

Connecticut Ecosystems LLC

- Wetland Delineation
- Wetland & Aquatic Evaluation
- Mitigation
- Natural Resource Inventory
- Permit Assistance
- Expert Testimony



WETLANDS REPORT

PONDE PLACE

Mansfield, Connecticut

July 5, 2007

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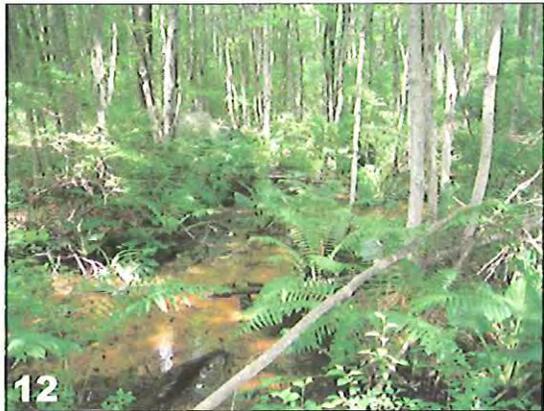
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Ponde Place Mansfield, CT 6/11/07 1. Looking north at site from Northwood Road 2. Vernal pool with dark, saturated leaves 3. North end of vernal pool still holding water 4. Seepage area near flag 200 5. Lush herbaceous vegetation that has developed beneath gap in swamp canopy 6. Upland mixed hardwood forest



Ponde Place Mansfield, CT 6/11/07 7. Seasonal watercourse in Wetland 1D 8. Carpet of skunk cabbage in Wetland 1D 9. Existing crossing of Wetland 1D 10. Wetland 1D north of existing crossing 11. Shallow ponded water in Wetland 1D north of existing crossing 12. Stagnant shallow water in Wetland 1C

1.0 INTRODUCTION

The construction of "Ponde Place", a residential apartment community catering to University of Connecticut students, post-graduate candidates and junior faculty members, is proposed on a 45.93acre parcel of land in Mansfield, CT.

Connecticut Ecosystems LLC was retained to conduct a site plan review, the results of which are presented in this report. Its staff inspected the subject property on nine occasions to collect biological data (see table below). Site plans prepared by F.A. Hesketh & Associates, Inc. were reviewed prior to issuing this report.

Ponde Place Inspection Dates	
Date (2007)	Purpose of Inspection
March 30	Initial reconnaissance of site
April 13	Set 17 minnow traps in Wetland 1A, 3 minnow traps in Wetland 1D
April 14	Check minnow traps
April 20	Set minnow traps
April 21	Check minnow traps
May 16	Wildlife survey
May 30	Wildlife survey
June 11	Plant & wildlife survey
June 15	Wildlife survey

2.0 SITE DESCRIPTION

The 45.93acre subject property is located in a RAR-90/Multi-Family Zone (Figure 1). The proposal includes a zone change request to the DMR (Design Multiple Residence) Zone. It is bordered to the south by single family residences along Northwood Road, to the east by Hunting Lodge Road, to the north by apartment buildings on Carriage House Drive, and to the west by undeveloped forest land (Figure 2). Slopes on the property are gentle, with the exception of the northwest end, where they are steep. Across the portion of the site where development is proposed, the elevation varies from approximately 580 feet along the northerly boundary to 550 feet along the southerly boundary.

3.0 LANDSCAPE CONTEXT

The property is part of a large landscape block that is bordered to the north by Birch Road, to the east by Hunting Lodge Road, to the south by Eagleville Road, and to the west by Bone Mill Road (Figures 1 and 2). This landscape block is mostly wooded, and contains roads and buildings.



Figure 2. Aerial Photograph
Ponde Place Mansfield, CT
Connecticut Ecosystems LLC
June 20, 2007

4.0 SOILS

Soils on the property are described in Appendix 4. Wetland soils belong to the poorly and very poorly drained Ridgebury, Leicester and Whitman complex, which derived from glacial parent materials. The non-wetland soils are classified as Sutton (moderately well drained), Woodbridge (moderately well drained) and Charlton series (well drained).

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

5.1 Mixed Hardwood Forest (U1)

An extensive mixed hardwood forest covers the upland portion of the property. Canopy trees include shagbark hickory, American beech, sugar maple, white oak, black oak, white ash and white pine. Tree calipers generally range from 8 to 20 inches. There is a well-developed leaf litter on the forest floor.

6.0 WETLAND COVER TYPES

The subject property contains a total of 7.5 acres (16.3 percent) of wetlands.

In this section of the report the following information is provided for the on-site wetland:

- Description of wetland cover type
- Wetland water regimes
- Description of 150-foot wide Upland Review Area (URA), as defined by the Town of Mansfield Inland Wetland Regulations
- Discussion of the principal functions associated with each on-site wetland. 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 wetland.

Table 1. Wetland Summary	
Principal Functions/Values	Wetland 1
<i>Groundwater Recharge</i>	P
<i>Groundwater Discharge</i>	P
<i>Floodflow Alteration</i>	P
<i>Fish & Shellfish Habitat</i>	
- <i>Ponds & Lakes</i>	
- <i>Streams & Rivers</i>	
<i>Pollutant Removal</i>	P
<i>Production Export</i>	P
<i>Recreation</i>	
<i>Wildlife Habitat</i>	P
<i>Educational/ Scientific Value</i>	
<i>Uniqueness/Heritage</i>	
WETLAND DATA	
<i>Type (*)</i>	DWS
<i>Water Regime (**)</i>	SEF,SS
<i>Soil Parent Material (***)</i>	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):

<u>Water Regime</u>	<u>Definition</u>
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.
Artificially flooded (AF)	Flooding caused by dikes, dams, pumps, etc.,

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

6.1 Wetland 1 (W1)

6.1.1 Wetland Description

Wetland 1 is a deciduous wooded swamp that extends across the eastern and central portions of the property, and consists of four discrete sections, which are described below.

