Connecticut Ecosystems LLC
• Wetland Delineation • Wetland & Aquatic Evaluation • Mitigation
• Natural Resource Inventory • Permit Assistance • Expert Testimony

WETLANDS REPORT

MIDDLETOWN HIGH SCHOOL

Middletown, Connecticut

October 29, 2003

CE Project 01-400 File c:\projects 2003\01-400\report.doc

38 Westland Avenue • West Hartford, CT 06107
Phone (860) 561-8598 • Fax (860) 561-0223 • email ecosys@comcast.net

Photo 1. Wetland 1B

Photo 2. Wetland 1C

Photo 3. Wetland 4

Photo 4. Wetland 5

Photo 5. Wetland 6

Photo 6. Wetland 7

Photo 7. Wetland 8

Photo 8. Wetland 9

Photo 9. Wetland 10

1.0 INTRODUCTION

The construction of a new high school and athletic fields is proposed in Middletown, CT. Connecticut Ecosystems LLC was retained to delineate the wetlands on the subject property and conduct a site plan review, the results of which are presented in this report. Mr. Edward M. Pawlak, Registered Soil Scientist and Certified Professional Wetland Scientist, delineated the wetlands on five dates in August 2003 (6, 7, 11, 12, 14), and reinspected the subject property on August 14, 15, 25 and 26, 2003 to collect data for this report.

2.0 SITE DESCRIPTION

The school construction project is proposed on the site of an existing school campus that includes Woodrow Wilson Middle School, Keigwin School, and athletic fields (Figure 1). Wilderman's Way runs through the center of the property, which is bordered by Newfield Street to the east, residential developments to the north and south, and undeveloped forest land to the west (Figure 2). Slopes on the property range from nearly level to steep, and elevation varies from 20 feet to more than 150 feet (Figure 1).

3.0 LANDSCAPE CONTEXT

The property is part of a 287± acre landscape block bounded to the east by Newfield Street, to the west by Ridgewood Road, to the north by Mile Lane and to the south by an electric transmission right-of-way (ROW) (Figure 2). This landscape block contains school buildings, parking lots, athletic fields, houses, roads, forest land and farm fields (Figure 2).

4.0 SOILS

Soils on the property are described in Appendix 4. Four wetland soil series were identified on the property: Rumney Variant (in the floodplain of East Swamp Brook), Wilbraham (glacial till hillside), Raypol (derived from glacial outwash, on nearly level landscapes), and Aquents (disturbed wetlands). Non-wetland soils in undisturbed areas belong to the Wethersfield series, while in disturbed areas they are classified as Udorthents or Urban Land (Appendix 4).

5.0 UPLAND COVER TYPES

Whitlock et al. (1994) define "cover type" as "*a portion of a wetland or upland system that contains a uniform plant community composition and structure or that is influenced*

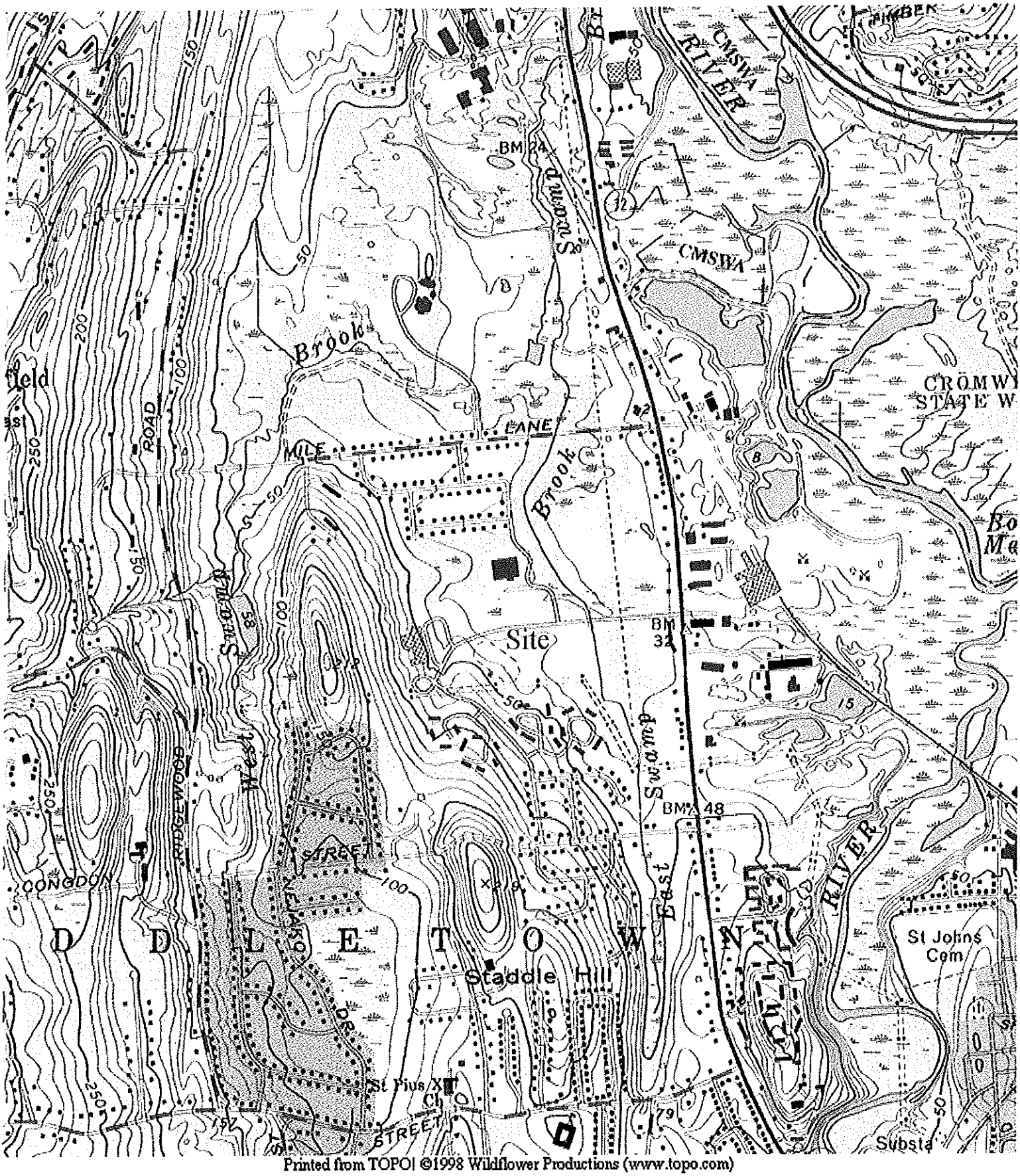

Figure 1. Site Location Map
Middletown Schools Middletown, CT
Connecticut Ecosystems LLC
September 14, 2003
Middletown, CT Quadrangle Map

