

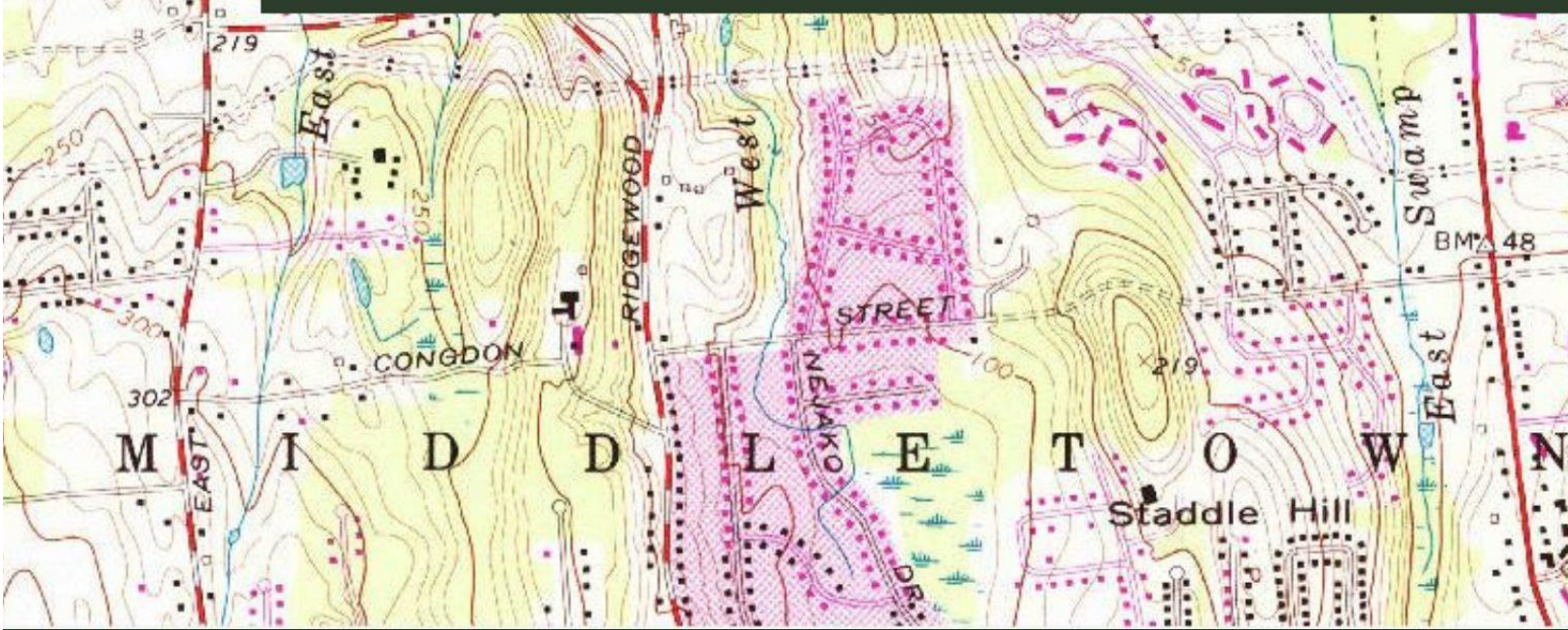
# NATURAL RESOURCES INVENTORY

RED MAPLE SWAMP PROPERTY: MILE LANE  
MIDDLETOWN, CONNECTICUT



**Connecticut**  
Resource Conservation  
& Development

FEBRUARY 2023





## Table of Contents

Acknowledgments_____	4
Introduction_____	6
Watershed Context _____	7
Geology _____	12
Soils and Wetlands _____	18
Herpetological Assessment_____	26
Natural Diversity Database (CTDEEP)_____	36
Invasive Management and Pollinators_____	37
Planning Considerations _____	39
• Consistency with Connecticut, RiverCOG and Middletown Plans of Conservation & Development	
• Transportation and Accessibility	
• Planning Recommendations	

*(All site photos were taken by CT RC&D staff unless stated otherwise. Cover photo provided by the USGS TopoView website)*



ERT Team- Site Visit 2022

## Acknowledgments

This report is the product of a request from the City of Middletown Conservation Commission to CT Resource Conservation and Development's (CT RC&D) Environmental Review Team (ERT) program. The CT RC&D Environmental Review Team program is a free service for Connecticut municipalities and land trusts to obtain baseline environmental data and best management practices for town properties or properties of significant interest for existing or future development or conservation. The ERT program is funded by the CT Department of Energy and Environmental Protection (CT DEEP) Passport to the Parks Program as well as CT RC&D.

CT RC&D would like to acknowledge and express their appreciation for the important work of the following Environmental Review Team members. Their professionalism and expertise were critical to the analysis of the Red Maple Swamp – Mile Lane Property for the Middletown Conservation Commission.

The field reviews were conducted on from Jun 2022 through November 2022

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Invasive Species Management Overview and Pollinator Pathway guidance was derived from expertise provided in past projects by **Todd Mervosh and Dr. Charlotte Pyle**, specialists in this subject area. They are leaders in the Connecticut Invasives Plants Working Group and for more specific management should be consulted. <https://cipwg.uconn.edu/>

Prior to the review day, each Environmental Review Team member receives a summary of the proposed concepts or projects anticipated for the property along with various information and geographic information maps. Some team members made separate visits to the site following the initial ERT review. Reports from each team member were submitted to the CT RC&D Environmental Programs Coordinator for compilation and editing into this final report.

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

An additional valued resource for conservation information is the Connecticut River Coastal Conservation District. <https://www.conservect.org/ctrivercoastal/>

The CT RC&D Council hopes you will find this report of value and assistance in providing information to the Middletown Conservation Commission. If you require additional information, please contact:

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## Introduction

The Town of Middletown reached out to CT RC&D Environmental Review Team to gain insights into natural resources located at the Red Maple Swamp Property owned by the City of Middletown and managed by the Middletown Conservation Commission. The overall goal was to evaluate natural resources toward a permanent conservation easement for the property as evidenced through inventory of the property's natural resource and recreational value, land use patterns, adjacent properties, climate change mitigation, and public access.

The specific issues the Town wanted to address in the ERT report include:

- Land Use Context
- Soils
- Topography
- Traffic and Access
- Geology
- Vernal Pools/ Wetlands
- Herpetology
- Invasive Species -Pollinators
- Watershed

This ERT report is provided to help land use professionals, stakeholders, land trust and town officials make environmentally responsible decisions toward future management of these current parcels.



## Watershed Analysis

**Kelly Starr**

**Natural Resource Specialist, CT River Coastal Conservation District**

The Red Maple Swamp property is a 164.74-acre property that is mostly undeveloped, with the exception of Lawrence School and associated parking and access road. The Middletown Commission on Conservation and Agriculture would like to preserve the undeveloped portion (approx. 161 acres) with a conservation easement to prevent further development of the parcel to protect the property's natural resources and water quality.

Even though the parcel is in a fairly developed and urbanized area there are several significant natural resources present. These include an extensive wetland system, vernal pools, and West Swamp Brook, which runs along the western property boundary and to the south of the wetland. The majority of the undeveloped portion of the parcel is forested and there is a small area of maintained grass (not associated with the school) to the north of the wetland. The Mattabesset River and Cromwell Meadows are located approximately 4,000 feet to the east of the parcel. The site topography is fairly flat and low-lying, with the contours of the surrounding land to the west and south sloped towards the parcel.

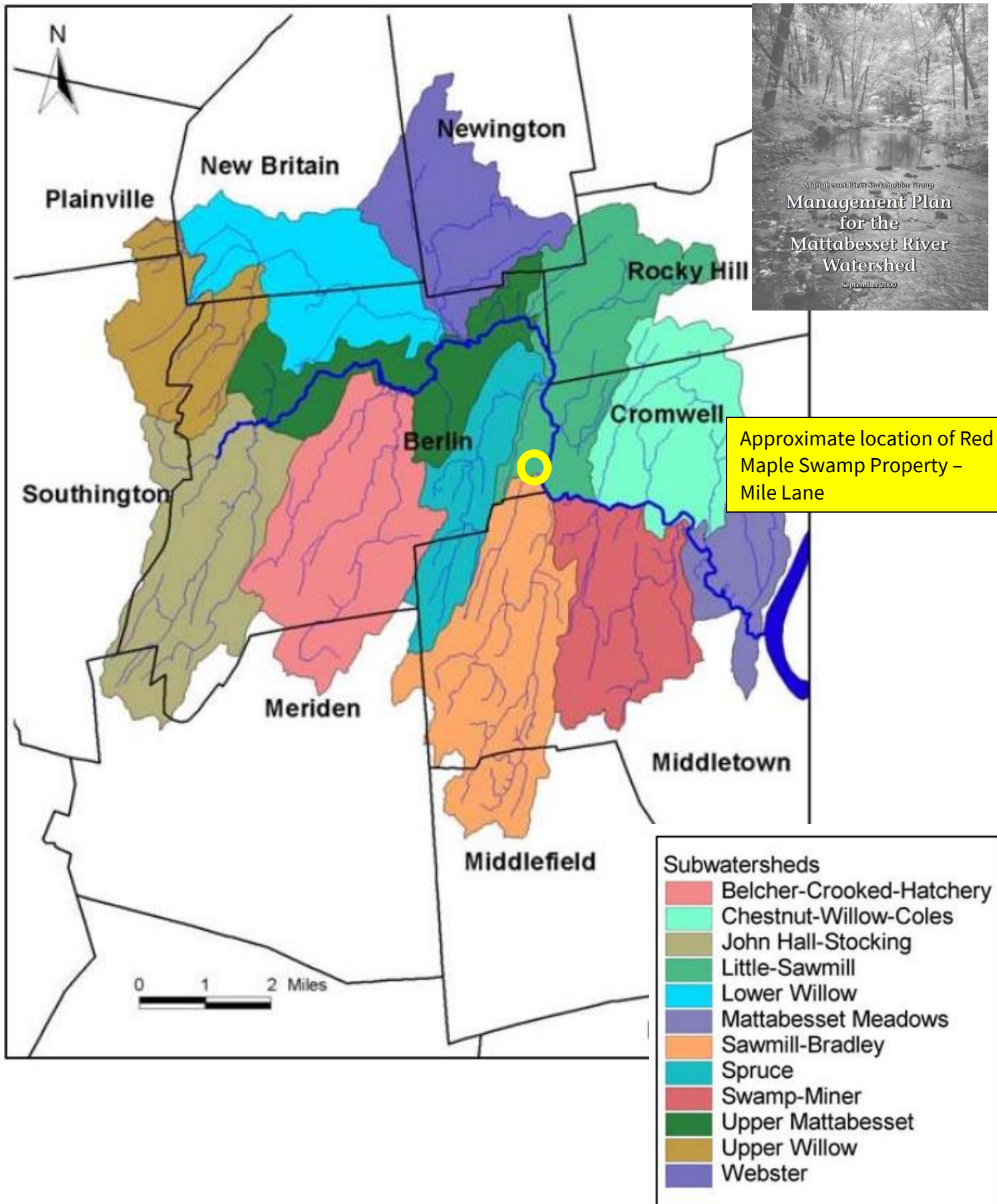
The property is in the Mattabesset River Watershed (regional drainage basin), which encompasses ten towns (Newington, New Britain, Plainville, Southington, Berlin, Rocky Hill, Cromwell, Middletown, Middlefield, and Meriden); and eight subregional drainage basins (Mattabesset River, Belcher Brook, Willow Brook, Webster Brook, Sawmill Brook in Middletown, Cuginchaug River, Sawmill Brook in Durham, and Allyn Brook. The Mattabesset River Watershed and all the contributing basins/watersheds are located in the Connecticut River Major Basin. The property is within the 32.82 square mile Mattabesset subregional drainage basin.

The Mattabeset River Watershed is a much-studied area, which has been the target of ongoing protection and restoration efforts. A comprehensive watershed management plan was developed for the Mattabeset in partnership with the watershed towns, state and federal agencies, and other stakeholders. Goals of the management plan include: "To restore and maintain fishable and swimmable conditions in the Mattabeset River Watershed consistent with the goals of the state water quality standards;" and "To encourage and promote land use most appropriate to ensuring the protection and improvement of water quality, habitat, and recreation opportunities through partnership with public and private entities." The plan was officially endorsed and adopted by the City of Middletown in 2002. The CT Coastal Conservation District provided a summary report in 2007 of the sub watershed which provides an quick introduction overview. <https://www.conservect.org/wp-content/uploads/2018/01/CSA-summary-report.pdf>

The Mattabeset River is on the state's list of impaired waters and does not meet the criteria in the water quality standards for recreation and aquatic life due to high levels of bacteria and habitat changes. In more urbanized watersheds, such as the Mattabeset Watershed, nonpoint source pollution associated with changes in site hydrology and increases in stormwater run-off from development have been identified to have water quality impacts. Two different mapping resources were used to determine the land use/cover of the watershed and the overall health of the basins within the watershed. More details about the resources are provided below.







To determine the land use/cover of the watershed, the UConn Environmental Conditions Online, Land Cover and Change GIS data layer (<https://cteco.uconn.edu/ctraster/rest/services/landcover>) was consulted. Although the data are from 2015 and not up-to-date, the information is still helpful to establish a baseline that quantifies the land cover/use of the watershed. The information in this layer uses the hydrologic units (HUC) and in this dataset the property is located in the Lower Mattabesset River Watershed, which is approximately 40 square miles. The land use/cover is mixed with the majority of the Lower Mattabesset River Watershed being developed (30.1-50%), followed by forested (25.1-40%), turf and grass (15.1 - 20%), and agricultural fields (4.1-8%). The impervious cover of the Lower Mattabesset Watershed is 11-15%. The 2004 Connecticut Stormwater Quality Manual indicates, "Research has shown that when impervious cover in a watershed reaches between 10 and 25 percent, ecological stress becomes clearly apparent, beyond 25 percent, stream stability is reduced, habitat is lost, water quality becomes degraded, and biological diversity decreases." The Lower Mattabesset River Watershed is 11-15% impervious cover, which is within the range where impacts to the watershed can be observed.

More information about the health of local water resources is available through the new Center for Land Use and Research (CLEAR) GIS-based [Local Watershed Assessment Tool](#). This tool looks at three types of land cover within the watershed and also in the 100-foot distance on either side of the riparian area: natural land, agriculture or ag-like land, and impervious cover. CLEAR used these data to determine the probable health of the watershed and developed the Combined Condition Index (CCI). The CCI considers the three types of land use data and also the CT DEEP Macroinvertebrate Multi-Metric Index that is used to assess the health of a stream by the macroinvertebrates that are present. The CCI range is from 0 – 1. A healthy watershed has a CCI over 0.75. The Mattabesset River watershed, and the smaller basins adjacent to the parcel, have CCIs ranging from 0.14 -0.42, which indicates the watershed is experiencing impacts from the surrounding land use.

The assessment tool also provides an Enrichment Factor (EF) for each basin. CLEAR defines the EF as a measure of how much nitrogen (N) is estimated to be in the basin's waters compared to a theoretical baseline level of a natural/unaltered watershed. The EF for the Mattabesset River Watershed, including the smaller basins surrounding the parcel, ranges from 5.02 to 10.81. According to the tool, an EF of 5.02 means the N load produced by the watershed is 5.02 that of a natural watershed.

The assessment tool uses the CCI data to determine a Recovery Category, which is the suggested land use strategy for a watershed based on the current CCI value.

CLEAR defines the three Recovery Categories as:

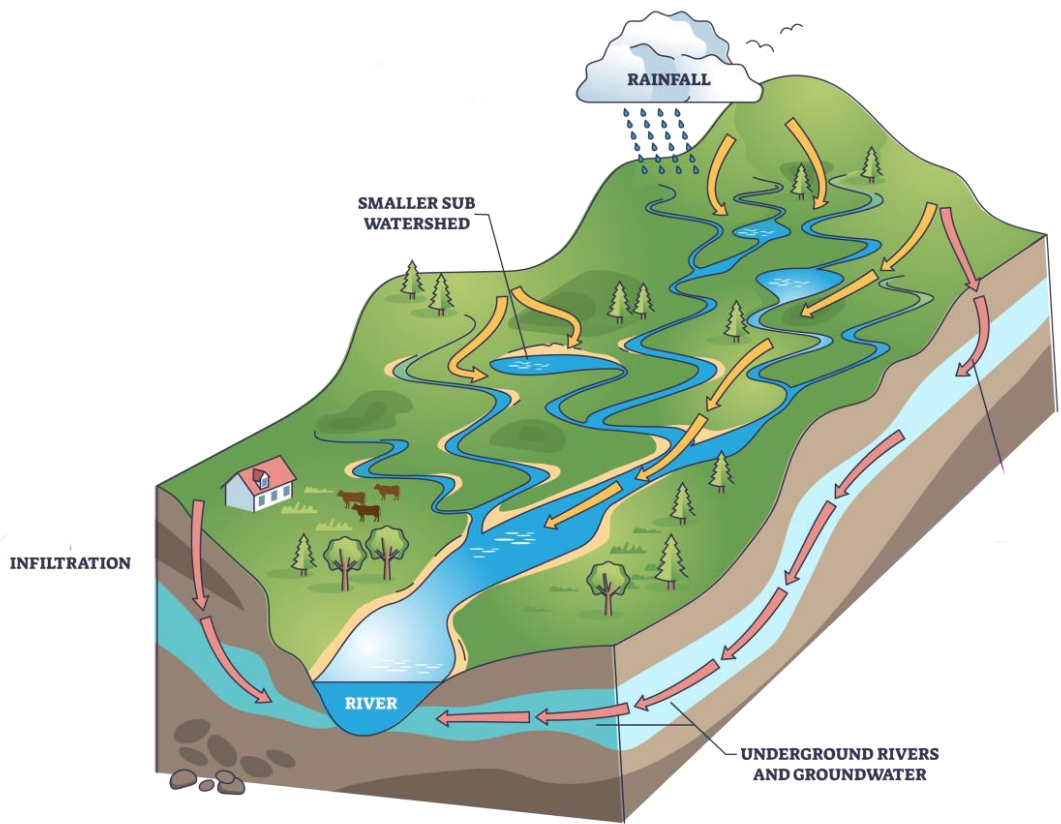
- Conservation - if CCI is greater than 0.75. This means the health of the watershed is likely to be good and should be protected by land conservation and riparian protection strategies.
- Recovery - if the CCI is between 0.43 and 0.75. This means the health of the watershed is likely to be impaired but could be improved with conservation and reforestation of key areas and riparian restoration.
- Mitigation – if CCI is less than 0.43. This means the health of the watershed is likely to be significantly impaired but can be improved with an emphasis on restoration activities within the riparian zone and projects such as those designed to increase the urban tree canopy.