Wetland 1A is a nearly level, seasonally flooded area located in a basin depression immediately west of a dirt road that extends north from Northwood Road. It appears that the construction of the dirt road blocked water from draining to the east, creating a seasonal impoundment. On April 20, 2007 the maximum water depth at the south end of the pool was 6-7 inches, and 15 inches at the north end of the pool. Fifty-three wood frog and four spotted salamander egg masses were present in the pool on that date. Neither of these species is listed as Threatened, Endangered or Special Concern.

The Army Corps of Engineers Programmatic General Permit defines a vernal pool as:

“an often temporary body of water occurring in a shallow depression of natural or human origin that fills during spring rains and snow melt and typically dries up during summer months. Vernal pools support populations of species specially adapted to reproducing in these habitats. Such species may include wood frogs, mole salamanders (Ambystoma sp.), fairy shrimp, fingernail clams, and other amphibians, reptiles and invertebrates. Vernal pools lack breeding populations of fish.”

According to this definition, Wetland 1A is classified as a vernal pool.

By June 11, 2007 only small, shallow puddles remained in the southern portion of Wetland 1A, while a pool measuring approximately 100'x25' remained in the northern end.

A dense stand of shrubs in Wetland 1A grows on small hummock islands surrounded by a matrix of seasonal shallow water. Canopy trees fully shade the pool.

Wetland 1B is a swamp that extends along a gentle slope to the west and north of Wetland 1A. Seasonally active groundwater discharges on June 11, 2007 created soft, saturated soils across this wetland. Windthrown trees have created a gap in the center of this area where lush herbaceous vegetation grows.

Wetland 1C is a nearly level swamp located east of Wetland 1A, on the other side of an existing dirt road. On June 11, 2007 it contained shallow, stagnant surface water at its

west end, which was flowing very slowly to the east at its east end. Since there was no inflow to this wetland, this is evidence of a groundwater discharge function.

A very large white oak tree is located near Wetland 1C (36± feet on a 120 degree bearing from flag 46).

Wetland 1D is a riparian swamp located along the eastern end of the property. A seasonal headwaters watercourse, which is tributary to Eagleville Brook south of Eagleville Road (Figure 1), flows south through the center of this swamp. Its shallow channel is 2-6 feet wide, consists of large flat cobbles, and accumulated sand and organics. Its banks are stable and wooded. Soils adjacent to the channel were soft and saturated on June 11, 2007, owing to groundwater discharges. A carpet of skunk cabbage grows in these waterlogged soils.

Wetland 1D is presently crossed by a dirt road (18± feet wide) at its south end. This fill creates a shallow impoundment on the upstream (northeast) side of the crossing. On April 20, 2007 this pool was approximately ten inches deep, and contained eight wood frog and three spotted salamander egg masses. Tadpoles were observed in this area on June 11, 2007. According to the Army Corps definition cited above, this area is classified as a vernal pool, although its productivity is very limited as indicated by the small number of egg masses observed there.

6.1.2 Wetland Water Regime

Golet et al. (1993) define wetland water regime as follows: "*the elevation and degree of fluctuation of the water table with respect to the land surface over time.*" They note that the water level in a wetland can vary widely among years, depending largely upon precipitation levels. Thus, water regime is best interpreted as characterizing a wetland in *most* years. The various wetland water regimes, along with their definitions, are listed in the center of the Wetland Data Sheet found in Appendix 3.

6.1.3 URA Description

The URA bordering Wetland 1 is the mixed hardwood forest described in Section 5.1.

6.1.4 Wetland Functions & Values

Wetland 1 is associated with the following principal functions: Groundwater Recharge and Discharge, Floodflow Alteration, Pollutant Removal, Production Export, and Wildlife Habitat (Table 1, Appendix 3).

7.0 WILDLIFE

An intensive and thorough wildlife survey running from late March through mid-June 2007 was conducted on the subject property (see site inspection dates listed in table on page 1). This survey included spring minnow trapping for pool-breeding amphibians, dip-netting for amphibian larvae, pool-breeding amphibian egg mass counts, extensive cover searches, and early morning surveys for breeding avians.

As a result of this survey effort, a total of 48 wildlife species were identified on the property, including 36 avians, seven amphibians, two reptiles and three mammals (Appendix 2). None of these are Threatened, Endangered or Special Concern species.

8.0 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. According to the NDDB there are historic records of State Endangered horned lark (*Eremophila alpestris*), and State Special Concern southern bog lemming (*Synaptomys cooperi*) and northern spring salamander (*Gyrinophilus porphyriticus*) in the vicinity of the subject property. No listed species were observed during the wildlife surveys.

8.1 Horned Lark

The following description of Horned Lark habitat preferences is taken from Bevier (1994):

“In Connecticut, the Horned Lark breeds on beaches and open areas mostly along the coast, as suggested by its early common name of Shore Lark. They also breed regularly in grassland surrounding Bradley Airport, Windsor Locks, which is also typical habitat for this species. Horned Larks generally prefer open areas, particularly fallow agricultural fields, and are not likely to be found in areas with substantial cover.”