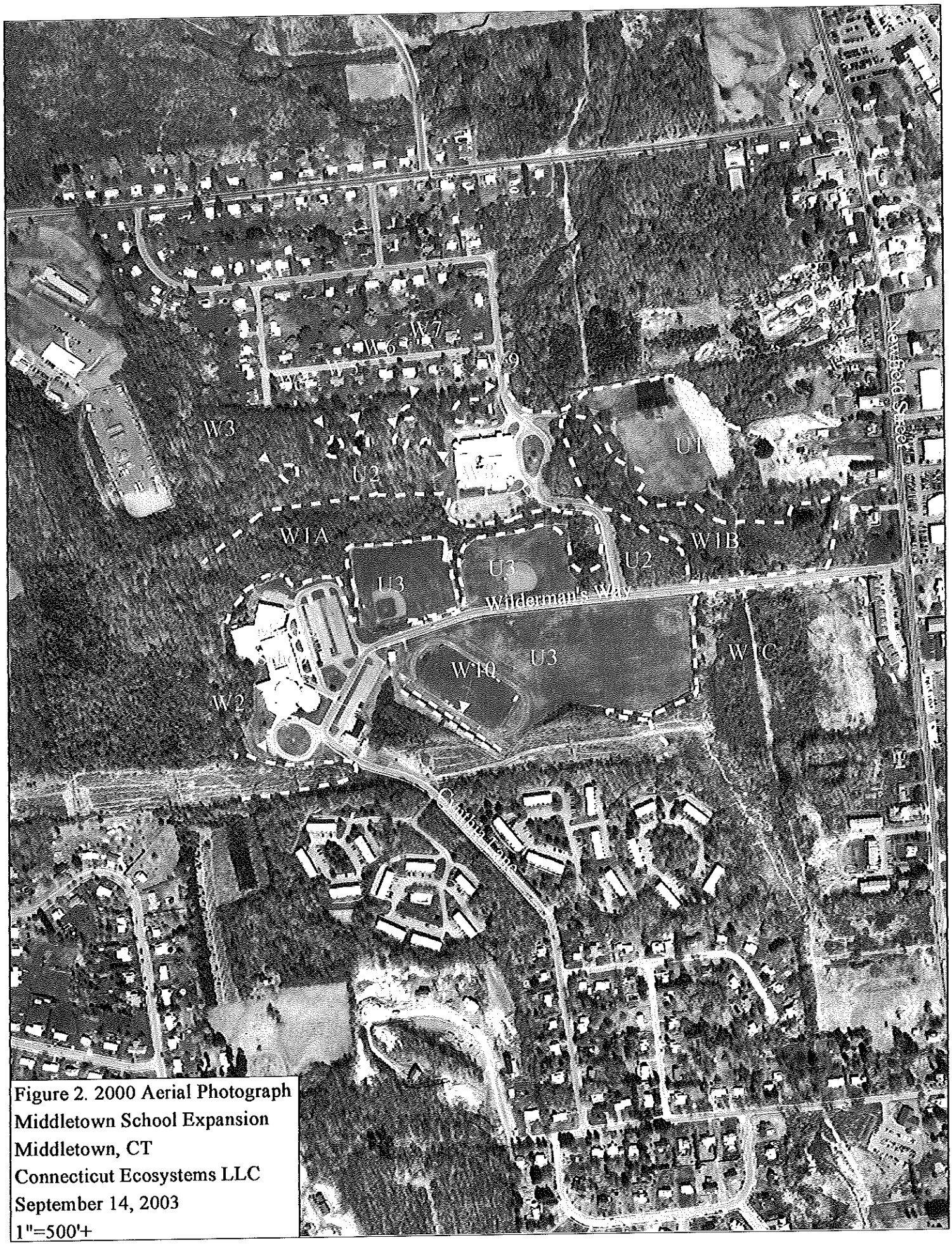

Figure 2. 2000 Aerial Photograph
Middletown School Expansion
Middletown, CT
Connecticut Ecosystems LLC
September 14, 2003
1"=500'+

by one hydrologic regime." Below is a description of the upland cover types found on the property.

5.1 Old Field & Meadow (U1)

An "old field" lies east of the Keigwin School, and is accessed by a paved path (Figure 2). A paved basketball court lies at the west end of this field. Goldenrods and meadow grasses are the dominant flora. An extremely dense thicket of multiflora rose borders the field.

To the east of this field is a wooded hedgerow, and further to the east lies a mowed grass meadow (Figure 2).

5.2 Mixed Hardwood Forest (U2)

Mixed hardwood forest stands occur on the property in three locations (Figure 2). To the west of Woodrow Wilson School, on a steeply sloping hillside, lies a young, overstocked hardwood forest. West of Keigwin School is a mature hardwood forest containing red oak, hickory, American beech, sugar maple and red maple. Near the corner of Spruce Street and Wilderman's Way lies a small stand of red maple trees.

5.3 Athletic Fields (U3)

The school campus includes large mowed athletic fields (soccer, football, baseball – see Figure 2).

6.0 WETLAND COVER TYPE: DESCRIPTION AND FUNCTIONAL VALUE

Below is a description of the wetland cover types on the property. A modified version of the "Highway Methodology", developed by the U.S. Army Corps of Engineers, was used to assess wetland functions and values (Appendix 3). Table 1 lists the principal functions and values associated with the on-site wetlands.

6.1 Wetland 1

Wetland 1 is a large resource associated with East Swamp Brook that extends off-site to the north and south (Figures 1 and 2). East Swamp Brook is tributary to the Mattabessett River north of the subject property.

For the purposes of this report Wetland 1 is divided into three subunits, separated by roads (Wilderman's Way and Spruce Street – see Figure 2).

6.1.1 Wetland 1A (W1A)

Wetland 1A is located north of the Woodrow Wilson School parking lot, and two adjacent baseball fields (Figure 2). This seasonally saturated deciduous wooded swamp occurs on gentle to moderate slopes. Red maple, Tartarian honeysuckle (an invasive exotic shrub) and skunk cabbage are representative flora in the swamp (Appendix 1). Numerous shallow, dry intermittent watercourse channels were observed in the swamp on the inspection date, indicating seasonal drainage patterns. The primary watercourse channel in the swamp is located between the Keigwin School parking lot and a baseball field. It is a straight ditch that was channelized in the past, and contains a significant load of sandy sediments.

