

Norwich Hospital Property NRI

Preston, Connecticut



Eastern Connecticut Environmental Review Team Report

Eastern Connecticut Resource Conservation & Development Area, Inc.

Norwich Hospital Property Preston, Connecticut



Prepared by the
Eastern Connecticut Environmental Review Team
Of the
Eastern Connecticut Resource Conservation & Development Area, Inc.

For the
Conservation Commission
Preston, Connecticut

Report #625

April 2010

CT Environmental Review Team
1066 Saybrook Road, PO Box 70
Haddam, CT 06438

www.ctert.org

Acknowledgments

This report is an outgrowth of a request from the Preston Conservation Commission to the Eastern Conservation District (ECD) and the Eastern East Lyme Connecticut Resource Conservation and Development Area (RC&D) Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The Eastern Connecticut Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field reviews took place on Wednesday, July 1, 2009, Thursday, July 2, 2009, Tuesday, August 18, 2009 and Thursday, September 3, 2009.

Nicholas Bellantoni	State Archaeologist UCONN – Office of State Archaeology (860) 486-5248
Robin Blum	Wildlife Biologist DEP – Eastern District Headquarters (860) 295-9523
Teresa Gagnon	Geologist DEP – CT Geological and Natural History Survey (860) 424-3680
Mark Johnson	Fisheries Biologist DEP - Inland Fisheries Division Habitat Conservation Program (860) 434-6043
David Kozak	Senior Coastal Planner DEP – Office of Long Island Sound (860) 424-3034
Alan Levere	Wetland Reviewer DEP – Parks and Recreation (860) 424-3643
Dawn McKay	Biologist/Environmental Analyst 3 DEP – Bureau of Natural Resources (860) 424-3592

Nancy Murray	Biologist, NDDDB Program Coordinator DEP – Natural Diversity Data Base (860) 424-3589
Jean Pillo	Watershed Conservation Coordinator Eastern Connecticut Conservation District (860) 887-4163
Dave Poirier	Staff Archaeologist State Historical Preservation Office (860) 566-3005
Sherwood Raymond	Service Forester DEP – Division of Forestry Goodwin Conservation Center (860) 455-0699
Michael Senyk	Environmental Analyst DEP Bureau of Water Protection and Land Reuse Remediation Division 860-424-3782
Richard Serra	Regional Planner Southeastern CT Council of Governments (860) 889-2324
Randolph Steinen	Geologist DEP – State Geological & Natural History Survey UCONN – Geology (emeritus) (860) 487-0226
Eric Thomas*	Thames River Basin Coordinator DEP – Bureau of Water Protection and Land Reuse Watershed Management (860) 424-3548
Julie Victoria	Wildlife Biologist DEP – Franklin Wildlife Management Area (860) 642-7239
Pat Young	Natural Resource Specialist Eastern CT Conservation District (860) 887-4163

**Report not yet received.*

I would also like to thank Gail Rigney, Timothy Bowles, Jerry Giabarch and Gary Piszczek of the Preston Conservation Commission, and Kathleen Nichols and Kathy Warzecha of the Preston Planning Department for their cooperation and assistance during this environmental review.

Prior to the review days, each Team member received a summary of the proposed project with location and topographic maps and aerial photos. During the field reviews Team members received additional information, reports and maps. Some Team members made separate follow-up visits. Following the reviews, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the town. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in reviewing the Norwich Hospital Property for development, preservation and conservation.

If you require additional information please contact:

Elaine Sych, ERT Coordinator
CT ERT Program
P. O. Box 70
Haddam, CT 06438
Tel: (860) 345-3977 e-mail: connecticutert@aol.com

Table of Contents

	Page
Frontpiece	2
Acknowledgments	3
Table of Contents	6
Introduction	7
Topography and Geology	15
Eastern Conservation District Review	25
Watershed Perspective*	34
Wetlands Resources	35
DEP – Office of Long Island Sound Programs Review	54
Poquetanuck Cove	63
The Natural Diversity Data Base	66
Fish Habitat and Fish Populations	68
Wildlife Resources	73
Forestry Resources	79
Cultural Resources Survey Summary	87
Planning Considerations	88
Appendix	91
About the Team	

*Section not yet received.

Introduction

The Preston Conservation Commission has requested assistance from the Eastern Connecticut Environmental Review Team (ERT) in conducting a natural resource inventory and review of the town owned Norwich Hospital property.

The project site is located in the town of Preston along the Thames River and Route 12. The +400 acre property may be divided into 4 parcels for description and discussion. *(Parcel names/numbers may vary by report section but accompanying maps or descriptions will define the areas.)*

1. The first parcel is located on the north side of Route 2A and Route 12 and consists of approximately 205 acres (per town GIS). This parcel is primarily wooded with watercourses and wetlands. Slopes range between 15-30%. Four buildings are located adjacent to a +13 acre former reservoir on the westerly portion of the parcel. North of the former reservoir are two “State Archaeological Preserves” consisting of two WWII F6F Hellcraft aircraft. It also contains portions of the former Norwich and Westerly trolley line.
2. The second parcel contains about 122 acres and is the main campus area located on the southerly side of Route 12. The railroad borders the west edge of this segment with a narrow parcel of land isolated on the west side of the tracks.
3. The third segment is located south of the 2A bridge and abuts the railroad to the west and Route 12 to the east. The 133 acre parcel is primarily wooded, contains no structures, and has less severe topographic conditions than parcel 1.
4. The fourth parcel is located south of the Route 2A and east of Route 12. Containing over 50 acres, the portion of the this parcel that borders Route 12 is currently in agricultural use, with a wooded buffer providing a buffer to Poquetanuck Cove.

Objectives

A natural resources inventory is requested for the property prior to any specific development proposal. In addition, it is requested that any planning, engineering, and environmental protection techniques be recommended to mitigate potential development impacts.

The Preston Conservation Commission hopes to use this report as a tool to prioritize areas in need of protection during the master planning process. Major areas of significance include: extensive frontage on the Thames River, a large forest block with steep grades and wetland systems, watershed and frontage on Poquetanuck Cove and gravel deposits.

Specific concerns and information requested include: general soils mapping and interpretation, slope constraints, overview of surficial and bedrock conditions, recommended Best Management Practice (BMPs) tool box, location of significant wetland systems, means of limiting development impacts on the Thames River and shoreland concerns, fisheries habitat and impact mitigation measures, general forestry inventory and management, wildlife habitat and management and mitigation techniques, prioritize areas to be protected due to environmental significance, any special design considerations, potential hazard areas, historic and archaeological significance and protection.

The ERT Process

Through the efforts of the Preston Conservation Commission this environmental review and report was prepared for the Town of Preston.

This report provides a natural resource inventory and a series of recommendations and guidelines which cover the topics requested by the Commission. Team members were able to review maps, plans and supporting documentation provided by the town.

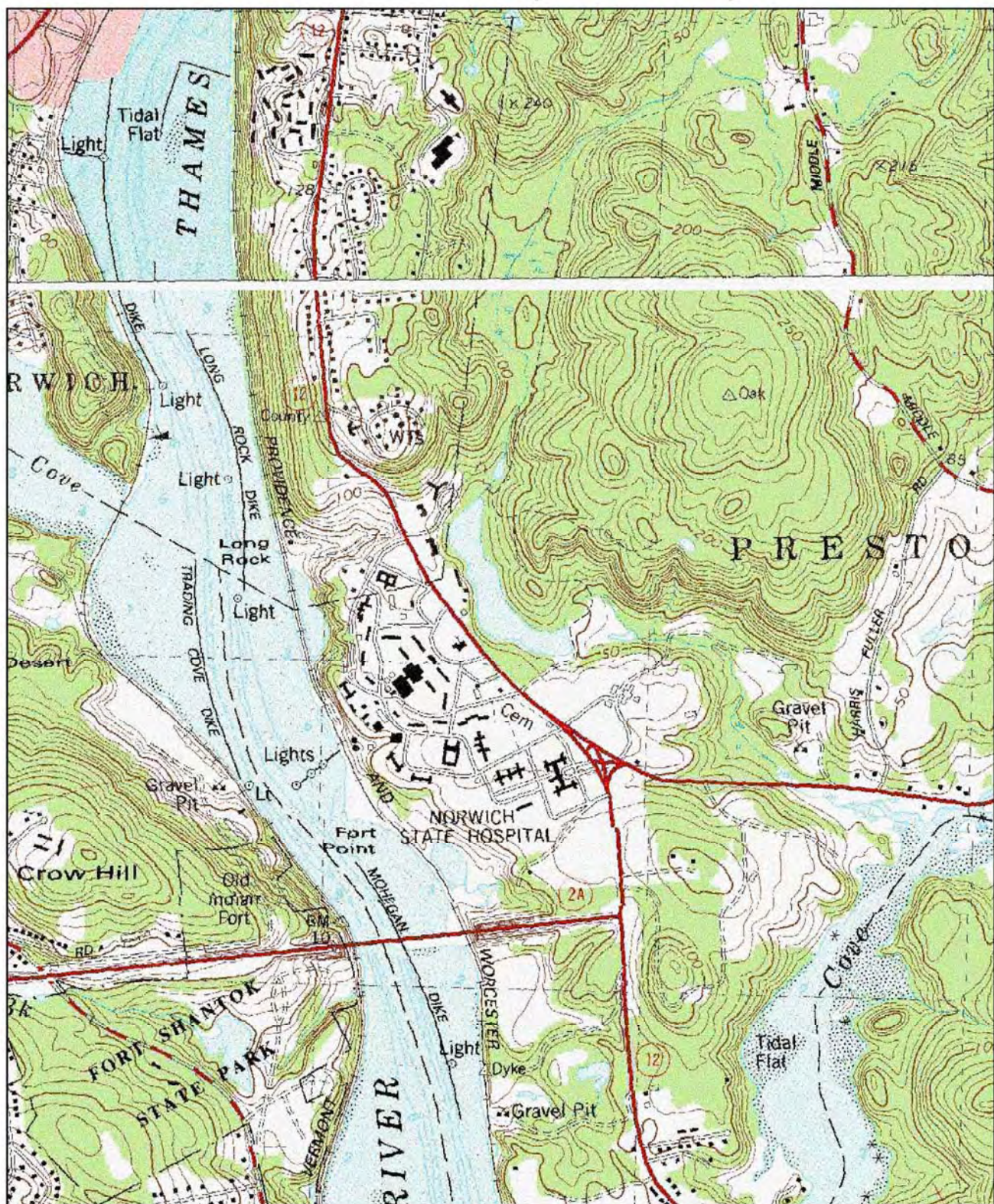
The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field reviews was conducted on July 1, 2, 2009, August 18, 2009 and September 3, 2009. The emphasis of the field reviews was on the exchange of ideas, concerns and recommendations. Some Team members made separate and/or additional site visits while others conducted a map review only. The field review allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

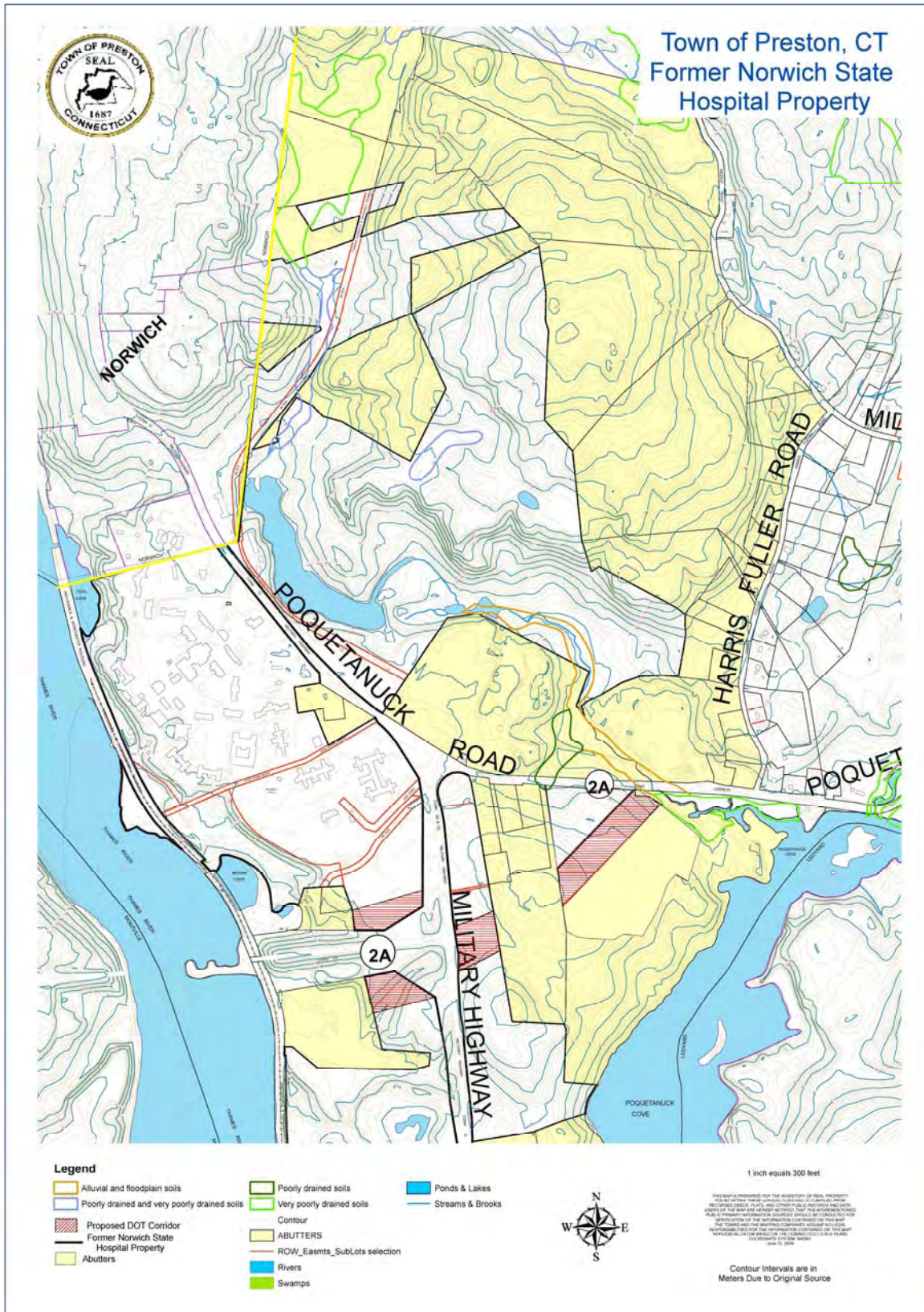
Norwich State Hospital Site Map

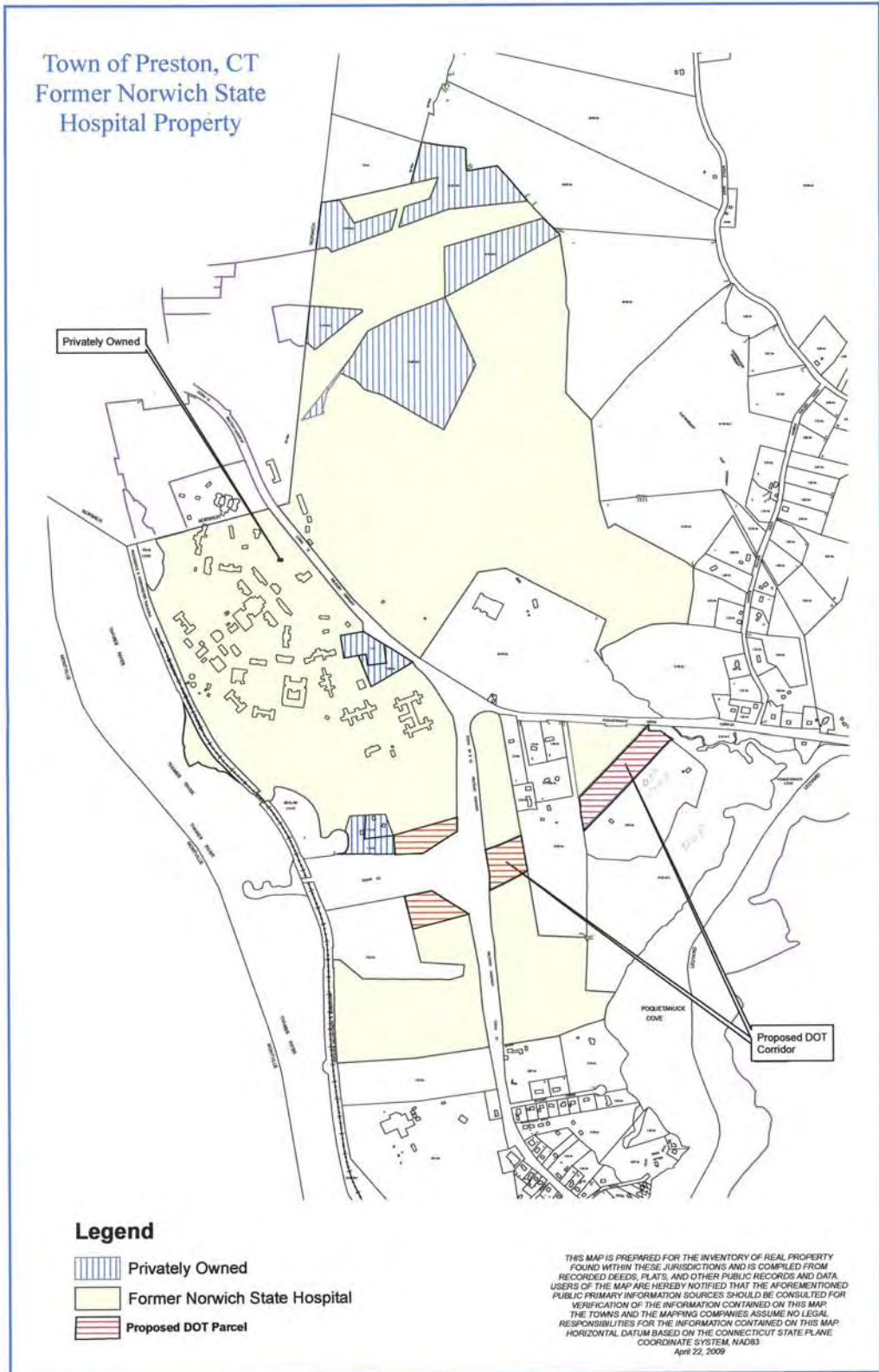


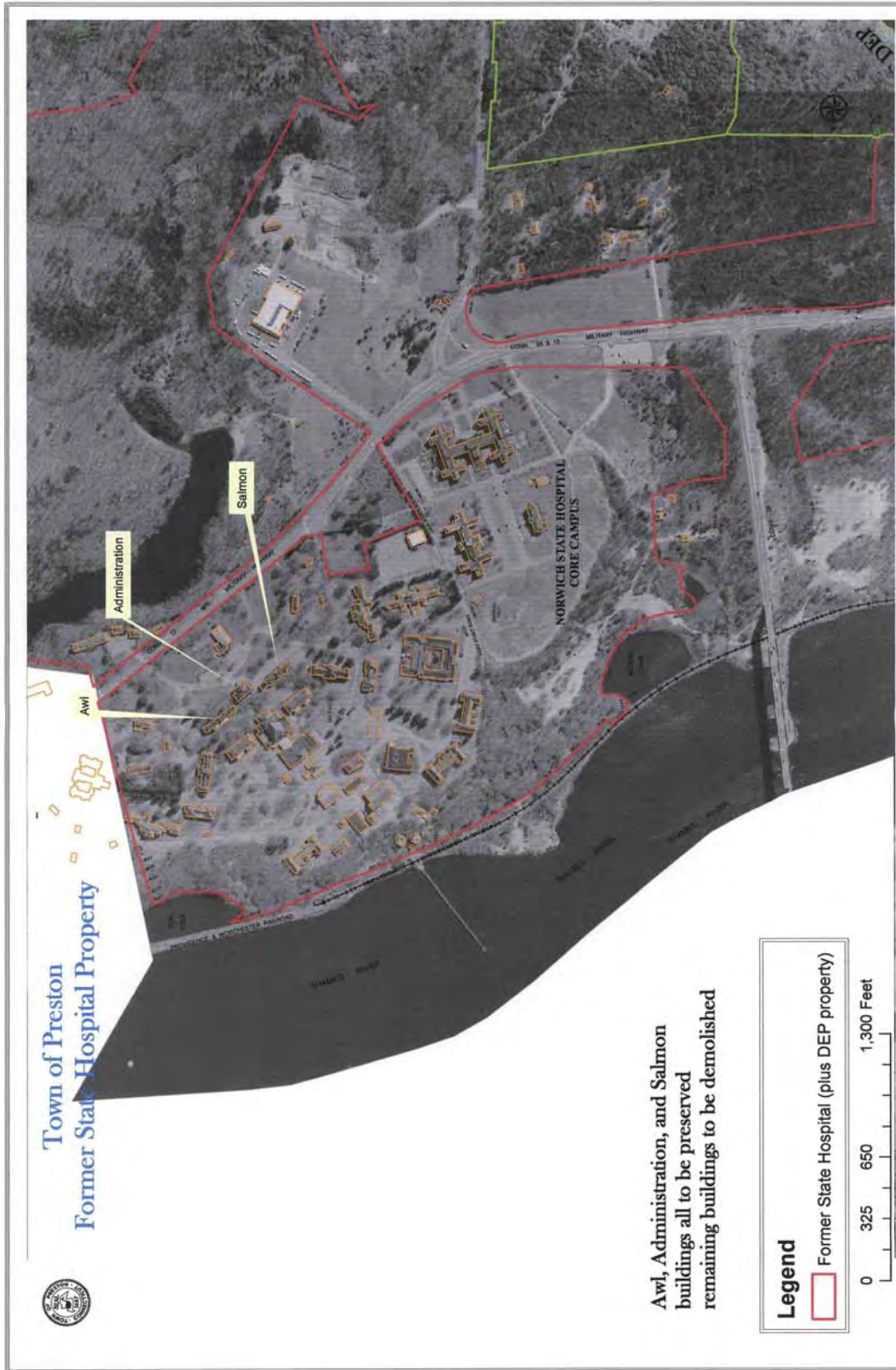
The Connecticut Environmental Review Team

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team. This map is for educational use only. It contains no authoritative data. April 2010.

Preston, Connecticut

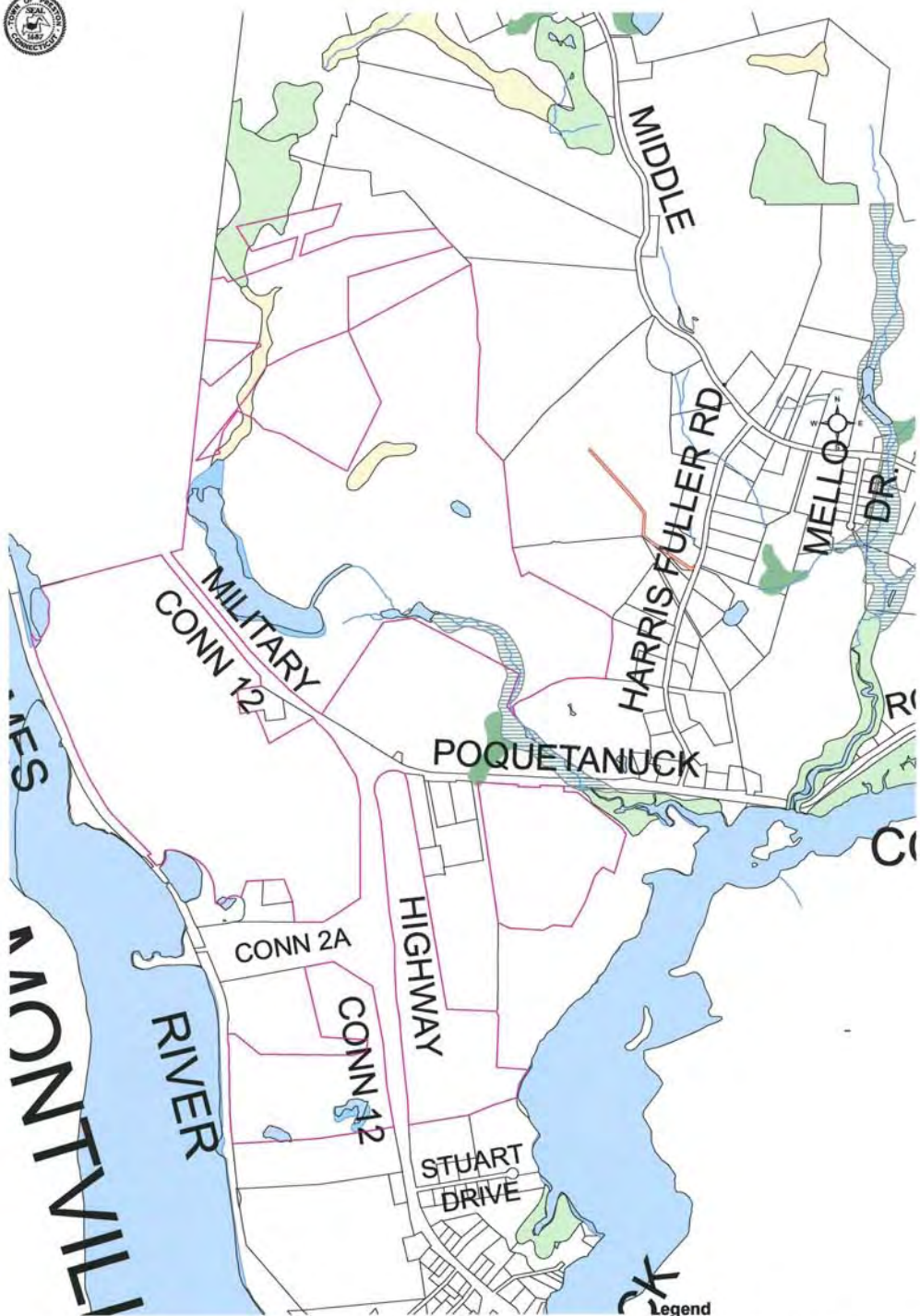









Preston
owned
parcels



THIS MAP IS PREPARED FOR THE INVENTORY OF REAL PROPERTY FOUND WITHIN THESE JURISDICTIONS AND IS COMPILED FROM RECORDED DEEDS, PLATS, AND OTHER PUBLIC RECORDS AND DATA. USERS OF THE MAP ARE HEREBY ADVISED THAT THE FOREMENTIONED PUBLIC PRIMARY INFORMATION SOURCES SHOULD BE CONSULTED FOR VERIFICATION OF THE INFORMATION CONTAINED ON THIS MAP. THE TOWNS AND THE MAPPING COMPANIES ASSUME NO LEGAL RESPONSIBILITY FOR THE INFORMATION CONTAINED ON THIS MAP. HORIZONTAL DATUM BASED ON THE CONNECTICUT STATE PLANE COORDINATE SYSTEM, NAD83.