The subject property is wooded, and does not contain open areas or grasslands. Thus, there is no suitable habitat on-site for the Horned Lark.

8.2 Southern Bog Lemming

Ms. Jennie Dixon (personal communication) of the Connecticut DEP provided the following information on this species:

- the historic Mansfield record is very old

- the habitat preferences of this species are variable, and are not restricted to bogs.
- surveying for this species is very difficult
- short of trapping, there is no easy method of surveying for this species

Merritt (1987) notes that this species commonly litters its runways with bright green, oval scats. This fact was confirmed by Mr. James Fischer, Vertebrate Collections Manager at the University of Connecticut and Wildlife Research Biologist at the White Memorial Conservation Center, who spoke with Connecticut Ecosystems LLC staff. Mr. Fischer noted that this species is very social, and is unlikely to occur on a site as a solitary individual. This would increase the likelihood of encountering the species during the course of a wildlife survey.

A thorough cover search of on-site wetland and upland habitats detected numerous rodent burrows, but no definite evidence of Southern Bog Lemmings. Thus, it is unlikely that they occur on the subject property.

8.3 Northern Spring Salamander

According to Klemens (1993):

- Spring salamanders require clean, cold, well oxygenated water
- Steep, rocky, heavily forested hemlock ravines are favored habitats
- Can also be found in brooks, seepage areas, and hillsides below perched swamps

According to DeGraaf and Yamasaki (2001), this species requires cold streams, seeps or springs containing large flat rocks or rock crevices.

A thorough cover search was conducted of Wetland 1B and 1C, seepage swamps, and Wetland 1D, which contains a seasonal watercourse. No Spring Salamanders were observed, although Northern Two-Lined and Northern Dusky Salamanders were found in Wetland 1D. Based upon this survey effort, it is very unlikely that the Northern Spring Salamander occurs on the subject property. However, Cedar Swamp Brook, a fast-flowing perennial watercourse located southwest of the property, could potentially support or may have supported a Northern Spring Salamander population.

9.0 REGULATED ACTIVITIES

9.1 Wetlands & Watercourses

The property will be accessed by three driveways, two of which originate at Hunting Lodge Road. The proposed driveways from Hunting Lodge Road will cross Wetland 1D. One of these crossings will be located at the site of an existing dirt road crossing. The crossing will consist of a wooden bridge supported on wooden pilings that will be driven along the limits of the wetland soil. The vertical clearance of the span above the wetland

will be about three feet. A narrow swath of vegetation will need to be cleared to construct the crossing.

The second crossing of Wetland 1D, which is intended for fire lane access only, will also consist of a wooden bridge supported on wooden pilings. The vertical clearance of this span above the wetland will also be approximately three feet. A narrow swath of vegetation will also need to be cleared to construct the crossing.

The two crossings of Wetland 1D with wooden bridge spans will allow for free movement of wildlife along this corridor, and will eliminate the need to place fill in the wetland, thus significantly reducing the footprint of the activity.

The third driveway is essentially an extension of Northwood Road to the north into the property following the path of an existing dirt road between Wetlands 1A and 1C. No wetland disturbance is involved with the construction of this driveway and only small areas of vegetation will need to be cleared for construction.

The wood frog and spotted salamander populations that breed in the on-site vernal pools will likely decline due to the development of some of the adjacent upland forest. It is expected that they will persist (in smaller numbers) on the site post-development because they will still have access to an upland forest that will not be disturbed.

9.2 Upland Review Area

The Mansfield Inland Wetland Regulations define an Upland Review Area (URA) that extends 150 feet from the edge of wetlands.

The intent of the Inland Wetlands and Watercourses Act is to protect the functions and values of wetlands, not Upland Review Areas. According to Mr. Steve Tessitore of the Connecticut DEP, wetland commissions regulate activities in the in upland areas that are likely to affect wetlands or watercourses; they do not regulate the URA itself.

Importantly, development within a URA does not necessarily affect or impact the functions of the associated wetland or watercourse. The URA is a zone of more or less arbitrary width in which the Commission has decided an activity may result in an indirect impact to an adjacent wetland or watercourse. However, it is necessary to evaluate the site-specific functions of the wetland or watercourse in question, the physical features of the associated URA (soils, slope, vegetation), and the details of the site plan to assess the likelihood of any impacts to wetlands or watercourses.

The average width of the URA that will be preserved adjacent to the on-site wetlands is 60-75 feet. It is recommended that grading and clearing adjacent to the proposed buildings, roads and parking lots be minimized during construction in order to preserve the maximum amount of URA.

10.0 STORMWATER QUALITY

Two measures are proposed to treat the runoff that will be generated by the parking lots. The runoff will first pass through a hydrodynamic separator unit, where suspended solids and oil/grease will be removed. The runoff will then pass through a vegetated biofilter swale for additional treatment. The swale length will vary from 60 to 75 feet, and the average channel gradient will be less than one percent. Multiple discharge points have been incorporated in the design to minimize peak flow rates at any given location and to evenly distribute the runoff throughout the site.