A narrow "finger" of this wetland is located between the two baseball fields. This also contains a linear ditch, which serves as a conduit for drainage that originates to the south in Wetland 2 (Figure 2).

A small lobe of Wetland 1A is located west of and adjacent to Spruce Street, east of a baseball field (Figure 2). This area includes a large patch of common reed (*Phragmites australis*), an invasive exotic plant that excludes more valuable native flora.

6.1.2 Wetland 1B (W1B)

Wetland 1B is located north of Wilderman's Way and east of Spruce Street (Figure 2). The majority of this wetland is a seasonally saturated deciduous wooded swamp, with red maple abundant in the overstory. The herb stratum is locally dense beneath canopy gaps created by mortality of American elms and windthrow.

The tributary watercourse that originates in Wetland 1A flows into Wetland 1B, where it joins East Swamp Brook. The shallow brook channel is six feet wide, straight, and contains a significant accumulation of sandy sediments. Its banks are stable and vegetated with trees and shrubs. Minnows were observed in the watercourse, whose aquatic habitat consist primarily of a shallow run.

At the east end of Wetland 1B lie two small seasonally flooded basins. One basin was dry on August 26, 2003, but contained soft saturated sediments. A partly open canopy has allowed a very dense herbaceous stratum to develop in the basin. A berm that surrounds the basin suggests that this area is an old farm pond that has filled in with sediments over time.

A second small basin lies approximately 50 feet to the west. It contained a maximum of nine inches of water on August 26, 2003, whose surface was covered with a dense mat duckweed. Green frog adults and larvae were present in this basin depression.

It is possible that these basin depressions are vernal pools. A DEP Task Force has defined this term as follows:

> *"Vernal pool means a seasonal watercourse in a defined depression or basin, that lacks a fish population and supports or is capable of supporting breeding and development of amphibian or invertebrate species recognized as obligate to such watercourses. These species include spotted salamander, Jefferson salamander complex, marbled salamander, wood frog, and fairy shrimp."*

No finfish were observed in these basin depressions, which appear to be seasonally flooded. Although no "obligate" vernal pool species were observed in or adjacent to these basin depressions, an inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether these wetlands are vernal pools.

6.1.3 Wetland 1C (W1C)

Wetland 1C is bordered to the north by Wilderman's Way, to the east by condominiums, and to the west by an athletic field (Figure 2). This very densely vegetated early successional thicket contains wet meadow and scrub-shrub components. Purple loosestrife, an invasive exotic plant, is abundant in this wetland.

East Swamp Brook flows north along the west side of this very gently sloping wetland, bordered by a very dense shrub and sapling thicket. Its channel is lined with accumulated sandy sediments.

6.1.4 Functions & Values

Wetland 1 (the combination of Wetland 1A, 1B and 1C) is associated with the following principal functions: Groundwater Discharge, Floodflow Alteration, Pollutant Removal, Production Export and Wildlife Habitat (Table 1 and Appendix 3). The hardpan that characterizes the soils in portions of this wetland promotes a seasonal groundwater discharge, which contributes to the baseflow of East Swamp Brook. Large size, gentle slopes, constricted outlets, dense vegetation and well-developed microtopography contribute to the Floodflow Alteration and Pollutant Removal functions. Biomass produced in the wetland is seasonally exported into East Swamp Brook to support downstream aquatic ecosystems, including the Mattabessett River system. The wetland wildlife habitat is impaired by extensive development on and adjacent to the property. Still, the wetland functions as a "habitat island" that supports wildlife species adapted to a human presence. Features that contribute to the Wildlife Habitat function include the relatively large size of the landscape block in which the wetland is located (Figure 2), large wetland size, wetland cover type diversity, high vegetation density/diversity, and special habitat features (snags, fallen logs). The educational value of Wetland 1 is limited by safety hazards that preclude field trips (e.g., bordering multiflora rose thickets, seasonally waterlogged soils).

TABLE 1. WETLAND SUMMARY										
	Wetlands									
Principal Functions/Values	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**	**W9**	**W10**
Groundwater Recharge			P	P	P				P	P
Groundwater Discharge	P	P								
Floodflow Alteration	P									
Fish & Shellfish Habitat										
- Ponds & Lakes										
- Streams & Rivers										
Pollutant Removal	P	P	P	P	P	P	P	P	P	P
Production Export	P									
Recreation										
Wildlife Habitat	P	P	?	?	?	?	?	?	?	
Educational/ Scientific Value		P	?	?	?	?	?	?	?	
Uniqueness/Heritage										
WETLAND DATA										
Type (*)	DWS, WM, BSS	WM, BSS	DWS	DWS, BSS	DWS	DWS	DWS	DWS	DWS	WM
Water Regime (**)	SS	SS	SEF	SEF	SEF	SEF	SEF	SEF	SEF	IF
Soil Parent Material (***)	T,F	T	T	T	T	T	T	T	T	T

Note: P=Principal Function, NA=Not Applicable, see Appendix 3 for data sheets
(*) DWS=deciduous wooded swamp, CWS=coniferous wooded swamp, BSS=bushy shrub swamp, SSS=sapling shrub swamp, SM=shallow marsh, DM=deep marsh, WM=wet meadow, OW=open water
(**) Water Regimes based upon Cowardin et al. (1979) and Golet et al. (1993):

Water Regime	*Definition*
Permanently flooded (PF)	*Water covers surface throughout the year, in all years.*
Intermittently exposed (IE)	*Surface water present through the year, except during extreme drought.*
Semipermanently flooded (SF)	*Surface water persists throughout the growing season in most years.*
Seasonally flooded (SEF)	*Surface water present for extended periods, especially early in growing season.*
Seasonally saturated (SS)	*Soil saturated to surface, especially early in growing season, but water table usually well below surface for most of season.*
Temporarily flooded (TF)	*Surface water present for brief periods of growing season, but water table lies far below surface for most of the season.*
Intermittently flooded (IF)	*Substrate usually exposed, but surface water present for variable periods.*

(***) T=glacial till O=outwash G=glaciolacustrine F=floodplain

6.2 Wetland 2

6.2.1 Description

Wetland 2 is located within a CL&P right-of-way (ROW) at the southwest corner of the property (Figure 2). Periodic vegetation cutting within the ROW has resulted in the development of early successional wetland cover types (wet meadow and scrub-shrub). On August 14, 2003 a low flow discharge was draining across the gentle to moderate slopes of this wetland, eventually entering a catch basin along Cynthia Lane. Species diversity is high in the herbaceous stratum, which was attracting an abundance of butterflies (cabbage, monarch, swallowtail) on the inspection date.