- Legend**
- Alluvial and floodplain soils
 - Poorly drained and very poorly drained soils
 - Poorly drained soils
 - Very poorly drained soils
 - Water

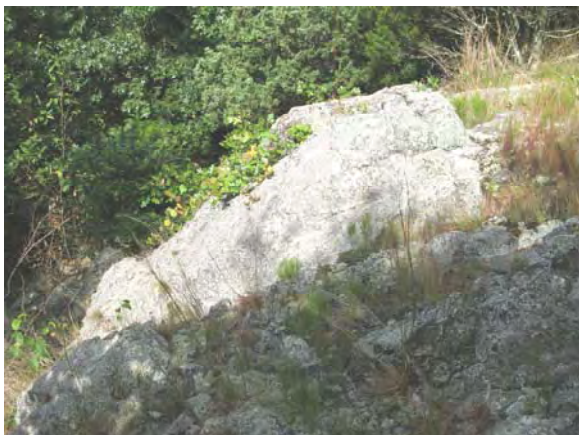
Topography and Geology

Topography: The former Norwich State Hospital property is easily subdivided into a northern and eastern hilly section and a southern terraced to hummocky section. The topographic differences are a result of the underlying geology of the different areas. The



Figure 1. Topography on the northern portion of parcel. A. View from top of steep topography and bedrock outcrops, looking west-southwest across the Thames River (not visible). Mohegan-Sun parking area can be seen in the distance. B. Outcrop of bedrock in area of steep topography. In places bedrock outcrops form cliffs (C).

A.



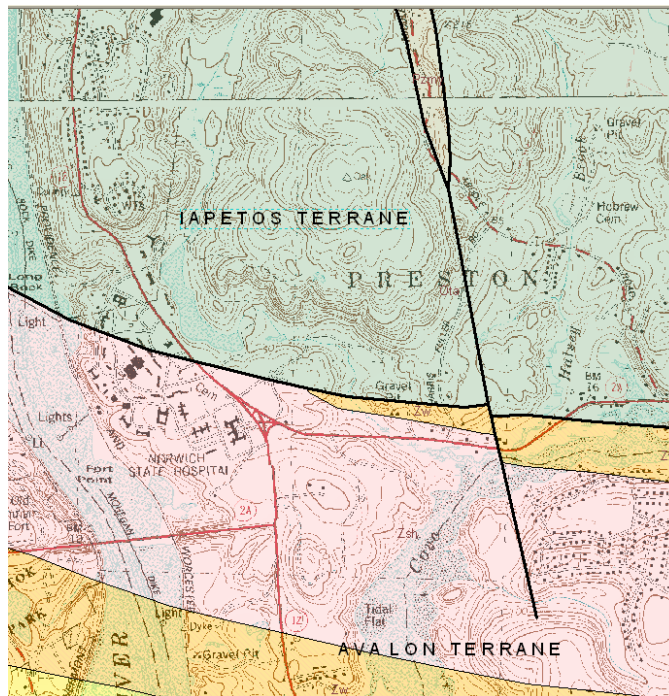
B



C.

hill section has generally moderate slopes throughout most of the area, but a line of steep south-facing slopes and cliffs extends roughly through the center of the property in a west-northwest/east-southeast direction (Figure 1). A major geologic fault passes through the region in this area (see Figure 2). Rocks on the north side of the fault stand higher than rocks south of the fault (see *Bedrock geology* section). Hills north of the fault reach a maximum elevation of almost 300 feet above sea level and are characterized by several areas of moderate to steep slopes. Rock outcrops are scattered around the high areas but are concentrated along the line of cliffs and steep slopes. Hills south of the fault

Figure 2. Geologic map of the Norwich State Hospital campus and surrounding area. Heavy black lines are faults or fault zones. The roughly east-west fault crossing the area is the Honey Hill Fault that juxtaposes rocks of the Iapetos and Avalon Terranes. North of the fault are rocks of the Iapetos Terrane. They are metamorphic rocks that formed initially as sediments and volcanic rocks along the eastern margin of the Proto-North American continent. In this area the rocks are schist and gneiss of the Tatnic Hill Formation. South of the fault are rocks of the Avalon Terrane which is considerably older and formed initially as part of another continent that has similarities with the Baltic area of present day Europe. They are gneiss and granitic gneiss of the Waterford Group (yellowish color) and Hope Valley Formation (pinkish color). Topographic contours are 10'. Map from Rodgers, 1985.



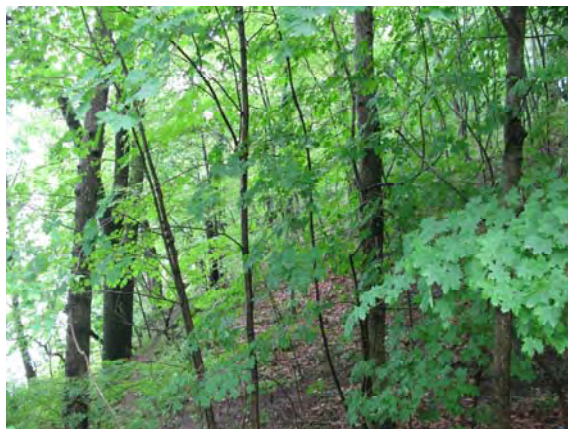
reach a maximum elevation of about 130 feet with generally gentle slopes. The western perimeter of the main campus, however, is bounded by steep slopes that drop to the Thames River (Figure 3c).



A.



B.



C.

Figure 3. A. Flat terrace upon which main campus is built. B. Hummocky topography south of main campus. C. Steep slope along western edge of terrace at main campus. Thames River at base of slope.

The main campus of the former hospital is built on a sand and gravel terrace having an elevation of about 70-80 feet above sea level (see Figure 2). South of the campus the topography becomes rather hummocky and pitted with small pond-bottomed depressions (holes). Sand and gravel were removed from part of this area in the past. Bedrock (ledge) is not exposed in the terraced/hummocky areas.

Bedrock Geology: A major bedrock-fault cuts across the campus of the former hospital (Figure 2): the Honey Hill Fault is a terrane₁ boundary. Iapetos Terrane is the north of the fault; the rocks are made up of 480 to 300 million year old (Ordovician through Devonian) schist and gneiss formed by the metamorphism of sedimentary and volcanic rocks. The Tatnic Hill Formation (Fig. 4a) is abundantly exposed along southerly-facing cliffs just north of the fault. It consists mostly of gray biotite feldspar gneiss in this area. Pegmatite (Fig. 4b; coarsely crystalline rock) is locally abundant and in many places is correlated with steep topography and areas of ledge outcrops. Some is rusty weathering where iron-bearing garnets are part of the rock (Fig. 4c, d). The grain (orientation of foliation planes) of the rock is north-south in this area and is cut by the Honey Hill Fault almost at right angles.

South of the fault, Avalon Terrane consists of gneisses that were formed almost a billion years ago. The Waterford Group consists of light colored granitic and more grayish colored biotite-quartz feldspar gneiss, and the Hope Valley Formation (Fig. 4e) consists of alaskite gneiss (quartz and feldspar with minor amounts of mica). These formations strike parallel to the Honey Hill Fault. There is an abrupt topographic change associated with the fault in this area. Apparently the schist and gneiss of the Tatnic Hill Formation were less easily eroded by glacial erosion and other weathering processes than



Figure 4a. Biotite gneiss of Tatnic Hill Formation exposed along trail in northern portion of the parcel. It consists of biotite (dark colored) and feldspar with minor quartz. Note that mineral grains are all stretched out parallel to the foliation (grain) of the rock which suggests that the rock was at one time hot and deformed, behaving somewhat like taffy. Pen is 5.5" in length.

-
1. A terrane is a grouping of rocks that have similar or related histories. In this case the Iapetos Terrane formed along the margin of the ancestral North American continent (Proto-North America) and the Avalon Terrane formed as part of another continent that is much older. Plate tectonic processes juxtaposed the two terranes. (See Bell, 1985, p140ff)



Figure 4b. Pegmatite in Tatnic Hill Formation. Pegmatite is more coarsely crystalline than the gneiss. Pegmatite results from slow crystallization of molten rock formed when the metamorphic temperatures were hot enough to cause partial melting of the gneiss. Pen for scale.

Figure 4c. Rusty weather layers in Tatnic Hill Formation. This stain probably results from weathering of garnets.



Figure 4d. Garnet concentration associated with rusty weathering layer of Tatnic Hill Formation. Garnets are small nobby areas just above pen.

Figure 4e. Alaskite gneiss of the Hope Valley Formation. It is composed of flesh-colored microcline feldspar and quartz with traces of muscovite mica.



the granite gneisses of the Avalon Terrane. Rocks of Avalon Terrane are poorly exposed in the immediate area.

Surficial Geology: The surficial geology consists of the unconsolidated material that lies on top of and covers or partially covers the underlying ledge (bedrock). The materials consist of glacial soils and sand and gravel deposits. Figure 5 shows the distribution of surficial materials in the area surrounding the former state hospital.

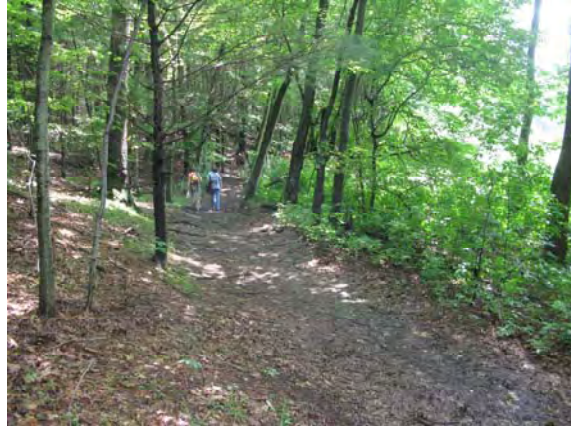


Figure 5. Quaternary Geologic Map of the former Norwich State Hospital and surrounding areas. The higher topographic areas are covered by glacial till, colored pale green on the map, much of which is thin (especially on steep slopes) and ledge crops out. Till (labeled T on the map) was deposited beneath the glacier. The map areas colored yellow are deposits of sand and gravel formed during the melting of the glacier. One sand and gravel deposit (LU on the map) forms a terrace with an elevation of about 70+ feet upon which the main campus is located. Other, younger, deposits of sand and gravel are labeled TC, U, and P. Line of triangles (southern edge of map) is an esker, deposited by a melt-water stream in cracks or tunnels in the ice. Hachured or dashed line depicts the southern edge of glacier during its progressive melt-back. Areas labeled SM and ST are salt marsh deposits and old stream terraces. Blue outline maps extent of watershed of stream that feeds former water-supply reservoir. Inset box shows area enlarged as Figure 10. Topographic contours are 10'. Map from Stone and others, 2005.

Glacial till is widespread over most of Connecticut. Glacial till consists of poorly sorted material that may contain, clay, silt, sand and even coarser material. Till was deposited beneath the glacier while the glacier was active. It was deposited also as a residue on top of the ledge when the glacier wasted away. Till forms the soil material of the higher areas of the property of the former hospital; in the lower areas the till was later covered by sand and gravel. Till on the parcel has been exposed in a gully south of the overflow outlet of the former water-supply pond northwest of the current DOT facility (Figure 6a). Sand and gravel underlies most of the campus and land south of the campus. The deposit forms a flat topped terrace (Figure 3a) at the main campus and has a hummocky topography south of the campus. In this area at least one kettle is preserved (Figure 6b); perhaps there were others. The deposit is composed of stratified sand and gravel that contains rounded pebbles and cobbles indicative of deposition from a river or stream. Indeed, these deposits are interpreted as forming in melt-water streams and small short lived ponds during the melting of the glaciers (Stone and others, 2005). The hummocky topography and kettle suggest that small and large blocks of left-over ice (that later melted) were buried by the streams. The material exposed in an old gravel pit south



A.



B.



C.



D.



E.

Figure 6. A. Glacial till exposed in gully south west of former water supply reservoir. Particle size of the till ranges from rocks up to 2' in length to silt and clay matrix. View shows nick-point in what may be a hardpan in the till over which overflow rain-water flows. B. Kettle just off Rte. 12 on south end of parcel. Slopes are natural except where road was excavated. This kettle has a shallow pond in its bottom. The pond farther west is likely a kettle also. C Thin gravel layer overlying fine-grained sand along excavated road at edge of kettle. D. Gravel excavation in esker west of kettle on south portion of parcel. E. Fine and medium grained sand adjacent to excavated area. This sand is contains shells and may be dredge spoils placed in the abandoned gravel pit.

of campus (Figure 6c-e) contains an abundance of fine sand with few coarse gravel layers. Fine sand is not as useful as coarser material and the mining operation was not extensive. Most of the fine sand was left behind during the mining operation.

Observations on the Small Reservoir Watershed:

A reservoir on the eastern side of the campus (see Figure 5) of the former Norwich State Hospital supplied water to the hospital in the past. The up-stream

watershed to this reservoir (approximately 500 acres) is currently undeveloped and the water entering the reservoir is apparently of high quality (the water is clear and supports abundant aquatic-life). A discontinued trolley line runs through a good part of the upstream area and thus unrecognized impacts may exist. In addition, upstream use by all-terrain vehicles (ATV) may also create unrecognized impacts.

Downstream from the reservoir stream management engineering affects the stream in a much more apparent way. The entire watershed is only 800 acres in size. It supports one perennial stream and several intermittent feeders. It contains several upland wetland areas and at least one man-made pond that may have originally been an upland wetland (Fig. 7). Upstream from the reservoir the watershed appears to be functioning properly. Streams and water bodies are clear and support diverse ecosystems. Local erosion and wetland damage is



Figure 7. Impoundment near top of watershed has clear water and healthy ecosystem.

caused by ATVs that appear to seek out muddy areas. The old trolley causeway also has experienced minor local erosion.

At the reservoir, however, engineering and other impacts lead to deterioration of the riparian environment. The reservoir was constructed by placing an earthen dam to impound the water. An overflow

spillway diverts excess water around the dam and discharges it downstream onto the valley slope with a gradient more than twice that of the original stream (see Figure 10; Table I).

Engineers constructed a cobble-armor revetment in the channel downstream from the spillway for about 500 feet of the 1100 foot distance² to its confluence with the original stream bed. The rocks protect the spillway bed and banks and dissipate some of the stream energy. This has prevented spillway erosion. Where the protection ends however, the stream has eroded a gully that is up to 5 feet deep into the underlying glacial till (Figure 8). Erosion has occurred at this location in part because the gradient of the stream more than doubled over what it naturally had been before dam construction. This erosion likely dumps episodic loads of silt into downstream wetlands and ultimately into Poquetanuck Cove during storm events. When the ERT viewed the stream, however, flow was minimal and of high clarity. Downstream the incision of the channel gradually diminishes so that when the overflow channel rejoins the original stream channel it is

2. Distance estimated from USGS topographic map (Uncasville Quadrangle, 1"=2000') Elevations discussed (Table 1) are from the USGS map. Distance estimated from "Town of Preston, CT Former Norwich State Hospital Property" (1"=400 ft), April 22, 2009 distributed to ERT members.

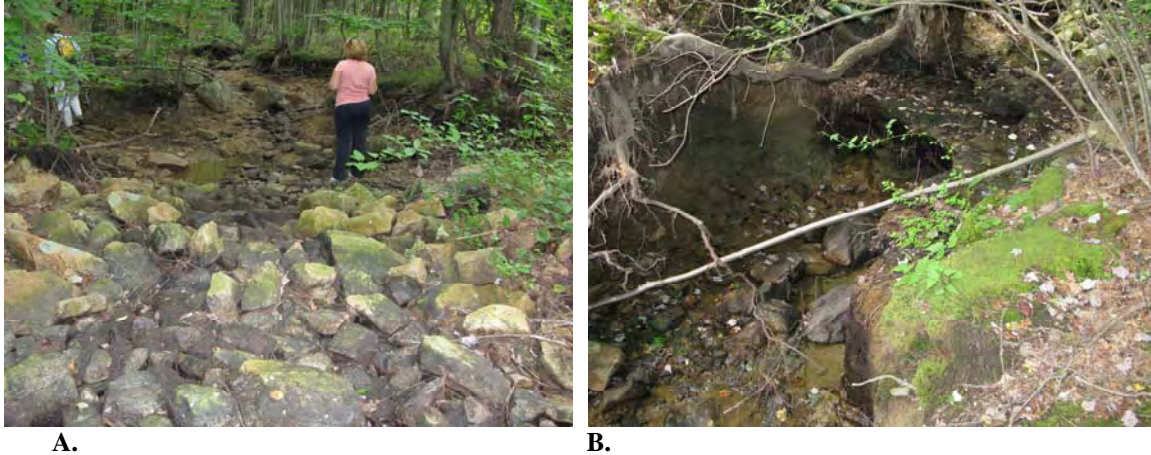


Figure 8. A. Cobble armor revetment protects spillway channel from erosion. This view looks downstream at end of protected section. Downstream the stream gradient increases. Lack of protection and the increased gradient result in accelerated channel erosion. B. Nick-point in eroded channel below revetment area presents a dry waterfall when no water flows out spillway. Channel incision is almost 4' at this point.

TABLE I. GRADIENT DATA.

Location	Elevation	Distance ^a	Δ Elev. ^b	Gradient ^c	Drop/100 ft. ^d
Head of Reservoir	56'	2400'	24'	24/2400	1'
Spillway	56'	1100'	24'	24/1100	2.18'
Pond below dam	32'				

- a. Distance (approximate) between specified location and pond below dam
- b. Difference in elevation between pond below dam and reservoir.
- c. Δ Elev./Distance
- d. Gradient expressed as drop in elevation per 100 ft. horizontal distance.



Figure 9. A. Overflow channel on lower left near its confluence with original drainage, which flows through small pond seen in background. Pond in background, however, supports little amphibian or insect life. It is murky orange colored with visibility of only a few inches. Algae grows on the bottom and on sticks protruding from the water. B. Stream channel below pond. Stream is murky orange.

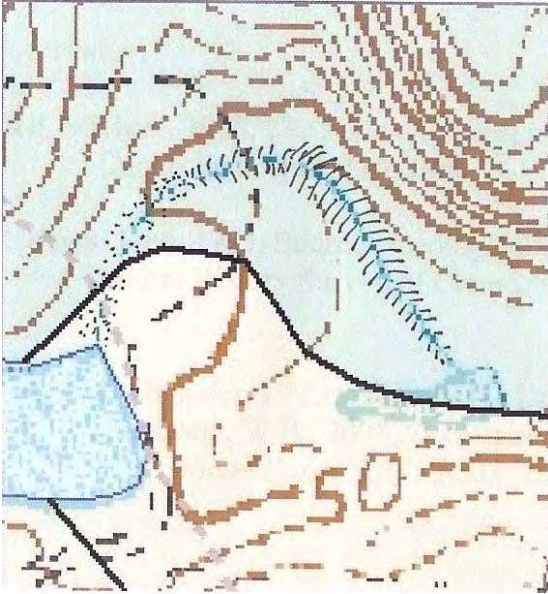


Figure 10. Detail of erosion near spillway area for former water-supply reservoir. Stipple area indicates channel armor-revetment and hachures indicate approximate area of channel erosion; length of hachures approximates depth of erosion. Green area underlain by till; yellow area underlain by sand and gravel.

flowing normally at the surface. Immediately before rejoining the original drainage channel, the overflow channel contains water of high clarity and supports a vigorous aquatic ecosystem (Figure 9a).

The nick point developed (Figure 8b) is a classic example of headward erosion. The plunge pool of the small fall illustrated will gradually undercut and lead to upstream migration of the nick-point. At some time it will reach the revetment segment of the spillway and will undercut that also. The end result of this erosion will be destruction of the spillway and drainage of the reservoir. A minimum length of time for this erosion could be roughly estimated if the date of construction of the dam were known.

A small acre-sized pond occupies the valley near the confluence of the overflow channel and the original stream network. The pond is orange colored and murky with visibility of only a few inches and supports little amphibian or insect life. Algae coats sticks and grass blades at the edge of the pond. The pond appears have impaired water quality but no tests were conducted); a source(s) for the apparent impairment was not identified.

The overflow channel joins a small water course that exits the pond. The combined flow is murky orange (Figure 9b); amphibian and insect life were not noticed. Whether the apparent water quality impairment from the pond makes it way to Poquentanuck Cove was not determined, but a likely pathway for that exists.

Geological Resources: It might be thought that the sand and gravel represents a good resource and possibly it is. It is interpreted as a deposit that filled a temporary pond. As melt-water streams entered the pond the coarse material was deposited near the stream mouth (to the north) and mostly fine material washed into the pond. Coarse material could only wash southward into areas where fine material had filled the pond making it shallow enough for currents strong enough to transport the coarse grains. Hence, over most of the area, the desirable coarse gravel is likely to be a relatively thin layer over finer, less useful material (see Figure 6c). Certainly that is the case in the southern part of the parcel where mining activity left most of the deposit behind. The northern end of

the campus may be an exception. It would be close to the melt-water stream source and may have a thicker layer of coarse gravel.

The rock could be a useful resource if quarried and crushed. The Hope Valley Alaskite Gneiss (labeled **Zsh** on Figure 3) is probably the better rock for crushing into sharp-edge particles because it contains less mica and its foliation is less well developed.

References:

Bell, Michael, 1985, *The Face of Connecticut*, State Geologic and Nat.Hist. Surv. Of Connecticut, Bull. 110, 196p

Rodgers, John, 1985, Bedrock Geological Map of Connecticut. State Geological and Natural History Survey of Connecticut, Nat'l. Resource Atlas Series

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., and Thompson, W.B., 2005, Quaternary Geologic Map of Connecticut and Long Island Sound Basin (1:125,000). U.S. Geol. Surv. Sci. Invest. Map # 2784.

Eastern CT Conservation District Review

The former property of the Norwich State Hospital is approximately 470 acres total and split between two towns, Preston and Norwich. This report addresses the request by the town of Preston for a natural inventory along with considerations for future land use of the hospital land within its municipal boundaries. The portion of land in Preston, approximately 400 acres, is split into four segments that was field reviewed by the ERT team over four separate site visits. As part of its review Eastern Connecticut Conservation District (ECCD) focused primarily on soil resources for each of the four land areas under consideration.

Since parcel size, land use and natural resources differ substantially among the four parcels, ECCD has organized its report to address each parcel individually. Further, ECCD reviewed the recent concept map by the Preston Redevelopment Agency for potential uses of each of the parcels and has factored in those uses as part of its review.

The four parcels reviewed include:

- Parcel 3 south of Route 2A
- Parcel 4 east of Route 12 and south of Route 2A
- Parcel 2 Main Campus
- Parcel 1 east of Route 12 and north of Route 2A
-

Soil mapping and site limitations are produced by using the NRCS Soil Web. Since there are four separate parcels that were reviewed, ECCD generated soil maps and reports on soil limitations for each area, which are included as part of this report (Please see the Appendix for all maps referenced in this section.) The Area of Interest (AOI) or approximate parcel area may extend beyond the limits shown on the mapping submitted with the ERT request. This is intentional to ensure as complete mapping as possible and to compensate for jagged property lines. Further on parcel “1”, the mapping included the smaller lots that are surrounded by former State Hospital Land.

A wealth of information can be found about each of the soil’s properties as well as its suitability for a variety of uses and applications by using the NRCS Soil Web tools. The ones selected here were based on concerns generated by field observation or in response to the Preston Redevelopment Agency’s proposed concept plan. While ECCD has attempted to summarize limitations, the individual reports should be consulted for specific limitations for individual soils. Further, field verification and testing should be conducted for site specific information.

Considerations specific to each parcel follows each parcel section. Overall considerations that apply to all or several parcels are included at the end.

Parcel 3:

The first parcel is approximately 33 acres, located south of the Route 2A Connector with frontage on both Route 12 and the Thames River. Railroad tracks follow the Thames River coastline preventing any official water access. Several areas of this parcel have been mined for sand and gravel deposits leaving open unvegetated areas. Another extraction site lies immediately to the north in what appears to be the DOT ROW. Slopes are gently to moderately steep to very steep. Some steep slopes are the result of material excavation sites. The soil map for this parcel is entitled “Soil Map—State of Connecticut (Norwich State Hospital Land, East of Route 12)”. Large sections of this area are designated as Udorthents, indicating disturbed areas.



The Thames River, which is a coastal surface water body, is designated as impaired and does not meet water quality standards. Little information was available about the small pond on the southeast corner of the property. Its banks are dominated by Phragmites or common reed, invasive to Connecticut. Bodies of water, whether man-made or natural, are considered regulated resources. Soil mapping for the area based on the NRCS website does not indicate any on-site hydric (wetland) soils, however that should not replace on-site mapping for development consideration.

Per the concept plan prepared by the Preston Redevelopment Agency, a possible use for this area would be industrial or commercial. In looking at the onsite soil mapping and possible uses, ECCD selected the following categories for further information on site suitability; construction materials for road fill, construction material for sand sources and suitability of site soils for small commercial buildings. Roughly half the site is listed as poor for road fill construction, with the remaining soils listed as good to fair. For potential sand sources, soils ranged from good to fair, with about an equal split for size of areas. Previous extractions may well have already depleted suitable materials. Considering small commercial buildings, the majority of land was categorized as somewhat limited to very limited, due primarily to slope and depth to saturated zone.

While the soil survey has good information for general planning purposes on larger parcels, it should not replace on-site soil investigations for site specific information.

Considerations for Future Development:

- A primary consideration for potential development of this site would be the amount of land regarding that would be required to develop it for commercial or industrial uses, due to size of building and associated access drives and parking areas. Creative design that works with the contours and preserves the majority of vegetation on any significant slopes is recommended.