It is recommended that the biofilter swales be seeded with New England Erosion Control/Restoration Mix (New England Wetland Plants; 413-548-8000). The swales should be seeded either in spring or fall in order to avoid the hot, dry summer months. Erosion control mats should be used in conjunction with the seed mix. Runoff should not be discharged to the swales until it has been determined that the vegetation is established to the point where scouring is unlikely. It is recommended that stone check dams be placed in the swales at regular intervals to slow the velocity of the runoff.

Rooftop runoff will be infiltrated into the soil using underground Stormtech units, in accordance with the DEP Stormwater Quality Manual.

11.0 FEASIBLE AND PRUDENT ALTERNATIVES

The State of Connecticut general statutes define "feasible and prudent alternative" as follows: "*a feasible alternative is one that is "able to be constructed or implemented consistent with sound engineering principles." The term "prudent" means "economically and otherwise reasonable in light of the social benefits to be derived from the proposed regulated activity provided cost may be considered in deciding what is prudent, and further provided that a mere showing of expense will not necessarily mean an alternative is imprudent."*"

The original design of the two wetland driveway crossings entailed the use of fill and culverts. The design was modified to a wooden bridge on pilings to eliminate the fill footprint and mitigate impacts to wildlife movement along the wetland corridor.

12.0 CONSERVATION EASEMENTS

The applicant is proposing to place a Conservation Easement on the wetlands and preserved URA, and the upland forest on the westerly portion of the property, so that they will be protected in perpetuity.

13.0 VERNAL POOL MONITORING PROGRAM

The Connecticut Association of Wetland Scientists (CAWS) has initiated a vernal pool monitoring program. The goal of the program is to collect long-term data, starting with a pre-development condition, on amphibian populations in vernal pools under a broad continuum of development scenarios. The annual spring monitoring inspections are conducted pro bono by CAWS members, at no cost to applicants or municipalities. Additional information on the program can be found at the CAWS web site (<http://www.ctwetlands.org/>) - click on "Vernal Pool Monitoring" on the right side of the page.

It is recommended that the applicant consider enrolling the Wetland 1A vernal pool in this program. The data collected for this report could serve as baseline data for the CAWS monitoring program.

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APPENDIX 1. VEGETATIVE INVENTORY

PONDE PLACE WETLAND VEGETATIVE INVENTORY

Scientific Name	Common Name	Indicator Status (*)	Wetland I
TREES/SAPLINGS			
<i>Acer rubrum</i>	Red maple	FAC	D
<i>Fagus grandifolia</i>	American beech	FACU	+
<i>Fraxinus pennsylvanica</i>	Green ash	FACW	+
<i>Nyssa sylvatica</i>	Tupelo	FAC	+
SHRUBS			
<i>Berberis thunbergii (WI)</i>	Japanese barberry	FACU	+
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL	+
<i>Ilex verticillata</i>	Winterberry	FACW+	+
<i>Lindera benzoin</i>	Spicebush	FACW	+
<i>Rhododendron viscosum</i>	Swamp azalea	OBL	+
<i>Rosa multiflora (WI)</i>	Multiflora rose	FACU	+
<i>Vaccinium corymbosum</i>	Highbush blueberry	FACW-	+
<i>Viburnum recognitum</i>	Arrowwood	FACW-	+
HERBS			
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	FACW-	+
<i>Carex crinita</i>	Sedge	OBL	+
<i>Carex lurida</i>	Sedge	OBL	+
<i>Dryopteris sp.</i>	Wood fern	FACW	+
<i>Gallium sp.</i>	Bedstraw	---	+
<i>Impatiens capensis</i>	Jewelweed	FACW	+
<i>Iris versicolor</i>	Blue flag iris	OBL	+
<i>Maianthemum canadense</i>	Canada mayflower	FAC	+

Connecticut Ecosystems LLC

Notes: D=dominant +=present

See accompanying text for explanation of "Indicator Status" codes.

WI="Widespread & Invasive" RI="Restricted & Invasive" PI="Potentially Invasive" from the publication: Mehrhoff, L.J., K.J. Metzler, and EE Corrigan. 2003. *Non-native and potentially invasive vascular plants in Connecticut*. Center for Conservation and Biodiversity, University of Connecticut, Storrs.

PONDE PLACE WETLAND VEGETATIVE INVENTORY

Scientific Name	Common Name	Indicator Status (*)	Wetland 1
<i>Osmunda cinnamomea</i>	Cinnamon fern	FACW	+
<i>Osmunda regalis</i>	Royal fern	OBL	+
<i>Pilea pumila</i>	Clearweed	FACW	+
<i>Polygonum sagittatum</i>	Arrow-leaved tearthumb	OBL	+
<i>Sphagnum sp.</i>	Sphagnum moss	OBL	+
<i>Symplocarpus foetidus</i>	Skunk cabbage	OBL	D
<i>Toxicodendron radicans</i>	Poison ivy	FAC	+
<i>Viola sp.</i>	Violet	---	+

Notes: D=dominant +=present

See accompanying text for explanation of "Indicator Status" codes.

WI="Widespread & Invasive" RI="Restricted & Invasive" PI="Potentially Invasive" from the publication: Mehrhoff, L.J., K.J. Metzler, and EE Corrigan. 2003. *Non-native and potentially invasive vascular plants in Connecticut*. Center for Conservation and Biodiversity, University of Connecticut, Storrs.

Connecticut Ecosystems LLC

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.