The recovery category is “mitigation” for the smaller local basins surrounding the parcel. However, it should be noted that there are a few local basins in the Mattabesset Watershed that are in recovery and conservation categories. In these basins the impervious cover is considerably lower and there are more natural areas. See category descriptions above.

Both of these resources point to the impacts of development, which result in an increase of impervious cover in a watershed and have a significant impact on water quality. When an area is developed, the natural drainage patterns are changed, impervious surfaces concentrate the stormwater, preventing infiltration and increasing the amount of water that is flowing across the ground surface, and picking up pollutants and sediment that will eventually flow into receiving waters. The changes in infiltration also affect groundwater recharge and the base flow of streams, and contribute to an increase in flooding, especially downstream. The changes in the landscape due to development also result in the loss of vegetated buffers. These buffers help reduce erosion; and filter sediment and nutrients/pollutants by slowing the flow of surface water, allowing sediment to settle out and be trapped.

One of the objectives of the watershed management plan is to “Assist in the protection of open space through acquisition or other means to improve ecosystem health and enhance aesthetics within the watershed.” The watershed management plan further states, “Acquiring and protecting undeveloped land is an effective method for preserving critical habitat. In the Mattabesset River Watershed, natural areas that are most easily damaged by urban and suburban development include wetlands, floodplains, forests, and traprock ridges. These habitats can be protected through purchases, easements, and tax breaks.”

Preserving the undeveloped portion of the parcel with its extensive wetland system will help to address the objectives of the watershed management plan by protecting the natural resources identified on the parcel, maintaining the natural/existing drainage of the area, and allowing the parcel to continue to function as a buffer, which will help protect water quality in the local watershed and downstream waters, including the Connecticut River.



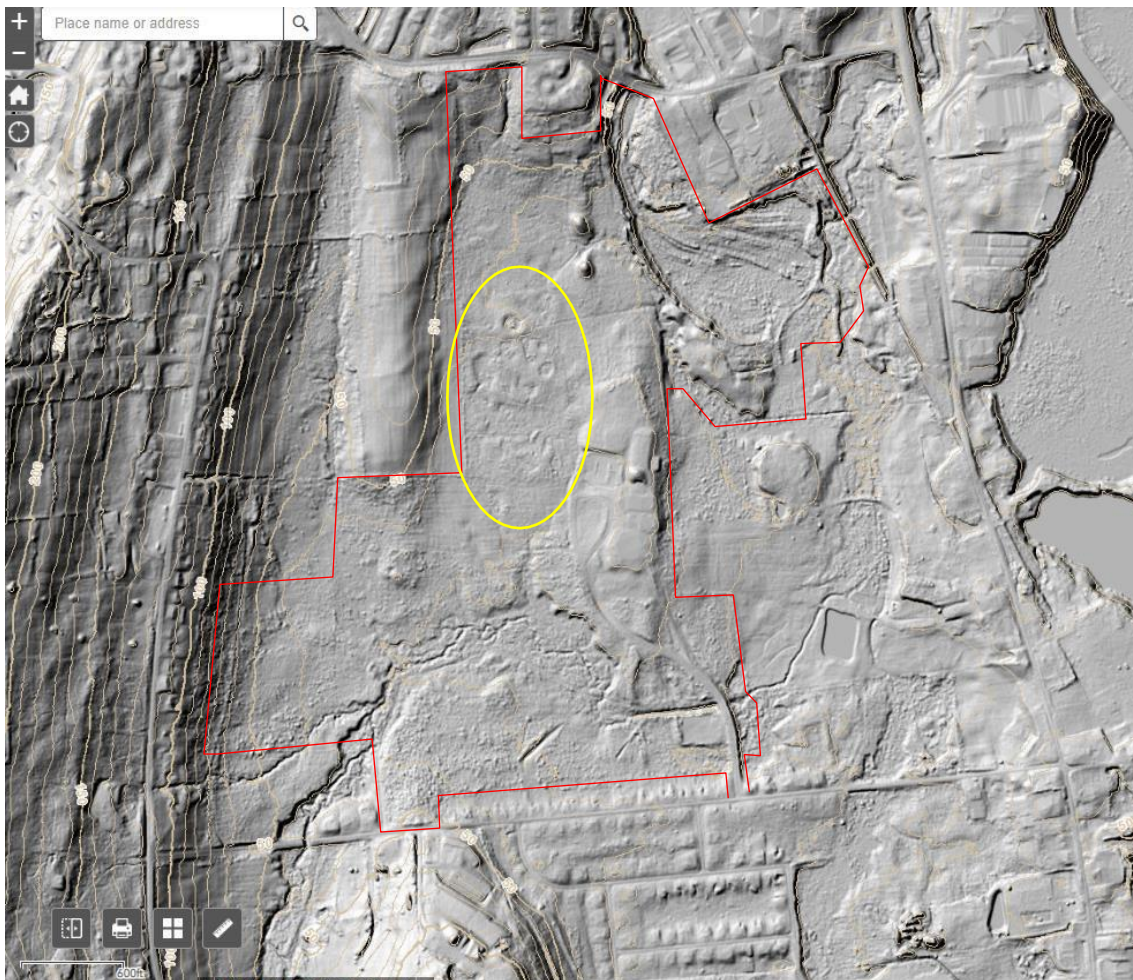
# Geology

**Randolph Steinen**

**Geologist, Connecticut Geological Survey (Retired CTDEEP)**

## **Topography and Geology of Red Swamp properties of the Town of Middletown.**

The geological story of the Town of Middletown's Red Swamp property is mostly about the history of the end of the last Ice Age (Pleistocene Epoch): bedrock is not exposed on the property. The immediate area is low lying wetland surrounding glacial drumlin-shaped hills. Most of the property has an elevation of less than 40 feet above sea level. The elevation of the Lawrence School grounds is only 40-41 feet except for a small 8-foot-high hill of soil likely excavated from the building site and stock-piled north of the buildings. Two additional 8-10' hills of soil are found on the northern part of the property adjacent to commercial development and likely are similar stockpiles. The ground surface rises to about 80 feet elevation along the far western border of the property.



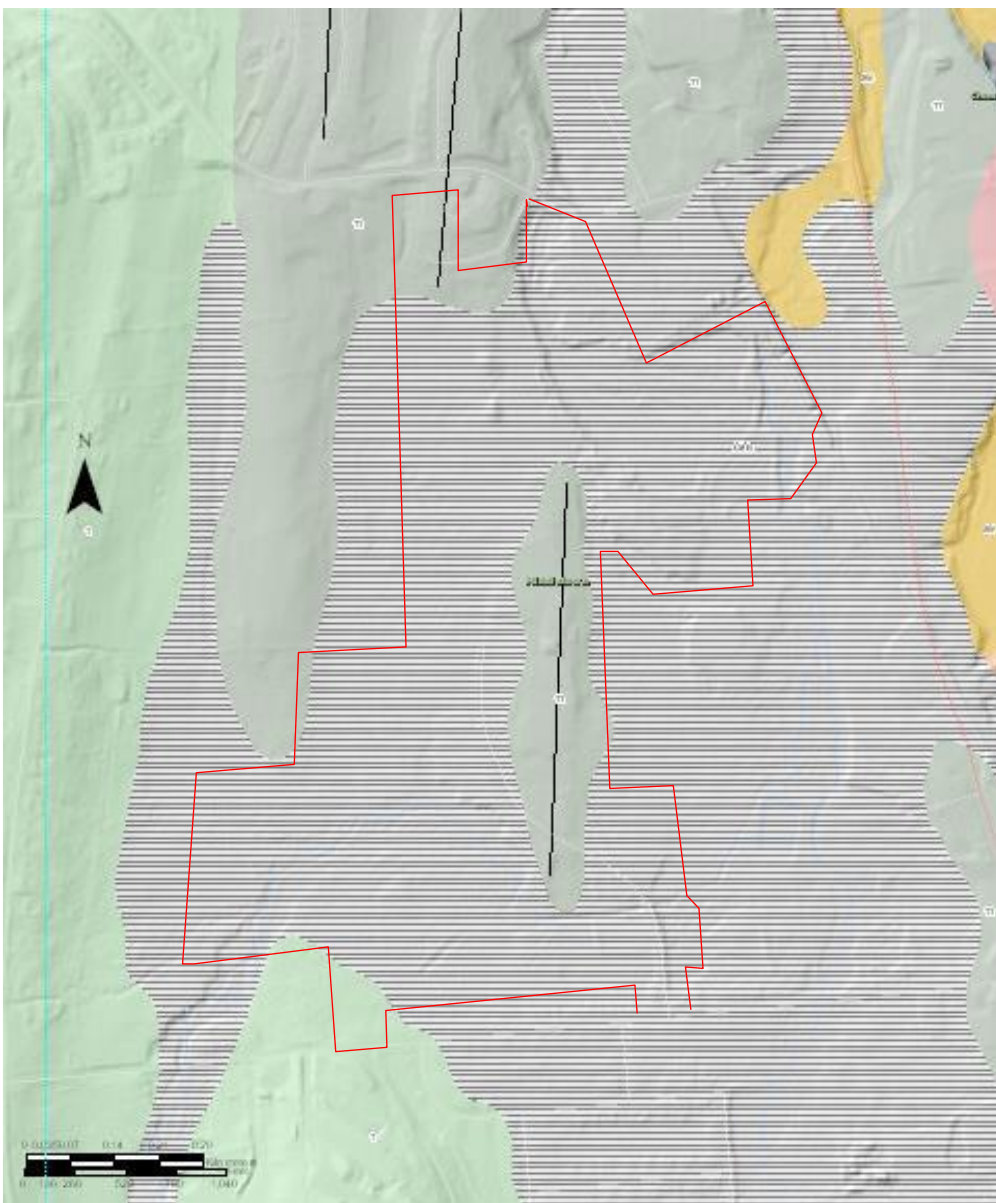
*Figure 1. Hillshaded LiDAR image with 5' topographic contours showing Red Swamp properties and surrounding area. LiDAR image can be thought of as a black-and-white photograph of the ground surface without trees or buildings providing a view of the lay-of-the-land. Property boundary (red) only approximate. Lawrence School (L) is in the middle on a low drumlin. Larger drumlin in NW sector is shown as Figure 3. Yellow circled is a field of pingo scars. See Appendix Figure 1 for topographic map without the LiDAR image.*

## Bedrock geology

Bedrock (ledge) is not exposed on the property but is exposed west of the property. The area lies within the Mesozoic Hartford Basin. The youngest of the three basin lava flows, the Hampden Basalt, is exposed along the low hills west of Red Swamp (Lehman, 1959). It is tilted downward toward the east and is covered by Pleistocene sediments at or immediately east of the western border of the Red Swamp property. The Hampden Basalt is overlain by the Portland Arkose which is buried by the Pleistocene sediments under all rest of the property.

## Pleistocene geology

Unconsolidated sand, mud, and gravel overlie the bedrock throughout the entire property. The lower wetlands are underlain by silt and clay deposited in a glacial meltwater lakes at the end of the last Ice Age. The higher elevations (only 10-20 higher than the wetlands) are underlain by glacial till.



*Figure 2. Quaternary geological map of the Red Swamp properties (boundary in red approximate). Area colored green is glacial till. Gray color (TT) is thick till, pink is alluvium on old river terrace, orange is modern alluvium, black ruled pattern is lake bottom sediments of glacial Lake Middletown. Solid black lines are drawn through the central point of drumlins parallel to the direction of inferred ice movement.*

Two N-S elongate hills composed of glacial till stand 10-20' higher than the surrounding wetlands (Figure 3). The easternmost hill is the site of Lawrence School. The westernmost hill is the site of a hay-field. Only the southernmost end of the western hill is part of the property. Both are composed of thick glacial till and are classified as drumlins (Stone and others, 2005; Stone 2013). Glacial till is composed of unsorted sand, gravel and mud that originated as ground-up rock that was eroded by the Ice Age glaciers. Till was deposited by the glacial ice either beneath the active glacier or as residue left behind when the ice melted. Drumlins, however, are composed of till that was deposited beneath actively moving ice that shaped the till into an elongate hill.

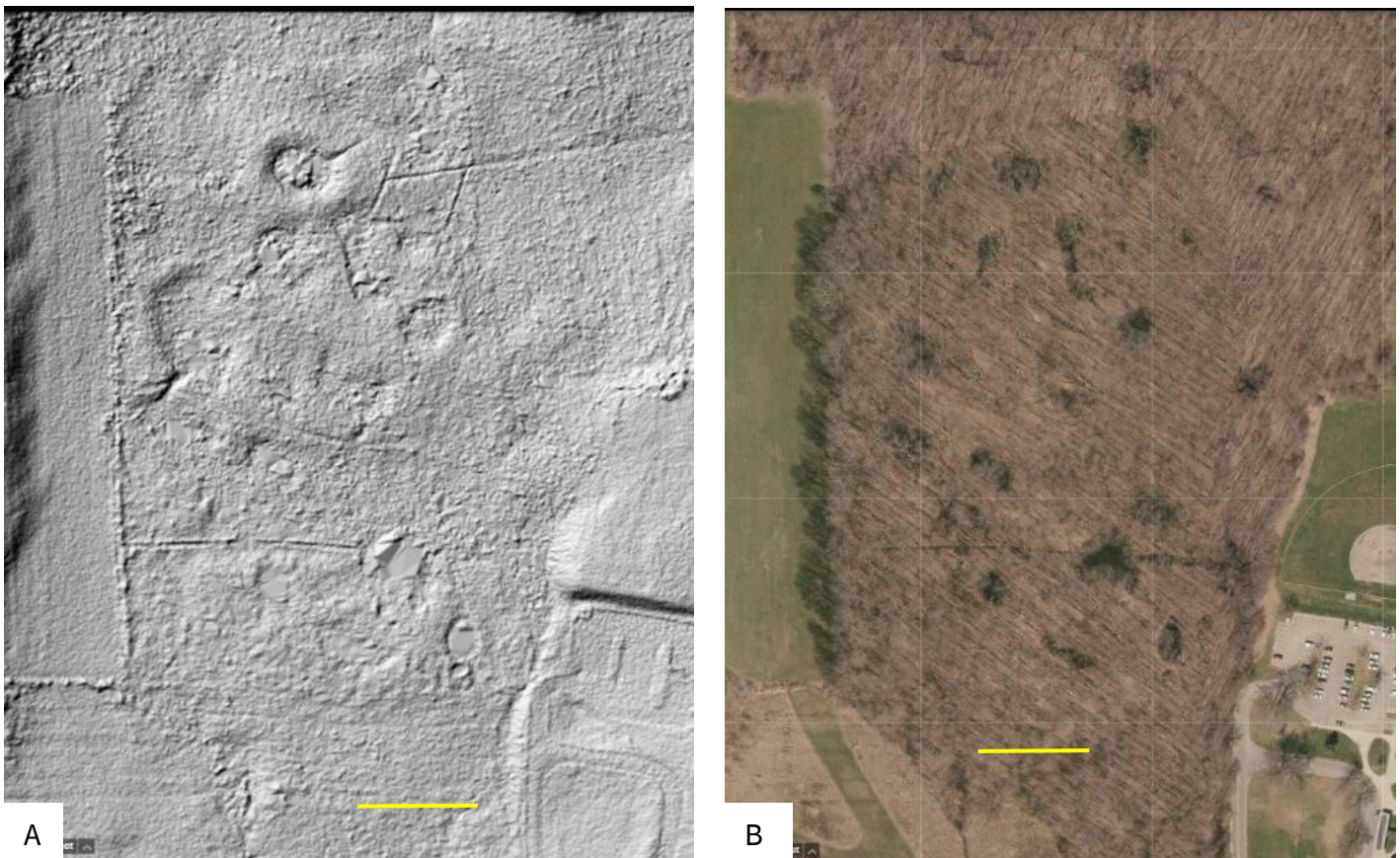
The southern shore of Long Island was the greatest extent to the last Ice Age glacier. It began melting back (toward the north) about 21,000 years ago and had melted north of Middletown by about 18,000 years ago. At that time, glacial till and sand and gravel deposits filled the gorge of the Connecticut River just east of Middletown, impounding glacial meltwaters forming a lake, glacial Lake Middletown. Meltwater streams and rivers carried glacial debris into the lake. The coarse material, sand and gravel, was deposited on deltas where each stream entered the impoundment. Silt and clay were swept by cold, dense water currents to the bottom of the lake. The wetland areas of Red Swamp are all underlain by layers of silt (deposited during the warm summer months) and clay (settled out during the winters). Continuous layers of the lake bottom sediments, recovered by U.S. Geological Survey scientists, consist of annual couplets of silt and clay (Stone, 2013, p. 29-31, Figure 28; Stone and others, 2015, p. 35-37), called varves. Varves can be used as time markers similar to tree-rings. The survey scientists cored 75 feet of varves that were deposited on reddish till about a half mile east of the properties and 39 feet of varves



Figure 3. Longitudinal mosaic (A) and cross-sectional (B) profile of westernmost drumlin. The drumlin stands only 20 feet higher than adjacent wetland floor. Review team members for scale in B.

immediately east of Lawrence School. More than 171 years of lake history were sampled by government scientists. Lake Middletown predated the more famous glacial Lake Hitchcock by more than 1000 years (Stone, 2013; Stone and others, 2015) and was shorter lived than Lake Hitchcock. Clay and silt were extracted in pits on Newfield Street northeast of the Red Swamp property. The LiDAR image (Figure 1) shows an excavation that also may have been a clay pit near the northeastern corner of the Red Swamp properties.

Numerous circular and somewhat circular vernal pools, 10-50 feet in diameter, dot the wetland west and northwest of Lawrence School (Figure 4). Many have slightly elevated (by only inches) rims surrounding them. In other areas of Connecticut, lake bottom sediments contain similar rimmed depressions that have been interpreted as pingo scars (Stone and Ashley, 1992, p.311-315). Indeed, Stone (2013, Fig. 29) interprets the vernal pools northwest of Lawrence School as pingo scars noting that this is evidence for a climate cold enough to support permafrost when Lake Middletown drained.



*Figure 4. LiDAR image (A) and aerial photograph (B) of pingo field north west of the Lawrence School, part of which can be seen in lower right. Yellow scale bar in both is 200 feet.*

Pingo formation is a permafrost phenomenon in modern cold areas where former lakes recently drained. As saturated lake-bottom sediment freezes, water (unfrozen) accumulates in circular pockets, eventually leading to large frozen pockets of ice. The melting of those pockets of ice leave circular scars in the lake bottom sediment (see Appendix Figure 2; for another detailed explanation see Stone and Ashley, 1992, p. 315).