- Due to the railroad, the site becomes somewhat restricted from a stormwater discharge standpoint. Installation of new culverts has not historically been easy to negotiate. Low Impact Development (LID) and strategies that encourage the infiltration of stormwater should be considered, provided underlying soils are suitable and groundwater will not be polluted.

Parcel 4

This parcel which lies east of Route 12 is approximately 50 acres. It has road frontage on Route 12, on Route 12 and 2A where they are combined and a small portion of frontage on Route 2A along the northern property line.

This parcel also has a small amount of frontage along Poquetanuck Cove. The cove frontage remains largely undeveloped, with sections dedicated as permanent open space. A parcel contiguous to this one also with cove frontage is under management by the Department of Environmental Protection. Just a few years ago, the shorefront of the cove



was dominated by the invasive plant *Phragmites*. A separate report has been submitted by the Thames River Basin Partnership Watershed Coordinator regarding the *Phragmites* removal project. It can be found following this report.

The site is primarily wooded, with the exception of an approximate ten acre hayfield at the very northern part. Slopes range from fairly gentle at the hayfield to moderate to steep slopes. The steepest slopes are adjacent to the Cove. None of the soils mapped are considered hydric (wetland) soils per the NRCS. However this should be verified by on-site mapping prior to any development proposals. Soils mapped for this are found on the map entitled “Soil Map—State of Connecticut, (Norwich State Hospital Land, East of Route 12)”.

Further soil mapping was conducted to determine the extent of important farmland soils. That map is entitled “Farmland Classification—State of Connecticut, (Norwich State Hospital Land, East of Route 12)”. The present hayfield, the area proposed for Route 2A extension and smaller areas along the Route 12 frontage and southern property lines, approximately one half of the site, are all considered prime farmland soils or farmlands of statewide importance.

Potential uses for this site per the concept map prepared by the Preston Redevelopment Agency indicate a mixture of commercial, commercial/residential and/or commercial/industrial. To address these potential uses, ECCD selected soil interpretations that addressed on-site soils for; construction materials (gravel resources), construction materials (road fill) and small commercial buildings.

The majority of the site is rated poor to fair for gravel sources, with small sections adjacent to the cove and along Route 12 rated good for the same resource. For road fill almost all soils were rated good, with the exception of the soil adjacent to the cove, which is rated poor. Regarding the commercial building category, most soils were rated as somewhat limited to very limited, due mainly to slope considerations.

Considerations for Future Development:

- A primary concern with development of this site, especially as one moves inland from the road, is slope. Development of these areas require careful planning to work with topography by creating smaller varying levels for building pads. Large buildings and large parking lots generally make it difficult to work with underlying contours.
- Consideration should be given to preserve the land adjacent to the cove. Several hundred feet inland from the cove, the steepest slopes on the site, should be protected from disturbance and left in its present vegetated state, with the exception of removal of any rubbish and debris. Consolidation with the adjacent DEP parcel may have merit.
- Stormwater management on this site is critical for any areas that will drain to the cove. Both water quality and water quantity are issues that need to be addressed to ensure that the cove remains unaffected. *Phragmites* colonization is often a direct result of the sediment loading at stormwater outfalls.
- With farmland continuing to be lost every year, consideration should be given to preserve blocks of suitable soils wherever feasible.

Parcel 2

Parcel 2 is the site of the main campus, with frontage on Route 12 and the portion of Route 12 and Route 2A that are combined. It is approximately 122 acres and contains numerous buildings in various states of deterioration. The railroad runs along this



property's western edge following the Thames River. Small areas of shorefront on the Thames are accessible by crossing the tracks. Two small tidal coves are located adjacent to the property, one to the south and one to the north.

The majority of this site is developed, as it served as the main campus, although some portions were reported to have been farmed previously. The site is gently sloping where the buildings are located then drops sharply to a lower fringe level along the

shorefront. This steeper strip is mostly vegetated with trees and shrubs. Numerous invasive plants can be found in this area. The map entitled “Soil Map—State of Connecticut (Norwich State Hospital Land-Man Campus-Preston)”, shows soils for the site. No hydric (wetland) soils were indicated on the site however it should be verified by an on-site inspection. There are times when fringe inland wetlands are marked along tidal boundaries.

Since portions of the site were previously farmed, ECCD ran the farmland soil classifications for this site, which is on a map entitled “Farmland Classification—State of Connecticut (Norwich State Hospital Land-Main Campus-Preston)”. Interestingly, about three quarters of the site is shown as prime farmland or farmlands of statewide importance. Areas that are not prime farmland, are the steeper slopes along the coastline. While it is highly unlikely that developed areas will ever be converted back to farmland, portions may be appropriate to maintain as community gardens or use for hayfields, provided environmental conditions are not prohibitive.

The proposed concept plan indicates several possible uses for this site including; a marina, river walk, and retail along the coastline, an entertainment area, community center and a hotel or conference center with some retail. To address this development along with existing site conditions, ECCD selected the following soil interpretations; shallow excavations, small commercial buildings and dwellings with basements. While residential buildings were not a proposed use, it was selected as it may mimic some small building development, such a specialty retail development, like Mystic Village. For dwellings with basements, most of the site is not limited, with the exception the steeper slope areas along the western side of the property. For shallow excavations the majority of the site is listed as very limited, due primarily to cutbanks caving and slope. For small commercial buildings, ratings range from not limited on the majority of the site to somewhat limited due to slopes.



Considerations for Future Development:

- It is likely that this site will be redeveloped due to its location. While several of the front buildings may be preserved, the majority of the site will most likely be totally demolished. As there are numerous underground tunnels and utilities, excavation 20+ feet into the ground will be required for removal over large portions of the site. Careful consideration for phasing, both during demolition and redevelopment, to minimize site exposure to erosion should be a key part of any plan.

- Again this site is restricted from a stormwater perspective due to the railroad. While there may be existing stormwater discharge points, they may be in disrepair, with limited ability for improvements. This site may be further encumbered by contaminated soils that limit stormwater infiltration. It is important that stormwater design and management be a key component at the beginning stages of any site design.
- Careful consideration should be given to development of any of the steep slope areas along the western property line. Preserving these slopes to the extent possible, protects the slopes, areas at the base of the slopes and helps maintain some of the natural beauty of a vegetated coastline.
- Not developing some areas of prime farmland soils and allowing areas to be used as community gardens, greenspace or managed as bird habitat serves to preserve these soils.

Parcel 1

Parcel 1 is approximately 200+ acres and largely undeveloped. It has frontage on Route 12 and lies northeast of the main campus. It has several buildings formerly used as residential halls which are in disrepair. The rest of the site is wooded and undisturbed with the exception of the remains of an old water supply conveyance system at a pond on top of the hill and tracks of current ATV users. This parcel is part of a large undeveloped forest land block.

A 13 acre pond formed by damming a brook is parallel to Route 12 on the southwestern part of the property. This pond was also used as a former beach/recreation area. The dam is currently in a state of disrepair. The main wetlands and watercourse on the site flows through the property in a general north to south orientation ultimately ending up in Poquetanuck Cove. A smaller earthen dammed pond is located at the top of the hill, which was originally part the water supply system. It is completely surrounded by woods. A smaller wetland system is located in about the middle of the property most likely forming the headwaters of one of the intermittent watercourses flowing down the



hillside to the brook/pond. ECCD had an opportunity to conduct a field walk during a summer downpour and the amount of water flowing down the hillside following trails and intermittent drainage ways was significant.

An old trail bed system extends north past the buildings. Old footpaths crisscross the remainder of the site, which are also being used by the ATVs. Significant soil erosion damage is being done in a few locations, where the slopes are steep, by these motorized vehicles.

This property is a varied combination of gentler slopes, with some moderate to steep to very steep areas. Large portions of the site qualify as moderately steep to very steep. Several areas of the site are vertical rock cliffs offering spectacular views of the River.

While there is access to narrow upland areas along Route 12, access to the remainder of the site is limited at this point, unless it is over another property to the east. A fairly significant wetland/watercourse crossing would be required for typical vehicular access if constructed using the existing road frontage.

Soils for the site are shown on a map entitled “Soil Map--State of Connecticut (Norwich State Hospital Land—Property East of Route 2 and North of Route 2A-Preston)”. Several wetland soils as well as the larger of the two ponds, show on the map. The wetland soils have been identified on the selected soil interpretation report. Obviously with a parcel of this size, it is imperative to map the soils on site when considering any potential use, beyond preservation.

Due to the size of this property and steep slopes, ECCD generated a map of the site focusing on the potential for soil erosion. This map is entitled “K Factor, Whole Soil-State of Connecticut (Norwich State Hospital Land-Property East of Route 12 and North of Route 2A-Preston)”. A description of this factor is included with the report accompanying the map. Areas that are hydric (wetland) soils, open bodies of water and areas of significant bedrock outcroppings are generally not rated. This is approximately 40% of the parcel mapped. Other areas primarily show moderately low to moderate levels of susceptibility of soils to sheet and rill erosion from water. Obviously this does not take into consideration large areas open to construction and channel water which would increase erosion potential.

According to the concept plan, possible uses include; town facilities, commercial or residential use and golf courses, residential areas and a nature preserve. In consideration of these potential uses, ECCD selected the following categories for the soil interpretations; dwellings with basements and lawn, landscape and golf fairways. The third category selected was the inland wetland designation mentioned earlier. Regarding dwellings with basements, relatively small portions of the whole site are shown as not limited, primarily in areas surrounding the DOT garage and adjacent to brook. The remaining areas are listed as somewhat limited to very limited, due to slope, depth to hard bedrock and depth to saturated zone. For lawns, landscape and golf fairways the ratings include, not limited, for the areas also not limited for residential development. The remainder of the site is listed as somewhat limited to very limited due to a variety of reasons, some very specific to individual soils. The range of limitations include; slope, large stone content, depth to bedrock, droughty, depth to saturated zone, flooding, gravel content, too sandy, depth to pan and ponding. These limitations do not apply to each specific soil. The report should be consulted to determine which limitations correspond with individual soil types.

Considerations for Future Development:

- Large blocks of forest land are relatively rare in Connecticut and certainly in the southeastern part of the state relatively close to the shore. These blocks of land provide critical habitat to species that either require large tracts of forestland or pristine habitats. They provide areas for air and water purification and lower

- surrounding temperatures. This parcel in particular offers opportunities for passive recreation within close proximity to suburban and urban centers. Its viewsheds, from several of the cliffs, offer unparalleled views of the Thames River. Preservation of the majority of this property should be a key priority.
- Any development of this site which is designed to drain to the brook (or associated pond) on site will ultimately end up in Poquetanuck Cove. Careful consideration to impacts to on-site as well as off-site sensitive resources is recommended.
 - Although wetland soils and waterbodies do not appear to occupy much of the landscape, they are spread throughout the site and further mapping is essential to locate their exact boundaries. Further, while certain areas that convey water during storm events do not qualify as intermittent watercourses or are not wetland soils, they are a significant part of the landscape. Development of these areas and the subsequent blockage or redirection of flows can have detrimental impacts for erosion, water quality, building or recreation infrastructure, and downstream sedimentation.

Considerations for Development or Redevelopment of any Parcels

- Large sites, when developed or redeveloped often are not designed to work with underlying soils. Similar to selecting and testing soils for on-site septic systems as a first step, soil information should be gathered up front and factored into design for many development aspects. Prime farmland soils should be preserved whenever feasible. Soils suitable to treat stormwater through infiltration should be selected for that purpose to avoid large detention basins or direct discharges to coastal and inland water resources. Development should take into consideration natural topography and work development around underlying contours. Short and long-term erosion hazards of underlying soils, excavated or created slopes, should be addressed.
- Development that is conducted in smaller building pads, separated by well stabilized, vegetated slopes, wherever slopes are steeper will limit short and long term erosion. This also allows stormwater to be treated close to the generation source.
- Some areas should be preserved outright, either due to soils, slopes or position adjacent to other natural resources of importance.
- Effective treatment and management of stormwater generated on site requires careful consideration with any development. The 2004 Connecticut Stormwater Manual provides a variety of options and considerations. There are however numerous new initiatives and emerging technologies which are worth consideration, many of them are aimed at further protection of sensitive resources, use of less space and work with existing site conditions. Effective long term maintenance plans are an essential part of stormwater management.
- A fully developed soil and erosion plan, designed in accordance with the 2002 Connecticut Guidelines on Erosion and Sediment Control, should be submitted with any proposal. Although 33 or 50 acre sites may seem small compared to

100+ acre site, these still have the potential of significant short and long term erosion issues if not designed and managed properly.

A Watershed Perspective

Report not yet received.

Wetland Resources

Parcel Number 1

The Norwich Hospital property is in the extreme southwestern section of the town of Preston and is divided into four major parcels. This report section concentrates solely on Parcel Number One (Parcel 1 – North side of Route 2A and Route 12) and the two watersheds of which it is a part.

Brief background:

Parcel 1 is located in southwestern Preston approximately 1,500 feet inshore from the Thames River. However, due to the local topography the watercourses that drain this parcel have a circuitous, two mile path to traverse before they empty into the Thames River.

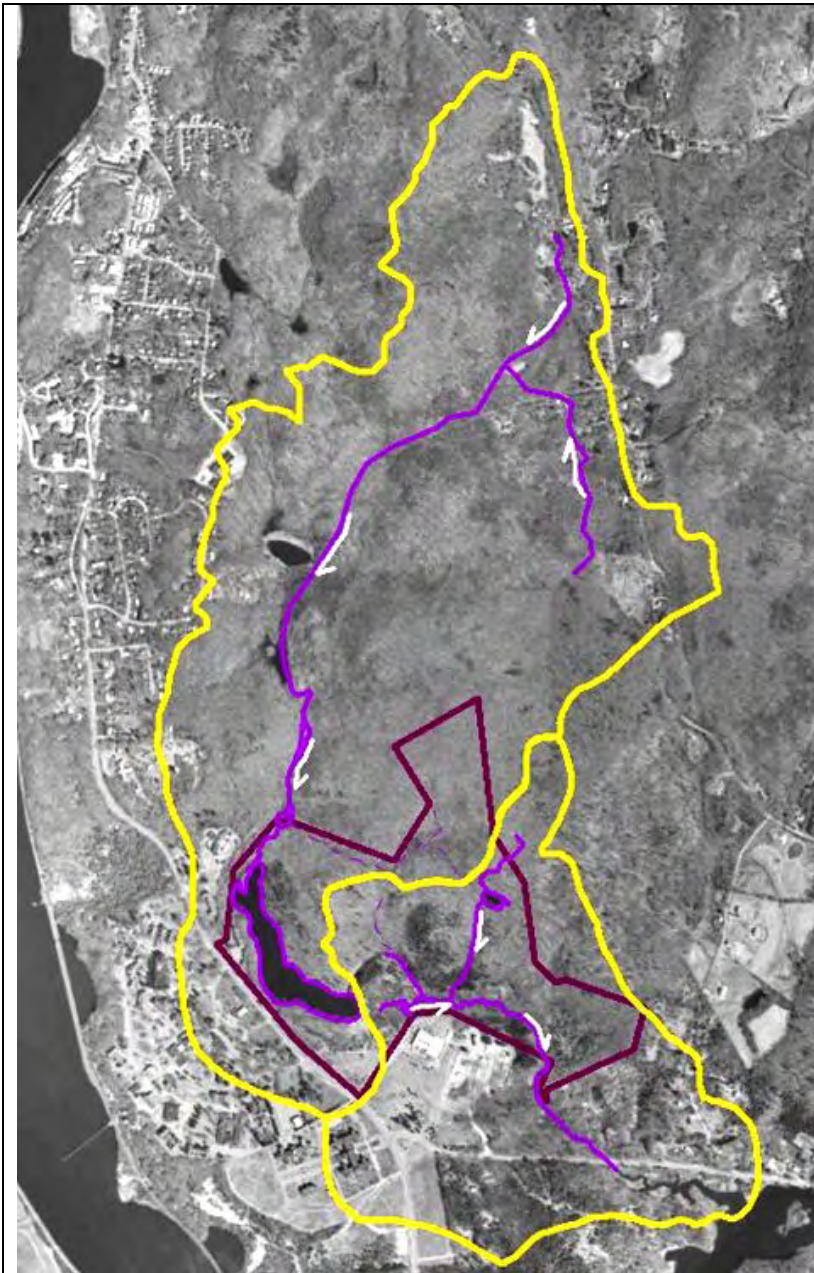
The ~149 acre Parcel 1 is split almost exactly 50-50 by a natural topographic drainage divide (see graphic below). The western ~75 acres of the parcel lies within a 573 acre watershed. The 75 acres make up about one seventh, or 13 percent, of the drainage's total size.

The distinguishing water feature of this western 75 acres is the ~10 acre reservoir which is the 'downstream' or endpoint of a larger wetland and watercourse system. This reservoir is the terminus of all the drainage in the 573 acre watershed. An earthen dam impounds the reservoir. There is a very coarsely rip-rapped overflow spillway exiting from the reservoirs' easternmost end. The rip-rapped spillway is approximately 550 feet in length.

The eastern part of Parcel 1 also measures ~75 acres. It makes up just less than one third, or 31 percent, of the eastern 244 acre drainage.

All the runoff from both watersheds drains ultimately into the Poquetanuck Cove, then to the Thames River.

The natural topographic divide that splits Parcel 1 into east and west halves conveniently allows for a closer study of each of the halves wetland and watercourse systems.



In this graphic the two watershed delineations are in yellow, the primary watercourses that drain the landscape are shown in violet and the half arrows indicate direction of flow. The outline of Parcel 1 is seen here in dark red.

While all the runoff from Parcel 1 flows ultimately into Poquetanuck Cove in the southeast corner of this image, the divide provides for two separate study areas, each with its own distinctive features.

Graphic: DEP-GIS, 2009

Discussion of Larger, ~573 Acre Drainage

The large watershed that drains to the reservoir encompasses the western side of Parcel 1. Two easily recognizable features from the image of this watershed (see above) are the extensive percentage of woodland cover and the reservoir in its southern extreme.

A preliminary calculation of the 573 acres yields three different land use percentages:

LANDUSE in 573 Acre Watershed	Percent Cover in Watershed
Forest cover: 491.5 acres	86%
Open Water: 10.25 acres	2%
Developed Land: 71.25 acres (houses, yards, buildings, parking lots, roads, fields)	12% (3.2% impervious)

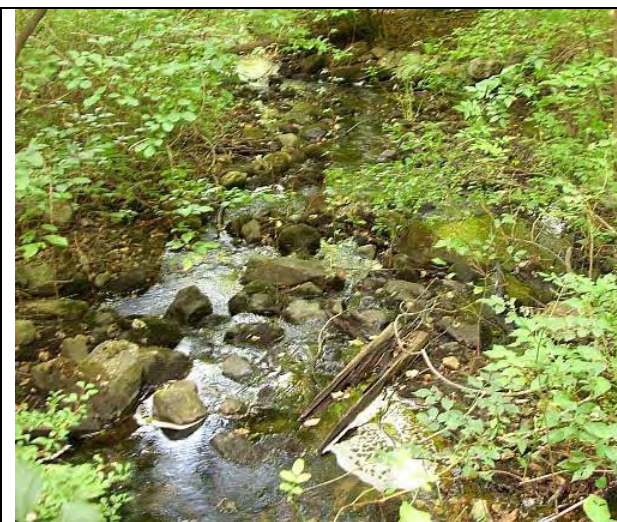
Less visible in the above aerial photograph because of the woodland cover, but an integral part of the wetland and watershed discussion, is the stream that drains the 573 acres. As mapped here, the stream that drains the watershed flows 1.6 miles (~8,500 feet), almost exclusively through woodlands and wetlands, before entering the reservoir.

Since land use in the watershed dictates the water quality, it follows that at 86% forested, and with very little impermeable surface (3.2 percent), the water quality is excellent for both the open water and terrestrial wetland environments. The forest floor is a critical component in both the surface and the groundwater recharge, filtering, and buffering of water within the watershed.

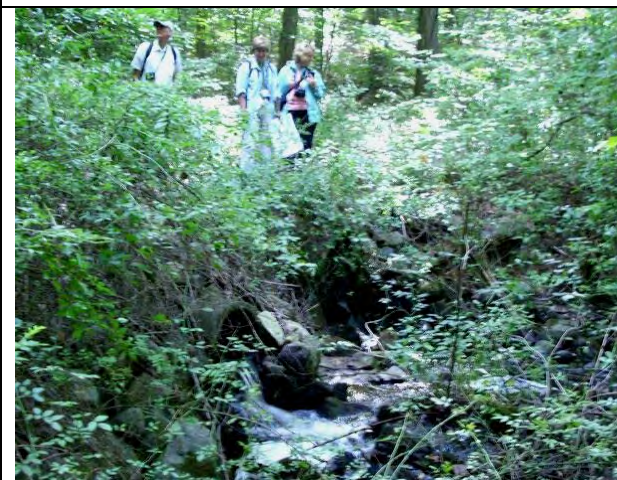
As of this writing the DEP has classified the Water Quality of the unnamed stream from its headwaters to the reservoir as “A”. This is on a rating scale of “AA” being the best, “A” being next, then “B”, “C”, and finally “D”. The further into the alphabet the letter, the more degraded the water quality. (The full text of DEP’s *Water Quality Standards and Criteria* can be found on the web at: http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs.pdf)

Wetlands Discussion - Large watershed

Because of the minimal amount of impervious surface and the great extent of forest cover within this watershed, the wetlands and watercourses are in excellent health. While the comments from this section are limited to the wetlands observed on the western 75 acre half of Parcel 1, these wetlands constitute the lower part of a continuous wetland and watercourse system within this western 573 acre drainage. Principle parts of the system are the reservoir and the wetlands upstream of it.



This is a photograph of the unnamed stream that connects a large forested wetland upstream from the reservoir to the reservoir. Being rocky and dropping 8-10 feet between the two entities it is well aerated, clear, without odor and alive with aquatic insects.



Team members view the unnamed stream as it passes through two reinforced concrete pipe culverts, one of which is clearly visible in this photograph. The culverts are just downstream of the above image.



Two hundred seventy feet downstream from the culverts the stream ends its 1.6 mile run through the watershed by flowing into the ten acre reservoir.

This is the end point of the unnamed stream that drains the 573 acres.

It is notable that not all tributaries that feed the wetlands and watercourses are always flowing; that is, not all water that passes into the reservoir flows through year-round streams. During times of high rainfall and spring snow melt, some runoff finds its way to the reservoir via intermittent streams. In the image below a muddy-bottomed, intermittent stream bed awaits the next rainfall.



This intermittent waterway was encountered about 500 yards east of where the unnamed stream passes through the culverts. Notice the log down across the flow path. Throughout the wetland complex and throughout the forested watershed, coarse woody debris decreases water speed (minimizing erosion), increases aerial extent of flooding, and allows for absorption into the groundwater.

Future Protection

The Connecticut DEP states the reservoir has a Water Quality of “A” and all visual indicators are consistent with that. The water is clean and clear and free of algae and strangling weeds. It supports a diverse population of flora at the water’s edge. In addition, it is likely the fish population within the reservoir is robust based on the great number and frequency of the fish rising to the surface for insects.

Natural forested buffers to all wetlands and watercourses are firmly established because of the decades long extent of woodland cover throughout the watershed. This is especially important in the critical riparian buffer zones of 50-60 feet.

Two challenges will have to be met for the future protection of the integrity of this western half of Parcel 1. First is the planning for future use of the 75 acres themselves, and secondly, and possibly more importantly, planning the land use in the watershed upstream of Parcel 1. The town is in the envious position to plan for this land use today given that such opportunities can be elusive in Connecticut in the 21st century

Because the wetland system exists in an almost unspoiled nature, it performs a full range of functions within the watershed. Four critical functions of flood control, groundwater recharge potential, wildlife habitat and erosion and sediment control are all exhibited. These wetlands also have exceptional educational potential, though the value might be limited because of access, although the trolley bed offers a great avenue of approach.

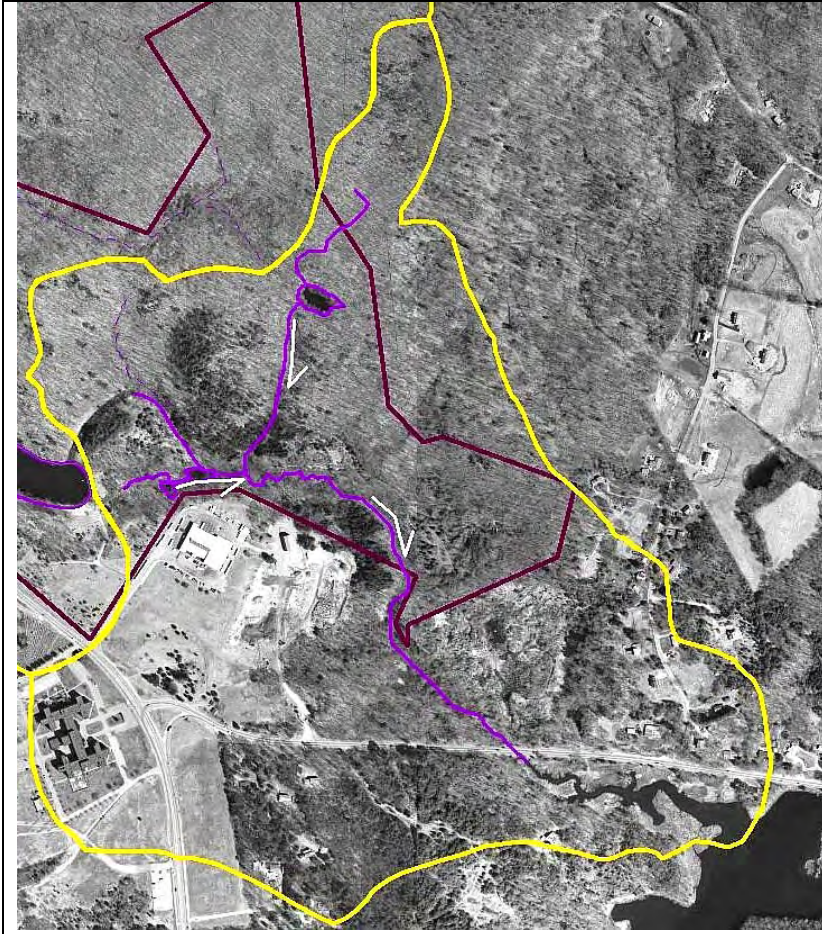
In Summary, the linear system of watercourse-connecting-wetlands in a continuous and fluid manner through the watershed provides many functions and values to the community. The health of the wetlands on this west side of Parcel 1 however, is subject to the land uses that occur upstream from them within the watershed. The long term health of the wetlands on this property will be subject to the planning and zoning for future land use in the upper watershed.