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	1 st Reference	2 nd 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 **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 Status

B=confirmed breeder (evidence of on-site breeding observed)

PRB=probable breeder (species occurs in region and suitable breeding habitat exists on-site)

POB=possible breeder (species occurs in region and marginal breeding habitat exists on-site)

PONDE PLACE WILDLIFE INVENTORY

Group	Species	Wetland Dependence	General Habitat Preferences	Status	Notes
AVIANS					
Ardéidae (Bitterns, herons)	<i>Ardea herodias</i> (46,85) (great blue heron)	OBL	FM, PO	NB	Uncommon migratory breeder. Often nest in snags.
Anatidae (Swans, geese, ducks)	<i>Branta canadensis</i> (68,93) (Canada goose)	OBL	FM, PO, M	NB	Island nest sites preferred.
Picidae (woodpeckers)	<i>Anas platyrhynchos</i> (76,99) (mallard)	OBL	PO, RI, FM, WM, DWS	NB	Ubiquitous, avoids salt water.
	<i>Melanerpes carolinus</i> (188,159) (red-bellied woodpecker)	---	DF	PRB	Suburban & rural open woods.
	<i>Picoides pubescens</i> (192,161) (downy woodpecker)	FAC	DF, MF	PRB	Cavity nester. Wide variety of habitats, rural & suburban.
	<i>Colaptes auratus</i> (196,164) (northern flicker)	FAC	Open woodlands, areas with large trees.	POB	Cavity nester.
Tyrannidae (Tyrant flycatchers)	<i>Contopus virens</i> (202,167) (eastern wood-peewee)	---	DF, MF	PRB	Favors forest gaps & edges.
	<i>Sayornis phoebe</i> (212,171) (eastern phoebe)	OBL	DF, edges	POB	Nests on sheltered ledged near water.
	<i>Myiarchus crinitus</i> (214,172) (great-crested flycatcher)	---	DF, MF	PRB	Cavity nester. Avoids deep forest, prefers edges.
Corvidae (Jays, crows)	<i>Cyanocitta cristata</i> (232,181) (blue jay)	---	DF, MF, CF	NB	Generalist.
	<i>Corvus brachyrhynchos</i> (234,182) (American crow)	---	DF, MF, CF	NB	Scavenger. Suburbs & urban open habitats.
Paridae (Chickadees, titmice)	<i>Parus atricapillus</i> (240,190) (black-capped chickadee)	---	DF, MF, CF	B	Cavity nester. Interior-edge species.
	<i>Parus bicolor</i> (242,191) (tufted titmouse)	FAC	DF, MF, DWS, suburbs	B	Interior-edge species. Cavity nester.
Sittidae (Nuthatches)	<i>Sitta carolinensis</i> (246,193) (white-breasted nuthatch)	---	DF, MF, edges	PRB	Mature trees. Cavity nester.
Troglodytidae (Wrens)	<i>Thryothorus ludovicianus</i> (Carolina wren) (250,195)	FAC	ST	B	Edges. Prefers dense shrubs.
	<i>Troglodytes aedon</i> (252,196) (house wren)	---	DF	B	Cavity nester. Edges. Suburbs & woodlots.
Muscicapidae (Kinglets, gnatcatchers, thrushes)	<i>Catharus fuscescens</i> (264,203) (veery)	FAC	DWS, SS	B	Moist woods with thick understory.

PONDE PLACE WILDLIFE INVENTORY

Group	Species	Wetland Dependence	General Habitat Preferences	Status	Notes
Muscicapidae (Kinglets, gnatcatchers, thrushes)	<i>Hylocichla mustelina</i> (270,207) (wood thrush)	FAC	DF, MF	PRB	Mature forest interior & edges, near water or wetlands.
	<i>Turdus migratorius</i> (272,208) (American robin)	---	MF, DF, edges, suburban yards	PRB	Ubiquitous.
Mimidae (Mockingbirds, thrashers)	<i>Dumetella carolinensis</i> (274,209) (gray catbird)	FAC	ST	PRB	Often near water or wetlands, absent from dense woods.
Bombycillidae (Waxwings)	<i>Bombycilla cedrorum</i> (280,214) (cedar waxwing)	---	M, AF	POB	Forest edges. Eats berries.
Vireonidae (Vireos)	<i>Vireo flavifrons</i> (288,176) (yellow-throated vireo)	FAC	DF	B	Forest edges, seldom in dense woods.
	<i>Vireo olivaceus</i> (292,179) (red-eyed vireo)	---	DF	B	Unbroken canopy.
Parulidae (wood-warblers)	<i>Dendroica caerulescens</i> (310,223) (black-throated blue warbler)	---	Mature DF, MF with dense undergrowth	NB	North CT. Large wooded tracts.
	<i>Dendroica virens</i> (314,225) (black-throated green warbler)	---	MF (with hemlock)	NB	Mature forests, cool ravines.
	<i>Setophaga ruticilla</i> (326,233) (American redstart)	FAC	SS, ST, DF, MF	POB	Prefers thick sapling understory in early successional deciduous forest.
	<i>Seiurus aurocapillus</i> (332,235) (ovenbird)	---	DF, MF	B	Ground nester, dry soils. Large contiguous forest.
	<i>Seiurus motacilla</i> (336,236) (Louisiana waterthrush)	OBL	DF, MF, DWS	PRB	Woods with flowing streams.
	<i>Geothlypis trichas</i> (340,238) (common yellowthroat)	FAC	SS, ST	B	Sites often wet or moist. Dense herbaceous & shrub vegetation.
Thraupinae (Tanagers)	<i>Piranga olivacea</i> (348,242) (scarlet tanager)	---	DF, MF	PRB	Mature forest.
Cardinalinae (Cardinals, grosbeaks, buntings)	<i>Cardinalis cardinalis</i> (350,255) (northern cardinal)	---	ST	PRB	Forest edges. Requires thick brushy understory.
	<i>Pheucticus ludovicianus</i> (352,256) (rose-breasted grosbeak)	---	DF, MF	POB	Forest edges in dense shrub or sapling growth.
Emberizinae (Towhees, sparrows)	<i>Spizella passerine</i> (358,245) (chipping sparrow)	---	M, lawns	POB	Suburbs, farms.
Icterinae (Blackbirds, orioles)	<i>Molothrus ater</i> (388,262) (brown-headed cowbird)	---	M	PRB	Open fields with low vegetation, forest edges. Nest parasite.
	<i>Icterus galbula</i> (392,264) (Baltimore oriole)	---	M	NB	Nests in open areas with tall trees.