Pingo fields are a rare feature in Connecticut. This particular group has been preserved while others in Connecticut have been lost already to development.

## References

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Stone, J.R., 2013, Quaternary Geology of Connecticut. Geological Society of Connecticut Fieldtrip Guidebook #4, 45p.

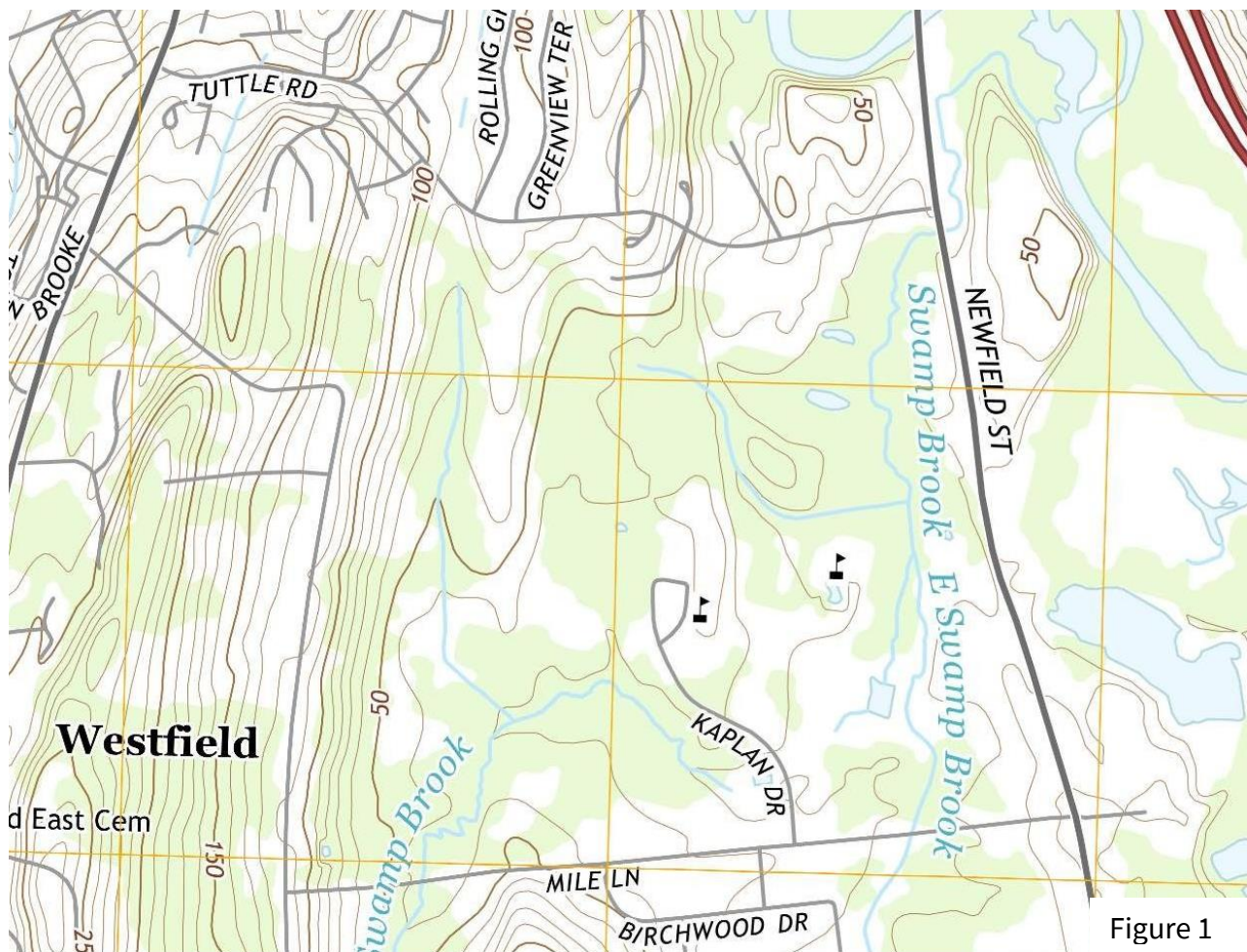
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## Appendix.

Appendix Figure 1. Topographic map of Red Swamp area. Contour interval 10 feet.





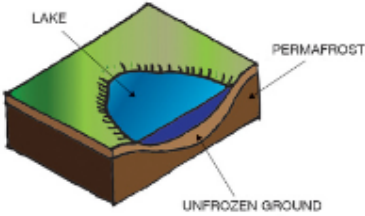
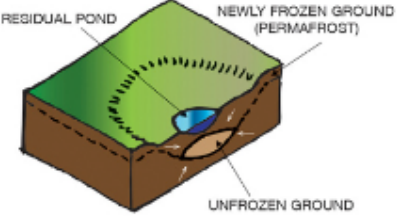
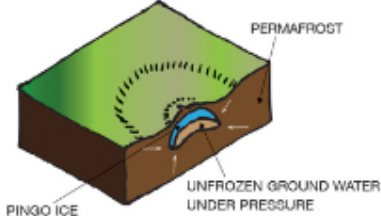
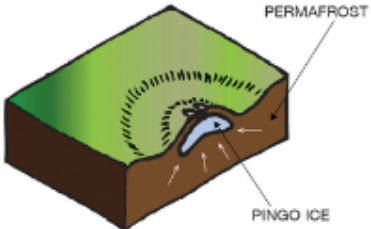
How Pingos Grow	
<p>A layer of unfrozen ground lies beneath most arctic lakes, since they are often too deep to freeze through to the bottom in winter. This year-round presence of water thaws the permafrost.</p>	
<p>When a lake drains, a shallow residual pond is often left behind. The former lake bed begins to freeze, but the remaining water slows the development of permafrost around it. As the lake bed freezes, the water in the ground turns to ice and expands. The extra water cannot escape, so it pushes inward toward the centre, ahead of the freezing front. (see arrows)</p>	
<p>The freezing front advances inward, placing the encapsulated "lens" of water under pressure. The thin layer of permafrost above the lens is pushed upward and the pingo begins to grow.</p>	
<p>The pingo is fully formed and stops growing when it is frozen solid. The unfrozen ground becomes permafrost. Now the pingo's core is almost pure ice.</p>	

Figure 2

Appendix Figure 2. Diagram explaining the formation of pingos. Source noted at bottom of illustration. <https://www.pc.gc.ca/en/lhn-nhs/nt/pingo/Environment/formation>



## Soils and Wetlands

**Edward Pawlak**

**Registered Soil Scientist- Certified Professional Wetland Scientist**

**Connecticut Ecosystems LLC**

### **Introduction**

Connecticut Ecosystems LLC inspected the subject property on several occasions in 2022: June 22, July 5, August 10 and September 26 in order to characterize the wetlands and watercourses contained therein, assess their functional values, and develop management recommendations for them.

### **Soils**

The characteristics of the soils on the property were investigated in various locations with a soils auger. The NRCS Soils Map (Appendix 1) shows three wetland soil map units on the subject property:

- Rippowam fine sandy loam (#103) - these poorly drained soils are derived from alluvium and occur on nearly level floodplains.
- Raypol silt loam (#12) - these poorly drained soils are derived from glacial outwash and occur on nearly level to gently sloping landscapes.
- Bash silt loam (#104) - these somewhat poorly drained alluvial soils occur on nearly level floodplains.

The dominant non-wetland soil unit on the subject property is Berlin silt loam (#26). This moderately well drained and somewhat poorly drained soil is formed from silty and clayey glaciolacustrine deposits. They occur on nearly level to moderately steep landscapes.

### **Wetland Characterization**

The National Wetlands Inventory (NWI) Map shows the locations of the wetlands on the subject property, as interpreted from aerial photography by the U.S. Fish and Wildlife Service (Figure 1). Table 1 interprets the symbology used on the map. The legend on the map provides the broad scale classification of these wetlands. Zooming in on the map provides more granular information about the wetlands. Specifically, they are characterized as either temporarily flooded or seasonally flooded/saturated. Some of the wetlands have been partly drained, as indicated by shallow linear ditches that were observed in some of the wetlands.

The wetlands on the property belong to three broad classes: deciduous forested swamps, scrub-shrub swamps, and emergent marshes. The forested swamps are located on the central and eastern portions of the property. The dominant vegetation in the swamps is red maple, spicebush and skunk cabbage, with a strong representation of invasive shrubs (especially multiflora rose).

A large emergent marsh at the north end of the property is dominated by an invasive plant (common reed). The marshes and scrub-shrub swamps on the western portion of the property were not inspected due to lack of access from the west and south, and extremely dense shrub and vine thickets that blocked access from the east.

### **Vernal Pools**

As discussed in detail in another section of the report, the property contains a unique assemblage of seasonally flooded shallow depressions to the west and northwest of the school and parking lot (Figure 3). This cluster of pools was inspected by Hank Gruner, Herpetologist and Edward Pawlak, Professional Wetland Scientist on several occasions in the summer of 2022 (Gruner had surveyed them previously, as described in this report). These pools retain surface water for varying lengths of time. For example, some were completely dry on July 5 (Photo 1), several held water on July 5 (Photos 2 and 3) while one retained a shallow pool of water more than one month later. These pools owe their existence to the soils and topography that characterize this central portion of the site. The soils are formed from the deposits of a glacial lake that covered this entire area during the last Ice Age. As such, the soils are fine-grained (silt loam) and characterized by a slow permeability. The very gentle to nearly level slopes found in landscapes with glaciolacustrine soils causes surface water to be retained within shallow depressions. This explains the numerous small seasonally flooded pools in the forest to the west of the school (Figure 3).

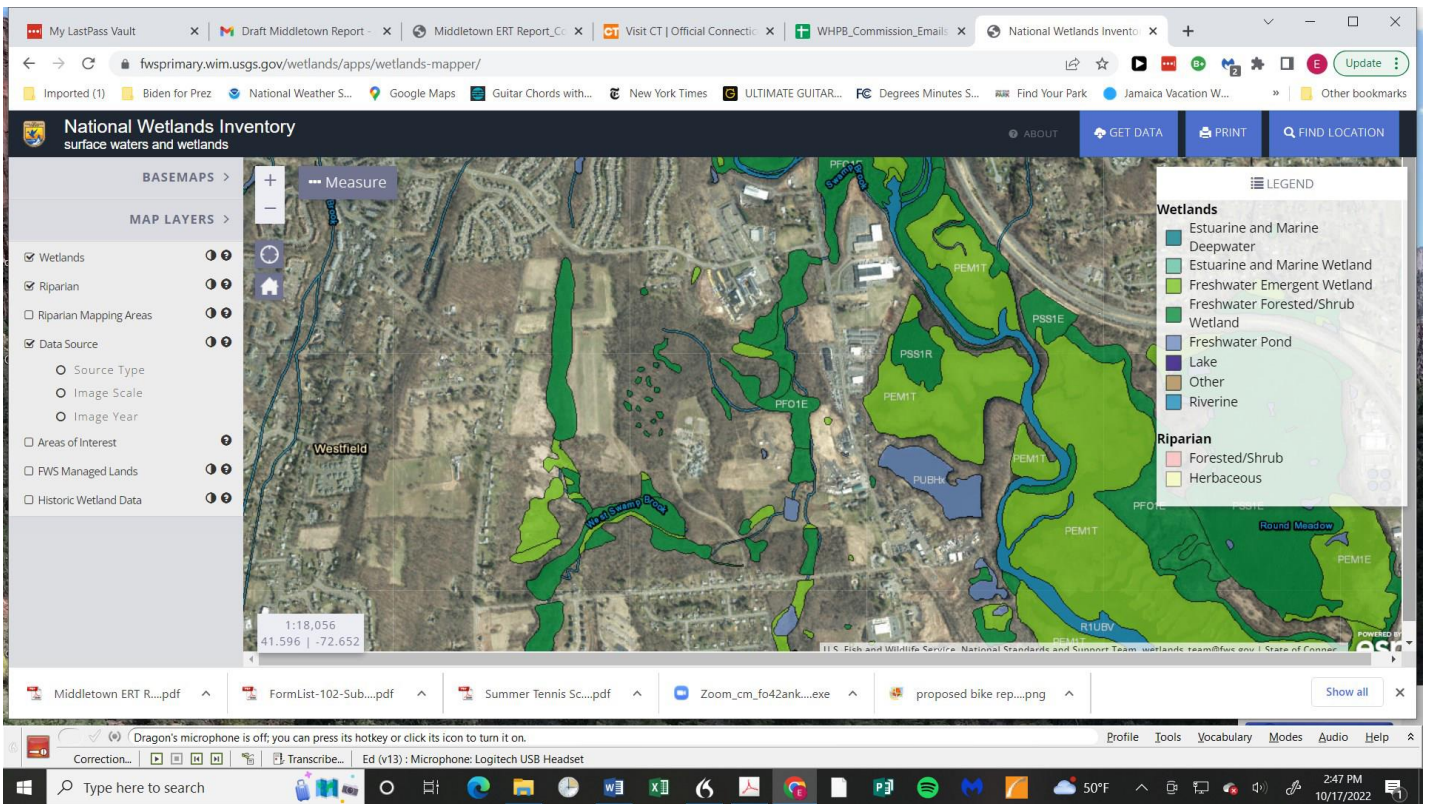


Figure 1. - National Wetlands Inventory Map - Middletown ERT Middletown, CT -Connecticut Ecosystems LLC

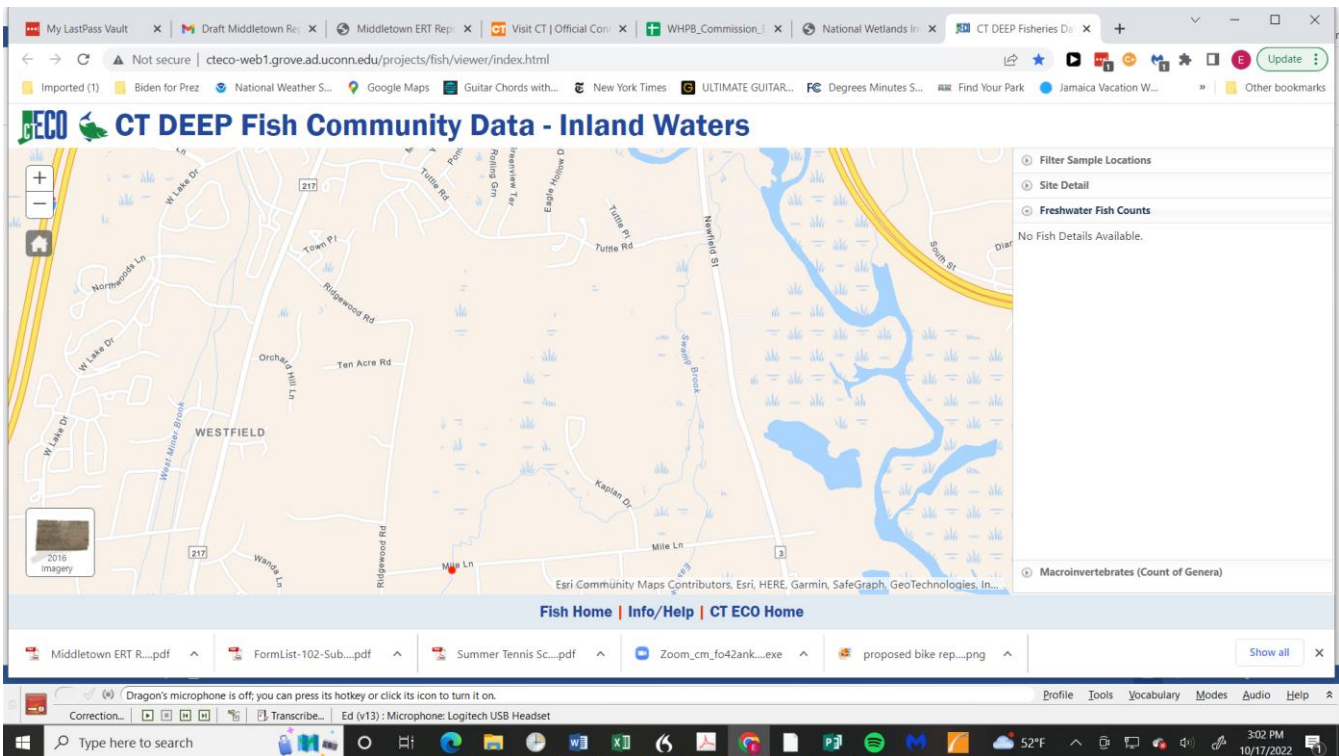


Figure 2. Watercourses Map -Middletown ERT Middletown, CT - Connecticut Ecosystems LLC