Discussion of Smaller, ~244 Acre Drainage

There is a striking difference in the land use within the smaller watershed that encompasses the east half of Parcel 1. Review of an aerial photograph (below) shows the use of the land to be the most dominant feature, more so than any topographical elements.

A preliminary calculation of the 244 acres yields three different land use percentages:

LANDUSE in 244 Acre Watershed	Percent Cover in 244 Watershed
Forest Cover: 175 acres	72%
Open Water: 3 acres	1%
Developed Land: 66 acres (houses, yards, buildings, parking lots, roads, fields)	27% (7% impervious)



It is noteworthy that both sides of Parcel 1 are almost entirely wooded, but it is the other land uses within these watersheds which impact the respective sides' water quality.

A substantive drainage system dominates this east side of Parcel 1. Large structure, residential and roadways dominate the balance of the non-hospital property in the watershed.

Imagery: DEP GIS, 2009

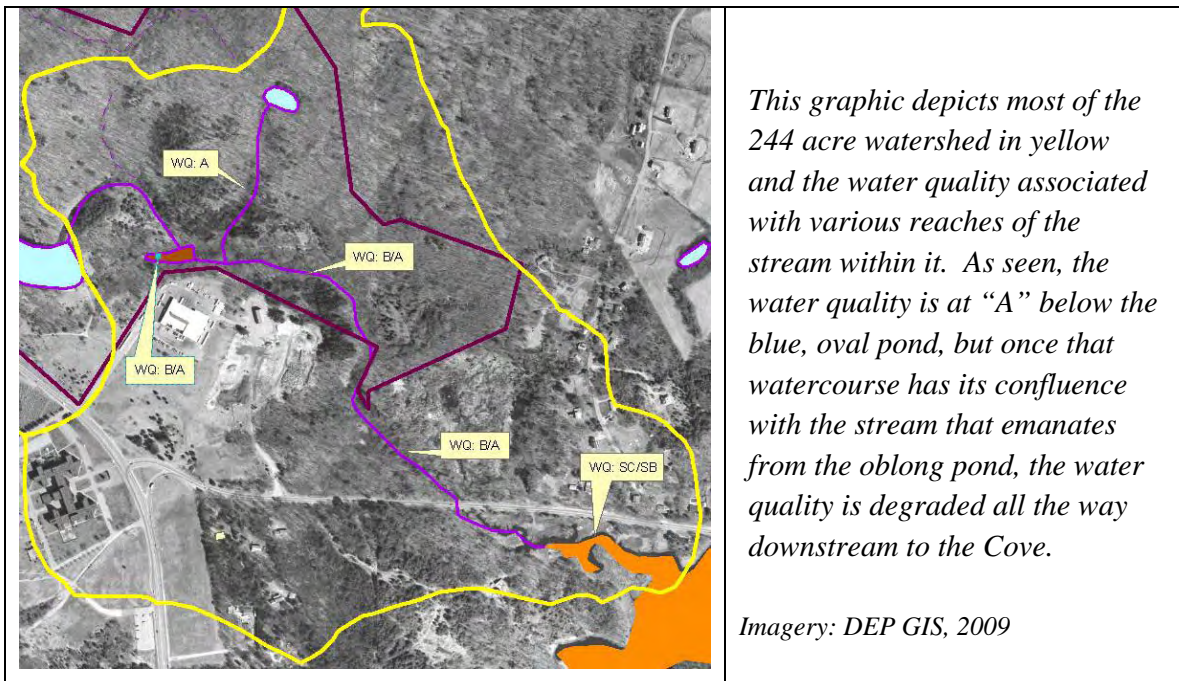
Predictably, the water quality in this watershed is more impacted than that of the less developed, more forested watershed to the west. As of this writing the DEP has classified the Water Quality of the stream which empties into Poquetanuck Cove with a rating of "C". And here, because the waterway is tidally influenced, the classification is preceded by an S (for saline). Thus, the actual rating is SC. The long term goal here is to upgrade this classification from the SC to SB.

Wetlands Discussion: Small Watershed

Within this eastern half of Parcel 1 two tributaries make up the primary stream course that drains most of this 244 acres. The 'oval pond stream' combines with the 'arcing stream' that emanates from the reservoir to flow slightly more than half a mile after their confluence before passing under Route 2A and emptying into the Cove.

On the day of this visit the stream flow throughout this drainage was quite small. However, as is typical, the stream flow increased its flow as it progressed downstream, but nowhere was the quantity of water abundant. This lack of abundant flow leaves the stream in a fragile state and adds to its susceptibility to pollutants and thus to degradation of its water quality.

The water quality of the stream that flows south from the oval pond is rated as “A”. The stream that flows in an arc from the end of the reservoir is also rated “A” but degrades to “B” once it enters the oblong pond which is just west of the confluence with the oval pond stream. (see graphic below)



Discussion - Spillway Tributary: The stream that flows from the arcing dam spillway can be seen in the photographs below. One of the aspects of this watercourse that cannot be picked up from aerial photography is the nature of its channel bottom as it moves downstream through the watershed. Where the channel is lined with energy absorbing riprap, the stream bed is well protected from erosion. This rip-rapping extends for 550 feet from the reservoir edge. As seen in the photos below, when the energy absorbing riprap ends, the erosion and down cutting of the stream bed begin.



On aerial photographs it can be difficult to see the riprapped, channelized, outfall spillway from the 10 acre reservoir. The channel is shaped as such: \backslash _____/ \wedge and this photograph was taken looking down a short sideslope into the bottom of the channel.



After 550 feet the energy absorbing riprap in the channel comes to an abrupt end. Immediately upon its termination, the water flow begins its erosion and downward cutting. As a result, gullying begins.

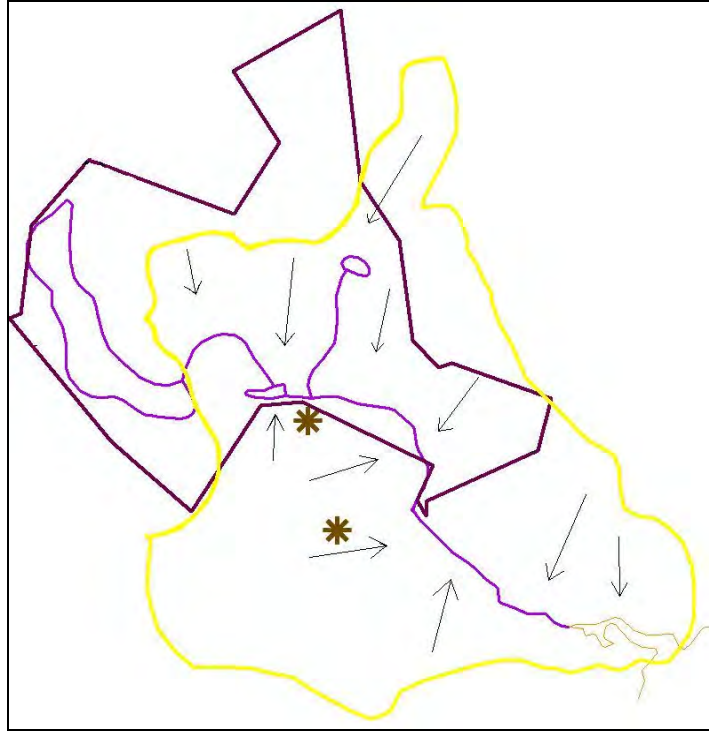


The gullying cuts through the till based soils to depths of 5 and 6 feet providing a diverse array of erosion based vignettes both within and abutting the stream course.

Oval Pond Tributary: The oval pond that is the headwaters of this tributary measures one half acre in size. Inspection shows it to be a constructed pond with a roadway along the southwest perimeter acting as the impoundment structure. Historically, there was use of an outflow control structure in the pond which had its outfall through a submerged pipe. The pipe discharged down gradient, below the impounding road. On the day of the visit it appeared that the outfall structure no longer functions and the pond is now creating its own overflow path over the road during times of high outflow. At the time of this visit there was no over-the-road outfall and the stream course became noticeable down gradient from the roadway seeping among the rocks.

Pollutant Discharge: It is notable that this east side drainage of Parcel 1 has what the west side drainage does not – degraded water quality. The reason for this, at least on paper, is straightforward. Two former Town of Preston landfill/ transfer station sites are in the immediate vicinity south of the stream. The sites lie 300 and 600 feet away from the stream and 35 and 45 feet above it respectively. Thus, with gradients of 12 and 8 percent, both surface and groundwater flow past, through, and under these two locations then downslope to impact the streams water quality.

The graphic below (next page) shows the direction of topographic-based drainage through the watershed and towards Poquetanuck Cove.



In this graphic the Parcel 1 property boundary is depicted in dark red, the drainage area in yellow, and the water courses in purple. The rust colored stars are the two points of known Leachate and Wastewater Discharge sources in the watershed. Both are no longer active and are alternatively known as Preston Landfill and Preston Transfer Station. The arrows indicate general direction of surface and ground water flow. In a typical scenario, the downhill direction of the flow would intercept pollution from the two landfills and deposit it in the watercourse down gradient thereby degrading the water quality. (Leachate and Wastewater Discharge source information: DEP GIS, 2009)

Wetland Discussion

Spillway Tributary: The arcing spillway watercourse showed only modest flow at the time of the visit but must, at times, be full and rigorous based on the amount of erosion, gullyng and bank undercutting it has done. The stream flow was both clean and clear, and without odor. Little natural habitat exists along the flowpath and no wetlands are associated with it, although, it is undoubtedly high in value for wildlife use.



This photograph shows the end of the arcing spillway tributary just before it empties into the small oblong pond. The clarity of the water is readily apparent here at the end of the stream's run despite traversing large runs through eroded areas. Despite the erosion problems seen above, the forested watershed still does a good job of keeping sediments from impacting that water quality.

As seen in the previous watershed graphic above, the spillway tributary ends its flow in an oblong pond due east of the reservoir. This pond has water quality status of "B" and visual inspection yielded water quality and aesthetic differences from all other wetlands previously seen in on either side of Parcel 1.



This is the oblong pond into which the arcing spillway tributary empties. The brown color likely indicates suspended sediments and compromised water quality. This pond is situated just below the hill upon which the landfills are present.

Oval Pond Tributary: the open water habitat of the ½ acre pond and its resulting stream course has evolved into a healthy wetland environment. At the pond, a turtle slipped off a log as team members approached. Based on the empty/skeletal shell found near shore, the turtle population is assumed to be Eastern Painted Turtle (*Chrysemys picta*). Just downstream from the pond two juvenile Pickerel Frogs (*Rana palustris*) were observed. At adulthood Pickerel Frogs measures up to three inches in length. The two individuals observed were much smaller and could sit comfortably on a quarter.



This photograph of the Oval Pond was taken from the road which impounds it. The nonfunctioning outlet structure is seen in the foreground and the pond itself, which is home to frogs and reptiles, is undoubtedly used by other wildlife in the area.

Other Wetlands

There is an additional set of wetland ponded areas, the largest measuring only ± 15 feet by 8 feet in size, at the foot of the earthen dam west of the oblong pond. These wet areas show no visible inlet or outlets. Their distinctive feature is the color and bottom makeup, both of which are the result of the presence of iron bacteria.

Aesthetically, the ponds are not pleasing, being the orangey-red in color and displaying a weak spongy mold formation anchored to the bottom. Iron bacteria is not uncommon in acidic soils, however, its presence may also indicate elevated pollutant levels which water quality testing would reveal. Notably, upon approach to these areas, several frogs leapt into them and remained hidden under the cover of the “fluffy”, spongy matter.

In their publication: *A FIELD GUIDE TO AQUATIC PHENOMENA*, the University of Maine, Water Resources Research Institute uses this description: “This is usually a natural phenomenon and is generally associated with acidic soils. However in large amounts (orange fluff that fills a stream bed) iron bacteria might indicate pollution.”



This orangey color is caused by bacteria which thrive on iron in the soil and water. Lying beneath crystal clear water, a puffy bottom mass looking somewhat like mold broke up readily when frogs leapt into it and under it at our approach.

Summary: Parcel 1 is divided into two equal halves by a natural drainage divide. The western side is more than two times larger than the eastern side. Because of its larger drainage area there is more flow in its primary water course. The water quality of the wetlands and watercourses is rated “A” but could possibly score an “AA” upon closer inspection. The overwhelming land cover is forest, but even more importantly the amount of impermeable surface within the watershed is small (3.2 percent). A healthy population of Pickerel Frogs inhabits the wetland upstream from the reservoir, as do other large fauna based on tracks seen in the floodplain soils. The system also enjoys a diverse population of wetland vegetation.

In all, it is a healthy wetland system because of limited development within the watershed. The guidelines for maintaining that health are straightforward: keep impervious surface at or below 10 per cent, maintain riparian buffer zones and keep forest cover in the 50-60 percent range.

The eastern side of Parcel 1 is impacted by development. The riprap channel and subsequent erosion scar the entire length of the spillway stream. The oval pond is the

highlight of the wetlands in this drainage. Home to amphibians and reptiles, the pond is a haven for local fauna.

But the placement of former landfill sites and the resulting impact on the water quality of the streams downslope from them taint the quality of the downstream wetland system. Here again, forest cover is substantial and impermeable surface is below the 10 per cent level, but the landfills have left their mark.

The east side is a good lesson for the future health of the west side. Careless, unplanned land use will ultimately degrade the water quality. And, of equal importance, impacts to the natural flow of the watercourse (IE: channelization) may well lead to landscape scarring erosion events as is so readily apparent on the east side.

Dam Safety Concerns

Members of the Team have strongly suggested that the dam which impounds the 10 acre reservoir on the property be reviewed by a professional familiar with dam maintenance and safety. It is a long held rule of thumb that vegetation larger than grasses should not be growing on an earthen dam. However, on the field review the team observed a thick brush and small tree community firmly established on the dam side slopes. Clearly in the past some maintenance has cut back this vegetation but, left to its own for several years, it has continued its efforts to reestablish itself. As a result it is strongly suggested this situation be reviewed immediately.



This is the view across the top of the dam. The pathway is surrounded on both sides by dense vegetation which inhabits both side slopes of the dam. Root penetration into the earthen dam structure by large vegetation has always been seen as a potential threat to the long term stability and safety of the dam structure.



This photograph was taken on the top of the dam looking east with the water behind the photographer. The vegetation measures one to two inches in diameter. This well established growth surrounds an interior core of previously cut stumps, a sign of maintenance in the past.

Historic photograph of storage reservoir.



DEP – Office of Long Island Sound **Review**

Poquetanuck Cove Forest/Tidal Marsh

Norwich Hospital includes a 37-acre “dog-leg” shaped parcel with approximately 300 feet of frontage along the mid-cove section of Poquetanuck Cove in the Lower Thames River basin (see following maps). Poquetanuck Cove is the *anchor* within a shallow estuarine open water-tidal marsh- forest habitat complex of significant biological interest.

With over 3,000 feet of frontage on Route 12 at the eastern terminus of the Mohegan-Pequot /Route 2A Bridge, the Poquetanuck Cove parcel will likely be of significant interest to potential developers of Norwich Hospital and therefore this parcel will likely be subject to pressure to convert it to commercial uses. DEP-OLISP staff has learned that the privately-owned adjacent parcel to the east abutting DEP’s parcel was recently transferred to an owner-developer who has clear-cut the parcel in preparation for possible future development. Depending on the proposed use, location and design, the development of the Poquetanuck Cove parcel has potential to adversely affect the quality of the habitats provided by the Cove and tidal marshes. Therefore, it’s recommend that the portion of this parcel draining directly to the Cove, approximated by the area of the parcel within the Connecticut coastal boundary (see following maps), be designated solely for plant and wildlife habitat conservation purposes and dispersed passive recreational uses such as wildlife observation in order to maintain the parcel’s habitat and water quality protection functions and values.

The forest that surrounds the Cove in the vicinity of the DEP parcel provides an effective buffer between development along Routes 12/ 2A and the Cove and associated tidal marshes which contains much of the Cove’s habitat value (see also the discussion of Cove area’s forestland values provided by CT DEP-Forestry Division). The Poquetanuck Cove marshes are classified in the U.S. Department of the Interior’s Fish and Wildlife Service’s *Northeast Coastal Areas Study: Significant Habitats of Southern New England*

(1991) as part of the Lower Thames River System Significant Coastal Habitat. This study, CT DEP natural resource data, and local birding observations indicate that the Cove and tidal marshes are particularly significant for their over-wintering and migratory waterfowl habitat, particularly for Canvas Back and Black Ducks, Hooded Mergansers, Bufflehead, Golden Eye, Red-breasted Merganser, and Gadwalls. Few tidal coves of this size and habitat value exist in Connecticut, particularly within the heavily developed lower Thames River basin.

According to former CT DEP Senior Ecologist, Mr. Ken Metzler:

. . . Poquetanuck Cove is a significant brackish tidal marsh, unique within the Thames River estuary. . . . stormwater discharge(s) into this cove would have a significant negative effect on the tidal wetland and submerged aquatic vegetation. Furthermore, (Mr. Metzler) believes that such impacts, unless mitigated, will likely change the vegetation structure and habitat conditions that are important for wetland dependent species such as over-wintering waterfowl and spawning fish.¹

The shoreline of the Norwich Hospital property on the Cove includes a nearly continuously narrow band of tidal marsh vegetation. These vegetation include a *Spartina alterniflora-Bolboschoenus robustus* (aka *Scirpus robustus*), or Saltwater cordgrass-Saltmarsh bulrush, complex with a band of *Panicum virgatum* (Switch grass) along portions of the parcel's tidal marsh-upland boundary.



These linear shoreline marshes, often less than 1 meter wide to a few meters wide in places, are bordered on the upland by forested slopes exceeding 20 percent. Due to these

¹ Memo dated April 18, 2006 from Dawn McKay, Environmental Analyst, DEP-Wildlife Division/Natural Diversity Data Base to David Kozak, Environmental Analyst 3, DEP-OLISP. Subject: Route 2 By-Pass along Poquetanuck Cove in Preston, Connecticut; NDDB # 14433

steep slopes and soil conditions, DEP's Erosion Susceptibility Index rates the area along the Cove in the vicinity of the Norwich Hospital property as "most susceptible to erosion." Therefore the adjacent tidal marshes in this area are extremely vulnerable to sedimentation if the adjacent uplands are disturbed. Even small changes in the elevation of the marsh surface from sediment deposition have the potential to alter the existing plant community structure within these tidal marshes.

Within the tidal marshes of the Cove occurs *Bolboschoenus cylindricus* (a.k.a. *Scirpus cylindricus*) or Saltmarsh bulrush, a State Species of Special Concern. Species of Special Concern are any native plant species or any native non-harvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state². Connecticut's Natural Diversity Database Program (NDDDB) administrator recommends avoiding disturbance to areas where this species occurs to protect it and prevent it from being designated as "endangered" or "threatened," classifications that by State statute carry more significant restrictions³.

The Cove is also an important feeding area for Ospreys and for Bald Eagles (which occur frequently in both winter and summer). Great and Snowy Egrets and Great Blue Herons forage in the extensive shallow waters of the cove in large numbers. A key feature of the area just east of the Norwich Hospital property is the large expanse of narrow-leaf cattail marsh that supports a small but apparently stable population of Marsh Wrens⁴. Data from TNC-Connecticut who managed their 234-acre Poquetanuck Cove Reserve directly across the Cove from the Norwich Hospital property also indicates that the lower Cove's open estuarine waters may provide spawning and possible wintering grounds for fish (see DEP-Fisheries division discussion for more on the Cove's fisheries value).

² See Connecticut General Statutes Section 26-303 et seq. (Connecticut Endangered Species Act) for more on "State-listed" Endangered, Threatened and Special Concern species designations.

³ Connecticut General Statutes Section 26-303 et seq.

⁴ Personal communication with Robert Askins, Professor of Biology, Connecticut College, October 8, 2009.

Developed Shorefront:

Much of the Norwich Hospital property west of Route 12 (referred to as the “campus”) is bounded on the west by the Thames River most of which is lined with rip-rap (stone) and does not support tidal marsh grasses. Access to the River is encumbered by the Providence & Worcester rail line that runs along the entire length of the River on or adjacent to Hospital property. Immediately east of the railroad along the campus, the steeply- sloped face of the Thames River terrace further restricts uses of this riverfront portion of Norwich Hospital. The slopes of this River terrace adjacent to “Bedlum Cove” located south of a fixed pier (discussed below) contain a *Spartina alterniflora*-*Phragmites australis* tidal marsh and are therefore of particular concern because land disturbances along and upland of the slope could readily erode these slopes, classified as “most susceptible to erosion” according to DEP’s Erosion Susceptibility Index, resulting in sedimentation to the Cove and altering this tidal marsh plant community. Another unnamed cove, north of the fixed pier, where no tidal marsh was observed, is also bordered on its upland side by the steeply- sloped River terrace.

Existing Fixed Pier: Permitting and other re-use issues

The existing 500 foot fixed T-head pier adjacent Fort Point was constructed in the early 1950s to service vessels off-loading fuel oil for the Hospital (see attached Structure Dredging and Fill Permit-attached issued by the Connecticut Flood Control and Water Policy Commission on July 11, 1951). Therefore, the repair or reconstruction of this structure may be eligible for authorization under one of DEP’s “Short Permit Processes” including the “Certificate of Permission” or “General Permit” process, as more fully explained in DEP’s Coastal Permit Program Fact Sheet⁵.

Fuel storage site and other areas of soil/groundwater contamination concern:

On March 12, 2009 the Town of Preston acquired approximately 420 acres of land from the State of Connecticut that includes the Core Campus of the Norwich State Hospital.

⁵ This Fact Sheet can be accessed at the DEP’s Web site <http://www.ct.gov/dep/> under the headings: Permits and Licenses/Air, Waste, Water, Land Reuse/Land Use Permits and General Permits/Coastal Permits-Long Island Programs or by using the following link: http://www.ct.gov/dep/cwp/view.asp?a=2709&q=324222&depNav_GID=1643 .

That transfer was subject to the Property Transfer Law and as such the Town of Preston has filed a Form III and Environmental Condition Assessment Form certifying that they will remediate the site in accordance with the Remediation Standard Regulations.

Preston has been awarded a \$200,000 grant from US Environmental Protection Agency Targeted Brownfields Assessment Program. These funds will be used to further evaluate the environmental condition of the site.

Based on a 2006 Phase III Environmental Site Assessment, approximately forty (40) areas of concern were identified at the site. The 2006 cost estimate for remediating the site was projected to be approximately thirty five (35) million dollars. The cost estimate is likely to change depending on the final end use of the site.

While approximately forty areas of concern were identified at the site, the following are the most significant areas of concern:

- 1) Several feet of #6 fuel oil has been identified on the water table approximately fifty (50) feet below grade in the area of the power house facility. Remediating this release presents one of the greatest challenges at the site.
- 2) Chlorinated solvents have been identified in ground water in the vicinity of the former on-site dry cleaning facility. Further investigation of this area is warranted.
- 3) Pesticides have been identified in the soils surrounding many of buildings throughout the site. The remedial measures taken to achieve compliance will largely depend on the future use of each building and planned end land use.
- 4) Several areas of buried demolition debris/disposal areas were identified at the site. These areas will require further assessment.
- 5) A closed former ash landfill exists between Route 12 and the Poquetanuck Cove. This area requires additional investigation. (This land is not part of the parcel that the Town of Preston has acquired from the State of Connecticut.)

Water-dependent Uses of Norwich Hospital Shoreline:

The 2.2 (+/-) acre area referred to as Fort Point, immediately south of the fixed pier and waterward of the railroad, includes approximately 1,000 feet of unencumbered frontage

on the Thames River. This area, along with the adjacent fixed pier, offer the best opportunity within the Hospital's campus area to accommodate a water-dependent use. The Connecticut Coastal Management Act defines *water-dependent* uses as those requiring direct access to coastal waters in order to function and which therefore must be located at the waterfront rather than on inland sites. Such uses include, but are not limited to marinas, commercial fishing or boating facilities and uses that provide general public access to coastal waters⁶. Fort Point should be reserved to accommodate a water-dependent use, of which, a recreational use that provides public access to the Thames River would seem to be the most practical and desirable.

However, providing safe pedestrian or vehicle access to this area will likely be problematic if the existing at-grade rail crossing is used to cross the Providence & Worcester railroad line. As discussed in the DEP-Fisheries section of this report, this area provides potentially significant opportunity to offer access to the Thames River for angling and wildlife observation, as well as a venue for cultural and historic interpretation of the area.