PONDE PLACE WILDLIFE INVENTORY

Group	Species	Wetland Dependence	General Habitat Preferences	Status	Notes
Fringillidae (Finches)	<i>Carduelis tristis</i> (400,270) (American goldfinch)	FAC	M, FM	POB	Nests in early successional habitats.
AMPHIBIANS					
Plethodontidae	<i>Desmognathus f. fuscus</i> (52,32) (northern dusky salamander)	OBL	Seeps, springs, DF, CF, RI		Hide under large flat stones on stream banks.
	<i>Eurycea bislineata</i> (58,36) (northern two-lined salamander)	OBL	RI, seeps, springs		Hide under large flat stones on stream banks. Found below logs & rocks in seepage areas.
Bufo	<i>Bufo a. americanus</i> (97,38) (eastern America toad)	FAC	RI, FM, WM, PO		Breeding wetland sites often open, lacking dense vegetation.
Hylidae	<i>Hyla versicolor</i> (106,40) (gray treefrog)	OBL	SS, DF, DWS, FM		Breeds in variety of aquatic sites.
Ranidae	<i>Rana clamitans melano</i> (green frog) (126,42)	OBL	PO, DWS, FM, RI, WM, SS		Wide variety of aquatic habitats.
	<i>Rana palustris</i> (130,45) (pickerel frog)	OBL	PO, M, FM, DWS, SS		Wide variety of moist habitats.
	<i>Rana sylvatica</i> (140,43) (wood frog)	OBL	VP, DWS, SS, DF, CF		Prefers thick leaf & herbaceous layer.
REPTILES					
Colubridae	<i>Diadophis punctatus edwardsii</i> (northern ringneck snake) (222,60)	---	Varied		Wide habitat selection, prefers abundant cover.
Colubridae	<i>Thamnophis s. sirtalis</i> (eastern garter snake) (263,58)	---	Wide variety		Ubiquitous.
MAMMALS					
Sciuridae	<i>Tamias striatus</i> (136,323) (eastern chipmunk)	---	DF		Common. Stone walls, rock piles, logs.
	<i>Sciurus carolinensis</i> (144,324) (gray squirrel)	FAC	DF, MF, suburbs		Mast-producing trees.
Cervidae	<i>Odocoileus virginianus</i> (316,357) (white-tailed deer)	FAC	DF, M, DWS, CF, FM		Forest edges.

APPENDIX 3. WETLAND ASSESSMENT DATA SHEETS

Wetland Data Sheet

Project Pond Place Date Varied ^{Spring 2007} Wetland # 1
 Weather Varied Time Start _____ Stop _____
 Recent Precipitation: Below average Average Above average

Wildlife Investigation Method(s)

Cover search Dip netting Auditory songs/calls Scat Tracks Minnow traps

Wetland Type(s) (Golet 1973 classification)

Class	Subclass				
<i>Open Water</i>	Vegetated		Non-vegetated		
<i>Deep Marsh</i>	Dead woody	Shrub	Sub-shrub	Robust	
	Narrow-leaved	Broad-leaved			
<i>Shallow Marsh</i>	Robust	Narrow-leaved	Broad-leaved	Floating-leaved	
<i>Seasonally Flooded Flats</i>	Emergent	Shrub			
<i>Wet Meadow</i>	Ungrazed	Grazed			
<i>Shrub Swamp</i>	Sapling	Bushy	Compact	Aquatic	
<i>Wooded Swamp</i>	Deciduous	Evergreen			
<i>Bog</i>	Compact shrub	Bushy shrub	Wooded	Emergent	

Water Regime(s)

- Permanently Flooded* (water covers land surface throughout year in all years)
- Intermittently Exposed* (surface water present throughout year except in years of extreme drought)
- Semipermanently Flooded* (surface water persists throughout growing season in most years)
- Seasonally Flooded* (surface water present for extended periods, especially early in growing season, but is absent by end of season in most years)
- Seasonally Saturated* (soils saturated to surface, especially early in growing season, but are unsaturated by end of season in most years; surface water absent except for ground water seepage and overland flow)
- Temporarily Flooded* (surface water present for brief periods during growing season, but water table usually lies well below soil surface for most of the season)
- Intermittently Flooded* (substrate usually exposed, but surface water is present for variable periods without detectable seasonal periodicity)
- Artificially Flooded* (amount/duration of flooding controlled by dikes, dams, pumps, etc.)