6.2.2 Functions & Values

Wetland 2 is associated with the following principal functions: Groundwater Discharge, Pollutant Removal, Wildlife Habitat and Educational/Scientific Value (Table 1). An active groundwater discharge was observed in the wetland on the inspection date. Dense vegetation and gentle to moderate slopes promote the removal of water-borne pollutants. The wetland attracts a variety of wildlife species that favor early successional cover types and forest/field edges. The plant and invertebrate diversity of the wetland makes it well suited for ecological field trips, although safe walking lanes would need to be maintained in the wetland.

6.3 Wetland 3

Wetland 3 is a closed canopy basin depression located at the northwest corner of the property (Figure 2). It appears that this feature was created by means of excavation and a berm. The wooded wetland contained a small pool of shallow water (4") when inspected on August 25, 2003. Dark water-stained leaves indicate extensive seasonal flooding in the wetland, which lacks an inlet and outlet.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.4 Wetland 4

Wetland 4 is a closed canopy basin depression located east of Wetland 3 (Figure 2). It lacks an inlet, and a dug outlet channel was dry on August 25, 2003. On that date the wooded wetland contained a central pool of water (4.5" maximum depth) surrounded by soft, saturated soils. Fingernail clams and Coleoptera invertebrates (but no finfish) were found in the shallow water, which supports a small stand of buttonbush shrubs.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.5 Wetland 5

Wetland 5 is a closed canopy basin depression located east of Wetland 4 (Figure 2). The wetland contains very sparse herbaceous and shrub vegetation. It lacks an inlet and outlet channel, and August 25, 2003 contained a central pool of water (14" maximum depth) surrounded by soft, saturated soils. Coleoptera and Hemiptera invertebrates (but no finfish) were found in the shallow water. The basin depression contains a thick layer of decaying leaves. Pieces of concrete have been placed in the wetland, and a large pile of cut branches lies at its northern edge.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.6 Wetland 6

Wetland 6 is a small, closed canopy basin depression located east of Wetland 5 (Figure 2). It lacks an inlet and outlet channel, and was dry on August 15, 2003. Dark water-stained leaves line the surface of the wetland, indicating seasonal flooding.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.7 Wetland 7

Wetland 7 is a small, closed canopy basin depression located northeast of Wetland 6 (Figure 2). It lacks an inlet and outlet channel, and contained a small pool of shallow water (1" deep) on August 15, 2003. Dark water-stained leaves line the surface of the wetland, indicating seasonal flooding. The herbaceous and shrub strata are very sparsely vegetated.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be

required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.8 Wetland 8

Wetland 8 is a small, closed canopy basin depression located southeast of Wetland 7 (Figure 2). It lacks an inlet and outlet channel, and contained a small pool of shallow water (2" deep) on August 15, 2003. Dark water-stained leaves line the surface of the wetland, indicating seasonal flooding. Herbs and shrubs are absent in this wetland.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.9 Wetland 9

Wetland 9 is a small, closed canopy basin depression located northeast of Wetland 8 (Figure 2). The rear lawns of houses are very near to the north, and Keigwin School lies to the south. The wetland lacks an inlet and outlet channel, and was dry on August 15, 2003. Dark water-stained leaves line the surface of the wetland, indicating seasonal flooding. The herbaceous and shrub strata are very sparsely vegetated. Fallen logs are abundant in the wetland.

Although no "obligate" vernal pool species were found in or near this wetland, its basin topography, seasonally flooded hydroperiod and absence of finfish suggest that it is potentially a vernal pool. An inspection during the spring breeding period would be required in order to definitively determine whether any obligate species breed there, and thus whether the wetland is a vernal pool.

6.10 Functions & Values (Wetlands 3-9)

Wetlands 3-9 are very similar with respect to size, landscape position, watershed size, hydroperiod and vegetation. Hence, they provide the same principal function: Pollutant Removal. This is attributable to the long water retention time that characterizes these wetlands. However, their small watershed size limits the amount of stormwater runoff that they can renovate. Wetlands 3-5 and 9 also provide a Groundwater Recharge function, owing to their larger size and seasonally flooded hydroperiod.

For reasons explained above, an assessment of their wildlife habitat value must await a spring-time search for obligate vernal pool species. If any of these wetlands supports the breeding and development of one or more obligate species, then Wildlife Habitat will be added as a principal function. It should be noted that an adult wood frog, an obligate vernal pool species, was observed in the upland forest west of Woodrow Wilson Middle

School. A review of aerial photographs found that Wetlands 3-9 were the only potential wood frog breeding sites in the vicinity of this sighting.

6.11 Wetland 10

6.11.1 Description

Wetland 10 is long and narrow, very densely vegetated swale located immediately south of the football field (Figure 2). This constructed feature intercepts runoff draining down a hillside, preventing it from flowing onto the football field.

6.11.2 Functions & Values

Wetland 10 is associated with the following principal functions: Groundwater Recharge and Pollutant Removal (Table 1). Runoff that collects in this swale has the opportunity to infiltrate the soil and recharge the underlying aquifer. The very dense vegetation and gentle slope that characterize this swale make it very well suited to removing water-borne pollutants.

7.0 DEP NATURAL DIVERSITY DATA BASE

The DEP Natural Diversity Data Base (NDDB) was contacted to determine whether there are records of any State- or Federal-listed flora or fauna on the subject property, and the reply letter is included in Appendix 5. NDDB records indicate known populations of *Terrapene c. carolina* (eastern box turtle), a Species of Special Concern, in the vicinity of the property.

The eastern box turtle can be found along "old field"/forest edges, in open deciduous forests, and often near water (Klemens 1993; DeGraaf and Yamasaki 2001). Suitable "edge" habitat occurs at the south end of the property, within the electric utility ROW. Appropriate habitat can also be found in the mixed hardwood forest on the northeast and northwest portions of the property. However, no box turtles were observed on the property during the course of eight inspections in August of 2003.

8.0 WILDLIFE

A total of 19 wildlife species were identified on the property, including 14 avians, two amphibians and three mammals (Appendix 2). None of these are Threatened, Endangered or Special Concern species. In fact, the observed wildlife community is made up largely of common species typically observed in developed landscapes (e.g., green frog, American robin, American crow, northern cardinal, raccoon, etc.).

It is very likely that additional species would be observed there during the spring and early summer months, when wildlife are more active and visible. Anticipated species include eastern cottontail, gray squirrel, red fox, chipping sparrow, wood thrush, indigo

bunting, pickerel frog, and garter snake, none of which are rare or uncommon in Connecticut.