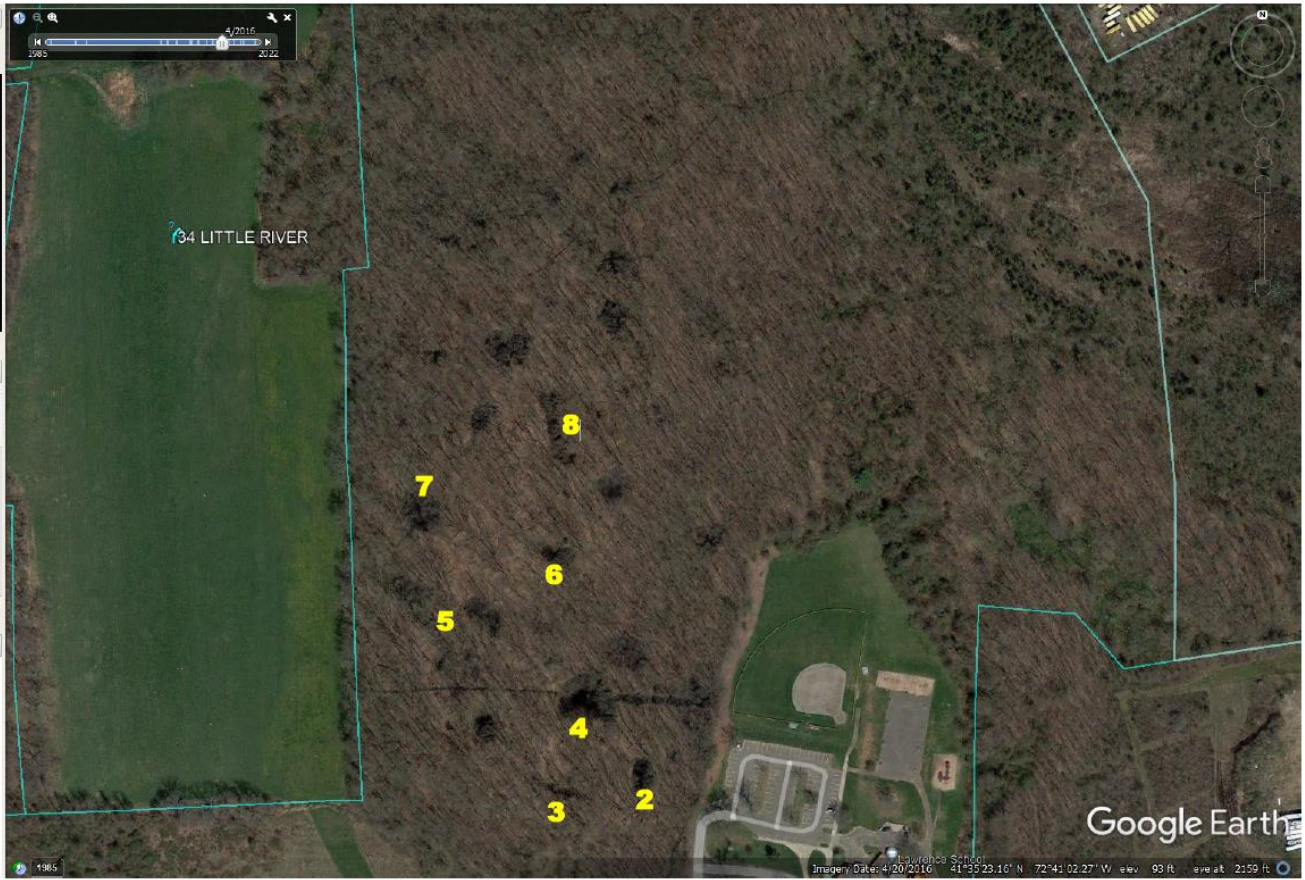


Figure 3. Vernal Pool Map - Middletown ERT - Connecticut Ecosystems LLC





Middletown ERT 7/5/22 1. Dry pool, note water-stained leaves 2. Unvegetated pool with small pocket of inundation 3. Vegetated pool with shallow water 4. *Ambystoma* sp. salamander larva collected from one of the pools

### Wetland Functions and Values

The wetlands on the subject property provide a variety of functions/ecological services:

- Groundwater Discharge and Recharge - Active wetland groundwater discharges support the baseflow of Swamp Brook, West Swamp Brook, and ultimately the Mattabeset Rivers off-site to the east. These groundwater discharges also modulate the water temperature of these resources, which is critical to the aquatic organisms that live there. Groundwater recharge likely occurs in the wetlands during the drier summer months, when the groundwater table is lower and does not preclude infiltration.
- Floodflow Alteration - The large gently sloping, densely vegetated wetlands detain and slowly release a significant amount of stormwater, protecting downstream structures.
- Pollutant Removal - The gentle slopes and dense vegetation that characterize the wooded, scrub-shrub and emergent wetlands remove a variety of solid and dissolved pollutants from stormwater runoff.
- Production Export - Biomass generated by the dense vegetation in the wetlands decomposes and is seasonally exported into Swamp Brook and West Swamp Brook, supporting the biota in these watercourses and in downstream aquatic systems.
- Wildlife Habitat – Another section of the report enumerates the many amphibians and reptiles that utilize the on-site vernal pools.
- Finfish Habitat (Swamp Brook and West Swamp Brook) – the CTDEEP website does not report any data on the finfish communities in these perennial watercourses.
- Recreation – The wooded wetlands (excluding the landscape with the vernal pools) contain a large number of multiflora rose shrubs, and the shrub swamp and emergent marsh communities are very densely vegetated. These factors limit opportunities for educational field trips in these resources.
- Educational/Scientific Value – The vernal pools offer the nearby school a tremendous resource for ecological studies.

## Landscape Context

The subject property is part of a larger landscape block bordered by Tuttle Road to the north, Mile Lane to the south, Route 3 to the east and Ridgewood Road to the west (Figure 1). This landscape block, approximately 325 acres in size, is one of the larger blocks of undeveloped land in this portion of Middletown. It contains a diversity of habitats: forested wetlands and uplands, shrub swamps, upland shrub thickets and meadows, emergent marshes, perennial watercourses, and mowed grass fields. This landscape mosaic is ideal for wildlife species (e.g., wood frog, box turtle, northern racer) that require multiple habitats for breeding, feeding, resting, hibernation, etc.

## Management Recommendations

It is strongly recommended that the forest canopy that covers the central portion of the property be maintained. The creation and maintenance of hiking trails within the upland portions of the property would provide opportunities for passive recreation and wildlife viewing that currently do not exist due to the density of invasive flora (e.g., multiflora rose, Asiatic bittersweet).

	Class			Subclass		Water Regime Modifiers		Special Modifiers
	Forested	Scrub-Shrub	Emergent	Broad-Leaved Deciduous	Persistent	Temporarily Flooded	Seasonally Flooded/Saturated	Partly Drained
Codes	FO	SS	EM	1	1	A	E	d
PFO1E	✓			✓			✓	
PFO1Ed	✓			✓			✓	✓
PSS1E		✓		✓			✓	
PSS1Ed		✓		✓			✓	✓
PSS1A		✓		✓		✓		
PEM1			✓		✓			
PEM1E			✓		✓		✓	

Note: All of these wetlands belong to the “Palustrine” System.



USDA Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey

MAP LEGEND		MAP INFORMATION
<b>Area of Interest (AOI)</b>	Area of Interest (AOI)	<p>The soil surveys that comprise your AOI were mapped at 1:12,000.</p> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: <a href="#">http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/soil_survey/</a></p> <p>Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: State of Connecticut</p> <p>Survey Area Data: Version 21, Sep 7, 2021</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Aug 30, 2019—Oct 15, 2019</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>
<b>Soil</b>	Soil Map Unit Polygons	
	Soil Map Unit Lines	
	Soil Map Unit Points	
<b>Special Point Features</b>	Blowout	
	Borrow Pit	
	Clay Spot	
	Closed Depression	
	Gravel Pit	
	Gravelly Spot	
	Landfill	
	Lava Flow	
	Marsh or swamp	
	Mine or Quarry	
	Miscellaneous Water	
	Perennial Water	
	Rock Outcrop	
	Saline Spot	
	Sandy Spot	
	Severely Eroded Spot	
	Shrub	
	Slide or Dip	
	Sodic Spot	
	Spot Area	
	Stony Spot	
	Very Stony Spot	
	Wet Spot	
	Other	
	Special Line Features	
<b>Water Features</b>	Streams and Canals	
<b>Transportation</b>	Rails	
	Interstate Highways	
	US Routes	
	Major Roads	
	Local Roads	
<b>Background</b>	Aerial Photography	



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Raypoi silt loam	7.3	3.3%
26A	Berlin silt loam, 0 to 3 percent slopes	67.3	30.6%
30A	Branford silt loam, 0 to 3 percent slopes	1.2	0.5%
30B	Branford silt loam, 3 to 8 percent slopes	5.2	2.4%
40A	Ludlow silt loam, 0 to 3 percent slopes	7.0	3.2%
40B	Ludlow silt loam, 3 to 8 percent slopes	8.2	3.7%
42C	Ludlow silt loam, 2 to 15 percent slopes, extremely stony	3.2	1.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	4.1	1.8%
69C	Yalesville fine sandy loam, 8 to 15 percent slopes	0.8	0.4%
77C	Cheshire-Holyoke complex, 3 to 15 percent slopes, very rocky	14.1	6.4%
87B	Wethersfield loam, 3 to 8 percent slopes	13.9	6.3%
87C	Wethersfield loam, 8 to 15 percent slopes	4.2	1.9%
103	Rippowam fine sandy loam	13.7	6.2%
104	Bash silt loam	62.4	28.4%
306	Udorthents-Urban land complex	7.4	3.4%
<b>Totals for Area of Interest</b>		<b>220.0</b>	<b>100.0%</b>



## Herpetology

**Hank Gruner**

**Conservation Biologist/Herpetologist, Consulting**

### **Scope of Work**

The focus of the herpetological assessment, and this report, is to categorize the amphibian and reptile community and important species habitat associations, on a 161-acre parcel of land owned by the city of Middletown. The parcel is referred to as the “Red Maple Swamp” and it lies within the Mattabesset River drainage basin, associated with the East Swamp Brook and West Swamp Brook tributary systems. This herpetological assessment is part of a broader natural resource inventory of the site.

A secondary goal of this work is to identify key herpetological-related conservation needs for future consideration by land use planners in the preparation of a natural resources management plan for the site.

### **Herpetological Survey Work and Data Availability for the Site**

Findings included in this report are based on the following:

- Biological surveys and habitat assessments conducted by the author in 1996 when the construction of a golf course was proposed on the site. These included night road surveys to detect migrating amphibians during the spring breeding season (April 1, 1996), cover-searching around vernal pools and wetlands (April 5, 1996), dip-netting vernal pools to sample larval amphibians (June 28, 1996), visual searching, and habitat assessments throughout the site (April 5 and June 28, 1996).
- Habitat assessments conducted by the author during an initial ERT team site inspection (June 22, 2022) and on a follow-up site visit (August 12, 2022).

- Biological surveys (dip-netting vernal pools for amphibian larvae), conducted by the author and Wetland Scientist Ed Pawlak (July 5, 2022), and a follow-up visual observation and cover-survey of early successional (i.e., managed fields and forest edges) and wetland habitats conducted by the author (August 12, 2022).
- A review of amphibian and reptile species distributions and habitat associations data collected by the author and his colleagues during the period 1993-2020 and published by the CT DEEP in the book: *Conservation of Amphibians and Reptiles in Connecticut* (Klemens et al 2021).

It is important to note that with the exception of spring and summer cover-searching and larval surveys of the vernal pools, a comprehensive herpetological survey has not been under-taken at the site and was beyond the scope of this assessment. Further survey efforts targeted at species of high conservation concern (e.g., leopard frog call surveys as noted in the discussion of riparian marsh and wetland habitats) would be required to confirm the presence of these species on the site.

A checklist of documented and potential amphibian and reptile species occurrence is included as Table 1. in this report

**Discussion of Important Herpetological Communities: Species and Habitat Associations**

The 161-acre Red Maple Swamp parcel encompasses three primary ecological communities that provide important habitat for amphibians and reptiles (Figure 1). These include: (1) forested vernal pool community, (2) riparian marsh and wetlands associated with the East Swamp Brook and West Swamp Brook riparian corridors, and (3) managed early successional stage fields (Figs. 1-3). These communities and their species associations are discussed in detail below.

**Forested vernal pool complex:**

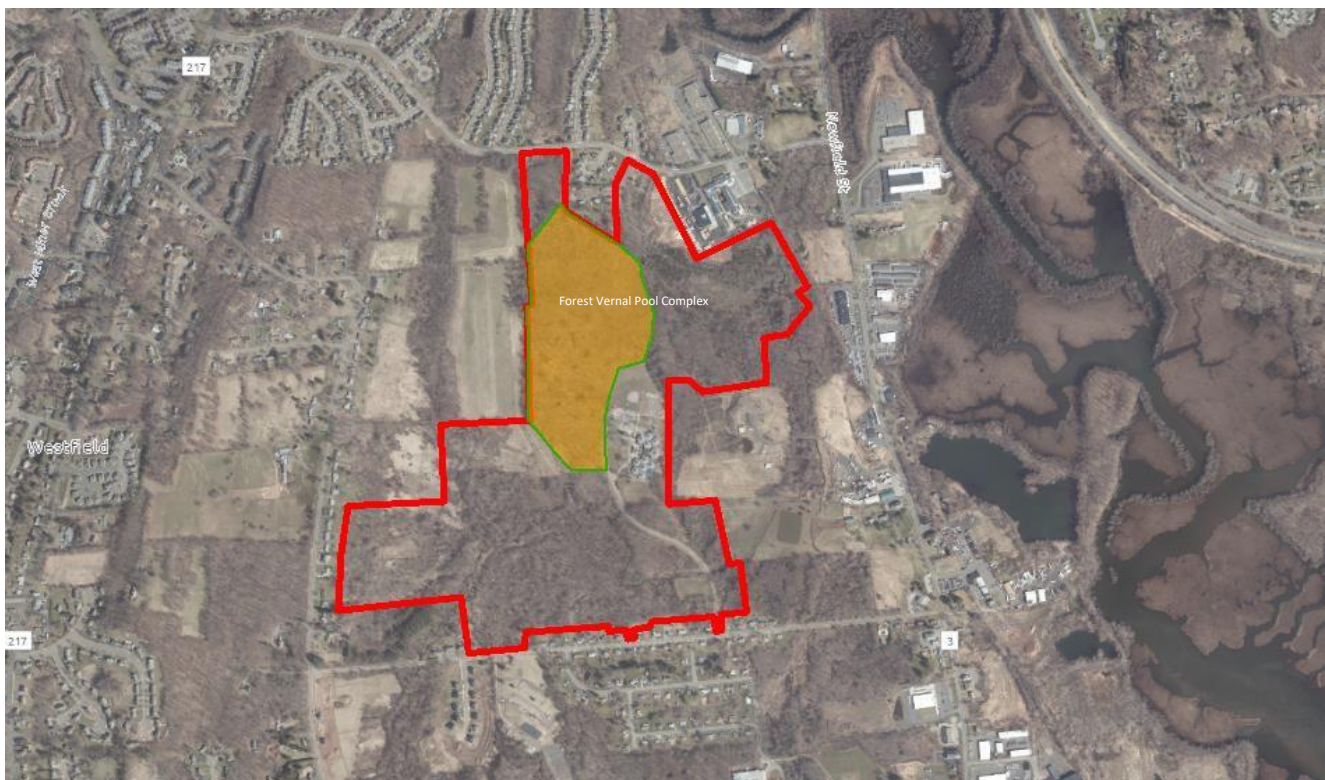


Fig. 1: Approximate area of forest vernal pool complex

Seventeen vernal pools, and a number of more ephemeral wet depressions are situated within the west-central section of the forest immediately adjacent to the school and ball field complex. The pools are clustered within an approximately 30-acre section of the forest which stretches to Tuttle Lane to the north and south to West Swamp Brook and Mile Lane (Figure 2). There is evidence of ditching in several places within the area, likely associated with past agricultural use. Encroachment by non-native invasive plants, especially multi-flora rose, has occurred with density varying throughout.

The vernal pools were found to varying in both size and the length of time that they hold water during the spring and summer (hydroperiod). The survey conducted on June 28, 1996 found 3 of the pools dry with 12 holding water and the July 5, 2022 survey found only 7 of the pools holding water. Follow-up surveys conducted on August 10 and 12, 2022 found only one pool still holding water (vp #4). This variability in hydroperiod is not atypical, especially within the central Connecticut lowland in areas underlain by clay and silt deposits originating from Glacial Lake Hitchcock. These temporary pools are sometimes referred to as “kettles” or “pingo potholes.” A very similar situation can be found at Wintergreen Woods Park in Wethersfield, located eight miles due north of the Red Maple Swamp site. The pools also varied in vegetation structure with some supporting little vegetation and others featuring stands of buttonbush, and sedges.

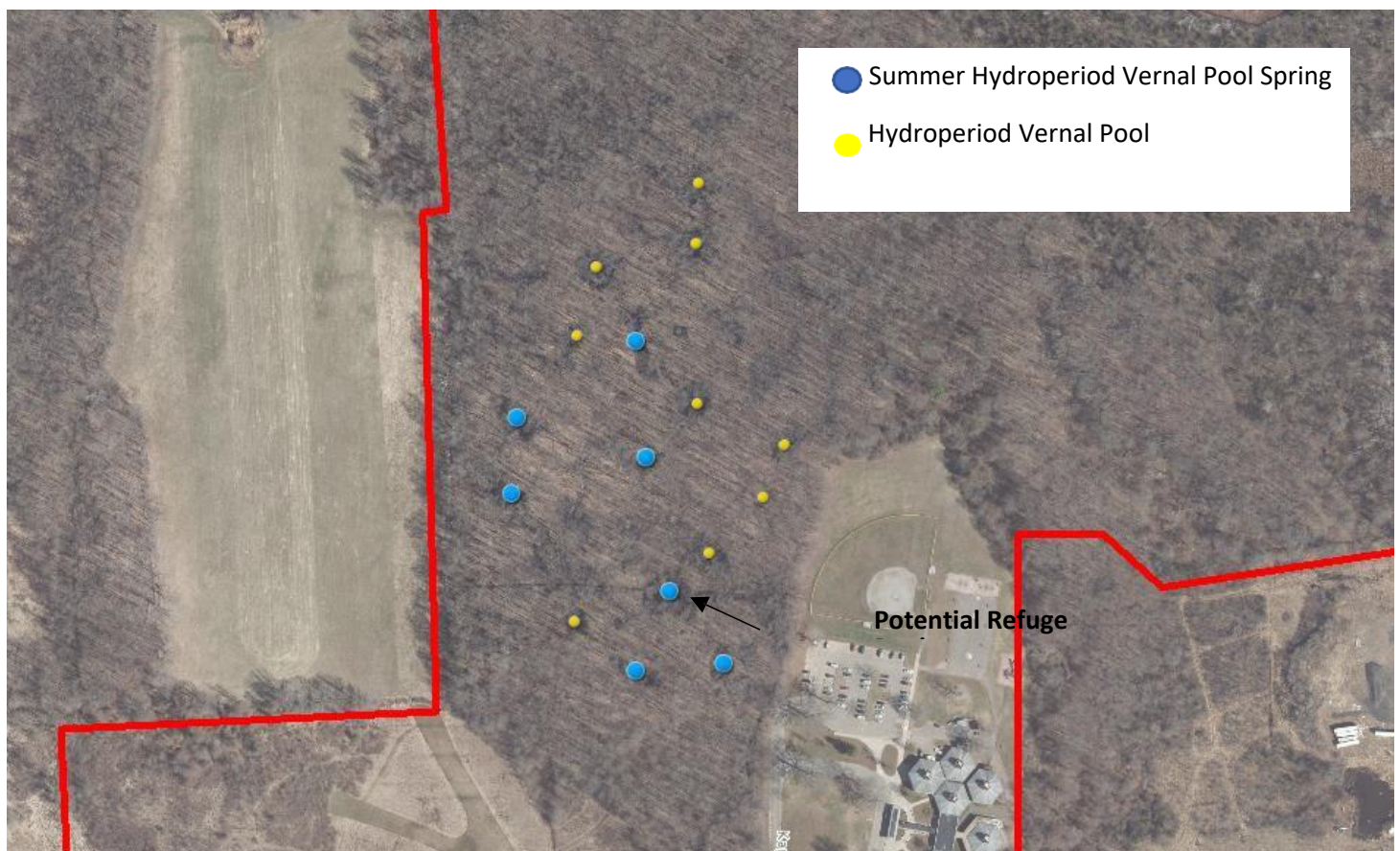


Fig. 2: Location of vernal pools. Summer hydroperiod pools held water until early July, Spring hydroperiod pools were dry by July. The potential refuge pool held water into mid-August.