Hydrology

Ground water discharges present? yes no
 Surface water depth: Varies " average 15 " maximum

Soils

Drainage Class(es): Well Moderately Poorly Very Poorly
 Parent Material(s): Glacial till Outwash Glaciolacustrine Alluvial Organic

Slope Nearly level Gentle Moderate Steep

Upland Review Area (URA)

Slope: Nearly level Gentle Moderate Steep
 Cover Type(s): Mature forest Sapling forest Shrub thicket Meadow Mowed lawn Farm
 Vegetation density: Trees Saplings Shrubs Herbs Grass _____
 Leaf litter: Well-developed Moderately well-developed Absent
 Cover objects: Logs Bark Boulders/Rocks
 Evidence of erosion? No Yes (explain)

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
 Inspection Date: 6/11/07

Project: Ponds Place
 Weather:

Photograph(s):
 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	7
Wetland outlet constricted?	yes	no	
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		

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)			
PRINCIPAL FUNCTION? yes no			

Wetland #:

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	dirt roads
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	✓		a stream to the west
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	moderate
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	WS/F
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)			
Cover objects (L=logs/branches R=rocks B=bark)	abundant	few	
Flat rocks in/near watercourse (stream salamanders) - present	present	absent	
Sphagnum hummocks next to shallow pools?	present	absent	
Bare well drained sandy soils near wetland (turtle nest site)	present	absent	
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	None found
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)			
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes (no)			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	None found
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)		✓	
PRINCIPAL FUNCTION? yes (no)			

Notes

APPENDIX 4. SOILS REPORT



HIGHLAND SOILS LLC

June 28, 2007



Dave Ziaks
F.A. Hesketh & Associates, Inc.
6 Creamery Brook
East Granby, CT 06026

**RE: KEYSTONE COMPANIES, LLC
HUNTING LODGE ROAD
MANSFIELD, CT**

Dear Dave:

The inland wetland boundaries on the above-referenced property were field delineated in 2005. In June of 2007 the wetland boundaries and upland soils were field verified. The wetlands were field delineated in accordance with the standards of the National Cooperative Soil Survey and the definition of wetlands as found in the Connecticut General Statutes, Chapter 440, Section 22A-38. I have reviewed the plans prepared by your office and have found the representation of the field delineated wetlands to be substantially correct.

The wetland soils were identified as belonging to the Leicester-Ridgefield-Whitman Complex. These soils range from poorly drained to very poorly drained. The soils formed over a compact to friable glacial till.

The upland soils were identified as belonging to the moderately well drained Woodbridge Series and Sutton Series. A small area of well drained soils of the Charlton Series was also identified on the property.

The soils of the Woodbridge Series formed from a compact glacial till that gives rise to a seasonally perched high water table. The soils of the Sutton Series also have a high water table and overlay a friable and sandy glacial till. The main difference between the two soils is the parent material or underlying glacial till.

The final soil series identified on the property include well drained soils of the Charlton Series. These soils also overlay a friable and sandy glacial till and are deeper to the seasonal water table.

Two areas of previous soil disturbances were noted on the property. An existing crossing of the wetlands by a small dirt road was noted in the system that parallels Hunting Lodge Road. Other man-made soils were noted at the point where Northwood Road intersects the wetlands in the center of the property.

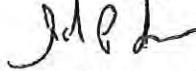
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PAGE TWO
MR. DAVE ZIAKS
JUNE 29, 2007

An existing culvert discharges onto the property along Hunting Lodge Road. The cross culvert conveys surface water from a seasonally ponded area on the east side of the road. The surface flow was not classified as a regulated seasonal watercourse due to the lack of a defined channel with banks. It should be noted that surface water is conveyed from the cross culvert toward the wetlands. Although this area is not classified as a regulated wetland, it should be noted as an area of occasional surface flow.

If you have any questions, or require additional information, please call me at (860) 742-5868.

Very truly yours,



John P. Ianni, M.S.
Professional Soil Scientist
CPESC

APPENDIX 5. DEP NATURAL DIVERSITY DATA BASE



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Natural Resources
Division of Wildlife
79 Elm Street, 6th Floor
Hartford, CT 06106
Natural Diversity Data Base

May 4, 2007

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

re: Apartment Building Complex "Ponde
Place in Mansfield, Connecticut

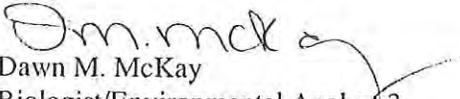
Dear Mr. Pawlak:

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed apartment building complex "Ponde Place" in Mansfield, Connecticut. According to our information, there are historic records of State ~~Endangered~~ *Eremophila alpestris* (horned lark), State Special Concern *Synaptomys cooperi* (southern bog lemming) and *Gyrinophilus porphyriticus* (northern spring salamander) in the vicinity of this project site. I have sent your letter to Jenny Dickson (DEP-Wildlife; 860-675-8130) for further review. Ms. Dickson 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,


Dawn M. McKay
Biologist/Environmental Analyst 3

Cc: Jenny Dickson, NDDB #15260

APPENDIX 6. STORMWATER MANAGEMENT

Introduction

The potential impact of stormwater runoff to wetlands and watercourses, if not addressed in site plans, has been demonstrated by many scientific studies over the past several decades. Numerous Best Management Practices (BMPs) have been developed to prevent the pollution of receiving resources. Many of these are documented in the "Connecticut Stormwater Quality Manual" prepared by the Connecticut Department of Environmental Protection (DEP 2004). Unless otherwise indicated, the information presented in this section was obtained from this manual.