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APPENDIX 1. VEGETATIVE INVENTORY

NATIONAL WETLANDS INVENTORY

Wetland Plants List for the State of Connecticut

Frequency Indicator: Represents the frequency of occurrence in wetlands versus nonwetlands in the northeast region of the country. For example, a frequency of 67%-99% (Facultative Wetland) means that 67%-99% of all individuals of a species that occur in the region occur in wetlands.

Obligate (OBL): **Always** found in wetlands under natural (not planted) conditions (frequency greater than 99%), but may persist in nonwetlands if planted there by man or in wetlands that have been drained, filled, or otherwise transformed into nonwetlands.

Facultative Wetland (FACW): **Usually** found in wetlands (67%-99% frequency), but occasionally found in nonwetlands.

Facultative (FAC): **Sometimes** found in wetlands (34%-66% frequency) but also occurs in nonwetlands.

Facultative Upland (FACU): **Seldom** found in wetlands (1%-33% frequency) and usually occurs in nonwetlands.

Nonwetland (UPL): Occurs in wetlands in another region, but not found (<1% frequency) in wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the list.

Drawdown (DRA): Typically associated with the drier stages of wetlands, such as mudflats, vernal pools, and playa lakes.

A positive (+) or negative (-) symbol was used with the Facultative Indicator categories to more specifically define the regional frequency of occurrence in wetlands. The **positive symbol** indicates a frequency toward the higher end of the category (**more frequently** found in wetlands), and a **negative symbol** indicates a frequency toward the lower end of the category (**less frequently** found in wetlands).

NA indicates that no agreement was reached by the regional panel.
NC indicates that species was not considered by the panel.

From: Reed, Porter B. Jr. 1986 Wetland Plant List, Connecticut.
U.S. Fish and Wildlife Service. WELUT-86/W12.07 May 1986.

VEGETATIVE INVENTORY												
			Wetlands									
Scientific Name	**Common Name**	**Indicator Status (*)**	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**	**W9**	**W10**
TREES/SAPLINGS												
Acer pensylvanicum	Striped maple	FACU							+			
Acer rubrum	Red maple	FAC	D	+	D		+				D	
Acer saccharum	Sugar maple	FACU				+	+	+				
Betula lenta	Black birch	FACU					+					
Carpinus caroliniana	Musclewood	FAC				+	+	+	+			
Carya ovata	Shagbark hickory	FACU					+					
Carya sp.	Hickory	—					+					
Fraxinus pennsylvanica	Green ash	FACW	+									
Juniperus virginiana	Eastern red cedar	FACU	+									
Quercus bicolor	Swamp white oak	FACW+	+								+	
Quercus palustris	Pin oak	FACW									+	
Salix babylonica	Weeping willow	FACW-	+									
SHRUBS												
Alnus rugosa	Speckled alder	FACW+	+	+								
Cephalanthus occidentalis	Buttonbush	OBL	+			+					+	
Cornus amomum	Silky dogwood	FACW	+	+								
Cornus racemosa	Gray-stem dogwood	FAC	+									
Euonymus alatus	Burning bush	NI (UPL)					+					
Hamamelis virginiana	Witch hazel	FAC-										
Ilex verticillata	Winterberry	FACW+	+		+	+	+				D	
Lindera benzoin	Spicebush	FACW	+	+	+							
Lonicera tartarica	Tartarian honeysuckle	FACU	D		+							
Rhamnus cathartica	Buckthorn	UPL	+		+		+				+	
Rosa multiflora	Multiflora rose	FACU	+	+								
Rosa palustris	Swamp rose	OBL	+									

Connecticut Ecosystems LLC

Notes: D=dominant +=present
See accompanying text for explanation of "Indicator Status" codes.

VEGETATIVE INVENTORY												
			Wetlands									
Scientific Name	**Common Name**	**Indicator Status (*)**	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**	**W9**	**W10**
Viburnum lentago	Nannyberry	FAC	+									
Viburnum recognitum	Arrowwood	FACW-	+	+	+	+	+		+			
HERBS												
Arisaema triphyllum	Jack-in-the-pulpit	FACW-	+		+		+					
Carex sp.	Sedge	OBL										+
Carex crinita	Sedge	OBL	+									
Carex folliculate	Sedge	OBL	+									
Carex lurida	Sedge	OBL	+	+								
Carex scoparia	Sedge	OBL	+									+
Carex stricta	Tussock sedge	OBL	+									
Cinna arundinacea	Wood reed grass	FACW	+									
Cyperus strigosus	Umbrella sedge	FACW	+	+								+
Dryopteris sp.	Wood fern	FACW	+									
Echinochloa crusgalli	Barnyard grass	FACU	+									+
Eleocharis sp.	Spike rush	OBL		D								
Epilobium coloratum	Purple willow herb	OBL	+									
Eupatorium maculatum	Joe-pye-weed	FACW	+	+								
Eupatorium perfoliatum	Boneset	OBL	+	+								
Geum sp.	Avens	—	+	+								
Impatiens capensis	Jewelweed	FACW	+	+								
Juncus canadensis	Canada rush	OBL	+	+								+
Juncus effusus	Soft rush	FACW+	+									
Juncus tenuis	Path rush	FAC-										+
Leersia oryzoides	Rice cutgrass	OBL	+									
Lythrum salicaria	Purple loosestrife	FACW+	D	D								
Mimulus ringens	Monkey flower	OBL	+	+								

Connecticut Ecosystems LLC

Notes: D=dominant +=present
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VEGETATIVE INVENTORY												
			Wetlands									
Scientific Name	**Common Name**	**Indicator Status (*)**	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**	**W9**	**W10**
Onoclea sensibilis	Sensitive fern	FACW	+	+	+							
Phalaris arundinacea	Reed canary grass	FACW+		+								
Phragmites australis	Common reed	FACW	D									
Pilea pumila	Clearweed	FACW	+									
Plantago alisma-aquatica	Water plantain	OBL	+									
Polygonum sp.	Smartweed	---	+									
Polygonum arifolium	Halberd-leaved tearthumb	OBL	+	+								
Polygonum saggitatum	Arrow-leaved tearthumb	OBL	+									
Scirpus cyperinus	Woolgrass	OBL	+	+								+
Scirpus validus	Softstem bulrush	OBL										
Solidago sp.	Goldenrod	---	+	+								
Symplocarpus foetidus	Skunk cabbage	OBL	+	+		+	+					
Toxicodendron radicans	Poison ivy	FAC	+							+	+	
Typha latifolia	Broadleaf cattail	OBL	D	+								
Verbena hastata	Blue vervain	FACW+	+	+								
Vernonia noveboracensis	New York ironweed	FACW+	+									
Viola sp.	Violet	---						+				
VINES												
Parthenocissus quinquefolia	Virginia creeper	FACU					+			+		
Vitis sp.	Grapes	---		+								

Notes: D=dominant +=present
See accompanying text for explanation of "Indicator Status" codes.