Biological surveys conducted in 1996 and 2022 identified a similar community of breeding amphibians associated with vernal pools. This community included spotted salamander (*Ambystoma maculatum*), wood frog (*Lithobates sylvaticus*), spring peeper (*Pseudacris crucifer*), and gray treefrog (*Dryophytes versicolor*). The spotted salamander and wood frog are considered to be obligate vernal-pool breeding species – requiring vernal pools for breeding. The spring

pepper and gray treefrog both will breed in a broader range of wetland types in addition to vernal pools. Adult and juvenile green frogs (*Lithobates clamitans*) were also found in association with the majority of the pools however, they are not breeding in the pools, as none of the pools appear to hold water long enough during the season to complete their larval development. These green frogs are primarily feeding on the abundant insects and other food sources available.

A unique characteristic of the forested vernal pool complex is how slight variations in topography have enabled the establishment of patches of upland deciduous tree growth and forest within surrounding saturated areas. This is especially true in the more central section of the 30-acre area where the pools are concentrated. Progressing north, the forest grades into a more traditional red maple dominated swamp. These forest patches include fallen leaf accumulation and numerous rotting logs and branches which provide cover for amphibians, and these deciduous upland areas are important non-breeding habitat. Outside of the breeding season, the amphibians utilize the surrounding forest habitat, and in some cases (wood frog, spring peeper, green frog), also the West Swamp Brook and East Swamp Brook riparian corridors. Thus, for these amphibians, the vernal pools and their surrounding forest and wetland habitats function as a single ecological community (see Baldwin et al 2008).

Although not observed during either the 1996 or 2022 survey, it is possible that the state-listed (special concern) blue-spotted salamander complex (*Ambystoma laterale x jeffersonianum*) remains undetected. The site falls within the biogeographic range of this species, which in the lowlands of central Connecticut primarily occurs in hybridized populations with the Jefferson's salamander (Bogart and Klemens 1997; 2008). The blue-spotted salamander complex is known to breed in similar vernal pool habitat in the central Connecticut lowlands, including at the Wintergreen Woods site mentioned earlier (Klemens et al 2021). Minnow-trapping and/or cover-searching during the spring breeding season would be required to confirm the presence of this species.

Two state-listed (special concern) reptiles frequently associated with vernal pools may also occur on site. These are, the spotted turtle (*Clemmys guttata*) and the ribbon snake (*Thamnophis sauritus*). Both of these species seasonally utilize vernal pool habitats, moving between the pools and other surrounding wetland and upland habitats. The best methods for detection of these species would be visual surveys in the spring, and with trapping for spotted turtles using baited hoop traps an option in some wetlands.

## Summary

Some areas of the central Connecticut lowland (Middletown north to the Massachusetts border) underlain by surficial deposits from Glacial Lake Hitchcock support unique clusters of vernal pools. These temporary wetlands provide important habitat for a diversity of amphibians, including species that require them for successful breeding, but that also require significant acreage of surrounding forest outside of the breeding season. This region is among the most urbanized areas of the state, and it also contains significant acreage in active agriculture. Consequently, large tracts of forest with embedded vernal pools, such as the Red Maple Swamp site, are uncommon and represent ecologically significant landscapes.

Because vernal pools are highly vulnerable to alterations to their hydrological cycles, the amphibian communities that rely on these habitats are thought to be especially at risk of changing climatic conditions (Cartwright et al 2021; Widmer et al 2022). Relatively large and intact forest systems that contain vernal pools exhibiting a diversity of hydroperiods, especially pools that hold water well into the summer season (as is the case with vp #4), may be critical for a regions amphibian populations seeking to adapt to changing environmental conditions brought on by climate change (Cartwright et al 2021).

### Management Considerations for Planners

Ideally the forested vernal pool area would be left in a natural state, with possible consideration of invasive plant control. If any activities (i.e., recreational trails, forestry practices, etc.) are considered for this area, planners

preparing the site management plan should research best management practices associated with managing conservation zones associated with vernal pools and their surrounding forest and wetland habitats (see Pennsylvania Natural Heritage Program 2015; U.S. Army Corps of Engineers 2015; Mitchell et al 2006; Calhoun and deMaynadier 2004; Calhoun and Klemens 2002).

## 2. Riparian emergent and forested wetland habitats associated with East Swamp Brook and West Swamp Brook

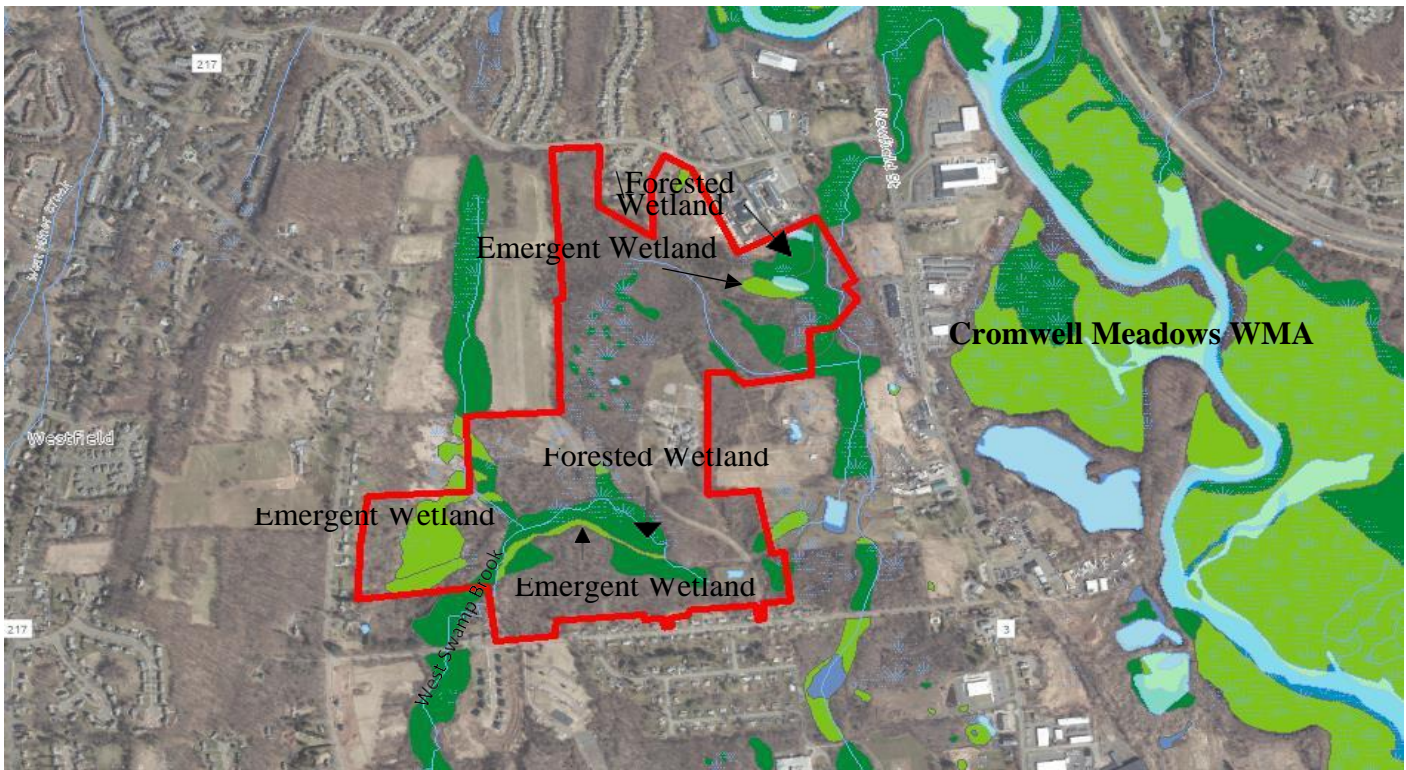


Fig. 3: Approximate locations of riparian wetland habitats associated with the East Swamp Brook and West Swamp Brook corridors

The riparian corridors associated with West Swamp Brook (located in the southwest section of the property) and East Swamp Brook (located along the eastern edge of the property) support both forested and open canopy emergent wetland habitats. East Swamp and West Swamp brook are small, perennial streams that are tributaries of the Mattabeset River. These streams and their associated wetland habitats likely support a diversity of amphibians including: northern two-lined salamander (*Eurycea bislineata*), green frog, wood frog, pickerel frog, spring peeper, gray treefrog. Two state-listed species of leopard frogs may also occur within the system. These are, the northern leopard frog (*Lithobates pipiens* – special concern) and the Atlantic coast leopard frog (*Lithobates kauffeldi* – proposed for endangered listing).

A population of the northern leopard frog occurs at Cromwell Meadows along the Mattabeset River. Because of the close proximity of this site and its tributary connection, it is possible that this species remains undetected on the site, especially along the East Swamp Brook corridor where are larger areas of marsh habitat interspersed with the forested wetlands along the brook. The density of vegetation within and adjacent to the wetlands renders survey efforts difficult and the best method for detection would be to conduct call surveys during the spring breeding season.

The Atlantic coast leopard frog is a recently discovered (2012) species that occurs along the east coast of the U.S., from the mid-Atlantic states north into central Connecticut. Populations have been documented within the

Connecticut River drainage both east and west of the river (Klemens et al 2021). Surveys conducted by biologists over several years at Cromwell Meadows have not documented the presence of the Atlantic coast leopard frog, however, a population is known to exist just east of the river in Portland (Klemens et al 2021). This cryptic species is difficult to detect because it closely resembles the northern leopard frog in appearance, and its call is difficult to distinguish from that of the wood frog. Because of the wetland habitat present along East Swamp Brook, the close proximity of a nearby population within the Connecticut River drainage, and the connection of the Mattabeset with the Connecticut River, the potential occurrence of the Atlantic coast leopard frog cannot be ruled out. To my knowledge, no dedicated surveys for this species have occurred on the site. As with the northern leopard frog, due to the density of vegetation within and adjacent to the wetlands, the best method for detection would be to conduct call surveys during the spring breeding season with experts familiar with this species call.

These wetlands also provide habitat to a variety of reptiles such as, northern water snake (*Nerodia sipedon*), eastern garter snake, painted turtle (*Chrysemys picta*), and snapping turtle (*Chelydra serpentina*). Two state-listed (special concern) reptiles frequently associated with riparian and emergent wetland habitats, as well as vernal pools, may also occur here. These are, the spotted turtle and the ribbon snake.

### Summary

The occurrence of a diversity of wetland habitats associated with the East Swamp Brook and West Swamp Brook corridors increases the probability that the site supports a high diversity of amphibians and reptiles, including several state-listed species. The geographical proximity and drainage connections between the Red Maple Swamp property with the Mattabeset River and the Connecticut River basins raises the possibility that the site could support two species of leopard frogs of state and regional conservation concern. Although the property is embedded within a fairly urbanized area, populations of the Atlantic coast leopard frog are known to occur in industrial and urban fragments (Feinberg et al 2014).

### Management Considerations for Planners

Because the site falls within an urbanized area and also appears to have had a past history of agricultural use, various impacts to the riparian wetland systems have occurred. This is especially true of the East Swamp Brook system which runs parallel in close proximity to route 3 and its associated commercial developments. Management priorities should focus on avoiding or mitigating any additional impacts along the riparian corridors and their associated wetlands. For any planned activities best management practices for maintaining water quality and minimizing the spread of invasive plants should be followed. For amphibian and reptile considerations see Mitchell et al 2006.



Figure 3a: Left to Right: Eastern red-backed salamander, Northern Leopard Frog, Eastern Box Turtle

### 3. Managed Non-forested early successional habitats (fields)

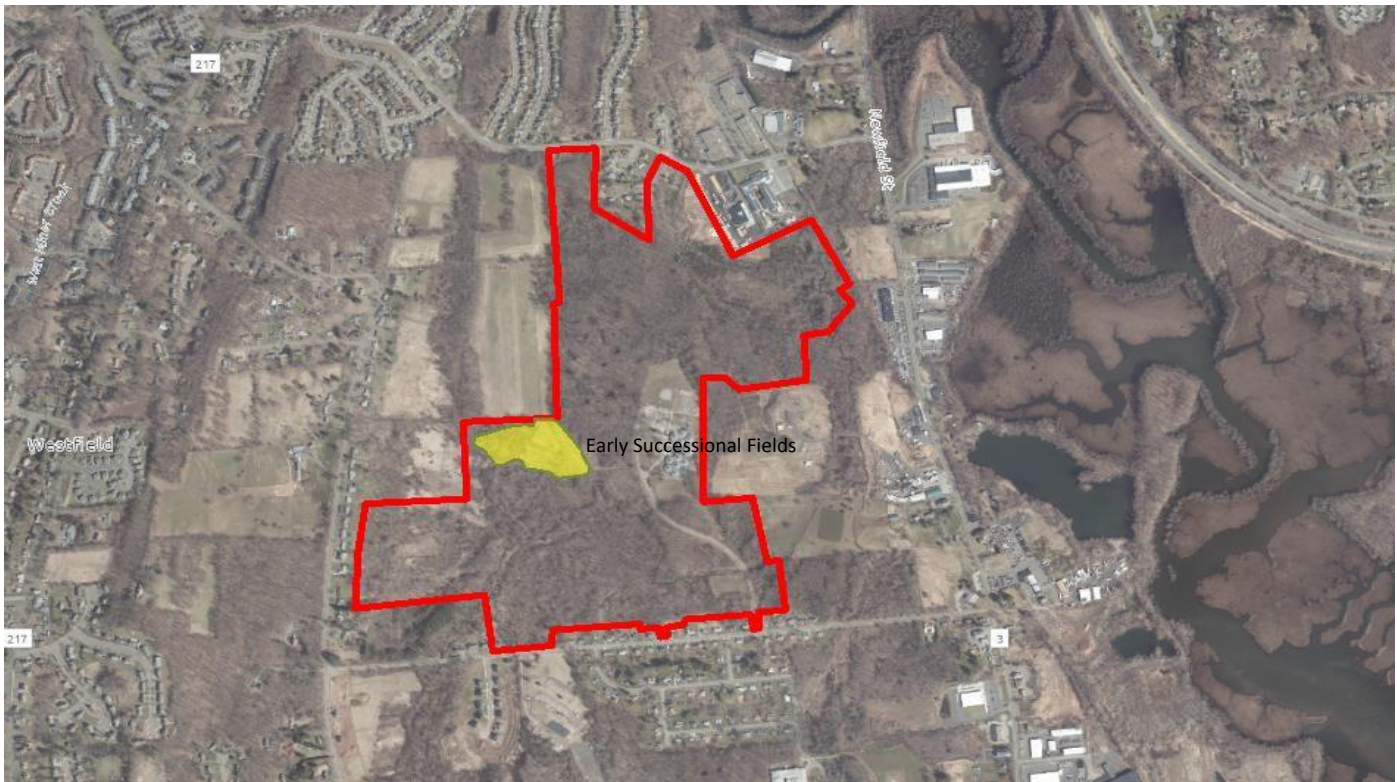


Fig. 4: Approximate locations of managed early successional habitats.

An approximately 5-acre area of open fields is located just south of the forested vernal pool complex and north of West Swamp Brook. These open fields appear to be maintained at different early successional vegetation stages by mowing. These habitats range from two strips of close-cropped grass, to border areas comprised of thick herbaceous growth with widely scattered shrubs, and other areas dominated by thick shrub growth. These fields are connected to a larger (approx. 25 acre) private agricultural field that lies immediately adjacent to the Red Maple Swamp's western boundary. Establishment of non-native, invasive plants has occurred, especially along edges, however, encroachment by autumn olive within the fields is minimal and very manageable at this time.

Early successional habitats play an important role in the life cycles of many amphibians and reptiles, with a number of species, including: Fowler's toad (*Anaxyrus fowleri*), northern leopard frog (*Lithobates pipiens*), Atlantic coast leopard frog (*Lithobates kauffeldi*), pickerel frog (*Lithobates palustris*), eastern box turtle (*Terrapene carolina*), eastern worm snake (*Carphophis amoenus*), northern black racer (*Coluber constrictor*), eastern hog-nosed snake (*Heterodon platirhinos*), smooth green snake (*Opheodrys vernalis*), DeKay's brown snake (*Storeria dekayi*), and ribbon snake depend upon their presence (Klemens et al 2021).

The areas of thick herbaceous vegetation, and areas with thick shrub cover provide ideal seasonal habitat for the state-listed eastern box turtle (special concern), and the northern black racer, and both species have been recorded in the vicinity of the site (Klemens et al 2021). The "edge habitat" – area of interface between the fields and the forest are especially important zones. These edges are important zones of transition for amphibians and reptiles moving seasonally among habitats, and they provide critical areas for basking, nesting (turtles and snakes), and foraging. Several small, seasonally wet swales are located within the herbaceous fields, and these may serve as breeding



habitat for American toads (*Anaxyrus americanus*), and foraging habitat for two state-listed (special concern) snakes, the smooth green snake and ribbon snake.

It is worth pointing out that a small, shallow depression located along one of the mown grassy strips appears to hold water periodically. This was confirmed by wetland scientist Ed Pawlak during our July 2022 site visit based on the presence of wetland associated plants, and the presence of mottling in the upper soil horizon. This type of ephemeral depression is characteristic of some sites used for breeding by the state endangered eastern spadefoot (*Scaphiopus holbrookii*). Spadefoot populations are extremely rare, and many of the historic populations, including those found in the central Connecticut lowlands, appear to have been extirpated. However, the distribution of the spadefoot in Connecticut is strongly aligned with glacial lake deposits, including Glacial Lake Hitchcock, and detection of populations is very difficult (Klemens et al 2021). Thus, although the probability of occurrence of this species is very low, it should not be discounted and may warrant further investigation. Nocturnal eye-shining surveys conducted under appropriate weather conditions by experienced individuals would be the most suitable method for detecting the presence of this secretive species.

