Planner positions in both the private and public sectors. He is extremely well prepared to carry on services assisting town commissions, land trusts, watershed and lake groups and many other clients on projects related to regional planning, parcel mapping, zoning maps, trail mapping, build outs, open space and natural resource maps, and other environmentally oriented projects.