Water Quality Volume

As defined in the DEP manual, the Water Quality Volume (WQV) is "*the amount of stormwater runoff from any given storm that should be captured and treated in order to remove a majority of the stormwater pollutants on an average annual basis.*" The manual defines the WQV as the runoff produced by a one-inch rainfall event, which accounts for approximately 90 percent of the storms in an average year in the northeastern United States. The goal is to treat the runoff from small, frequent storms, which produce the majority of the pollutant load (Horner et al. 1994), while bypassing larger, infrequent storms that generate a small percentage of the pollutant load.

Stormwater Treatment Practices

Primary

The DEP manual notes that when properly selected, sized, designed, constructed and maintained, Primary Stormwater Treatment Practices can:

- capture and treat the design WQV
- remove at least 80% of the average annual total suspended solids (TSS) load
- remove at least 80% of floatable debris (e.g., oil/petroleum products)

The manual lists five groups of Primary Stormwater Treatment Practices (Appendix Table 1).

Secondary

Secondary Stormwater Treatment Practices are not capable of satisfying the water quality criteria listed above, or have not been adequately tested and thus are not suitable as stand-alone measures (Appendix Table 1).

Stormwater Treatment Train

When multiple stormwater treatment practices are combined in a series, the resulting "stormwater treatment train" can improve overall pollutant removal efficiency and/or

satisfy multiple objectives (e.g., groundwater recharge, pollutant removal, channel protection, etc.).

Stormwater Wetlands

Stormwater wetlands are a commonly constructed primary treatment practice. They take advantage of the well documented capacity of natural wetlands to remove water-borne pollutants. Although they often provide multiple benefits (e.g., wildlife habitat, groundwater recharge, floodflow alteration), water quality renovation is their primary objective. Pollutant removal efficiencies of stormwater wetlands as reported in the literature are presented in Appendix Table 2. Removal rates are typically high for suspended solids and attached pollutants, and lower for dissolved constituents (EPA 1993). Appendix Table 3 lists common design criteria for constructed stormwater wetlands.

Appendix Table 1. Stormwater Treatment Practices		
Type	Category	Treatment Practices
Primary	Stormwater Ponds	Wet pond
		Micropool extended detention pond
		Wet extended detention pond
	Stormwater Wetlands	Multiple pond system
		Shallow wetland
		Extended detention wetland
	Infiltration Practices	Pond/wetland system
		Infiltration trench
	Filtering Practices	Infiltration basin
		Surface sand filter
		Underground sand filter
		Perimeter sand filter
	Water Quality Swales	Bioretention
		Dry swale
Wet swale		
Secondary	Conventional Practices	Dry detention ponds
		Underground detention facilities
		Deep sump catch basins
		Conventional oil/particle separators
		Dry wells
		Permeable pavement
		Vegetated filter strips & level spreaders
	Innovative/Emerging Technologies	Grass drainage channels
		Catch basin inserts
		Hydrodynamic separators
		Media filters
		Underground infiltration systems
		Advanced treatment

Note: From Connecticut DEP Stormwater Quality Manual

Appendix Table 2. Percent Pollutant Removal by Stormwater Wetlands				
Parameter	Winer (2000)	Schueler and Holland (2000)	Strecker et al. (1992)	EPA (1993)
TSS	83	----	80.5	65
Total Phosphorus	43	----	----	25
Soluble Phosphorus	29	----	58	
Total Nitrogen	26	----	----	20
Ammonia Nitrogen	----	----	44.5	----
Nitrate & Nitrite Nitrogen	73	----	----	----
Bacteria	----	78	----	----
Hydrocarbons	----	85	----	----
Copper	33	40	----	----
Zinc	42	44	42	35
Lead	----	68	83	65

Note: EPA (1993) data are average values, all others are median values.

Appendix Table 3. Stormwater Wetlands Design Criteria

Parameter	Design Criteria	Reference
Side Slopes	3:1 or flatter	DEP (2003)
Length to Width Ratio	3:1 minimum to maximize flow path of stormwater	DEP (2003); Horner et al (1994)
Pretreatment Volume	Forebay (at inlet) and micropool (at outlet) should each contain at least 10% of the WQV	DEP (2003); DEC (2003)
Storage Volume	Ideally the basin should fully retain the WQV	DEP (2003)
Drainage Area	At least 25 acres	DEP (2003)
Surface Area	<ol style="list-style-type: none"> 1. 5% of drainage area 2. 2-3% of drainage area 	DEP (2003)
Water Depth	<ol style="list-style-type: none"> 1. Maximum depth of retained water should be 0.5-1.5'. Forebay & micropool depth can be 4-6'. 2. Forebay & micropool: 12-71"; Low Marsh: 6-12 cm; High Marsh: 0-6 cm 3. 6" water depth optimal for shallow marshes 4. Minimum of 35% of total surface area can have depth of ≤6", and at least 65% of total surface area should be ≤18". 	Schueler (1987) <ol style="list-style-type: none"> 1. DEP (2003) 2. Schueler (1992) 3. Schueler (1987) 4. DEC (2003)