## Summary

The occurrence of early successional habitat in Connecticut has continued to decline as a result of the gradual reforestation of previously managed areas, as well as loss through development, and they have been identified as among the most imperiled ecosystems in the state (CT DEEP 2015 Wildlife Action Plan). This is especially true in the central Connecticut lowlands, which is among the most urbanized regions of the state. Although often small in area, these habitats contribute significantly to the biological diversity of the region, including its herpetofauna. This is especially true when early successional habitats are embedded within a larger, intact matrix of forest and wetland habitat - as is the case here.

## Management Considerations for Planners

Ideally the early successional habitats should continue to be managed, favoring a diversity of vegetation seral stages from herbaceous to shrub, and managing the encroachment of invasive plants such as autumn olive. Planners preparing the site management plan should review best management practices (timing and techniques) associated with managing early successional habitats, especially as they relate to mowing, and BMP's regarding invasive plant control (see Erb and Jones 2011; Massachusetts Division of Fisheries and Wildlife 2009; Mitchell et al 2006).

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Table 1. Checklist of Documented and Possible Amphibian and Reptile Species Occurrence with State Conservation Designations: East and West Swamp Brook System, Middletown, CT

<p><b>KEY</b></p> <p><u>State of Connecticut Endangered Species List (2015):</u> CT-SC= Special Concern species, CT-T= Threatened species, CT-E= Endangered species</p> <p><u>CT Wildlife Action Plan Greatest Conservation Need Species list (2015):</u> GCN/I= Important, GCN/VI= Very Important, GCN/MI= Most Important</p> <p>*Species documented at the Red Maple Swamp site</p>
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## AMPHIBIANS

Common Name	Scientific Name	Conservation Designations
<u>Salamanders</u>		
Spotted salamander*	<i>Ambystoma maculatum</i>	GCN/I
Blue-spotted salamander complex	<i>Ambystoma laterale</i> x <i>jeffersonianum</i>	CT-SC, GCN/VI
Northern dusky salamander	<i>Desmognathus fuscus</i>	GCN/I
Northern two-lined salamander	<i>Eurycea bislineata</i>	-
Eastern red-backed salamander*	<i>Plethodon c. cinereus</i>	-
<u>Frogs and Toads</u>		
Eastern American toad	<i>Anaxyrus a. americanus</i>	-
Gray treefrog*	<i>Dryophytes versicolor</i>	GCN/I
Spring peeper*	<i>Pseudacris crucifer</i>	-
American bullfrog	<i>Lithobates catesbeianus</i>	-
Green Frog*	<i>Lithobates clamitans</i>	-
Pickerel frog*	<i>Lithobates palustris</i>	-
Atlantic coast leopard frog	<i>Lithobates kauffeldi</i>	CT-E (proposed), GCN (TBD)
Northern leopard frog <sup>1</sup>	<i>Lithobates pipiens</i>	CT-SC, GCN/VI
Wood frog*	<i>Lithobates sylvaticus</i>	GCN/I
Eastern spadefoot	<i>Scaphiopus holbrookii</i>	CT-E, GCN/VI

## REPTILES

<u>Snakes</u>		
Northern black racer <sup>2</sup>	<i>Coluber c. constrictor</i>	GCN/I
Northern ring-necked snake	<i>Diadophis punctatus edwardsii</i> -	
Eastern milk snake	<i>Lampropeltis t. triangulum</i> -	
Northern water snake	<i>Nerodia s. sipedon</i> -	
Smooth green snake	<i>Opheodrys vernalis</i>	CT-SC, GCN/I
DeKay's brown snake	<i>Storeria dekayi</i> -	
Ribbon snake	<i>Thamnophis s. sauritus</i>	CT-SC, GCN/VI
Eastern garter snake*	<i>Thamnophis s. sirtalis</i> -	
<u>Turtles</u>		
Snapping turtle	<i>Chelydra serpentina</i> -	
Eastern painted turtle	<i>Chrysemys p. picta</i> -	
Spotted turtle	<i>Clemmys guttata</i>	CT-SC, GCN/VI
Eastern box turtle <sup>3</sup>	<i>Terrapene c. carolina</i>	CT-SC

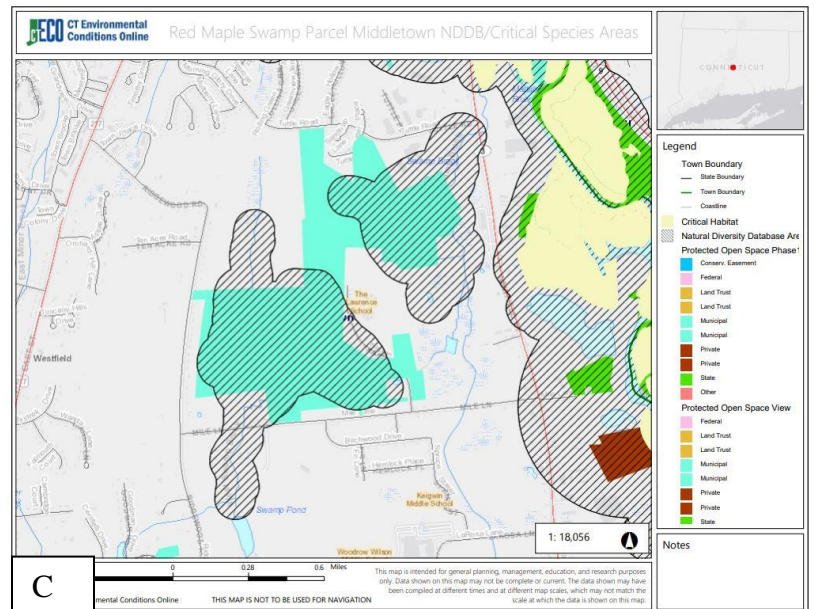
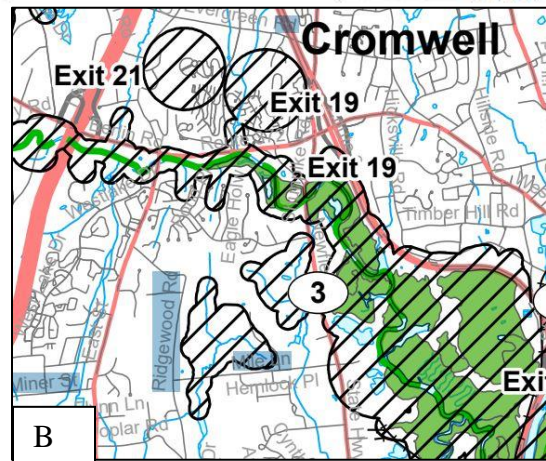
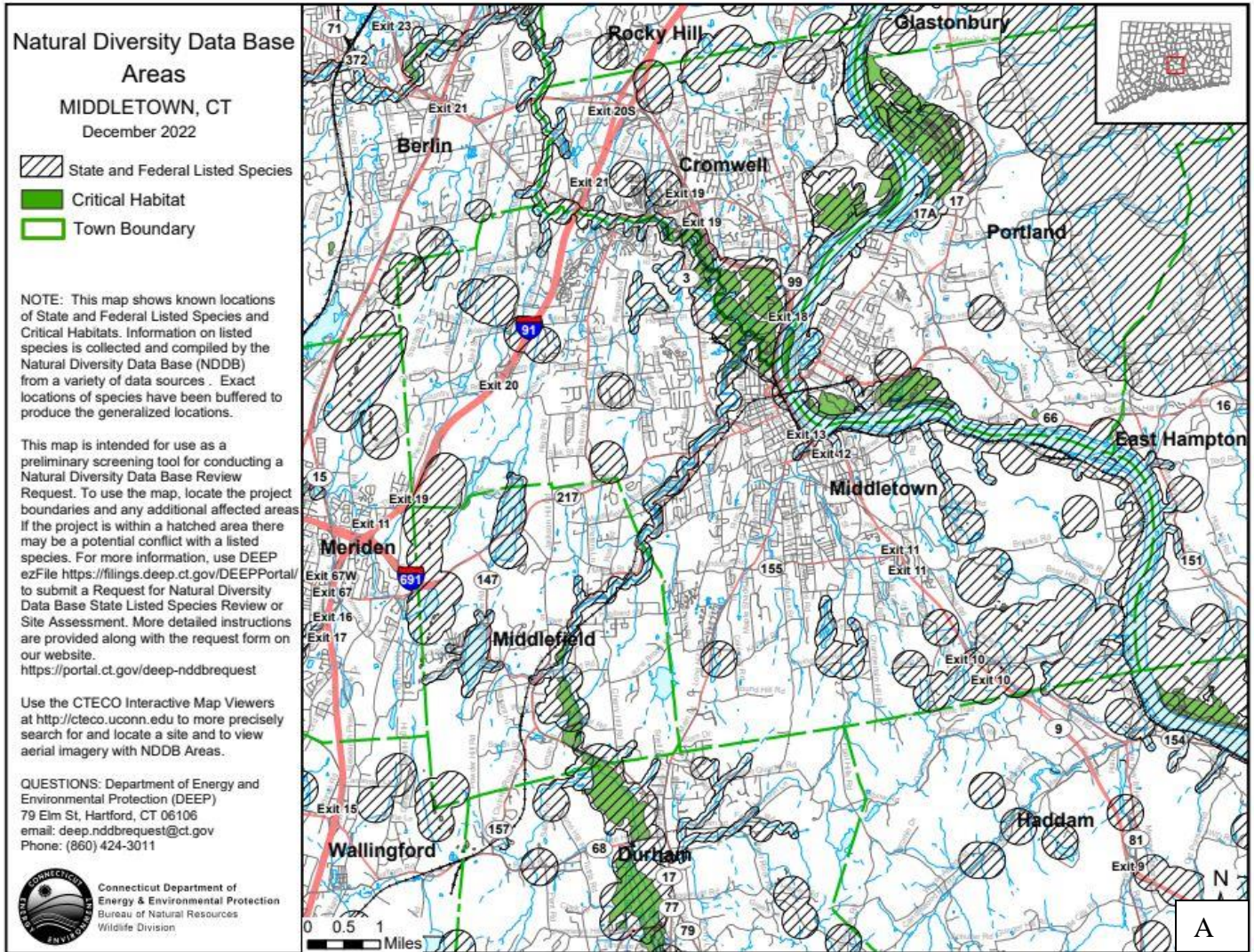
<sup>1</sup> = Population occurs within the adjacent Cromwell Meadows Wildlife Management Area

<sup>2</sup> = Species documented 0.7 miles south of the site along the West Swamp Brook corridor

<sup>3</sup> = Species documented 1.3 miles due west of the site

# Natural Diversity Database

Dawn McKay, CTDEEP – Pending



Map A – Overview of NDDB for Region - CTDEEP  
 Map B – Focus area Red Maple Swamp Property  
 CTDEEP  
 Map C – Red Maple Swamp Parcel with NDDB Layer –  
 UConn – Eco GIS

# Invasive Plant Management and Pollinators

## RECOMMENDED RESOURCES FOR PLANNING AND MANAGEMENT

Todd Mervosh is general manager of TM Agricultural & Ecological Services in Suffield, Conn. For the next 20 years, Todd was a scientist at The Connecticut Agricultural Experiment Station in Windsor. He conducted weed control experiments in several crops and did research on management of invasive plants including oriental bittersweet, Japanese stiltgrass and mile-a-minute weed. We are fortunate to have Todd to help with an overview of strategies about effective and ecologically sound plant management strategies, including proper use of herbicides. He provides vegetation control services on a wide range of lands across Connecticut.

Charlotte Pyle received her PhD in Forest Ecosystems Analysis at the Univ. of Washington. In Connecticut, she worked at the University of Connecticut as a Forest Ecologist and as a Landscape Ecologist with USDA Natural Resources Conservation Service. Now retired from NRCS, she is a Co-chair of the Connecticut Invasive Plant Working Group and chairs the group's Native Plant Alternatives Sub-Committee. As a nature writer, she was one of the 2016 Artists-in-Residence at Trail Wood (Audubon's Edwin Way Teale Sanctuary in Hampton, CT).

## Invasives Management

- Invasive species can harm the values for which land is conserved.
- Natural lands are not fully protected unless they also are managed for the features that first motivated preservation.
- Invasive species can change community structure, composition, and ecosystem processes on these lands in ways that may not be anticipated or desirable.
- Careful management can minimize these negative impacts.

## Pollinators

Middletown has an active chapter in the Northeast Pollinator Pathways with partners such as the Jonah Center for Earth and Art, the Rockfall Foundation, Middletown Conservation Commission, and the Middletown Garden Club. <https://www.middletownpollinatorpathway.com/causes>

As the city is unique in having an active website with partners on the Connecticut Pollinators Pathways Project, there is an opportunity to connect invasives management control with planting sections of pollinator pathways on the property at Red Maple Swamp, especially on borders of agriculture fields associated with the property.



Figure IP-1 – Opportunities on adjacent agriculture land borders could be evaluated for edge line pollinators or management of field crops toward pollinator covercrops rather than seasonal mowing. Opportunities toward soil health practices would also benefit neighboring woodland cover and vernal pool habitats.

- Pollinator pathway concept -Insects need to eat as they travel -Backyards – corridor of pit stops Joining a pollinator pathway is easy. Creating on the Air Line State Park Trail will be more challenging
- Benefit for Hibbert and Bernstein properties and the Air Line State Park Trail: mitigate and promote management of invasives, agriculture resilience in the community, and scenic enhancement
- Opportunity for a fun regional public project for all ages – engages people into the management of invasives, planting pollinators and engaging in trail awareness
- <https://www.pollinator-pathway.org/towns-1/Connecticut>

### WHY ARE POLLINATOR PATHWAYS IMPORTANT?

- help educate about pollinators
- provide habitat for pollinators
- facilitate safe movement (long & short distance)

### FINDING & CREATING POLLINATOR HABITAT

- don't overlook trees – important caterpillar host plants are Oaks, *Prunus* (Cherries, etc.), Willows, Birches, Poplars/Aspens
- look for existing patches of nectar sources
- look for easy access for watering in 1<sup>st</sup> year
- involve students and public groups to grow seedlings
- use signage to educate



Common Milkweed is an excellent nectar plant. Milkweeds also are the Monarch host plant. Each Spring it takes multiple generations of Monarchs to get back north to CT.



Good nectar source in unmown field with native Goldenrod & Joe-Pye Weed



Shrubs can be good habitat, offering not only nectar, pollen, and caterpillar food but also acting as a windbreak. < Summersweet is an excellent nectar source.

#### Additional Information

- <https://www.pollinator-pathway.org/>
- <http://xerces.org/> (publications, etc.)

Figure IP-2 – Overview of pollinator education. Charlotte Pyle.

## Planning Consistency

**Jeanne Davies, AICP**

**Environmental/Land Use Planner (CTRC&D)**

### CONNECTICUT POCD

Consistency with Connecticut's Plan of Conservation and Development (CTPOCD) is not binding, but funding from state agencies is often predicated on the growth management principles laid out in the most recent version of the plan. Connecticut does not require municipal, regional, and state plans to be consistent with one another. That said, CGS Section 16a-31 requires state agencies to be consistent with the State C&D Plan whenever they undertake any of the following actions with state or federal funds:

- (1) The acquisition of real property when the acquisition costs are in excess of two hundred thousand dollars.
- (2) The development or improvement of real property when the development costs are in excess of two hundred thousand dollars.
- (3) The acquisition of public transportation equipment or facilities when the acquisition costs are in excess of two hundred thousand dollars.
- (4) The authorization of each state grant, any application for which is not pending on July 1, 1991, for an amount in excess of two hundred thousand dollars, for the acquisition or development or improvement of real property or for the acquisition of public transportation equipment or facilities.

Therefore, it is recommended that Middletown continue to examine consistency with city, regional and state plans of conservation and development to ensure consistency in compatible land use and planning near the Red Maple Swamp Property especially considering the natural resources inherent on the property and the proximity a complex of both urban land use as well as nearby conservation and agriculture areas. Connecticut's POCD has several growth management principles listed that would apply to planning considerations for the properties quoted as follows:

“GROWTH MANAGEMENT PRINCIPLE #4 Conserve and Restore the Natural Environment, Cultural and Historical Resources, and Traditional Rural Lands: It is widely recognized that Connecticut's natural, cultural, and historical resources, along with its rural landscapes, have intrinsic values which contribute to the state's high quality of life. Less obvious are the functional values that these resources provide, such as storm water management, flood control, oxygen production and carbon storage, and the filtration and purification of water for human consumption and habitat preservation. Similar to the need to maintain the physical infrastructure of cities and towns, there is a corresponding need to strategically invest in the state's natural infrastructure, through preservation and maintenance of multifunctional land.”

- 4.1 Protect permanently preserved open space areas, Connecticut Heritage Areas, and archaeological areas of regional and statewide significance.
- 4.2 Limit improvements to permanently protected open space areas to those that are consistent with the long-term preservation of the natural resource and open space values of the site.
- 4.3 Expand the state's open space and greenway network through the acquisition and maintenance of important multifunctional land and other priorities identified in the State's Open Space Plan (i.e., Green Plan).

- 4.4 Avoid activities that could negatively affect rare or unique ecological communities and natural areas, including habitats of endangered, threatened and special concern species, other critical wildlife habitats identified in the Connecticut Wildlife Action Plan, river and stream corridors, aquifers, ridgelines, large or connected forest areas, highland areas, coastal marsh migration areas, and Long Island Sound.
- 4.5 Encourage collaborative ventures with municipalities, private non-profit land conservation organizations and other entities to provide a system of appropriately preserved and managed natural areas.
- 4.11 Promote Connecticut’s commercial and recreational fishing and aquaculture industries consistent with marine productive capacities and environmental protections.
- 4.12 Utilize the landscape to the extent practical and incorporate sound stormwater management design, such as low impact development techniques, in existing and new development to maintain or restore natural hydrologic processes and to help meet or exceed state and federal water quality standards, so that the state’s waters can support their myriad functions and uses.
- 4.16 Protect the ecological, scenic, and recreational values of lakes, rivers and streams by promoting compatible land uses and management practices in accordance with adopted plans.
- 4.17 Protect, maintain, and restore the chemical, physical, and biological integrity of ground and surface waters to ensure that existing and designated uses are maintained.
- 4.18 Promote innovative land conservation and banking practices that further local, regional, and state conservation and development objectives, and minimize the need to expand infrastructure to support new development in rural areas.

## LCRVCOG REGIONAL POCD

The LCRVCOG Plan of Conservation & Development for the region is designed to highlight four focus areas for the region and its towns. The Red Maple Swamp property geographically falls into several typology focus areas including sustainable, connected, innovative and community.