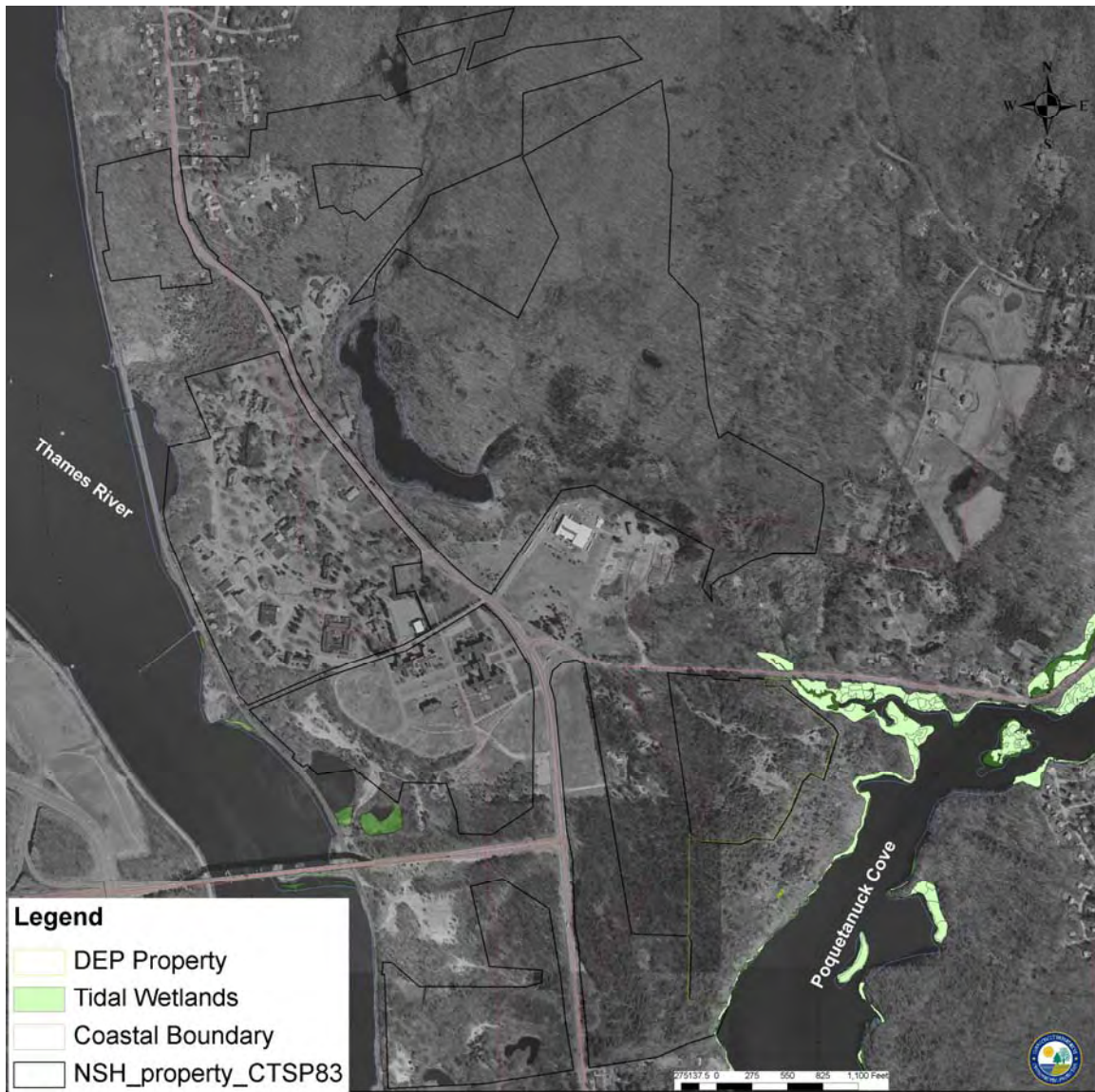
Cultural Resources

Sawmill Point and Fort Point:

Sawmill and Fort Points are documented by studies conducted for the State Historic Preservation Office of State Archaeology as having State historic or cultural value. As such, these sites are subject to the CCMA's policies:

To require reasonable mitigation measures where development would adversely impact historical, archaeological or paleontological resources that have been designated by the state historic preservation officer [CGS section 22a-92(b)(1)(J)].

⁶ Connecticut General Statutes (CGS) section 22a-93(16)





STATE OF CONNECTICUT
 FLOOD CONTROL AND WATER POLICY COMMISSION
 ROOM 317, STATE OFFICE BUILDING
 HARTFORD, CONNECTICUT

July 11, 1951

Mr. Stuart Allen
 State Public Works Department
 State Office Building
 Hartford, Connecticut

Dear Sir:

You have submitted an application for a State permit to construct and maintain a "T" head pier and dolphins and to dredge in the Thames River at the Norwich State Hospital as indicated on Scheme #2 on plans by Newman N. Argaves and Associates dated 4/13/51.

The Commission after investigation is of the opinion that such construction will have no adverse effect upon the navigability of the river, insofar as concerns the State's interest and authority in matters of navigation, and will not increase the danger to life or property by reason of flood waters. It is not the intent of this Commission to convey or waive any property right in any lands of the State, nor will this letter be construed as giving any property rights in real estate or material or any exclusive privileges nor does it authorize any injury to private property or the invasion of private rights or any infringement of Federal, State or local laws or regulations. This letter will be considered as the Certificate required by Section ~~36-100a, Acts of 1939, 3541, General Statutes 1949 Rev.~~

If the structure or work herein authorized is not completed on or before two years from this date, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

The previous permit for Scheme #3 dated June 8, 1951 is rescinded.

FLOOD CONTROL AND WATER POLICY COMMISSION

By Richard Martin
 Richard Martin, Secretary

cc: Corps of Engineers
 U. S. Department of the Army
 Army Base
 Boston, Mass.

Poquetanuck Cove

As part of the ERT review of the former Norwich State Hospital property located in Norwich and Preston, CT, this section will provide commentary related to the relationship of this land in reference to Poquetanuck Cove. Poquetanuck Cove is a narrow, two mile long tidal embayment located 10 miles upstream from the mouth of the Thames River between the towns of Preston and Ledyard, Connecticut. The open water and tidal areas encompass 280 acres and is under the jurisdiction of the State of Connecticut (public trust). These tidal marshlands and open waters of Poquetanuck Cove have been set aside as a state bird sanctuary in 1969. *The USFWS Northeast Coastal Study: Significant Coastal Habitat of Southern New England and Portions of Long Island, New York* (August 1991) specifically identifies the Poquetanuck Cove marshes as a significant coastal habitat site, particularly for its "... regionally significant concentrations of wintering and migrating waterfowl, especially of several species not commonly found elsewhere or in similar concentrations in the region."

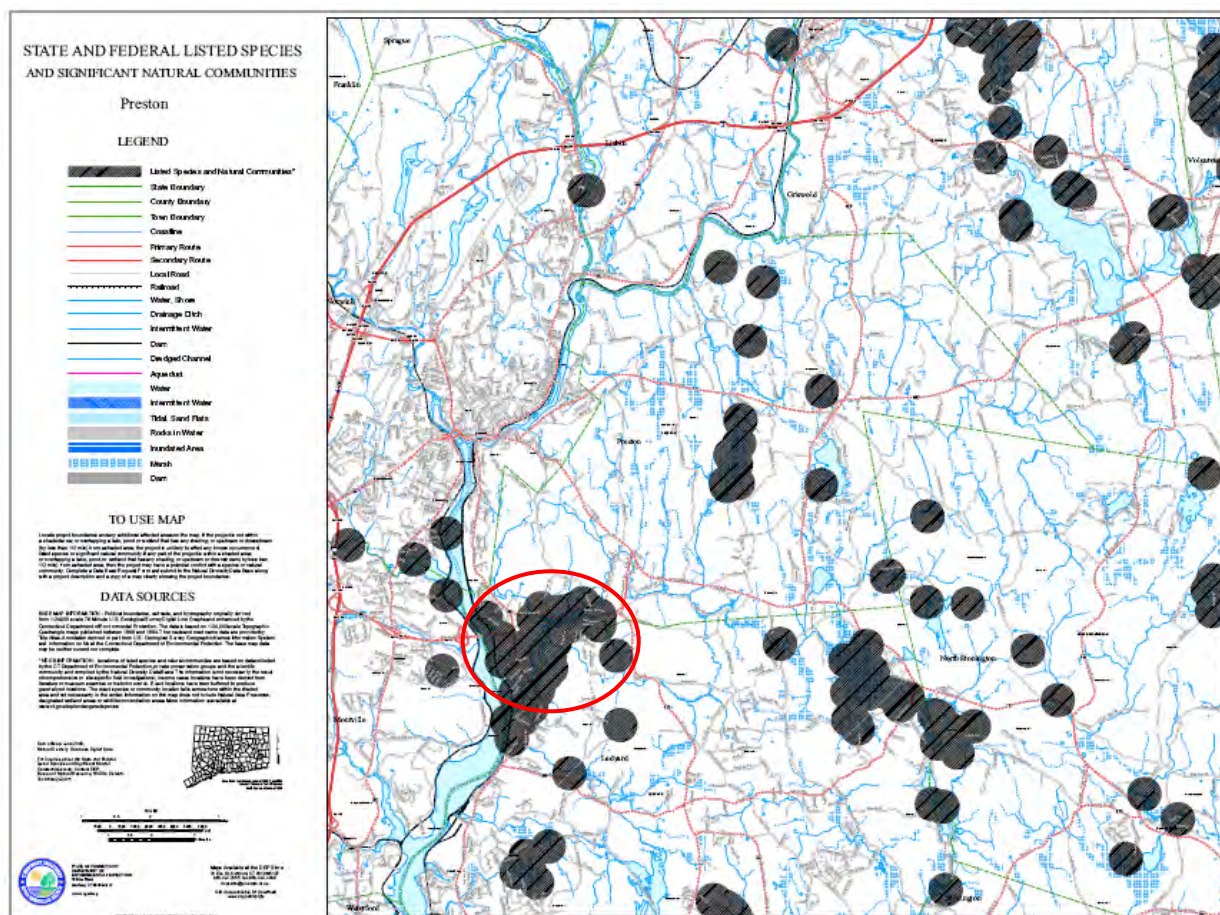
Invasive *Phragmites australis* or Common Reed was introduced to tidal marshes of Poquetanuck Cove and is present along the fringe areas of the open water. A multiyear herbicide program was initiated to remediate the marsh by eliminating the *Phragmites*. When multiple applications were prepared to fund the herbicide treatments, Ron Rosza, formerly of the CT DEP, described this project as a "high priority for invasive species control since it is the largest/best brackish meadow/cattail marsh on the Thames River". When the CT Tidal Wetlands Restoration Committee met on September 27, 2006, they placed a high priority for this project. After more than a year of effort on behalf by many stakeholders coordinated through the Thames River Basin Partnership, herbicide treatment began in September 2008. The value of the many phases of the project exceeds \$50,000.

Invasive *Phragmites australis* had become well established in Poquetanuck Cove and has been expanding along the marsh fringe areas. *Phragmites* had been displacing significant native flora, including six plant species listed in the State of Connecticut Natural Diversity Data Base as Endangered, Threatened or of Special Concern. A multi-seasonal year long floristic survey was commissioned by The Nature Conservancy and supported by the Town of Ledyard from summer 2007 – spring 2008. This survey, conducted by a professional field botanist, documented the locations of these rare plant communities, including one plant listed as an Endangered Species in Connecticut. Poquetanuck Cove is the only known location of this plant. Map 1 is the most recent (June 2009) Natural Diversity Data Base "blob" map for the Town of Preston and is included for reference. Any proposed activity in one of the shaded areas, or overlapping a water body containing a shaded area, or ½ mile upstream of a shaded area should be reviewed by the CT Department of Environmental Protection Natural Diversity Data Base office for potential impacts to the listed plant species in Poquetanuck Cove.

A portion of the land being considered in this review is in the watershed of Poquetanuck Cove and contains frontage along the north shore (Preston side) of the cove. The

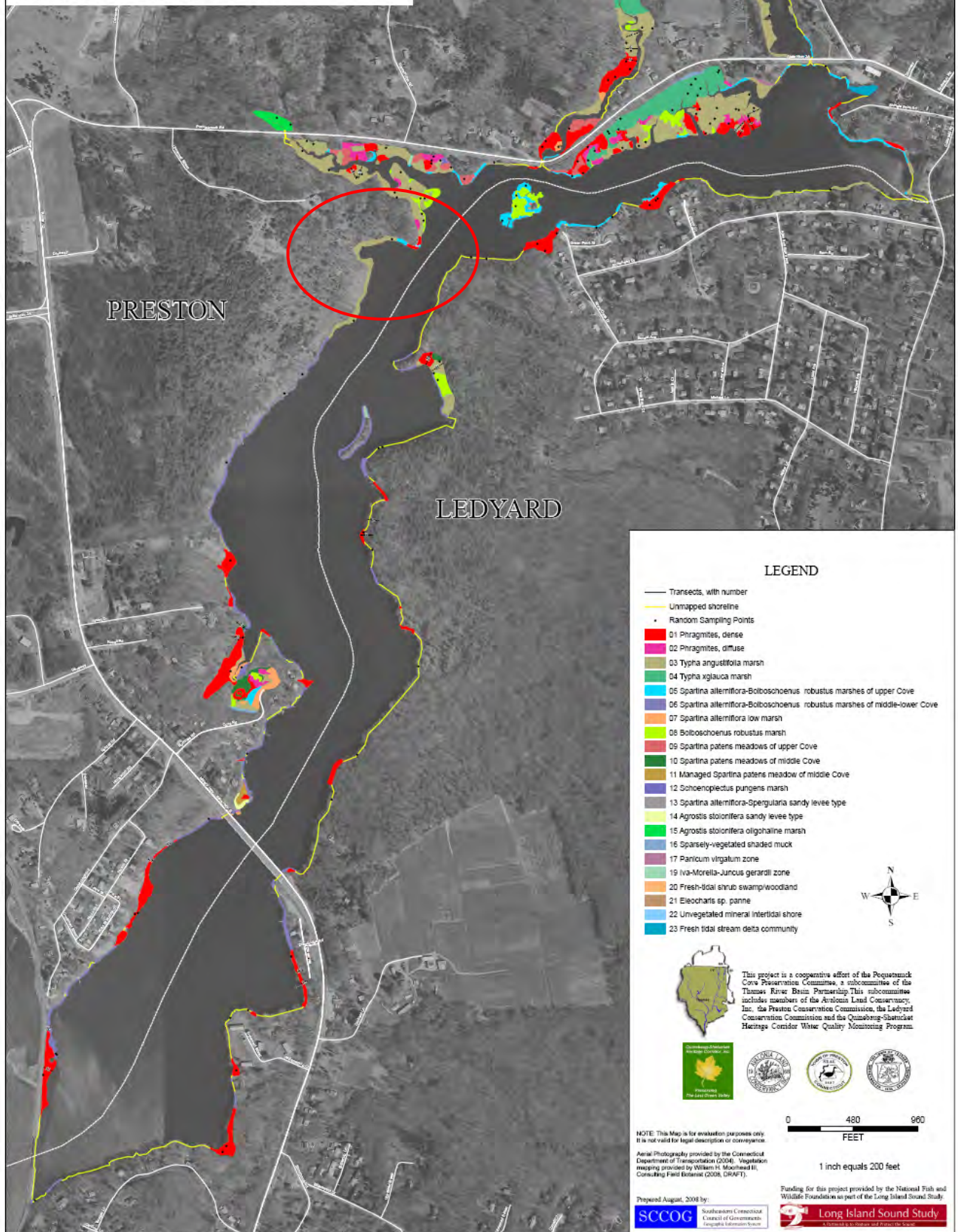
property also abuts coastal access land owned by the CT Department of Environmental of Protection along a portion of the eastern side of the “hospital” property. This undeveloped shoreline offers opportunities for osprey and eagle to perch while overlooking the cove. Bald eagle surveys conducted in January 2008 and 2009 confirmed the presence of eagles in the Poquetanuck Cove area. Development of the property should avoid disturbing the forested land along the shore.

A significant portion of the property drains into Poquetanuck Cove through an unnamed small brook that drains from a pond on the Preston portion of the property. During and after development of the property, increases in stormwater runoff from the property should be avoided. Areas disturbed by increased stormwater runoff and erosion may favor the growth of *Phragmites* over native plants. On Map 2, you will note that there was *Phragmites* mixed with the marsh vegetation at the mouth of this brook in 2008. It will take several years to reduce the *Phragmites* in this area. It is very important to avoid creating conditions that may favor its growth over native vegetation.



Map 1- Preston NDDB areas, proposed project area in red

PRE-TREATMENT VEGETATION MAP
OF POQUETANUCK COVE WITH
PLANT SURVEY POINTS



Map 2 – 2008 pre-herbicide treatment vegetation map, “hospital” brook outlet outlined in red.

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are records for State Special Concern *Cicindela Formosa generosa* (pine barrens tiger beetle) from the vicinity of this project site.

The Big Sand or pine barrens tiger beetle (*Cicindela formosa generosa*) occupies blowouts and sand plains of dry -xeric, loose shifting sands, without water that are sparsely vegetated, such as pine barrens.



If the tiger beetle habitat described above is going to be impacted by this project then the DEP Wildlife Division recommends that an entomologist conduct surveys for this species. A report summarizing the results of such survey should include habitat descriptions, invertebrate species list and a statement/resume giving the entomologist' qualifications. The Wildlife Division does not maintain a list of entomologists in the state. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Please be advised that this section of the DEP Wildlife Division has not made a field inspection of the project nor have we seen timetables for work to be done. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. If the proposed project has not been initiated within 6 months of this review, contact the NDDB for an updated review. If you have any additional questions, please feel free to contact [Julie.Victoria\(a\)ct.gov](mailto:Julie.Victoria@ct.gov). Please reference the NDDB #14876, 15418, 15681 and 16991) when you e-mail.

State listed plant species have also been documented to occur along areas of the shoreline/intertidal zone of Poquetanuck Cove. They are: *Atriplex glabriuscula*, *Deschampsia caespitosa*, *Lilaeopsis chinense*, and *Scirpus cylindricus*. These species are all listed as State Special Concern (RCSA Sec. 26-306). To prevent species that are listed as State Special Concern from becoming endangered or threatened we recommend avoiding disturbance to areas where they are documented to occur or minimizing impacts to their habitats. It is recommended that field surveys be conducted by a botanist in shoreline/intertidal areas that may be affected by direct and indirect impacts. If the proposed project has not been initiated within 6 months of this review, contact the NDDB for an updated review.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Environmental Protection's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact Nancy Murray if you have further questions regarding the plant species at (860) 424-3592. Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Fish Habitat and Fish Populations

Introduction

The Norwich Hospital Property (the Property) comprises 470 acres. The property is segmented by various roads, such as Routes 2A and 12, as well as the Providence & Worcester Railroad. There are numerous buildings and roads that comprised the hospital facility, but there are also large areas of undeveloped land.

Within the boundaries of the Property, there are two non-tidal waterbodies that provide fish habitat: a pond referred to as Hospital Pond, and a relatively remote pond that this Team member refers to as Unnamed Pond. In addition, the Property has frontage on the mainstem of the Thames River and on Poquetanuck Cove. Taken together, these waterbodies contain a variety of fish habitats, ranging from freshwater to estuarine, that support many species of fish.

Hospital Pond

Hospital Pond is a freshwater pond of approximately eight acres (this Team member's estimate using Bing.com/maps/). The pond is fed at the northern end by a network of wetlands within a relatively undeveloped and wooded watershed that drain to an intermittent stream. The lower portion of this intermittent stream may be used by pond fish when the stream is flowing. An earthen dam at the southern end maintains the water level of the pond, and there is also a small beach near the dam. The rest of the shoreline is heavily vegetated with trees and shrubs. On the day of the Environmental Review Team site visit (August 18, 2009) there was very little emergent vegetation along the shoreline or floating aquatic plants. The Team fisheries biologist observed sparse coverage of submerged aquatic plants at the southern and northern ends. The water was relatively clear with no evidence of algal blooms. Based on these observations, the pond appears to have very low inputs of nutrients from the surrounding watershed.

The dam appears to have a water level control structure, but no outfall was visible (it is possible it was buried by slumping of the dam). Apparently an alternate flow control feature was added at some time, consisting of a wide trench dug into the hillside that can channel flow when the pond level rises to the level of the trench (at the time of the site visit, the pond level was lower than the bottom of the trench). An intermittent watercourse and associated wetlands exists between the southern end of the pond and Poquetanuck Cove. Based on the abundant vegetation in the trench and watercourse, it appears that water flows infrequently from the pond.

To this Team member's knowledge no fish sampling has been conducted in the pond. It is possible that the pond was stocked with various species at the initiative of hospital staff, or fish were otherwise introduced. At the time of the site visit the Team fisheries biologist did observe largemouth bass, a popular game fish that was introduced to Connecticut's waterbodies. He also observed sunfish (species unidentified).

It would be desirable to maintain the pond in its current condition by limiting development along the shoreline and in the watershed that feeds the pond. The Inland Fisheries Division recommends an undeveloped buffer zone of 100 feet or greater be maintained between waterbodies and developed areas⁷. In order to keep the pond in its current condition, buffers much wider than 100 feet could be considered. In addition, the intermittent watercourse and associated wetlands between the pond and Poquetanuck Cove should be protected.

In its current condition, the pond could offer recreational fishing opportunities for species such as largemouth bass and sunfish. The parking area and beach could be maintained as a car-top boat launch area. Should the town of Preston be interested in enhancing fishing opportunities by stocking and managing the pond, then it would be advisable to map the bathymetry of the pond and collect temperature and dissolved oxygen data. This information is necessary to determine what species are appropriate for the pond. Staff from the Inland Fisheries Division, Habitat Conservation and Enhancement Program are available to provide guidance should the town be interested in pursuing this further.

Unnamed Pond

A small man-made pond of about 0.2 acres (estimate) is located on the property at 72° 03' 47.31" W 41° 29' 33.67" N (coordinates obtained from Google Earth). It is in a wooded area at a relatively high elevation. There are no wetlands or watercourses supplying water to the pond. No aquatic plants or fish were observed. Much of the bottom was covered with leaves. Given these characteristics and its relatively remote location on the property, the pond has minimal value as fish habitat and offers limited recreational fishing possibilities.

Thames River

The Property borders the mainstem of the Thames River from the Rt. 2 Bridge to a point approximately 3,500 ft north of the bridge. However, the Providence & Worcester Railroad runs through the Property along the shoreline, thus isolating the waterfront from the rest of the Property. The railroad is very close to the shoreline, with the exception of one area known as Fort Point. At the northern end of the Property there is a small cove called Tidal Cove that probably was created by the construction of the railroad. The Property shares frontage on the cove with the adjacent parcel. The property also has about 155 feet of shoreline on Poquetanuck Cove (all distances are estimates).

The Thames River in the vicinity of the Property is essentially an extension of Long Island Sound. Surface salinities vary considerably and can be below 10 ppt (parts per thousand), whereas bottom salinities are typically above 20 ppt (Soderberg and Bruno

⁷ Information on riparian buffers and Inland Fisheries Division guidelines is available on the CT DEP website. Web links to the relevant documents are provided at the end of this section.

1971). It can be expected that salinities will be lower at the head of Poquetanuck Cove where several brooks discharge.

Due to the wide range of salinities a variety of fish and invertebrate species occur in this reach of the river. Fisheries studies conducted by the AES Thames Cogeneration Station⁸ in 2006 observed 47 species of fish and nine species of crustaceans (AES 2007). Seine sampling conducted by the Marine Fisheries Division at various nearshore locations in the vicinity of the Property from 2000 to 2008 observed 18 species of fish (CT DEP Marine Fisheries Division, unpublished data). Earlier studies documented similar numbers of species (AES 1992, Marsh 1974, Tolderland 1975).

A number of fish species are of particular interest in the vicinity of the Property. Within the mainstem of the Thames River, striped bass, bluefish and white perch are sought by recreational fishermen. Striped bass and bluefish prey upon the numerous forage species prevalent in the area, such as mummichog, Atlantic silverside, bay anchovy, Atlantic menhaden and anadromous river herring (alewife and blueback herring), as well as juvenile white perch. No sampling has been conducted in Poquetanuck Cove, but it is likely these species also occur in the cove.

The Inland Fisheries Division has been working to enhance diadromous⁹ fish populations in the Thames River watershed. The Thames River serves as a migratory corridor for the anadromous American shad, blueback herring, alewife and sea-run brown trout, and the catadromous American eel. So far, fish passage has been provided at the Greenville Dam, Taftville Dam, Occum Dam on the Shetucket River, Versailles Pond Dam on the Little River, and the first dam on Trading Cove Brook. These fishways allow American shad, river herring (alewife and blueback herring), white perch and sea-run brown trout access to spawning and nursery habitats upstream. The Inland Fisheries Division is continuing efforts to render other barriers in the watershed passable to anadromous fish.

Alewife and blueback herring spawn in Poquetanuck Brook and to a lesser degree in Joe Clark Brook, therefore Poquetanuck Cove serves as a migratory corridor and perhaps nursery area for young-of-year herring. It is likely that the American eel is present in the system. The Inland Fisheries Division has historical accounts of another anadromous species occurring in this system, rainbow smelt, but it is unknown if a spawning population still exists.

The Thames River is an important spawning and nursery habitat for winter flounder. The Thames River was found to support the highest juvenile winter flounder catches of five Connecticut estuaries studied in a multi-year survey (Howell and Molnar 1995). Winter

⁸ The facility is located about 3.5 miles south of the Property, but the species observed there can also be found in the vicinity of the Property.

⁹ The term diadromous refers to species of fish that migrate between fresh and marine waters. It includes anadromous species, or fishes that migrate from the sea to spawn in freshwater, and catadromous species, which migrate from freshwater to spawn in the sea.

flounder once supported significant commercial and recreational fisheries in Connecticut's waters; however, the abundance of this species has declined for reasons that are not well understood (DEP 2008). Nonetheless, the Thames River continues to produce winter flounder. Spawning likely occurs in the reach of the river that encompasses the Property. Also, young of the year winter flounder have been captured by beach seine at a number of locations in this reach of the river (DEP MFD unpublished seine data referred to above).

Tidal Cove is a relatively shallow and muddy cove with a surface area of about three acres. It appears to have been created by the construction of the Providence & Worcester Railroad, perhaps by excavating material for the embankment and the isolation of an indented section of the shoreline. A small railroad bridge provides a narrow inlet to the cove. With the exception of the railroad embankment, the shoreline is heavily vegetated with trees and shrubs and there is a small area of fringing tidal wetland vegetation. The cove has not been sampled, but it probably provides foraging opportunities for small species of fish, such as mummichog and Atlantic silverside, as well as juvenile white perch, and may afford them some protection from piscine predators. It is also possible that young-of-year winter flounder reside in the cove during late spring and summer.

Since upland activities can affect the water quality, and thus the fisheries, of the Thames River, it is desirable to preserve land within the watershed and mitigate activities that might degrade water quality. But in this case the Property along the mainstem of the river is relatively limited and development will be constrained by the railroad. The length of shoreline along Poquetanuck Cove is relatively short (about 150 feet), but it is currently undeveloped and wooded, and it abuts a significant waterfront parcel owned by the State of Connecticut that is in similar condition. Therefore, it would be preferable to maintain the current condition of the Property along Poquetanuck Cove.