APPENDIX 2. WILDLIFE INVENTORY

Wildlife Inventory

Introduction

The wildlife inventory was compiled by direct sightings, songs/calls, tracks, scat, and/or browse. Also included in the inventory are species that potentially breed on or use the subject property. The latter was determined by published range maps and species habitat preferences (Bevier 1994; Klemens 1993; DeGraaf and Yamasaki 2001; Merritt 1987). Species are included in the latter group based upon the experience and professional judgment of the author.

Key

References
Included next to each species name are two parenthetical numbers. These represent page numbers from the following references:

Group	1st Reference	2nd Reference
Avians	Bevier (1994)	DeGraaf and Yamasaki (2001)
Amphibians	Klemens (1993)	DeGraaf and Yamasaki (2001)
Reptiles	Klemens (1993)	DeGraaf and Yamasaki (2001)
Mammals	Merritt (1987)	DeGraaf and Yamasaki (2001)

Listed Species
Bolded parenthetical symbols identify listed species:
E = Endangered Species **T** = Threatened **SC** = Species of Special Concern

Wetland Dependence
This indicates the degree to which a species depends upon wetlands to complete its life cycle:
OBL = obligate (requires wetland habitats during one or more stages of its life cycle)
FAC = facultative (uses wetland and non-wetland habitats, and is not dependent upon wetlands to complete its life cycle)

General Habitat Preferences
These are obtained from the references listed above, and the author's experience:

Wetland Habitats	Non-Wetland Habitats
DWS=deciduous wooded swamp	DF=deciduous forest
CWS=coniferous wooded swamp	CF=conifer forest
SS=scrub-shrub swamp	MF=mixed forest
FM=freshwater marsh	ST=sapling/shrub thicket
SM=salt marsh	M=grass/forb meadow
BM=brackish marsh	
WM=wet meadow	
FE=fen	
RI=river/stream	
PO=pond/lake	
FP=floodplain	
VP=vernal pool	

On-Site Habitat Use
These codes correspond to wetland and upland cover types (W1, U1, etc.) described in the report.

WILDLIFE INVENTORY

Site: Middletown Schools
Inspection Date(s): 8/14, 15, 25, 26/03 Inspected by: E.M. Pawlak
Weather: Search Methods: Cover search, auditory/visual observations, tracks, scat, browse
On-Site Cover Types
Wetland: Deciduous wooded swamp, shrub swamp, wet meadow
Upland: Mixed hardwood forest, "old field"

WILDLIFE INVENTORY

Group	Species	Wetland Dependence	General Habitat Preferences	On-Site Habitat Use	Notes
AMPHIBIANS					
Ranidae	*Rana clamitans melanota* (green frog) (126,42)	OBL	PO, DWS, FM, RI, WM, SS	W5	Wide variety of aquatic habitats.
	Rana sylvatica (140,43) (wood frog)	OBL	VP, DWS, SS, DF, CF	U2	Prefers thick leaf & herbaceous layer.
MAMMALS					
Didelphidae	*Didelphis virginiana (33,301)* (Virginia opossum)	FAC	DF, suburbs	W1	Prefers forest edge. Nests in abandoned dens & burrows.
Procyonidae	*Procyon lotor (266,346)* (raccoon)	FAC	DF, M	W1	Edges near humans.
Cervidae	*Odocoileus virginianus (316,357)* (white-tailed deer)	FAC	DF, M, DWS, CF, FM	W1	Forest edges.

APPENDIX 3. WETLAND ASSESSMENT DATA SHEETS

Introduction

The assessment of wetland functions and values in this report is based upon the "Highway Methodology Workbook Supplement" developed by the U.S. Army Corps of Engineers New England Division. This "descriptive approach" moves away from numerical or ranking methodologies, and instead relies upon professional judgment of the reviewer. It provides criteria to standardize the assessment process.

Many of these criteria appear in the data sheets that follow. Additional criteria were obtained from other assessment methodologies (Magee and Hollands 1998; Ammann et al. 1991) and the experience of the author. Responses to these criteria that are indicators of the function are listed under the "+" column. Those that detract from the function appear in the "-" column. Excluding conditions preclude a wetland from performing a particular function. The determination of whether a particular function is identified as a "principal function" is based upon the number of positive criteria responses, and the judgment and professional experience of the evaluator.

Descriptions of Functions and Values

Groundwater Recharge
The capacity of a wetland to influence the amount of water moving from surface water to ground water (Magee and Hollands 1998).

Groundwater Discharge
The capacity of a wetland to influence the amount of water moving from ground water to surface water (Magee and Hollands 1998).

Floodflow Alteration
The storage of inflowing water from storm or flooding events, resulting in detention and retention of water on the wetland surface (Magee and Hollands 1998).

Finfish Habitat: Ponds & Lakes
Considers the quality of the aquatic habitat of a pond or lake, and its capacity to support finfish.

Finfish Habitat: Streams & Rivers
Considers the quality of the aquatic habitat of a perennial watercourse, and its capacity to support finfish.

Sediment, Pollutant & Nutrient Removal
The capacity of a wetland to remove dissolved, suspended and floatable pollutants from storm water runoff.

Production Export
The capacity of a wetland to produce wildlife food sources, or to export biomass that sustains downstream ecosystems.

Recreation
The suitability of a wetland to support various recreation activities (e.g., hiking, canoeing, boating, fishing, hunting, bird watching).

Wildlife Habitat
The capacity of a wetland to support a diverse and abundant wildlife community.

Educational/Scientific Value
The suitability of a wetland for classroom field trips, or for scientific research.

Uniqueness/Heritage
The degree to which a wetland is considered a locally or regionally unique natural resource.