- **Sustainable**  
Land uses within areas identified as sustainable should prioritize conservation, preservation, low impact practices, and mitigation of land uses that are not sustainable.
- **Connected**  
The priority land use for these areas (mostly corridors) is to support connectivity within communities and across the Region.
- **Innovative**  
These areas benefit from the infrastructure and access needed to support innovation in commercial, cultural, institutional, and industrial practices and enterprises.
- **Community**  
Places that are most suitable to the expansion of residential development and expansion of the services and infrastructure needed for residential development are identified in this theme.



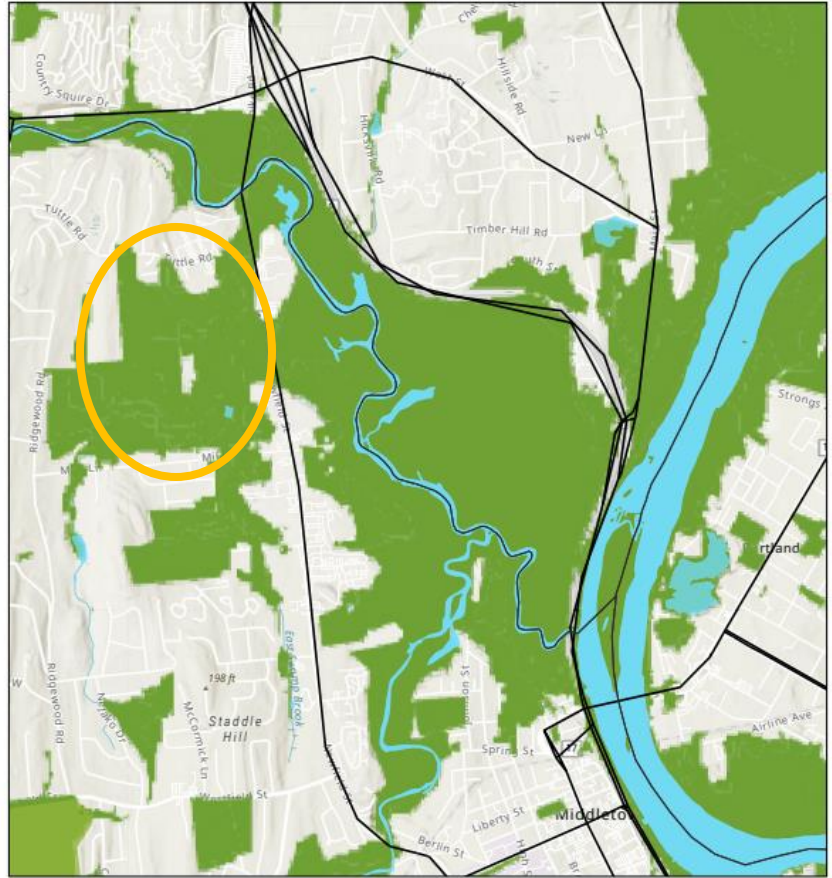
## Relevant Objectives for Red Maple Swamp Property from RiverCOG's Regional POCD

### SUSTAINABLE

#### General

- Promote and expand natural resource stewardship.
- Increase the area of land classified a protected open space.
- Expand and protect open space along the Connecticut River.
- Coordinate and prioritize open space preservation throughout the Region.
- Protect the biodiversity of the Region and control invasive species by investing in invasive species removal and education and conducting outreach along rivers to make visitors and residents aware of the threat of invasive species.
- Maximize opportunities to link open space land and create an interconnected system of protected habitat in the Region.
- Ensure an adequate and high-quality water supply.
- Encourage preservation of water supply watershed lands.
- Reduce environmental impacts of sewage discharge.
- Reduce impervious surface and stormwater runoff.
- Discourage development in floodways and floodplains.
- Ensure that wetlands are restored, enhanced, and protected.

Red Maple Swamp in Context with Regional POCD Sustainability Layer



#### Specific to Agriculture

- Identify vulnerable and potentially transitional agricultural properties and proactively work to keep those properties actively farmed.
- Support a viable and long-term agricultural industry and sustainable agricultural land uses that serve as beneficial resources to the Region.
- Support the economic competitiveness of regional agriculture and encourage the diversification of potential sources of farm income, including value added products, agricultural tourism, roadside stands, organic farming, and farmers markets.
- Encourage best management practices in agriculture and animal operations to protect watersheds from contamination and erosion, reduce greenhouse gas emissions, conserve energy and water, and utilize alternative energy sources, including wind and solar power.

### Primary Regional Wildlife Habitat and Natural Resource Protection Corridors

This map identifies areas in the Region that are a priority for wildlife habitat and natural resource protection due to attributes such as core forest areas, wetland soils, and hydrologic features. The areas represented by this map scored highest in those features.



B-2 LCRV Plan of Conservation and Development 2021-2031

## **CONNECTED**

- Improve walkability by encouraging pedestrian-oriented design of public and private projects in areas where higher levels of pedestrian activity are present or desired.
- Link sidewalks, pedestrian paths, and multi-purpose trails into a continuous Region-wide network.
- Promote safe, convenient, and adequate short- and long-term bicycle parking facilities and other bicycle amenities for employment, retail, multifamily housing, schools, colleges, and transit facilities.
- Coordinate with transit agencies to provide safe routes to transit stops and stations, to provide secure bicycle parking facilities, and to accommodate bicycles on transit vehicles.
- Conduct a comprehensive study of trails in the Region with the aim of assessing assets and needs and identifying opportunities for improving and expanding the Region's trail system.
- Improve and expand greenways to improve connections to the Region's parks and open space resources.
- Expand or improve transit service as needed to provide connections to the Region's parks and open spaces.
- Support and expand existing trail networks and improve trail head amenities

## **INNOVATIVE**

- Support the development of an "Agriculture Innovation" district or districts that could be home to agricultural products suppliers and distributors, local food processing facilities, and a farmers' market.
- Primary Regional Wildlife Habitat and Natural Resource Protection Corridors This map identifies areas in the Region that are a priority for wildlife habitat and natural resource protection due to attributes such as core forest areas, wetland soils, and hydrologic features. The areas represented by this map scored highest in those features.
- Connecting Regional Wildlife Habitat and Natural Resource Protection Corridors This map identifies areas in the Region that scored lower than the primary areas but are valuable in connecting the primary areas in for the benefit of wildlife habitat and natural resource protection.

## **COMMUNITY**

- Enhance all communities with placemaking and public spaces in designated centers to serve residents of all incomes, interests, ages, and cultures.
- Provide a variety of land uses within a community in order to offer opportunities for a diverse mix of uses and to help create a balance of land uses within a community
- Work with local and state officials to develop new, dedicated bicycle and pedestrian paths and connect existing paths to form regional and interregional routes.
- Ensure that the Region's farmers and farm communities have access to needed resources.
- Encourage the growth of agriculture based tourism (agritourism) and assist local communities with revising zoning regulations to fully support agritourism businesses.
- Seek ways to partner with regional community supported agriculture (CSA) programs as an alternative source of fresh and healthy fruits and vegetables for the Region's residents, particularly those with limited mobility, limited income, or those furthest from existing grocery stores.

## The LCRV Future Land Use Map: Connected Theme

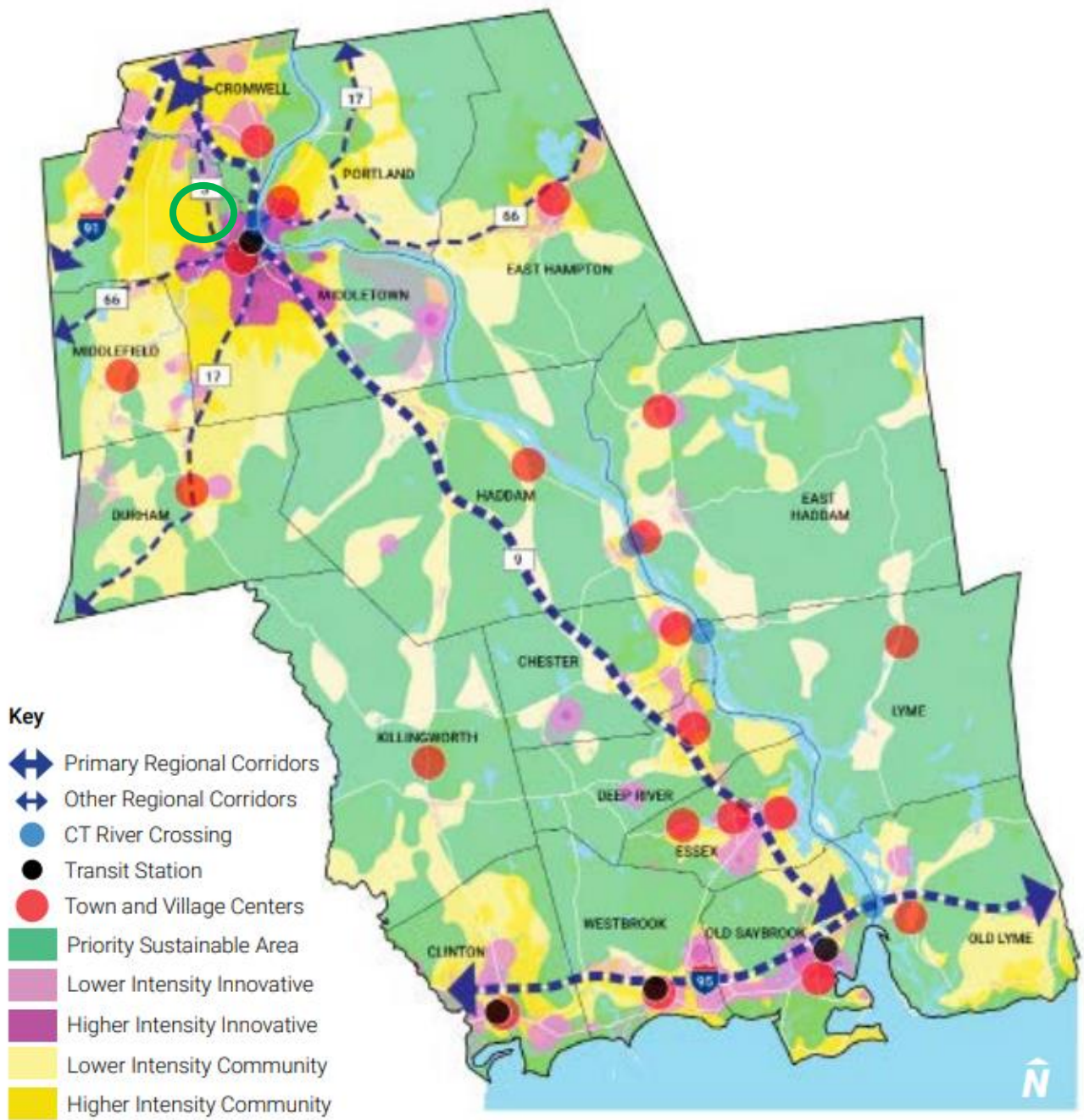
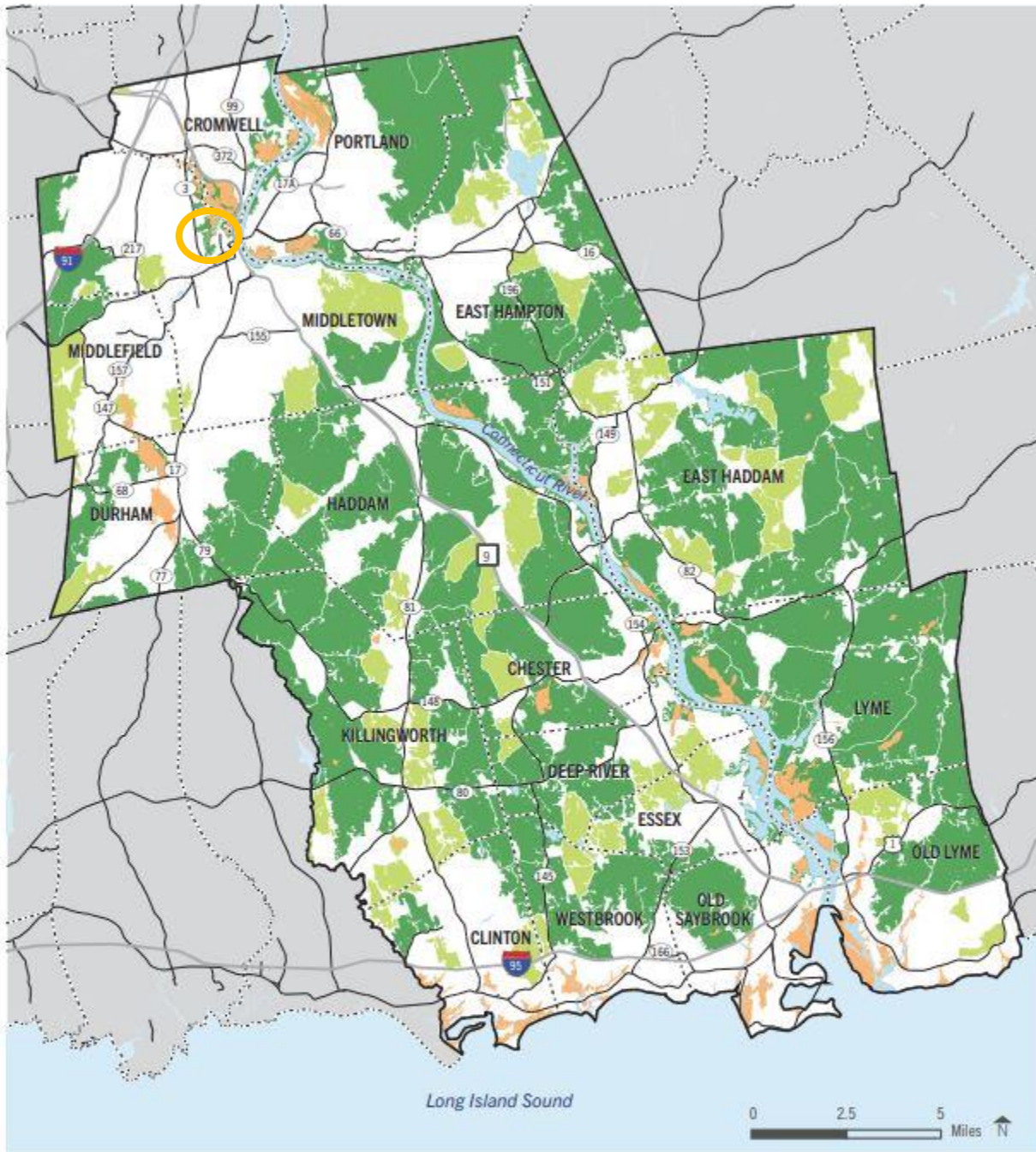


Figure 9-6. Conservation Corridors



- Primary Corridors
- Connecting Corridors
- Critical Habitat

Source: RiverCOG Lower CT Riverland Coastal Region Land Trust Exchange Natural Resource Based Strategic Conservation Plan, A GIS Overlay Analysis

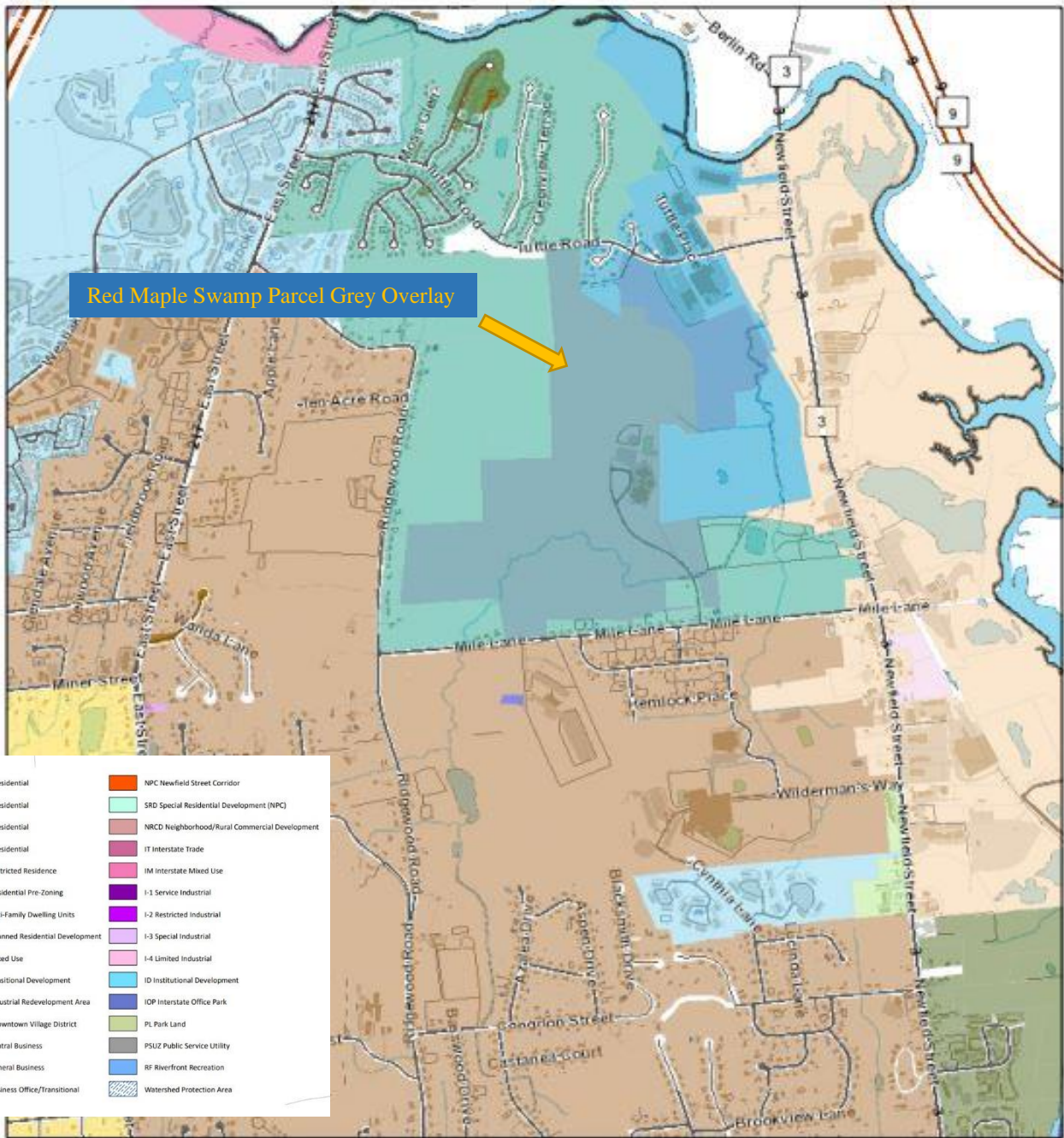
## MIDDLETOWN PLAN OF CONSERVATION & DEVELOPMENT

The Red Maple Swamp Parcel complex is located at the convergence of several of Middletown’s as well as RiverCOG land use and conservation goals objectives as noted in the regional plan section previous. This includes low density residential, high volume traffic corridors, industrial zoning, and agriculture. While the 164 acres of property are unique in their capacity to support unique, diverse, and critical listed species as noted in the previous reports, the property as examined in context with adjacent properties and prevailing land use patterns presents unique challenges and opportunities.