Of the waterfront areas, Fort Point offers the best possibilities for public access. Fort Point is about three acres in size and has almost 1,000 feet of shoreline. The maximum distance from the railroad to the river is 250 feet. Fort Point was once considered for a state boat launch, but the presence of the railroad created significant design problems. It was also expensive to establish an approved crossing of the railroad. Due to these problems the project was not considered feasible (Mike Payton, CT DEP Boating Division, personal communication). The presence of the railroad presents a number of issues for public access; however, given the recreational fishing possibilities at this location it would be desirable to provide some type of access for anglers.

Also of interest on the Property is a 550 ft long pier that was used to transfer fuel from barges to storage tanks on the Property. Converting all or part of this pier to a fishing pier could provide considerable fishing access. However, even more than the case with Fort Point, the presence of the railroad complicates the issue.

Despite the problems involved in providing fishing access, the Inland Fisheries Division is interested in whatever plans might be developed for Fort Point and the fuel pier. Staff are available to provide guidance on how best to provide angler access.

Literature Cited

AES 1993. AES Thames Cogeneration Plant 1992 Post Operational Fisheries Surveys. Prepared by Omni Analysis for AES Thames, Inc., Uncasville, CT.

AES 2007. 2006 Impingement and Entrainment Report. Prepared by Kleinschmidt for AES Thames, LLC, Uncasville, CT.

DEP 2008. Marine Finfish Survey, Part 1: Long Island Sound Trawl Survey, In: A Study of Marine Recreational Fisheries in Connecticut. Prepared by the CT DEP, Marine Fisheries Division, Old Lyme, CT. Available online at:
http://www.ct.gov/dep/lib/dep/fishing/general_information/marinefishsurveyreport2007.pdf

Howell, P. and D. Molnar. 1995. A study of marine recreational fisheries in Connecticut. Job 3: Inshore survey of juvenile winter flounder. Annual performance report, CT DEP Fisheries Division, pgs. 55-78.

Marsh, P.C. 1974. Seasonal diversity and abundance of fishes in the upper Thames estuary, Connecticut. M.S. Thesis. University of Connecticut. 25p.

Soderberg, E.F. and A.B. Bruno. 1971. Salinity distribution in the Thames River: New London to Norwich, Connecticut. Naval Underwater Systems Center Report No. 4005. Newport, RI. 87p.

Tolderlund, D.S. 1975. Ecological study of the Thames River estuary (Conn.) in the vicinity of the U.S. Coast Guard Academy. U.S. Coast Guard Academy Report No. RDCGA 575. 135p.

Welsh, B.L. and L. Stewart. 1984. The effects of energy-related transport activities on benthic marine plants, fish, shellfish and lobsters in the Thames River estuary. Marine Sciences Institute, University of Connecticut. 88p.

CT DEP Inland Fisheries Division Riparian Buffer Guidance is available at the following links:

<http://www.ct.gov/dep/lib/dep/fishing/restoration/riparianpolicy.pdf>

<http://www.ct.gov/dep/lib/dep/fishing/restoration/riparianpositionstatement.pdf>

Wildlife Resources

Site inspections were conducted on July 1, July 2, and August 18, 2009 to evaluate existing wildlife habitat on the property. The portion of the property considered in this report is in the town of Preston, along Routes 2A and 12, and along the Thames River, and is approximately 400 acres. There are 4 separate areas under review:

- Area 1 - The wooded area north of Route 2A and Route 12, (+/-205 acres) ;
- Area 2 - The main campus area, including the area around the railroad tracks along the Thames River, (+/- 120 acres);
- Area 3 - The area west of Route 12 and south of Route 2A, (+/- 30 acres);
- Area 4 - The area east of Route 12, south of Route 2A to Poquetanuck Cove, (+/- 38 acres).

The Preston Conservation Commission has asked for recommendations to prioritize areas in need of protection during the planning process prior to any development and for mitigating potential development practices.

Existing Wildlife Habitats

Area 1

This area is characterized by mature deciduous forest, with an overstory of primarily maple, oaks and birches. The understory is moderately dense and is comprised predominantly of mountain laurel and blueberry, and is relatively free of invasive species. There are existing trails including woods roads and footpaths and an old trolley line runs through portions of the parcel.

Forested areas such as this one with large mature mast producing trees along with a well developed understory are valuable to wildlife, providing cover, food, nesting and roosting places and denning sites. Mast or acorns produced by oaks provides excellent forage for a wide variety of mammals and birds including white-tailed deer, gray squirrel, southern flying squirrel, eastern chipmunk, white-footed mouse, eastern wild turkey and blue jay. Trees, both living and dead, also serve as a home for a variety of insects, which, in turn, are eaten by many species of birds, including woodpeckers, warblers and nuthatches.

Wetlands in this area include State Hospital Pond (approximately 8 acres) in the southern portion of the parcel and just east of Route 12, and an unnamed stream on the western side of the property. Large ponds such as this are useful to many species such as a variety of waterfowl and mammals such as mink, beaver, and otter.

There are also numerous shallow pools and poorly drained wet areas located in the forest useful to amphibian species such as pickerel frogs and spotted salamanders that utilize

both wetlands and surrounding forested uplands. There is another small pond located on the southeastern portion of the property. Species likely utilizing various wetland habitat for food and cover include raccoons, star-nosed moles, green frogs, spring peepers and eastern garter snakes.

Area 2

The main campus area of 120 acres is largely comprised of many abandoned institutional buildings of various sizes and associated parking lots and roadways. The landscape is characterized by areas of lawn, large trees, shrubs, some fields, and significantly overgrown vegetation resulting from a lack of maintenance. The western side of the campus contains a vegetated strip with a small amount of frontage (approximately 3,500 feet) along the Thames River, and an active railroad line.

The main campus area has limited wildlife value due to its highly developed nature and the potential for future development. Currently, while the area does not offer high quality habitat suitable for wildlife, the lack of human presence, vehicular traffic, maintenance and upkeep of buildings allows for more wildlife use than would a fully functioning campus. Species that would currently use the area despite development include coyote, red fox, raccoon, opossum, skunk, and gray squirrel. Various bird species such as blue birds, field sparrows, orchard oriole, and barn swallow could be expected to use this abandoned campus with open expanses of lawn and field. Species such as barn owl and chimney swift may utilize abandoned campus buildings. Other bird species highly tolerant of development and humans expected to occur here include gulls, blue jay and American crow, as well as non-native species such as house sparrow and European starling.

There is an approximately 7-acre grassy meadow that could potentially support some grassland-dependent bird species such as bobolinks, which require a minimum of five acres of grassland habitat in order to breed. This area could also potentially benefit wildlife in general, rather than specifically grassland-nesting birds; the forage and structure provided by a mix of grasses and flowers is useful to a wide variety of species, including insects, small mammals, birds, and those species, such as Eastern bluebird and red-tailed hawk that are dependent on such insects and small mammals for prey. Other species that may make use of meadow habitat include Eastern box turtle and smooth green snake.

The undeveloped frontage on the western side of the campus (along the Thames River and railroad tracks) is lightly wooded east of the tracks and more open with shrubby vegetation west of the tracks. Although generally of poor quality and narrow in width (averaging between 100 and 500 feet wide), this area does offer some wildlife value due to the fact that it is undeveloped river frontage; trees and shrubs can provide stopover locations for migrating birds, and, because the abutting campus area is inactive, some of

the negative impacts to wildlife associated with developments such as those that are found nearby (vehicular traffic, maintenance of lawns, parking lots, etc.) are somewhat mitigated. The area east of the tracks has had significant washout and contains extensive amounts of invasive plant species, including bittersweet, multiflora rose and black locust. There is a small cove (Bedlam Cove) in this area, in which, a pair of mallards and a green heron were observed during the site walk. While the cove currently provides good cover for wildlife, there is a significant amount of invasive tall reed grass (*Phragmites australis*). The various species of invasive plants found in the river frontage area will be particularly difficult to control given the current activity level of the railroad, which is likely a seed source for these species.

Area 3

This area is about 30 acres in size, and is bounded by Route 12 to the east, Route 2A to the north, residential and commercial development to the south, and the Thames River to the west. This area has been impacted by gravel removal operations conducted in the past. It is currently comprised of oaks, eastern cottonwoods and old cedar trees, with an extensive amount of non-native, invasive vegetation, including bittersweet, multiflora rose, and autumn olive. Invasive species can become the dominant vegetation, significantly reducing native plant diversity. They crowd out native plants and alter the interactions between plants, animals, soil, and water and are detrimental to other species in addition to the plants that have been crowded out.

Currently, the area is reverting from early successional habitat to poor quality forest. Early successional habitats are considered those found at the beginning of the successional process, whereby open areas typically dominated by herbaceous plants that thrive in sunlight, grow or succeed into brushy shrublands, young trees and eventually, without disturbance, a mature forest. Early successional habitats in Connecticut are declining due to natural succession, lack of natural disturbances such as fire and flooding, and development of those that remain. Species that make use of shrubby, young forest early successional habitats include hognose snake, indigo bunting and rose-breasted grosbeak.

Area 4

This parcel is east of Route 12, South of Route 2A, and west of Poquetanuck Cove. The southern portion of this parcel is comprised of mature coniferous forest with no understory. Further north and upslope, it becomes mature mixed coniferous/deciduous forest and abuts a recently logged parcel. There is approximately 300 feet of frontage along Poquetanuck Cove, which is abutted to the north by extensive frontage under Department of Environmental Protection ownership. Riparian zone habitat, the area along the edge of rivers and streams, is important in protecting and enhancing aquatic habitat, as well as providing travel corridors. Riparian habitat also provides for species such as water shrews, amphibians and many invertebrates. Other wildlife species capable

of using this habitat type include white-breasted nuthatch, American redstart, barred owl, broad-winged hawk, redback salamander and northern ringneck snake.

Prioritized Listing of Areas for Protection and Habitat Management Recommendations

The four areas under review offer a variety of habitat types of differing quality. All parcels occur in a moderately developed, semi-urban area. These areas, despite the development of Area 2, are unique due to their position on the Thames River and Poquetanuck Cove. Areas 1 and 4 are particularly important because of their size and juxtaposition to other undeveloped areas. With the exception of Area 2, all parcels contain highly significant wildlife habitat in an area of high human use and development.

Area 1 should be considered for protection because it contains a large tract of good quality deciduous forest, with associated wetlands. Large, contiguous tracts of forest are increasingly rare in Connecticut, as development continues to fragment the landscape.

Management recommendations include:

- No development or very limited development only near currently developed sites (existing buildings on the western side of the parcel). This will allow the area to continue providing habitat for those species that specifically require larger tracts, as well as being generally providing a larger quantity of resources than would be available if it was fragmented or degraded.
- Eliminate all motorized use of the area, such as ATV riding. This type of activity degrades the site by causing erosion and disturbing wildlife at all times of the year, but especially during nesting season.
- Develop and implement a forestry wildlife stewardship plan in order to maintain a healthy forest and create a diversity of wildlife habitat types, including seedling/sapling habitat.

Area 4 should be protected because it too contains undeveloped forest and abuts a recently logged area, providing for those species that require multiple habitat types. Additionally, the parcel contains frontage along Poquetanuck Cove, which is listed as a 'Regionally Significant Fish and Wildlife Habitat' by the US Fish and Wildlife Service Northeast Coastal Area Study and is home to multiple species of plants and animals listed as endangered, threatened or of special concern in Connecticut. The most important recommendation for this area would be to protect the existing upland habitat. In addition to species utilizing the upland area, many of the wetland species utilizing the Cove are also dependent on the upland habitat. Invertebrates using the wetland act as the prey base for reptiles, amphibians, and small fish, which in turn are fed upon by larger fish and birds such as great blue heron. Waterfowl and other birds also depend on aquatic invertebrates as a food source. Many wetland-dependent birds also need adjacent upland habitat to nest in, such as the wood duck which nests in tree cavities.

Currently, Area 3 contains extensive amounts of invasive species and is reverting from early successional habitat to poor quality forest. If managed to benefit wildlife, habitat management recommendations for this area include removing all the larger trees (over 2 inches diameter at breast height) in order to set it back to an earlier successional stage. This can be accomplished through use of chain saws and heavy duty brush clearing equipment. Additionally, management should include non-native invasive species control, which can be accomplished through manual pulling (although very labor intensive) or through the use of herbicides such as Roundup®, following all label directions and all state and federal regulations as appropriate. Once this is accomplished, this area would grow into shrubland, characterized by a mix of woody vegetation and herbaceous growth. It should be periodically mowed in order to keep it from succeeding again into poor quality forest.

In its current state, Area 2 does not provide much in quality wildlife habitat, and additionally, has the potential to be developed and is likely to require remediation.

Habitat management recommendations to benefit wildlife include:

- Converting the existing fields to warm-season grasses in order to benefit grassland nesting birds such as bobolinks. This would require pre-treating weeds and existing vegetation with herbicide, planting a warm-season grass seed mix ¼ to ½ inch deep, preferably with a no-till seeder for fluffy seeds, and follow-up mowing and/or herbiciding for weed control for at least the first two growing seasons post-planting.
- The area could also be managed to benefit wildlife in general, by allowing it to grow to a mix of grasses and flowers including purple coneflower, black-eyed Susan, and New England aster. Native wildflower seed mixes are available for purchase and planting, with follow-up mowing required for at least two growing seasons in order to keep weedy vegetation down. This would provide for a wider variety of species and could be maintained through periodic maintenance mowing, implemented as needed to keep woody vegetation from encroaching.

Summary

The old Norwich Hospital site and associated parcels contain a mix of habitat types of varying quality. While Areas 1 and 4 contain high quality habitat that should be protected, Area 3 is smaller and of lesser quality, and would require a moderate amount of management to increase its value for wildlife. Area 2 provides very little wildlife habitat and would require an extensive amount of manipulation to improve its quality.

Large parcels of undeveloped land such as found in Area 1 are increasingly rare in Connecticut, as development creates small, isolated patches of habitat in the landscape. For wildlife, large blocks of habitat are always better, as they can provide a greater variety of food (different types of acorns, catkins, a variety of fruits, etc.), more nesting

and roosting sites, and areas for cover, and support those species with large territory requirements as well as more pairs of species with smaller territory requirements. Additionally, the high quality upland and riparian habitat found in Area 4 abutting a wetland of importance such as Poquetanuck Cove should be protected in order to maintain and enhance the value of the Cove for wildlife. Human-impacted habitats, such as those found in Area 3 can offer some value for wildlife; despite the lower quality, there is still a benefit in the structure/cover as well as forage provided. Any positive management actions implemented would serve to increase the value of this area to wildlife. Although Area 2 presently offers little value to wildlife, its 'abandoned' status has allowed for more wildlife use than if it was still functional. Again, management practices can be implemented to improve the quality of the habitat for wildlife.

Continued protection and stewardship of these areas, including implementation of any management practices will conserve and enhance the inherent wildlife values and maintaining the habitat will provide for many species with dependent on a wide variety of habitats.

References

The Northeast Upland Habitat Technical Committee and the Massachusetts Division of Fisheries & Wildlife, 2006. Managing Grasslands, Shrublands, and Young Forest Habitats for Wildlife: A Guide for the Northeast. 148 pp.

Forestry Resources

In 1980, this forestry team member conducted a forest inventory of the Northeast, Cove and Southwest parcels of the Norwich State Hospital property and developed a forest management plan in anticipation of fuelwood harvesting by the general public. Demand for roadside fuelwood for harvest by the public was very high in late 1970's and early 1980's. To meet this demand, DEP marked and sold standing fuelwood from other state lands in addition to the State Forests. Some harvesting did take place on hospital property in the area of the old incinerator. All monies generated were deposited into the State's General Fund. The inventory data, forest management plan and accompanying maps were not found during a search for Norwich State Hospital files related to a Freedom of Information request several years ago.

(Non-native plant species known to be invasive are italicized.)

Northeast Parcel 1

This parcel of approximately 205 acres is the largest of the four parcels in Preston. The parcel is mostly upland woodlands with several watercourses and associated wetlands. A thirteen acre man-made pond is also within this parcel.

The overstory consists of pole and sawtimber-sized Black oak, Scarlet oak, White oak, Red maple, American beech, and Hickory. An understory of sapling and pole-sized Black birch, Yellow birch, Sassafras, Red maple, American beech, Black gum, Hophornbeam, and Hickory exists. On the ledge outcrops and where the soils are shallow to bedrock, Chestnut oak and Eastern white pine are also found in the overstory with Chestnut oak, Eastern white pine, and Eastern red cedar being included in the understory.

The forestry Team member recalls noting in 1980, a dense understory of Flowering dogwood was around the upper reservoir and spreading to the east and west. This was the only time the author has seen such an extensive pure stand of Flowering dogwood as an understory. The dogwood understory has since died out and has been replaced with the mixed understory species noted above. Loss of this dogwood understory may be attributed to natural forest succession, die off caused by shade, or dogwood decline caused a combination of insects and diseases which occurred during the late 1980's.



With the exception of the ledge outcrops and shallow soils of low productivity, this parcel is well suited for tree growth and has the ability to produce a variety of quality forest products over time. The parcel is fully stocked with trees of average to high quality. The overstory trees are estimated to be between 60 to 120 years of age.

A light to moderately dense shrub layer of Mountain laurel, Huckleberry, Lowbush blueberry, Highbush blueberry, Witch hazel, Viburnums, and greenbrier is found over much of this parcel. Spicebush and Sweet pepperbush occurs along the intermittent stream and in the low wet areas. *Oriental bittersweet* and *Japanese barberry* are found along the edges of the woodlands, especially near the buildings and old trolley line. The shrub layer varies from patchy to almost continuous.

Tree regeneration is primarily American beech, Eastern white pine, Red maple, Black birch, and various species of Oak. This regeneration is, at present, inadequate to create the next forest.



Ground cover varies from hardwood leaf litter to ferns to native grasses depending upon soil moisture and the amount of sunlight reaching the forest floor.

Operability for harvesting is fair to good but may have seasonal restrictions due to wet soil conditions. Some portions of this area are inoperable due to very steep slopes or saturated soils. A network of old woods roads and trails gives good accessibility throughout much of this parcel. Much of this road network, however, is in dire need of maintenance to improve storm runoff drainage and to stabilize the roadbed from erosion. The bridge on the former trolley line may need replacement to fully access this parcel. **The goals for management of the forest resource within this parcel should be to protect water quality, to encourage healthy woodlands of mixed tree species, and to control the spread of or eliminate the non-native invasive plant species.**

Cove Parcel 4

This parcel is 50 plus acres in size and consists primarily of woodlands with an agricultural field.

Pole to sawtimber-sized Eastern white pine, Black oak, Black birch, White oak, Red maple and American elm comprise the majority of the overstory of the woodlands within this parcel. Sapling to pole-sized Black birch, Eastern white pine, Black cherry, Sassafras, and American beech form the understory. This parcel is well suited for tree growth and has the ability to produce a variety of quality forest products over time. Stocking levels of trees are variable but most portions of the parcel are fully stocked. Tree quality ranges from average to high. Tree ages within this parcel are



estimated to be between 40 and 80 years.

A very light and patchy shrub layer of Viburnums, Bayberry, Spicebush, Greenbrier, and Sweet pepperbush exists. *Oriental bittersweet* and *Multiflora rose* is found along the edges of the parcel.

Tree regeneration of seedling-sized Black oak, White oak, Red maple, Black birch, Sassafras, and Eastern white pine is present. Numbers of seedlings are not adequate at this time to form the next forest.

A ground cover of hardwood leaf litter or pine needle litter exists on the majority of the parcel. Ferns and Poison ivy are also found. Bulrush occurs along the shoreline of Poquetanuck Cove.



Operability within the parcel is good, however, wet soil conditions may result in seasonal restrictions when harvesting. Access via the old road system is fair to good. These roads will need to be reopened and maintained.

The goals for management of the forest resource within this parcel should be to protect water quality, to encourage healthy woodlands of mixed tree species, and to control the spread of or to eliminate the non-native invasive plant species.

Southwest Parcel 3

This parcel of approximately 133 acres is primarily wooded. It has two distinct forest vegetation cover types.

Mixed Hardwoods along Route 12: An overstory of sawtimber-sized Black oak, Eastern white pine, Red maple, and American beech is present. The understory is comprised of sapling to pole-sized Black oak, White oak, Black birch, Red maple, and Eastern white pine. *Tree-of-heaven (Ailanthus altissima)* occurs along Route 12. This area is well suited for tree growth and has the ability to produce a variety of quality forest products over time. This stand is fully stocked to overstocked with average to high quality trees. The overstory trees are estimated to be 80 to 100 years old.



Mountain laurel forms a light and patchy understory in much of the stand. *Oriental bittersweet* and *Multiflora rose* is found along the stand's edges.

Little tree regeneration exists within this stand due to the dense shading by the overstory. Ground cover is limited to leaf and needle litter also because of shade.

The goals for management of the forest resource within this area should be to protect water quality, to encourage healthy woodlands of hardwood tree species, and to control the spread of or to eliminate the non-native invasive plant species.

Former Sand and Gravel Excavation Area: A tree cover of sapling to sawtimber-sized Eastern red cedar, White oak, Black oak, Black cherry, and Eastern cottonwood exists. This tree cover is very light and highly variable due to the past exaction activity resulting in a non-stocked to understocked forest condition. Tree quality is low to average. The ages of the trees are estimated to be between 10 and 60 years.

A shrub layer of *Multiflora rose*, *Tartarian honeysuckle*, *Autumn olive*, Sumac, Grape, Greenbrier, and *Oriental bittersweet* is present. This dense and continuous shrub layer is interspersed with areas of open sand and/or gravel.

Few tree seedlings are present. Ground cover includes native grasses, *Cypress spurge*, and Poison ivy. *Common reed (Phragmites)* is found in spots where drainage is impeded. The soils of this area are poorly suited for hardwood tree growth and have little ability to produce a variety of quality hardwood forest products over time. Softwood tree species,



especially Eastern white pine, are better suited to producing forest products on these nutrient deficient, droughty soils.

The goals for management of the forest resource within this area should be to protect healthy woodlands of softwood tree species, and to control the spread of or to eliminate the non-

native invasive plant species.

Sloping terrain and old sand and gravel excavation sites reduce operability for harvesting within this parcel from good to fair in places. Access to this entire block is good via an old gravel road from Route 12.

Main Block Parcel 2

This approximately 122 acre parcel contains the main hospital campus with woodlands occupying the steep river banks and abandoned lands.

Shoreline: The overstory is pole to sawtimber-sized Black oak, *Tree-of-*



Heaven, Silver maple, *Norway maple*, Red maple, American elm, Black birch, White ash, *Black locust*, and Hickory. The understory consists of sapling to pole-sized *Tree-of-Heaven*, Black birch, Black cherry, Hickory, Grey birch, and Flowering dogwood. Tree stocking levels are variable, ranging from understocked to fully stocked. Tree ages are estimated to range from 20 to 100 years. Tree quality varies from low to average.

This area is suitable for tree growth and has the ability to produce a variety of forest products over time, provided that desirable native tree species are not displaced or replaced by non-native invasive species.

Japanese Knotweed, *Winged euonymus*, *Autumn olive*, *Multiflora rose*, Bayberry, Pasture rose, Beaked hazelnut, Sweet fern, and *Oriental bittersweet* form the shrub layer. This shrub layer is very dense and continuous along the edges and openings of this area but becomes less dense and less continuous in interior sections and where dense tree shade is found.



There is little to no tree regeneration in this area, as it has been displaced by the non-native invasive plants. Where a ground cover is present, it is primarily *Cypress spurge* and Goldenrods.

“the Point”: This former sawmill site along the Thames River has areas of tree and shrub growth interspersed with areas of grasses. The overstory is formed by pole to sawtimber-sized *Tree-of-Heaven*, Black oak, Big-toothed aspen, *Black locust*, and American elm.

The understory is sapling to pole-sized Grey birch, Black cherry, Eastern red cedar, *Black locust*, Big-toothed aspen, Scarlet oak, and Black birch. Many of these tree species are considered pioneer species, the first to colonize abandoned land. Tree stocking is quite variable with little of this area being fully stocked. Tree quality is low and ages are estimated to be between 10 and 60 years.



This area is well suited for tree growth and has the ability to produce a variety of forest products over time. Tree quality and stocking

levels are dependent upon desirable species becoming established and not being displaced or replaced by non-native invasive species.

The shrub layer is comprised of Bayberry, *Japanese knotweed*, *Autumn olive*, *Multiflora rose*, Sumac, Sweet fern, and *Oriental bittersweet*. This shrub layer is relatively dense and continuous, especially along the edges of this area.

Few tree seedlings were observed in this area.

Ground cover within the openings consists of Toadflax, Little bluestem, other grasses, and sedges.

Access to the shoreline and “the Point” is via an old roadway that parallels and eventually crosses the railroad tracks. Some portions of the shoreline are inaccessible due to the steep slopes. Operability is limited by the steep slopes and by the railroad tracks.

Hospital Campus: Trees within the campus area of the property were planted among the buildings and along the roads as part of the landscaping for the hospital or became established following abandonment. Species noted include *Norway maple*, *Tree-of-Heaven*, Silver maple, Sugar maple, White ash, Black oak, and Norway spruce. The trees range in age from 1 to 100 plus years.



In July 2009, the Town Public Works crew was removing trees around and against the buildings for insurance and security reasons. The author did not return to the site to view the final extent of this clearing project.

Trees to remain within the campus will be dependent upon the final use and the development of this site. In deciding which trees should be retained, a licensed consulting arborist should perform an assessment of each tree’s health, hazard potential, and general condition. Only those trees having the potential for long-term viability should be retained.



The goals for management of the forest resource remaining within this parcel should be to protect water quality, to stabilize the steep river banks, to retain a forested buffer between developed and non-developed areas, and to control the spread of or to eliminate the non-native invasive plant species.