Wetland #: 1 Project: Middletown Schools Photograph(s):
Inspection Date: 8/26/03 Weather: Sunny 85° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge		
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	culverts
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 1

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	?
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	dense brush
PRINCIPAL FUNCTION? yes no			

Wetland #: 1

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	
Connectivity with other wetlands	✓		
Size of landscape block in which wetland is located	✓		
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	?
Edge diversity (list types, including upland cover types)	✓		WS/WM, WM/M, WM/SS/SS/M
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)	✓		
Abundance of invasive exotic flora? (give examples)	none/low	high	Lythrum, Rhamnus
PRINCIPAL FUNCTION? yes no			Impaired

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural) Low	high	✓ low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no ✓	
Safety hazards (if present, list them)			dense brush
Site currently used for educational/scientific purposes	yes	no	?
PRINCIPAL FUNCTION? yes no			unsafe for students

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	~~no~~ ?	?
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 2 Project: N'Jam School Photograph(s):
Inspection Date: 8/14/03 Weather: Sunny, humid, 90° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan shallow ledge	---	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			N/A

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 2

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low mod	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	dense brush
PRINCIPAL FUNCTION? yes no			

Wetland #: 2

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	ROW
Wetland fragmentation by development	little or none	moderate to high	school, houses
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)			
Buffer width		✓	narrow
Connectivity with other wetlands	✓		
Size of landscape block in which wetland is located	✓		long corridor
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	rare
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)	✓		SS/WM, WM/WS
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)	✓		
Abundance of invasive exotic flora? (give examples)	none low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	dense brush
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			potential for ed. site

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)		✓	
PRINCIPAL FUNCTION? yes no			

Notes

5, 4, 3

Wetland #: 9, 8, 7, 6 Project: Middletown Schools Photograph(s):

Inspection Date: 8/15/03 Weather: Sunny 85° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes (no)			likely perched water table

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	---	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes (no)			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes No outlet	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes (no)			Too small

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 3-9

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	~~no~~	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes Seasonally	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			limited

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			N/A

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	potentially a VP
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)	no		
PRINCIPAL FUNCTION? yes no			

Wetland #: 3-9

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	
Connectivity with other wetlands	✓		thru upland forest
Size of landscape block in which wetland is located		moderate/large	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low none	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	potentially WS/F
Edge diversity (list types, including upland cover types)		✓	
Water regime	wetter ✓	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)			
Abundance of invasive exotic flora? (give examples)	none/low	high	Rhamnus
PRINCIPAL FUNCTION? yes no			Only if it is a VP

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	Potential VP
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)	✓		
Site currently used for educational/scientific purposes	yes	no	?
PRINCIPAL FUNCTION? yes no ?			Potential VP

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: A 10 Project: Middleton Schools Photograph(s):
Inspection Date: 8/26/03 Weather: Sunny 85° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge		
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			Too small

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

APPENDIX 4. SOILS REPORT

Connecticut Ecosystems LLC
• Wetland Delineation • Wetland & Aquatic Evaluation • Mitigation
• Natural Resource Inventory • Permit Assistance • Expert Testimony

ON-SITE SOIL INVESTIGATION REPORT

Project Name & Location
Middletown Schools
Middletown, CT

CE Job No.: 01-400
Field Investigation Date(s): 8/6,7,11,12,14/03
Field Investigation Method(s):
☒ Spade & Auger
☐ Backhoe & Test Pits
☐ Other:

Report Prepared For:
HRP Associates
Attn: Mr. Joe Magdol
167 New Britain Avenue
Plainville, CT 06062

Field Conditions:
Weather: hot, humid
Soil Moisture: average
Snow Depth: ---
Frost Depth: ---

Purpose of Investigation:
☒ Wetland Delineation/Flagging
☐ Sketch Wetland Boundaries on Base Map (No Flagging)
☐ High Intensity Soil Mapping by Soil Scientist
☒ Medium Intensity Soil Mapping from SCS Soil Survey Maps

Base Map Source: Property topo map

Wetland Boundary Marker Series: 1-1→1-25 2-1→2-27 2-1→2-170 3-1/16 4-1→4-12 5-1/10 6-1/7 7-1/11 8-1/15 9-1/15 10-1→10-53 11-1→11-70 12-1→12-74 13-1→13-37 14-1/15 15-1→15-25 17-1→17-16 17-1→17-13

Intermittent Watercourse Marker Series: IWC 1-1→1-34 IWC 2-1→2-11

General Site Description/Comments: The site contains school buildings, parking lots, driveways, athletic fields, a power line ROW, and numerous small and large wetland areas.

38 Westland Avenue • West Hartford, CT 06107
Phone (860) 561-8598 • Fax (860) 561-0223 • email ecosys@comcast.net

CONNECTICUT ECOSYSTEMS LLC
ON-SITE SOIL INVESTIGATION REPORT (CONTINUED)

Project Name & Site Location: Middletown Schools, Middletown, CT
Project #: 01-400

SOIL MAP UNITS

WETLAND SOILS

Rumney Variant Series (Rv)

The Rumney Variant series consists of deep, poorly drained soils formed in silt loam, alluvial sediments. They are nearly level soils on floodplains. The soils formed in recent alluvium derived mainly from sandstone, shale, conglomerate and basalt.

Typically, these soils have a dark brown silt loam surface layer 11 inches thick. The subsoil from 11 to 28 inches is reddish brown silt loam with prominent mottles. From 28 to 60 inches the substratum is reddish brown silt loam with mottles.

Wilbraham Series (Wr)

The Wilbraham series consists of deep, poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till from Triassic materials. They are nearly level to sloping soils located in drainage ways and low lying positions on till plains, low ridges and drumloidal landforms. The soils developed in glacial till derived mainly from reddish Triassic sandstone, conglomerate and shale with some basalt.

Typically, these soils have a dark brown silt loam surface layer 8 inches thick. The subsoil from 8 to 25 inches is reddish brown, mottled silt loam. The substratum from 26 to 60 inches is reddish brown, mottled, very firm fine sandy loam.

Raypol Series (Rb)

The Raypol series consists of deep, poorly drained soils formed in a coarse-loamy mantle underlain by sandy water-deposited glacial outwash materials. They are nearly level and gently sloping soils on outwash plains and high stream terraces. The soils formed in loamy over stratified sandy and gravelly glacial outwash derived mainly from acid rocks.

Typically these soils have a very dark brown, silt loam Ap horizon, a grayish brown and dark yellowish brown, mottled, silt loam and very fine sandy loam B2 horizon over a light olive brown, mottled gravelly sand IIC horizon at a depth of 29 inches.

Raypol soils are poorly drained. The seasonal high water table is within 0 to 12 inches of the surface from fall through spring. Surface runoff is slow. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum.

CONNECTICUT ECOSYSTEMS LLC
ON-SITE SOIL INVESTIGATION REPORT (CONTINUED)

Project Name & Site Location: Middletown Schools, Middletown, CT
Project #: 01-400

Aquents (Disturbed Wetland Soils) (Aq)

This soil map unit consists of poorly drained and very poorly drained, disturbed land areas. They are most often found on landscapes that were subject to prior filling and/or excavation activities. In general this soil map unit occurs where two or more feet of the original soil surface has been filled over or excavated. Aquents are characterized by a seasonal to prolonged high ground water table and either support or are capable of supporting wetland vegetation.

Aquents are recently formed soils that have an aquic moisture regime. An aquic moisture regime is associated with a reducing soil environment that is virtually free of dissolved oxygen because the soil is saturated by groundwater or by water of the capillary fringe. The key feature is the presence of a ground water table at or very near to the soil surface for a period of fourteen days or longer during the growing season

The Aquents soil mapping unit is a miscellaneous unit that includes a large variety of soil materials and landscape features. Common locations of Aquents include former gravel pits, urban areas abutting marshland and broad ditches along highways.

Aquents are poorly and very poorly drained. Soil saturation may vary from periodic saturation during the growing season in poorly drained areas, to extended saturation for long periods throughout the year along with periodic ponding in very poorly drained areas. Due to the wide variation of soil materials included in this soil map unit predictions of water table elevations and soil permeabilities require on-site investigations and evaluations.

UPLAND (NON-WETLAND) SOILS

Wethersfield Series (Wk)

The Wethersfield series consists of deep, well drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till from Triassic materials. They are nearly level to steeply sloping soils on till plains, low ridges and drumloidal landforms. The soils developed in glacial till derived mainly from reddish Triassic sandstone, conglomerate and shale with some basalt.

Typically, these soils have a dark brown loam surface layer 8 inches thick. The subsoil from 8 to 25 inches is reddish brown loam. The substratum from 25 to 60 inches is reddish brown, firm fine sandy loam.

These soils are well drained. For most of the year the water table is deep, below 6 feet. During the wet periods between February and April a temporary, perched seasonal high ground water table may be present within 18 to 30 inches of the surface. Surface runoff is medium to rapid. Permeability is moderate in the surface layer and subsoil and slow or very slow in the substratum.

CONNECTICUT ECOSYSTEMS LLC
ON-SITE SOIL INVESTIGATION REPORT (CONTINUED)

Project Name & Site Location: Middletown Schools, Middletown, CT
Project #: 01-400

Udorthents (Ud)

This soil type was formerly mapped in Connecticut as **Made Land (Ma)**.

Udorthents consist of well drained to moderately well drained soils that have been altered by cutting, filling, or grading. The areas either have had 2 feet or more of the upper part of the original soil removed or have more than 2 feet of fill material on top of the original soil. Udorthent soils can be found on any soil type but typically are on glacial till plains and outwash plains and stream terraces.

These areas are mostly irregular in shape or are rectangular or long and narrow, and they generally range from 5 to 60 acres. Slopes range from 0 to 15 percent. Udorthent soils are commonly more than 60 inches thick and contain 10 to 65 percent rock fragments. Reaction is very strong to slightly acid.

Udorthent soils are well drained to moderately well drained. The determination of the water table and permeability requires onsite investigation and evaluation.

Urban Land (Ur)

The Urban land soil mapping unit consists mainly of areas that are covered by paved roads, parking lots, buildings and other structures. The areas are mostly in densely populated regions of the State. They range in size mostly from 5 to several hundred acres. Most of the original soils underlying Urban land have been altered by excavation or have been covered with fill material. Slopes range from 0 to 25 percent but are mostly 0-8 percent. Included with this mapping unit are small, intermingled areas of Udorthents.

CONNECTICUT ECOSYSTEMS LLC
ON-SITE SOIL INVESTIGATION REPORT (CONTINUED)

Project Name & Site Location: Middletown Schools, Middletown, CT
Project #: 01-400

The accompanying soil map and on-site soil investigation narrative were done in accordance with the classification of the National Cooperative Soil Survey, USDA National Resource Conservation Service and the County Identification legend. The investigation was conducted and reviewed by a Registered Soil Scientist.

Respectfully submitted,

Connecticut Ecosystems LLC

Edward M. Pawlak
Registered Soil Scientist
Certified Professional Wetland Scientist

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APPENDIX 5. DEP NATURAL DIVERSITY DATA BASE

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ENVIRONMENTAL & GEOGRAPHIC INFORMATION CENTER
79 Elm Street, Store Level
Hartford, CT 06106
Natural Diversity Data Base

September 5, 2003

Mr. Edward Pawlak
Connecticut Ecosystem, LLC
38 Westland Avenue
West Hartford, CT 06107

re: Middletown School Expansion in Middletown, Connecticut

Dear Mr. Pawlak:

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed Middletown School Expansion in Middletown, Connecticut. According to our information, there are known extant populations of State Special Concern *Terrapene c. carolina* (eastern box turtle) that occur in the vicinity of this project site. I have sent your letter to Julie Victoria (DEP-Wildlife Division; 860-642-7239) for further review. She will write to you directly with her comments.

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 Natural Resources Center'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 me if you have further questions at 424-3592. Thank you for consulting the Natural Diversity Data Base. 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.

Sincerely,

D.M.McK

Dawn M. McKay
Biologist/Environmental Analyst

Cc: Julie Victoria, NDDB # 12810

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

September 16, 2003

Mr. Edward Pawlak
Connecticut Ecosystems, LLC
38 Westland Avenue
West Hartford, CT 06107

re: Middletown School Expansion, Middletown

Dear Mr. Pawlak:

Your request was forwarded to me on 9/15/03 from Dawn McKay of the Department of Environmental Protection's (DEP) Environmental & Geographic Information Center (EGIC). Their records indicate that a State Species of Special Concern, the Eastern box turtle (*Terrapene carolina*) occurs in the vicinity of the project.

The Wildlife Division has not made a field inspection of the project nor have we seen detailed plans or timetables for work to be done. Impacts to this species are difficult to predict without detailed project plans. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments.

Eastern box turtles require old field and deciduous forest habitats, which can include power lines and logged woodlands. They are often found near small streams and ponds, the adults are completely terrestrial but the young may be semiaquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. This species has been negatively impacted by the loss of suitable habitat.

If this work will be conducted in any Eastern box turtle habitat, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of the box turtle conduct surveys. A report summarizing the results of such surveys should include habitat descriptions, reptile species list and a statement/resume giving the herpetologist' qualifications. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

The time of year when this work will take place will affect this species if they are present on the site when construction is scheduled. 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. If you have any additional questions, please feel free to contact me. Thank you for the opportunity to comment.

Sincerely,

Julie Victoria, Wildlife Biologist
Franklin Wildlife Management Area
391 Route 32
N. Franklin, CT 06254
860-642-7239

cc: D. McKay - 12810