Recommendations

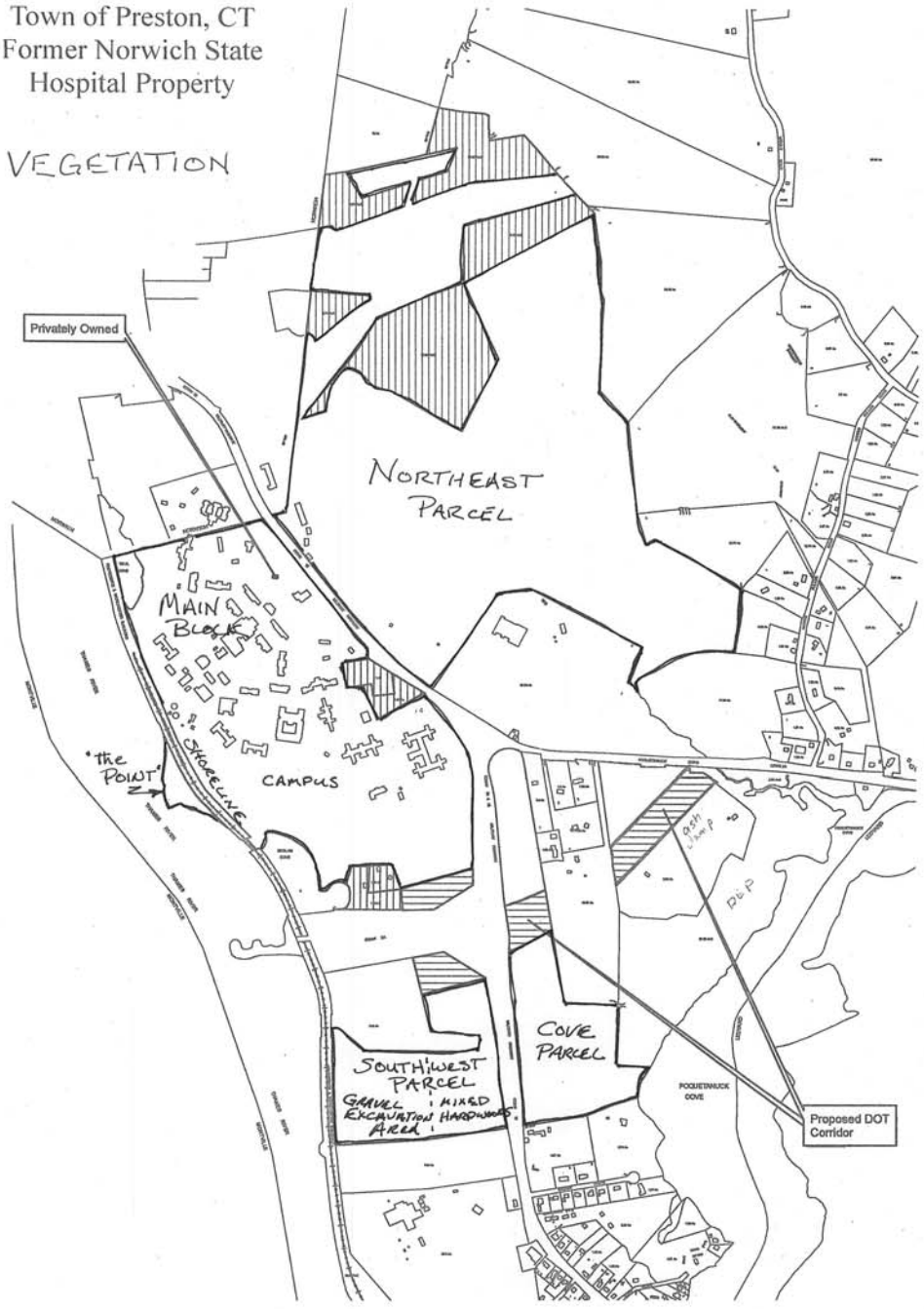
It is beyond the scope of this review to offer precise forest management prescriptions for each of the parcels within this property. A forest management plan would require an intensive forest inventory to be undertaken. The Town’s forestry and land use goals for

each of the parcels would need to be developed prior to the inventory fieldwork. The Division of Forestry could assist a Town committee in establishing these goals. A first step would be to accurately locate and mark the actual boundaries of the individual parcels using signs and/or painted bands. Use boundary marking paint to create 4 to 6 inch wide bands around trees along the bounds with double or triple bands at the corners. Signs and painted bands should be spaced closely enough to readily see several bands from one point when walking the bounds.

If parcels or portions of parcels are to remain as woodlands, it is best to retain large continuous blocks for their wildlife value as well as for management efficiency. Buffers along Poquetanuck Cove and the Thames River should also be retained as woodland to stabilize soils and filter water runoff. The decision on which parcels or portions of parcels to retain as woodland will remain with the Town and be based on the Town's goals and needs.

Town of Preston, CT
Former Norwich State
Hospital Property

VEGETATION



Legend

-  Privately Owned
-  Former Norwich State Hospital
-  Proposed DOT Parcel

JULY 2009

THIS MAP IS PREPARED FOR THE INVENTORY OF REAL PROPERTY FOUND WITHIN THESE JURISDICTIONS AND IS COMPILED FROM RECORDED DEEDS, PLATS, AND OTHER PUBLIC RECORDS AND DATA. USERS OF THE MAP ARE HEREBY NOTIFIED THAT THE FOREMENTIONED PUBLIC PRIMARY INFORMATION SOURCES SHOULD BE CONSULTED FOR VERIFICATION OF THE INFORMATION CONTAINED ON THIS MAP. THE TOWNS AND THE MAPPING COMPANIES ASSUME NO LEGAL RESPONSIBILITIES FOR THE INFORMATION CONTAINED ON THIS MAP. HORIZONTAL DATUM BASED ON THE CONNECTICUT STATE PLANE COORDINATE SYSTEM, NAD83
April 22, 2009

Cultural Resources Survey Summary

In 2005, the State of Connecticut Department of Economic and Community Development (DECD) contracted with Archaeological and Historical Services, Inc. (AHS) to conduct archaeological investigations and historical documentation of cultural resources located on the former Norwich State Hospital (NSH) property in Norwich and Preston, CT. AHS has submitted a multi-volume report which is on file with the State Historic Preservation Office (SHPO), the Office of State Archaeology (OSA) and the Towns of Preston and Norwich.

The archaeological and historical surveys of the NSH property represent occupation of the project area from the Paleoindian Period (10,000 years ago) to the 20th century. These resources include dozens of archaeological sites, presenting every period of prehistory; an 18th-century home and tavern; a Revolutionary War shipyard; an 18th/19th century homestead; remains of Norwich and Westerly electric railway, Thames River dikes, Confederacy/Fort Point and the airplane crash debris of two World War II Navy Hellcat fighters.

A total of 34 prehistoric sites and nine historic period sites were identified. Twenty-two sites are eligible for the National Register of Historic Places and two sites have been listed as State Archaeological Preserves. Both municipalities have copies of the report with maps showing site sensitive areas.

Based on AHS' report, SHPO and OSA recommend avoidance or impact mitigation in the form of Data Recovery excavations at 11 sites; avoidance or impact mitigation by pre-construction topsoil removal-monitoring at five sites and in place preservation of seven sites.

SHPO and OSA are prepared to provide technical assistance to the towns of Preston and Norwich in the preservation and conservation of cultural resources in the NSH property.

Planning Considerations

The State of Connecticut Conservation and Development Policies Plan 2005-2010, the Southeastern Connecticut Council of Governments Regional Plan of Conservation and Development 2007, the Town of Preston's Plan of Conservation and Development 2003, and the City of Norwich's Plan of Conservation and Development 2002, have designations for the former Norwich Hospital property that, while different in terminology, are consistent in their intent. That intent is to promote the development of much of this property at high densities, in part, due to the properties accessibility to State Routes 2A and 12, and the availability of both public water and sewer service from the City of Norwich. Also consistently, these plans recognize the natural resource sensitivity of the property frontage along both the Thames River and the Poquetanuck Cove and accordingly the Plans either designate these portions of the property as conservation areas or stipulate the preservation of natural and historical resources as a component of their designation.

The location of State Route 2A and 12 divide this property into four sections, which for the purpose of this review, as defined as follows:

Section 1 consists of the area on the west side of Route 12 and north of the Mohegan Pequot Bridge (Route 2A), which was the main campus area of the hospital. This section has shoreline frontage along the Thames River. This section contains approximately 122 acres of which approximately 23 acres are located in Norwich. Section 2 is the portion of the property located on the east side of Route 12 and north of Route 2A which has a number of buildings and the former reservoir of the hospital located on it. This section contains approximately 205 acres of which approximately 48 acres are located in Norwich. Section 3 is the property located on the east side of Route 12 and south of Route 2A. Section 3 was primarily used for agriculture purposes for the former hospital and includes shoreline frontage on Poquetanuck Cove. This section contains approximately 50 acres all located in Preston. Section 4 is the property located on the west side of Route 12 and south of Route 2A. This property has been mined for gravel and has not been reclaimed. This section contains approximately 133 acres all located in Preston. This Section of the property also has shoreline frontage along the Thames River. All property fronting along the Thames River shoreline is interrupted by the active use of the Providence and Worcester Rail line.

Each section of this property has unique development assets and constraints. As mentioned above, the primary development asset for all of the former hospital property is its access to both public water and sewer lines from the City of Norwich and access to State Routes 12 and, 2A, which provides connection to I-395. In general, the development constraints of this property vary from the many existing old buildings that are in extreme disrepair, and therefore need to be demolished and contain hazardous materials such as asbestos, to areas of steep slope and ledge outcrop. Other sections of this report will identify additional natural resource concerns. Additionally, the other side

of the asset of the property's access to I-395 via Route 2A, is the constraint created by the limited traffic volume capacity of the two-lane Mohegan Pequot Bridge.

The upgrade of this bridge has been recognized in the Regional Transportation Plan for Southeastern Connecticut for a number of years. An Environmental Impact Study has been completed for this project and a Record of Decision issued from the Federal Highway Administration supporting the project. The next step will be the design work, which may take 3 to 5 years and will then be followed by construction, pending availability of federal funds.

In a general sense, the section of this property with the fewest development constraints, and therefore the highest development potential, is likely the former agricultural use areas of section 3 along Routes 12 and 2A. Section 4, which is the former gravel removal site probably, has the second highest development potential due to the estimation that the extent and expense of the site work required would be less than that required on sections 1 or 2. Both sections 1 and 2 are problematic with regard to ease of development when compared to each other.

Some positives of Section 1, which includes the former main campus area, are the large areas of level topography, highway frontage, and available public water and sewer service, while the many former hospital buildings are development negatives. Again, these buildings are in an extensive state of disrepair and in all likelihood need to be demolished which represents a significant cost.

The property included in Section 2 also has the development positives of access to Routes 2A and 12 along with access to both public water and sewer service. Section 2 also has the negative of containing a number of former hospital buildings that likewise are in disrepair and in all likelihood will need to be demolished. Additional development negatives of Section 2 are steep slope rising from Route 12 and 2A northeasterly toward Middle Road. The elevation change rises some 220 feet in a linear distance of approximately 2000 feet. The property also has extensive ledge along the ridgeline at elevation one hundred and fifty. Section 2 also has several water bodies, the largest of which was the reservoir of the former Hospital and extends along Route 12. The combination of these factors suggests that the development potential for Section 2 is for less intensive land uses and some of the property may be appropriate for recreation-type uses whether publicly or privately operated.

Other areas suitable for less intensive uses and which also have recreation potential are the portions of property that abut Poquetanuck Cove and the Thames River. Although the railroad line that runs along the shore certainly limits the extent and type of use, the shoreline frontage may be more conducive to providing access points for small boats, fishing, and walkways.

In the Town of Preston the present zoning for the former hospital promotes the non-residential use of the property and re-use of the existing buildings. The regulations also promote access management through various lot and setback dimensional incentives when curb cuts onto Route 12 or 2A are minimized. While the present condition of

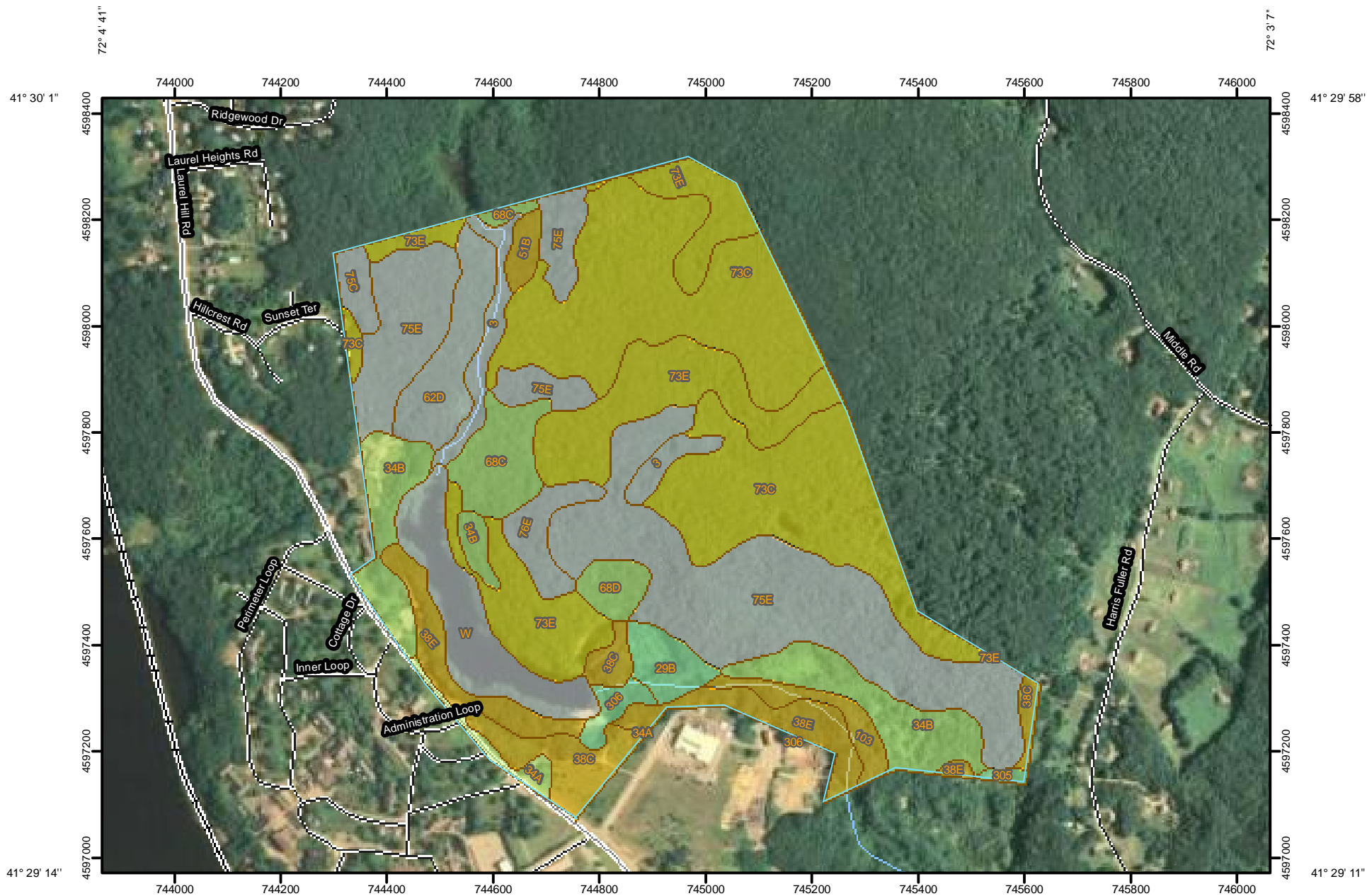
existing buildings probably limits much, if any, re-use of the existing buildings the incentives to promote access management continue to be important. Allowing the grouping of buildings, shared parking, reduced setback requirements, smaller lot dimensions, and the like for developments which utilize an interior access road rather than accessing directly onto Route 12 or 2A will significantly enhance a developed former hospital property.

The zoning designation for the former Hospital property within the City of Norwich is Planned Development District. This designation promotes various forms of residential and non-residential development, which must be designed to compliment the sites natural and historic resources. While access management is not directly mentioned the minimum lot size (120,000 sq. ft.) and frontage (250 ft.) requirements indicate that numerous curb cuts are a concern. It is suggested that specific regulatory requirements addressing access management would be beneficial. The comments regarding the condition of existing buildings are also applicable.

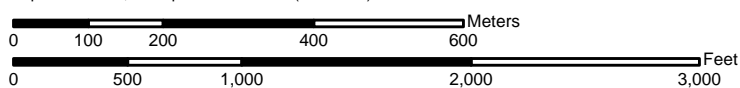
Promoting less intensive land uses for the most sensitive natural resource portions of the property in both municipalities would also be advantageous and enhance the long-term viability of a fully developed site. Such uses could include outdoor recreation such as campgrounds, agricultural related activities such as equestrian stables as well as publicly owned preservation or recreational use.

Appendix

K Factor, Whole Soil—State of Connecticut
 (Norwich State Hospital Land-Property E of Route 12 and N of Route 2A-Preston)




Map Scale: 1:10,400 if printed on A size (8.5" x 11") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings

 .02

 .05

 .10

 .15

 .17

 .20

 .24

 .28

 .32


 .37

 .43

 .49

 .55

 .64


 Not rated or not available

Political Features

 Cities


Water Features

 Oceans

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:10,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
 Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — State of Connecticut				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony		6.3	2.5%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	.28	3.9	1.6%
34A	Merrimac sandy loam, 0 to 3 percent slopes	.24	2.0	0.8%
34B	Merrimac sandy loam, 3 to 8 percent slopes	.24	18.4	7.4%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	.15	9.0	3.6%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	.15	12.3	5.0%
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	.15	1.8	0.7%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony		8.6	3.5%
68C	Narragansett silt loam, 3 to 15 percent slopes, extremely stony	.24	7.7	3.1%
68D	Narragansett silt loam, 15 to 25 percent slopes, extremely stony	.24	2.9	1.2%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	.17	62.0	24.9%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	.17	32.7	13.1%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes		2.2	0.9%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes		56.3	22.6%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes		4.3	1.7%
103	Rippowam fine sandy loam	.15	3.6	1.4%
305	Udorthents-Pits complex, gravelly	.28	0.5	0.2%
306	Udorthents-Urban land complex	.28	2.0	0.8%
W	Water		12.5	5.0%
Totals for Area of Interest			249.0	100.0%

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (K_{sat}). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor K_w (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

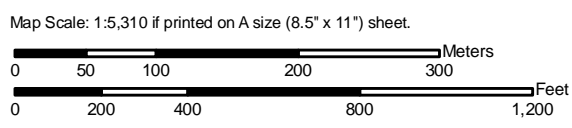
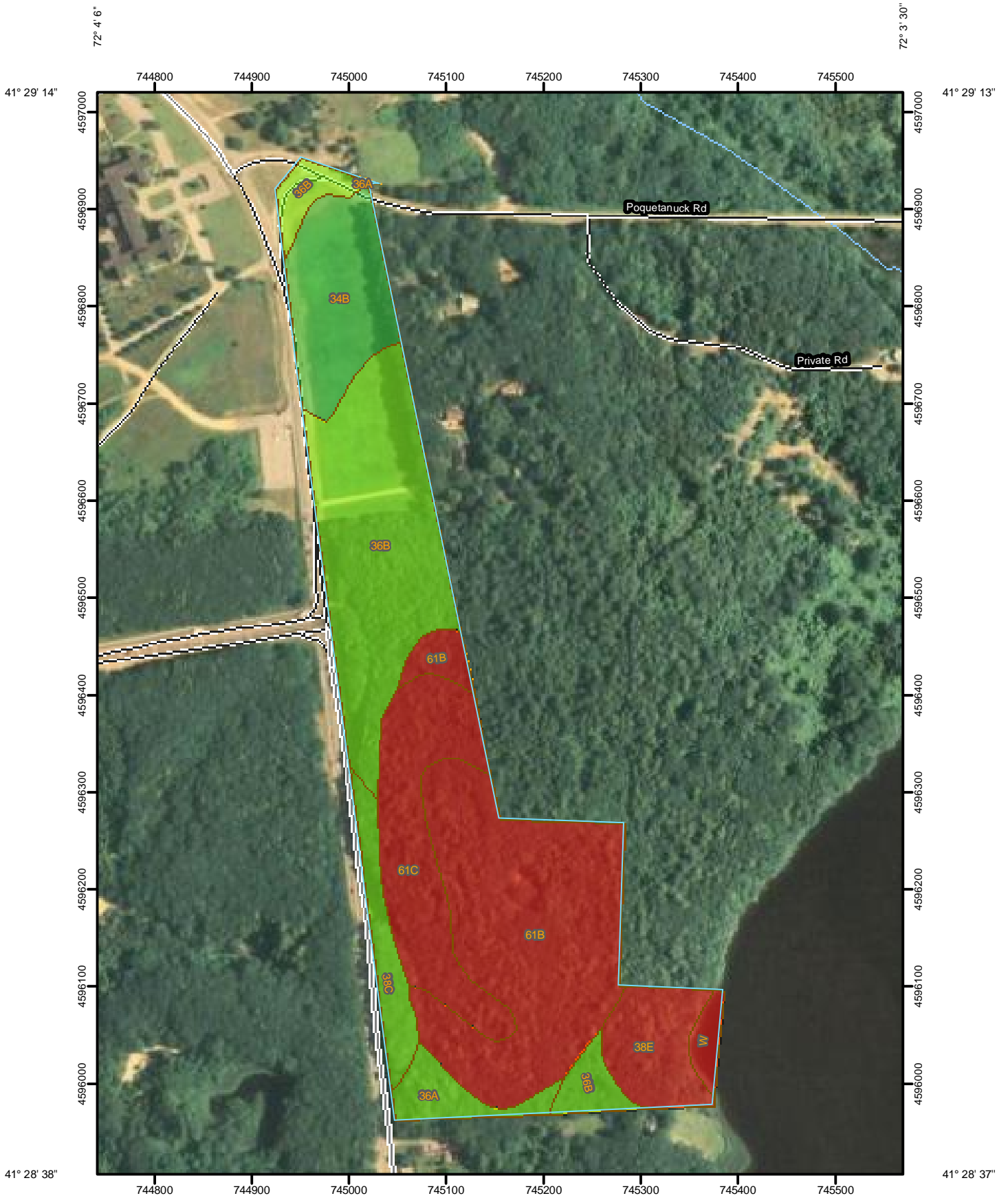
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher


Layer Options: Surface Layer

Farmland Classification—State of Connecticut
(Norwich State Hospital Land, East of Route 12)



MAP LEGEND









Area of Interest (AOI)








 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings



-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of local importance
-  Farmland of unique importance
-  Not rated or not available



Political Features




 Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways

-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:5,310 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — State of Connecticut				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
34B	Merrimac sandy loam, 3 to 8 percent slopes	All areas are prime farmland	4.7	11.1%
36A	Windsor loamy sand, 0 to 3 percent slopes	Farmland of statewide importance	1.4	3.4%
36B	Windsor loamy sand, 3 to 8 percent slopes	Farmland of statewide importance	11.7	27.7%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance	1.9	4.4%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	Not prime farmland	2.7	6.5%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	Not prime farmland	13.3	31.5%
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	Not prime farmland	5.9	14.0%
W	Water	Not prime farmland	0.6	1.4%
Totals for Area of Interest			42.1	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Selected Soil Interpretations

This report allows the customer to produce a report showing the results of the soil interpretation(s) of his or her choice. It is useful when a standard report that displays the results of the selected interpretation(s) is not available.

When customers select this report, they are presented with a list of interpretations with results for the selected map units. The customer may select up to three interpretations to be presented in table format.

For a description of the particular interpretations and their criteria, use the "Selected Survey Area Interpretation Descriptions" report.

Report—Selected Soil Interpretations

Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - lawn, landscape, golf fairway (ct)		Inland wetlands (ct)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3—Ridgebury, Leicester, and Whitman soils, extremely stony							
Ridgebury	40	Very limited		Very limited		CT wetland	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
				Depth to pan	0.99		
Leicester	35	Very limited		Very limited		CT wetland	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
Whitman	15	Very limited		Very limited		CT wetland	
		Ponding	1.00	Ponding	1.00		
		Depth to saturated zone	1.00	Depth to pan	1.00		
				Depth to saturated zone	1.00		
29B—Agawam fine sandy loam, 3 to 8 percent slopes							
Agawam	80	Not limited		Not limited		CT nonwetland	
34A—Merrimac sandy loam, 0 to 3 percent slopes							
Merrimac	80	Not limited		Not limited		CT nonwetland	
34B—Merrimac sandy loam, 3 to 8 percent slopes							
Merrimac	80	Not limited		Not limited		CT nonwetland	

Selected Soil Interpretations-- State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - lawn, landscape, golf fairway (ct)		Inland wetlands (ct)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
38C—Hinckley gravelly sandy loam, 3 to 15 percent slopes							
Hinckley	80	Somewhat limited		Very limited		CT nonwetland	
		Slope	0.04	Droughty	1.00		
				Large stones content	0.11		
				Gravel content	0.05		
				Slope	0.04		
38E—Hinckley gravelly sandy loam, 15 to 45 percent slopes							
Hinckley	80	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
				Droughty	1.00		
				Large stones content	0.11		
				Gravel content	0.05		
51B—Sutton fine sandy loam, 2 to 8 percent slopes, very stony							
Sutton	80	Very limited		Not limited		CT nonwetland	
		Depth to saturated zone	1.00				
62D—Canton and Charlton soils, 15 to 35 percent slopes, extremely stony							
Canton	45	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
Charlton	35	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
68C—Narragansett silt loam, 3 to 15 percent slopes, extremely stony							
Narragansett	80	Somewhat limited		Somewhat limited		CT nonwetland	
		Slope	0.04	Slope	0.04		
				Large stones content	0.01		

Selected Soil Interpretations-- State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - lawn, landscape, golf fairway (ct)		Inland wetlands (ct)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
68D—Narragansett silt loam, 15 to 25 percent slopes, extremely stony							
Narragansett	80	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
				Large stones content	0.01		
73C—Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky							
Charlton	45	Somewhat limited		Somewhat limited		CT nonwetland	
		Slope	0.04	Slope	0.04		
Chatfield	30	Very limited		Somewhat limited		CT nonwetland	
		Depth to hard bedrock	1.00	Depth to bedrock	0.54		
		Slope	0.04	Slope	0.04		
73E—Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky							
Charlton	45	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
Chatfield	30	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
		Depth to hard bedrock	1.00	Depth to bedrock	0.54		
75C—Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes							
Hollis	35	Very limited		Very limited		CT nonwetland	
		Depth to hard bedrock	1.00	Depth to bedrock	1.00		
		Slope	0.04	Droughty	1.00		
				Slope	0.04		
Chatfield	30	Very limited		Somewhat limited		CT nonwetland	
		Depth to hard bedrock	1.00	Depth to bedrock	0.54		
		Slope	0.04	Slope	0.04		
Rock outcrop	15	Not rated		Not rated		CT nonwetland	

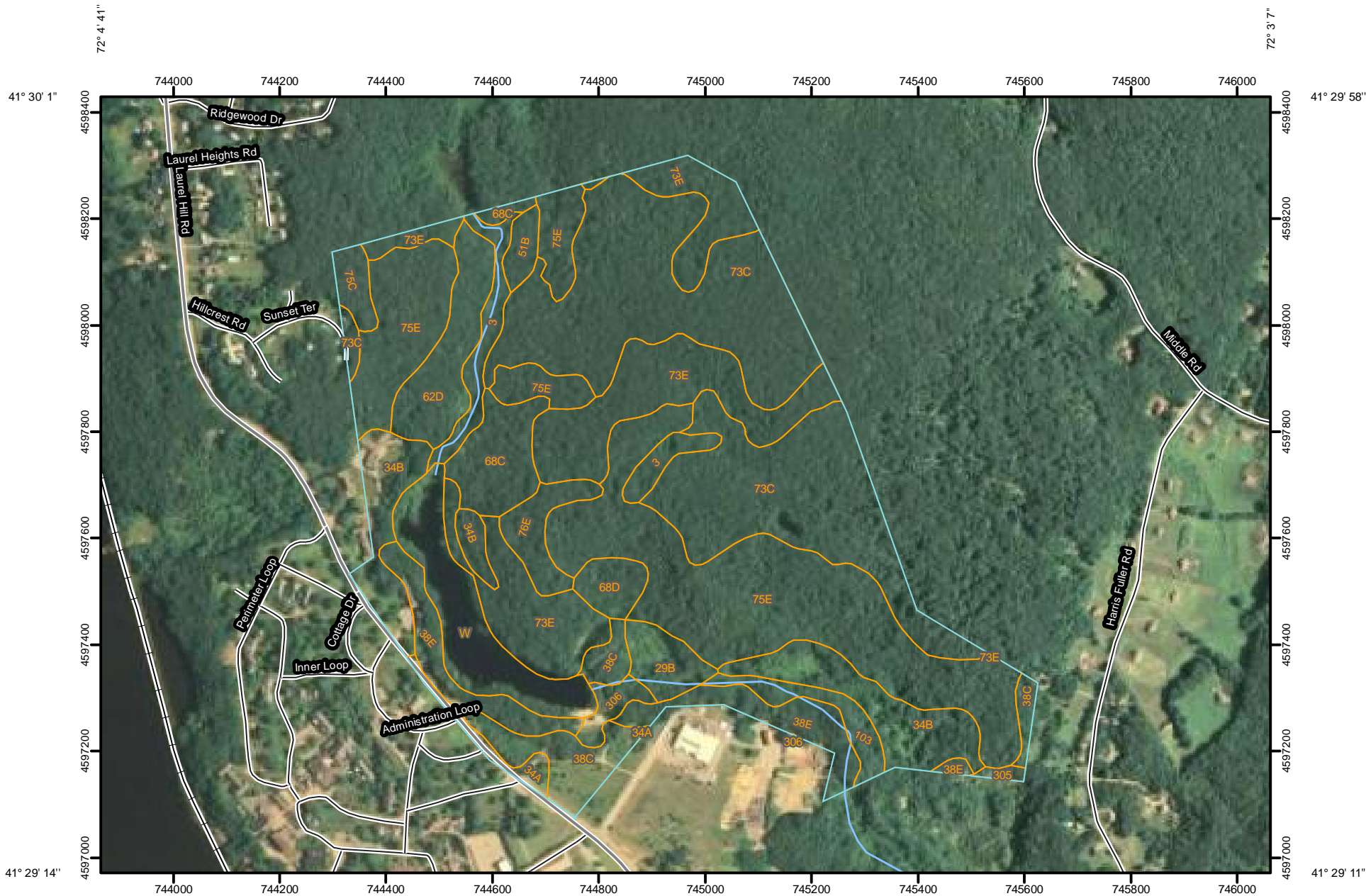
Selected Soil Interpretations-- State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - lawn, landscape, golf fairway (ct)		Inland wetlands (ct)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
75E--Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes							
Hollis	35	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Depth to bedrock	1.00		
		Depth to hard bedrock	1.00	Slope	1.00		
				Droughty	1.00		
Chatfield	30	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
		Depth to hard bedrock	1.00	Depth to bedrock	0.54		
Rock outcrop	15	Not rated		Not rated		CT nonwetland	
76E--Rock outcrop-Hollis complex, 3 to 45 percent slopes							
Rock outcrop	55	Not rated		Not rated		CT nonwetland	
Hollis	25	Very limited		Very limited		CT nonwetland	
		Depth to hard bedrock	1.00	Depth to bedrock	1.00		
		Slope	1.00	Droughty	1.00		
				Slope	1.00		
103--Rippowam fine sandy loam							
Rippowam	80	Very limited		Very limited		CT wetland	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
305--Udorthents-Pits complex, gravelly							
Udorthents	65	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
		Depth to saturated zone	0.89	Large stones content	0.01		
Pits	25	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Droughty	1.00		
				Gravel content	1.00		
				Slope	1.00		
				Too sandy	0.50		
				Large stones content	0.16		

Selected Soil Interpretations-- State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - lawn, landscape, golf fairway (ct)		Inland wetlands (ct)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
306—Udorthents-Urban land complex							
Udorthents	50	Very limited		Very limited		CT nonwetland	
		Slope	1.00	Slope	1.00		
		Depth to saturated zone	0.18	Large stones content	0.01		
Urban land	35	Not rated		Not rated		CT nonwetland	
W—Water							
Water	100	Not rated		Not rated		CT wetland	

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

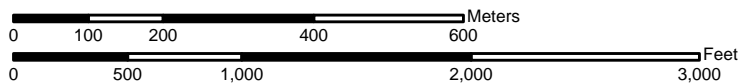
Soil Map—State of Connecticut
 (Norwich State Hospital Land-Property E of Route 12 and N of Route 2A-Preston)



72° 4' 43"




Map Scale: 1:10,400 if printed on A size (8.5" x 11") sheet.



72° 3' 9"

MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other



Special Line Features

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:10,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
 Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	6.3	2.5%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	3.9	1.6%
34A	Merrimac sandy loam, 0 to 3 percent slopes	2.0	0.8%
34B	Merrimac sandy loam, 3 to 8 percent slopes	18.4	7.4%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	9.0	3.6%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	12.3	5.0%
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	1.8	0.7%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	8.6	3.5%
68C	Narragansett silt loam, 3 to 15 percent slopes, extremely stony	7.7	3.1%
68D	Narragansett silt loam, 15 to 25 percent slopes, extremely stony	2.9	1.2%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	62.0	24.9%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	32.7	13.1%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	2.2	0.9%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	56.3	22.6%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	4.3	1.7%
103	Rippowam fine sandy loam	3.6	1.4%
305	Udorthents-Pits complex, gravelly	0.5	0.2%
306	Udorthents-Urban land complex	2.0	0.8%
W	Water	12.5	5.0%
Totals for Area of Interest		249.0	100.0%

Selected Soil Interpretations

This report allows the customer to produce a report showing the results of the soil interpretation(s) of his or her choice. It is useful when a standard report that displays the results of the selected interpretation(s) is not available.

When customers select this report, they are presented with a list of interpretations with results for the selected map units. The customer may select up to three interpretations to be presented in table format.

For a description of the particular interpretations and their criteria, use the "Selected Survey Area Interpretation Descriptions" report.

Report—Selected Soil Interpretations

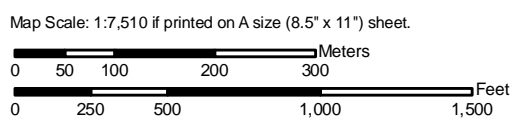
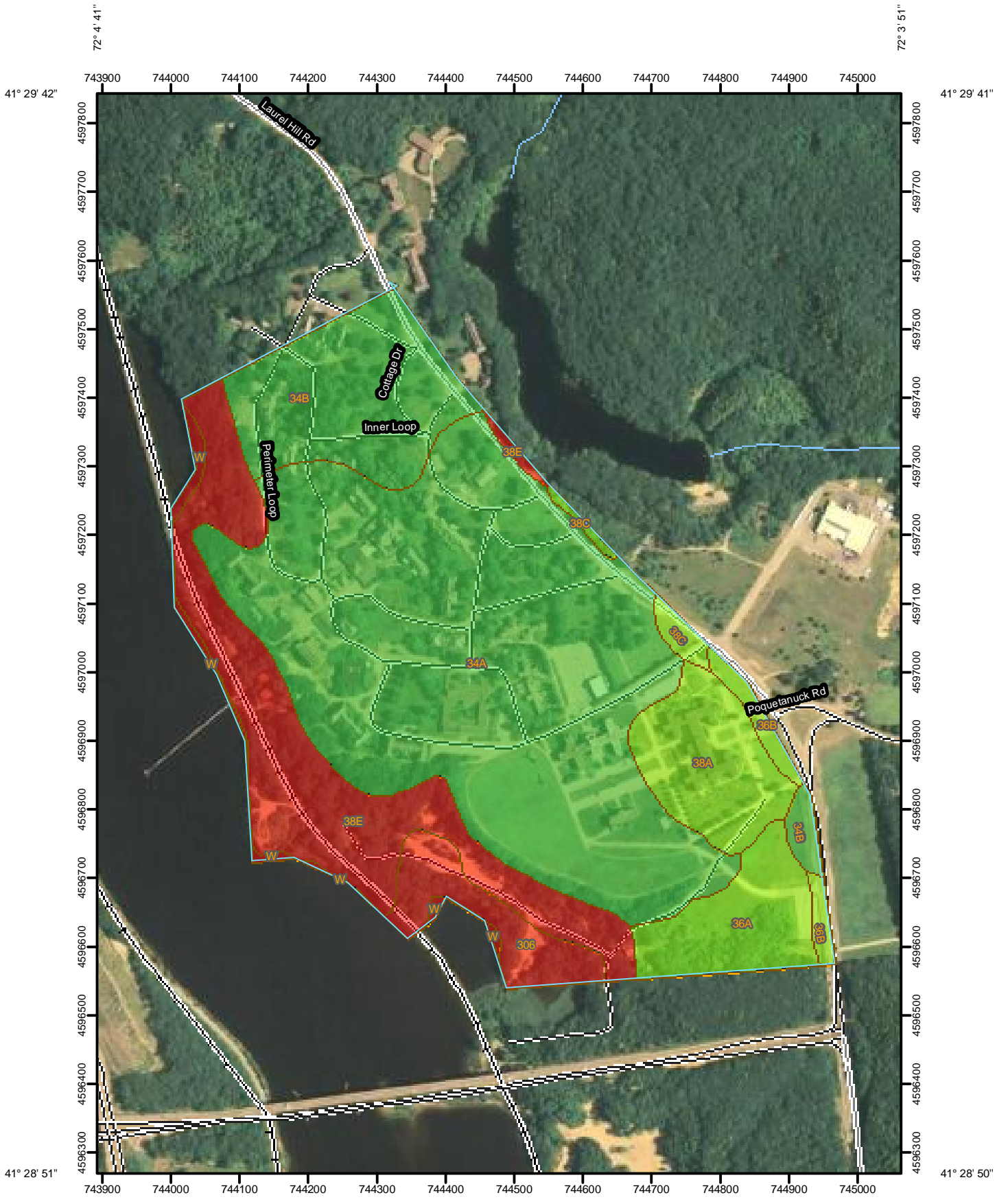
Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - construction materials; gravel source (ct)		Eng - construction materials; roadfill		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34B—Merrimac sandy loam, 3 to 8 percent slopes							
Merrimac	80	Fair		Good		Somewhat limited	
		Thickest layer	0.00			Slope	0.50
		Bottom layer	0.29				
36A—Windsor loamy sand, 0 to 3 percent slopes							
Windsor	80	Poor		Good		Not limited	
		Bottom layer	0.00				
		Thickest layer	0.00				
36B—Windsor loamy sand, 3 to 8 percent slopes							
Windsor	80	Poor		Good		Somewhat limited	
		Bottom layer	0.00			Slope	0.50
		Thickest layer	0.00				
38C—Hinckley gravelly sandy loam, 3 to 15 percent slopes							
Hinckley	80	Good		Good		Very limited	
		Thickest layer	0.21			Slope	1.00
		Bottom layer	0.64				

Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - construction materials; gravel source (ct)		Eng - construction materials; roadfill		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
38E—Hinckley gravelly sandy loam, 15 to 45 percent slopes							
Hinckley	80	Good		Poor		Very limited	
		Thickest layer	0.21	Slope	0.00	Slope	1.00
		Bottom layer	0.64				
61B—Canton and Charlton soils, 3 to 8 percent slopes, very stony							
Canton	45	Fair		Good		Somewhat limited	
		Thickest layer	0.00			Slope	0.50
		Bottom layer	0.36				
Charlton	35	Fair		Good		Somewhat limited	
		Thickest layer	0.00			Slope	0.50
		Bottom layer	0.14				
61C—Canton and Charlton soils, 8 to 15 percent slopes, very stony							
Canton	45	Fair		Good		Very limited	
		Thickest layer	0.00			Slope	1.00
		Bottom layer	0.36				
Charlton	35	Fair		Good		Very limited	
		Thickest layer	0.00			Slope	1.00
		Bottom layer	0.14				
W—Water							
Water	100	Not rated		Not rated		Not rated	

Data Source Information

Soil Survey Area: State of Connecticut
 Survey Area Data: Version 6, Mar 22, 2007


Farmland Classification—State of Connecticut
(Norwich State Hospital Land-Main Campus-Preston)



Farmland Classification—State of Connecticut
(Norwich State Hospital Land—Main Campus—Preston)

MAP LEGEND









Area of Interest (AOI)








 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings



-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of local importance
-  Farmland of unique importance
-  Not rated or not available


Political Features




 Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways

-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:7,510 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — State of Connecticut				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
34A	Merrimac sandy loam, 0 to 3 percent slopes	All areas are prime farmland	74.9	51.1%
34B	Merrimac sandy loam, 3 to 8 percent slopes	All areas are prime farmland	17.3	11.8%
36A	Windsor loamy sand, 0 to 3 percent slopes	Farmland of statewide importance	8.7	5.9%
36B	Windsor loamy sand, 3 to 8 percent slopes	Farmland of statewide importance	2.1	1.5%
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance	9.9	6.7%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance	1.4	0.9%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	Not prime farmland	24.7	16.8%
306	Udorthents-Urban land complex	Not prime farmland	6.2	4.2%
W	Water	Not prime farmland	1.6	1.1%
Totals for Area of Interest			146.7	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Selected Soil Interpretations

This report allows the customer to produce a report showing the results of the soil interpretation(s) of his or her choice. It is useful when a standard report that displays the results of the selected interpretation(s) is not available.

When customers select this report, they are presented with a list of interpretations with results for the selected map units. The customer may select up to three interpretations to be presented in table format.

For a description of the particular interpretations and their criteria, use the "Selected Survey Area Interpretation Descriptions" report.

Report—Selected Soil Interpretations

Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - shallow excavations		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34A—Merrimac sandy loam, 0 to 3 percent slopes							
Merrimac	80	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
34B—Merrimac sandy loam, 3 to 8 percent slopes							
Merrimac	80	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Slope	0.50
36A—Windsor loamy sand, 0 to 3 percent slopes							
Windsor	80	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
36B—Windsor loamy sand, 3 to 8 percent slopes							
Windsor	80	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Slope	0.50
38A—Hinckley gravelly sandy loam, 0 to 3 percent slopes							
Hinckley	80	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		

Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - dwellings with basements		Eng - shallow excavations		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
38C—Hinckley gravelly sandy loam, 3 to 15 percent slopes							
Hinckley	80	Somewhat limited		Very limited		Very limited	
		Slope	0.04	Cutbanks cave	1.00	Slope	1.00
				Slope	0.04		
38E—Hinckley gravelly sandy loam, 15 to 45 percent slopes							
Hinckley	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	1.00		
306—Udorthents- Urban land complex							
Udorthents	50	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
		Depth to saturated zone	0.18	Slope	1.00		
				Depth to saturated zone	0.18		
Urban land	35	Not rated		Not rated		Not rated	
W—Water							
Water	100	Not rated		Not rated		Not rated	

Data Source Information

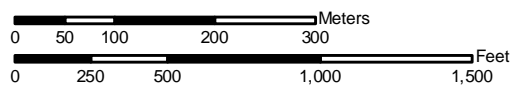
Soil Survey Area: State of Connecticut

Survey Area Data: Version 6, Mar 22, 2007

Soil Map—State of Connecticut
(Norwich State Hospital Land-Main Campus-Preston)




Map Scale: 1:7,510 if printed on A size (8.5" x 11") sheet.



Soil Map—State of Connecticut
(Norwich State Hospital Land-Main Campus-Preston)

MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other



Special Line Features

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:7,510 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

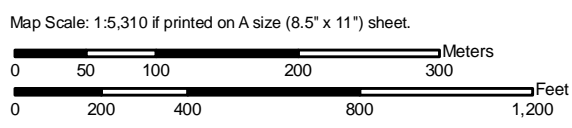
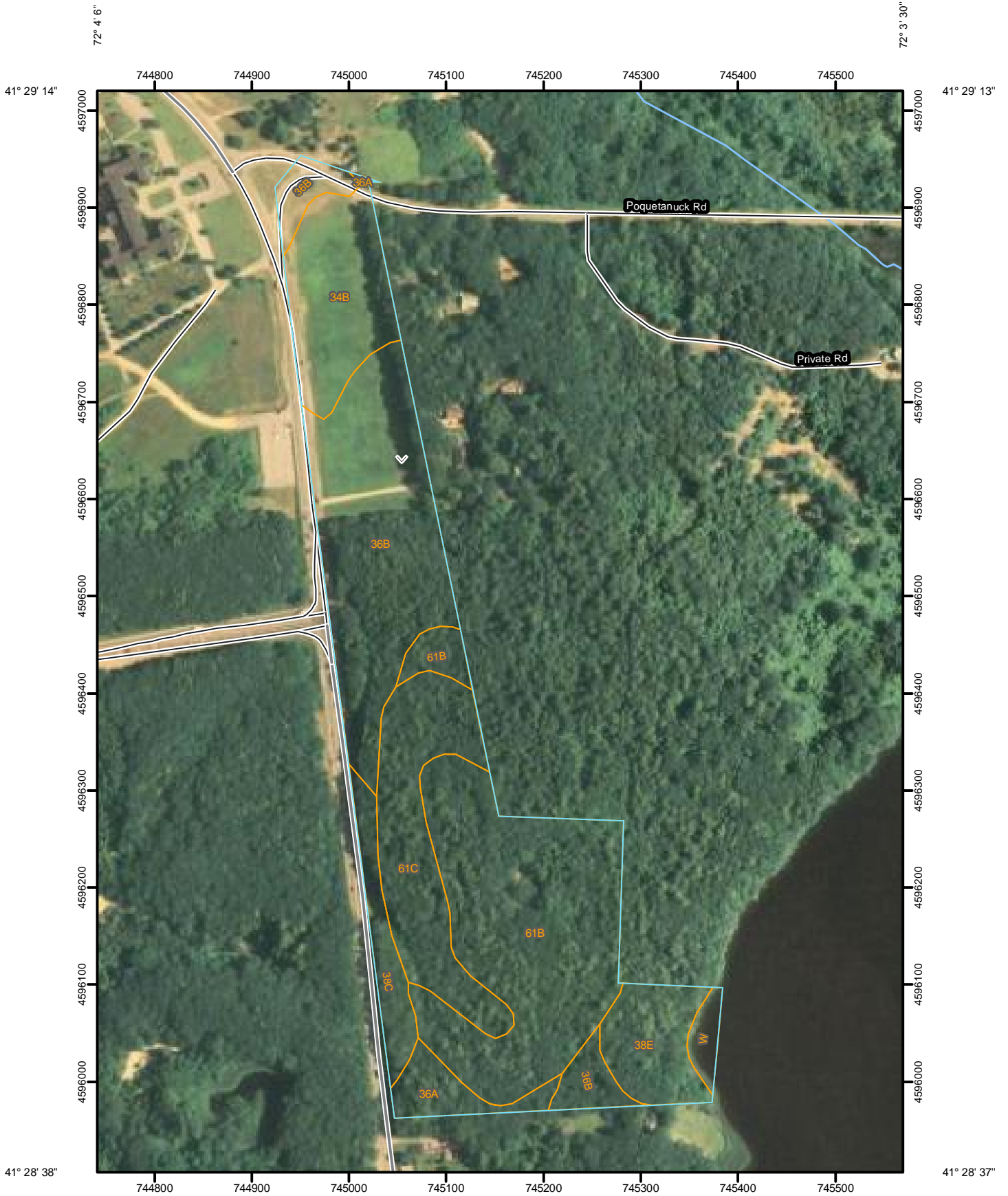
Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend


State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
34A	Merrimac sandy loam, 0 to 3 percent slopes	74.9	51.1%
34B	Merrimac sandy loam, 3 to 8 percent slopes	17.3	11.8%
36A	Windsor loamy sand, 0 to 3 percent slopes	8.7	5.9%
36B	Windsor loamy sand, 3 to 8 percent slopes	2.1	1.5%
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	9.9	6.7%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	1.4	0.9%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	24.7	16.8%
306	Udorthents-Urban land complex	6.2	4.2%
W	Water	1.6	1.1%
Totals for Area of Interest		146.7	100.0%

Soil Map—State of Connecticut
(Norwich State Hospital Land, East of Route 12)



MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other



Special Line Features

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:5,310 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
34B	Merrimac sandy loam, 3 to 8 percent slopes	4.7	11.1%
36A	Windsor loamy sand, 0 to 3 percent slopes	1.4	3.4%
36B	Windsor loamy sand, 3 to 8 percent slopes	11.7	27.7%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	1.9	4.4%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	2.7	6.5%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	13.3	31.5%
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	5.9	14.0%
W	Water	0.6	1.4%
Totals for Area of Interest		42.1	100.0%

Selected Soil Interpretations

This report allows the customer to produce a report showing the results of the soil interpretation(s) of his or her choice. It is useful when a standard report that displays the results of the selected interpretation(s) is not available.

When customers select this report, they are presented with a list of interpretations with results for the selected map units. The customer may select up to three interpretations to be presented in table format.

For a description of the particular interpretations and their criteria, use the "Selected Survey Area Interpretation Descriptions" report.

Report—Selected Soil Interpretations

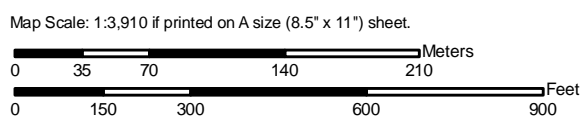
Selected Soil Interpretations— State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - construction materials; roadfill		Eng - construction materials; sand source (ct)		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21A—Ninigret and Tisbury soils, 0 to 5 percent slopes							
Ninigret	60	Fair		Fair		Somewhat limited	
		Wetness depth	0.53	Thickest layer	0.00	Depth to saturated zone	0.39
				Bottom layer	0.03		
Tisbury	25	Fair		Fair		Somewhat limited	
		Wetness depth	0.53	Thickest layer	0.00	Depth to saturated zone	0.39
				Bottom layer	0.10		
36A—Windsor loamy sand, 0 to 3 percent slopes							
Windsor	80	Good		Fair		Not limited	
				Thickest layer	0.06		
				Bottom layer	0.10		
36B—Windsor loamy sand, 3 to 8 percent slopes							
Windsor	80	Good		Fair		Somewhat limited	
				Thickest layer	0.06	Slope	0.50
				Bottom layer	0.10		

Selected Soil Interpretations-- State of Connecticut							
Map symbol and soil name	Pct. of map unit	Eng - construction materials; roadfill		Eng - construction materials; sand source (ct)		Eng - small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
38C—Hinckley gravelly sandy loam, 3 to 15 percent slopes							
Hinckley	80	Good		Fair		Very limited	
				Bottom layer	0.09	Slope	1.00
				Thickest layer	0.09		
38E—Hinckley gravelly sandy loam, 15 to 45 percent slopes							
Hinckley	80	Poor		Fair		Very limited	
		Slope	0.00	Bottom layer	0.09	Slope	1.00
				Thickest layer	0.09		
305—Udorthents-Pits complex, gravelly							
Udorthents	65	Fair		Poor		Very limited	
		Stone content	0.73	Bottom layer	0.00	Slope	1.00
		Slope	0.82	Thickest layer	0.00		
Pits	25	Poor		Fair		Very limited	
		Slope	0.00	Bottom layer	0.71	Slope	1.00
				Thickest layer	0.71		
306—Udorthents-Urban land complex							
Udorthents	50	Fair		Poor		Very limited	
		Stone content	0.73	Bottom layer	0.00	Slope	1.00
		Slope	0.82	Thickest layer	0.00		
Urban land	35	Not rated		Not rated		Not rated	
W—Water							
Water	100	Not rated		Not rated		Not rated	

Data Source Information


Soil Survey Area: State of Connecticut
 Survey Area Data: Version 6, Mar 22, 2007

Soil Map—State of Connecticut
(Norwich State Hospital Land, South of Route 2A, Preston)



MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other



Special Line Features

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:3,910 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	2.2	4.8%
36A	Windsor loamy sand, 0 to 3 percent slopes	0.9	1.9%
36B	Windsor loamy sand, 3 to 8 percent slopes	0.7	1.5%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	5.7	12.8%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	18.5	41.2%
305	Udorthents-Pits complex, gravelly	6.8	15.2%
306	Udorthents-Urban land complex	8.9	20.0%
W	Water	1.1	2.5%
Totals for Area of Interest		44.8	100.0%

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

Purpose of the Team

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, active adult, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

Requesting a Review

Environmental reviews may be requested by the chief elected official of a municipality and/or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is reviewed by the local Conservation District and approved by the ERT Subcommittee, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438, e-mail: connecticutert@aol.com.