### Zoning Regulations

Middletown’s zoning regulations provide a context for potential future land use impacts on the property’s integrity to support existing critical species. The property is located in a low density residential zone and abuts a high intensity industrial zone (currently mixed land use) on the Route 3 corridor. The I-2 Zones permits a spectrum of industrial, research, technology and agriculture uses in the zone some of which may or may not impact the site depending on intensity of use, site design and permitting. This industrial zoned corridor is predominantly located in a FEMA 100 year flood zone of the Mattabesset River and Swamp Brook and associated tributaries and drainage as noted in the watershed evaluation.



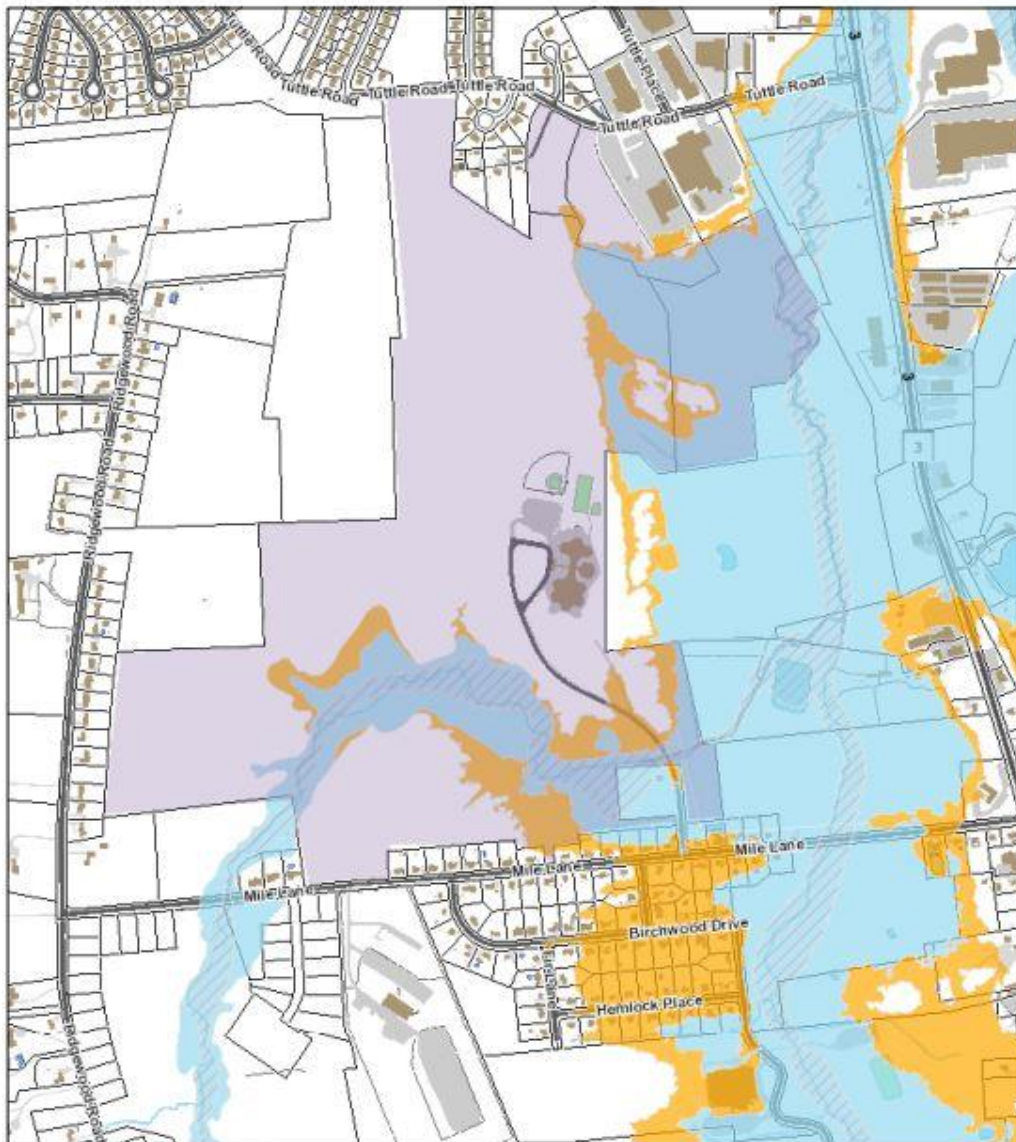


**Red Maple Swamp - Zoning Overlay** Map generated 2/28/2023

Map Legend: <http://gis.cityofmiddletown.com/middletownct/legend.pdf>  
 <vision link>

0 0.125 0.25 0.5 0.75 1 mi 1 in = 2,000 ft

**MAP FOR REFERENCE ONLY - NOT A LEGAL DOCUMENT**  
 Because of different update schedules, current property assessments may not reflect recent changes to property boundaries. Check with the Board of Assessors to confirm boundaries uses at the time of assessment.



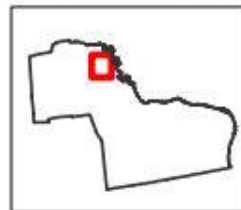
**Red Maple Swamp - Flood Zones**

Map generated 2/28/2023

Map Legend: <http://gis.cityofmiddletown.com/middletownct/legend.pdf>  
<vision link>



1 in = 1,000 ft



**MAP FOR REFERENCE ONLY - NOT A LEGAL DOCUMENT**

Because of different update schedules, current property assessments may not reflect recent changes to property boundaries. Check with the Board of Assessors to confirm boundaries uses at the time of assessment.



Flood Events in Middletown: Left to Right 1938 Hurricane – 1984 Stream Flood – 1927 River Flood



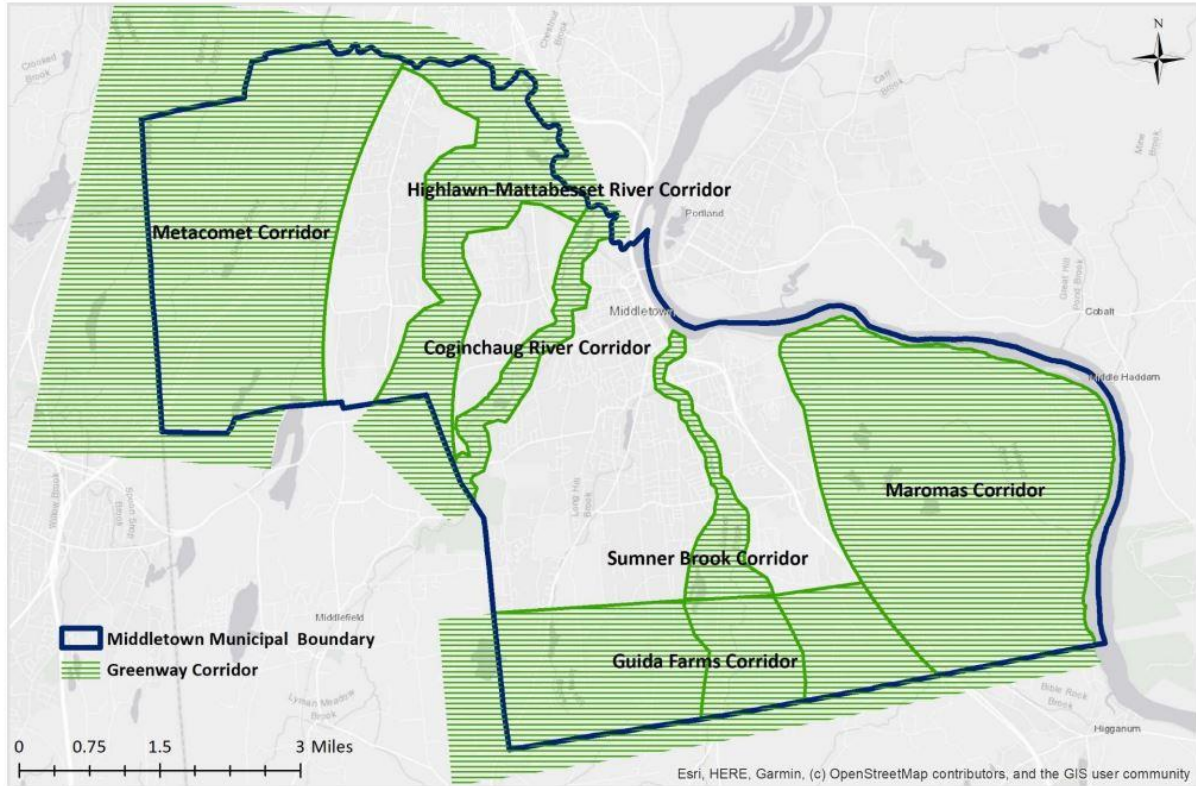
## **Plan of Conservation & Development Listed Objectives Consistent for Red Maple Swamp Property**

Middletown in its 2020 Plan of Conservation and Development lists out the need for greenway corridor preservation as well as agriculture preservation in a community historically known for agriculture with rich riverine soil deposits from the Connecticut, Mattabesset and Coginchaug Rivers.

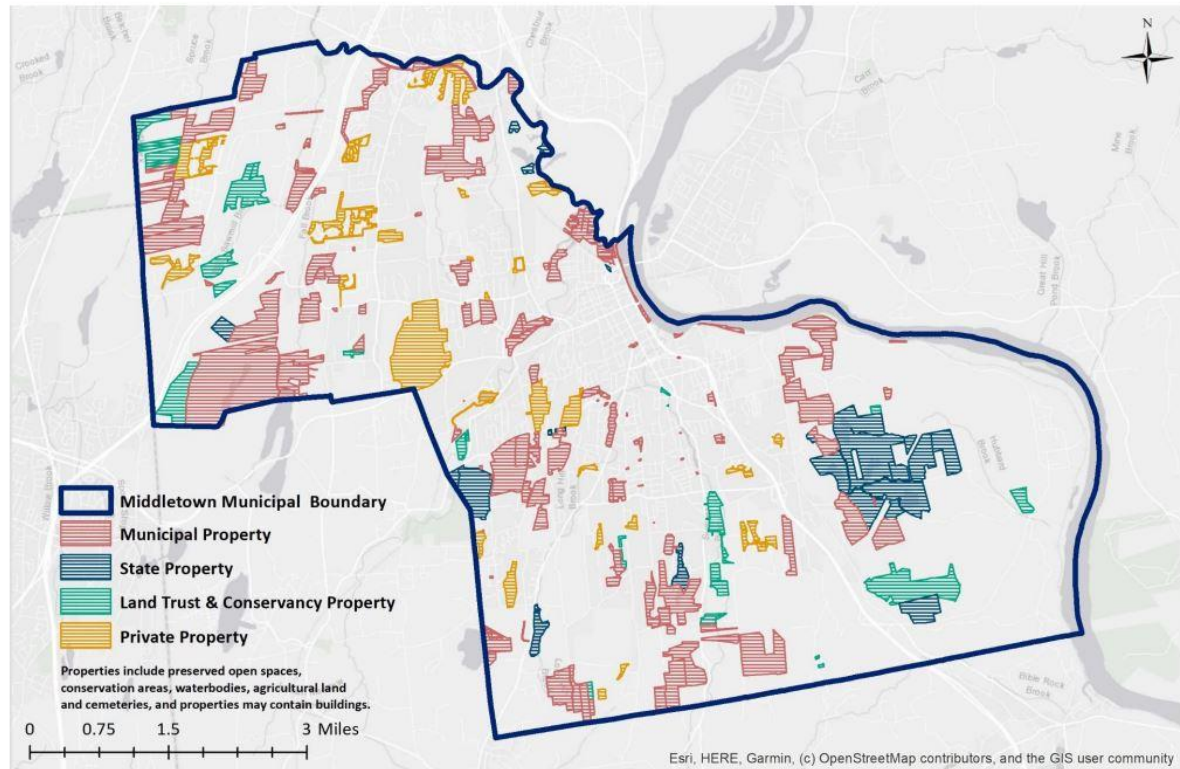
Excerpts from the Middletown Plan of Conservation & Development for the area in which Red Maple Swamp is located indicate both a goal for natural resources conservation, open space acquisition toward conservation and preservation as well development of an innovation zone on Route 3 (Newfield Street). Goals and objectives POCD excerpts:

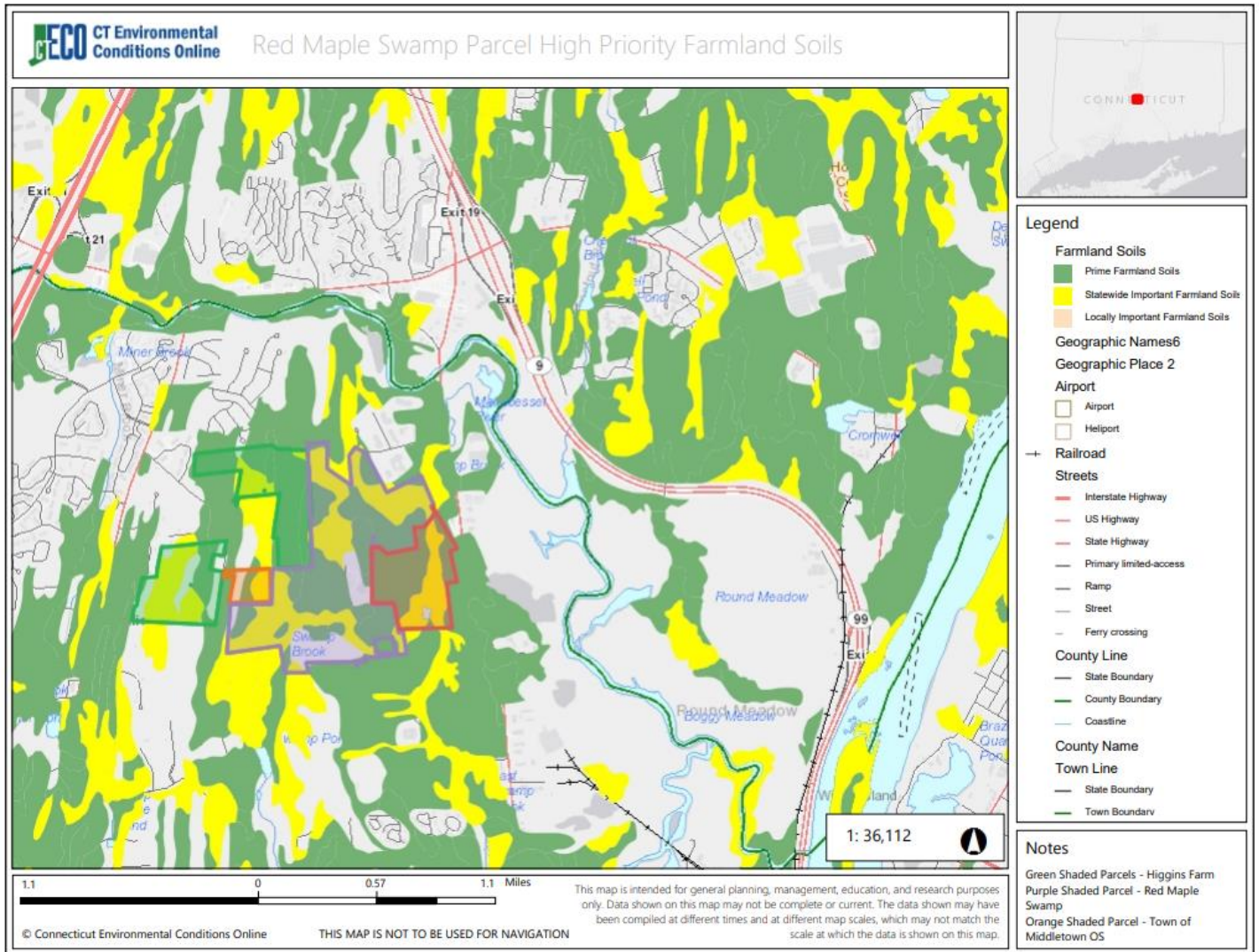
- As of 2015, over 12,000 acres in Middletown were classified as “forest” and 2,200 acres as “agricultural fields.” But the rate of loss demonstrated—over 70 acres converted per year from farm or forest to development land—is not sustainable. The implications of such land conversion extend from habitat loss for flora and fauna to the stormwater problems created by the increase in impervious surfaces, and from the loss of carbon-sequestering trees to the loss of capacity for local food production.
- In 2019, residents voted to approve a \$5 million bond for open-space acquisition to increase the protection of open lands and critical resources. The city, led by the Commission on Conservation and Agriculture, the Planning & Zoning Commission, and the Common Council should work together to acquire land. The Acquisition Committee of the Commission on Conservation and Agriculture will assess and rank all proposed purchases, seeking to expand open-space parcels, incorporate wetlands and watercourses, link existing trail systems, protect large, forested blocks, preserve prime agricultural land, and provide recreational opportunities throughout the city.
- The city should adopt an Open-Space Acquisition & Stewardship Plan for the City. The plan could identify key areas for future acquisition and detail specific stewardship plans for each open-space property, recognizing that each area requires different management and preservation strategies, depending on its intended use, e.g., for recreation activities or preservation of habitats and natural resources.
- Stewardship of the City’s properties must include ongoing maintenance such as basic forestry management, removal of invasive species, and safe and convenient public access where appropriate. Proper staffing and budgeting for Public Works and the Recreation Division, as well as strong partnerships with land trusts and other conservation organizations such as the Connecticut Forest & Parks Association, will ensure that stewardship remains a priority
- The farmland of the Connecticut River Valley is one of the most underappreciated resources in the city. Formed by centuries of flooding along major rivers and smaller waterways, these ancient loams are amazingly fertile. Since much of these soils lie in floodplains, they are at high risk from increased flooding caused by climate change. Their use as farmland would allow the natural cycle of sediment deposition to continue while keeping other development out of these sensitive areas.
- Wherever prime farmland or a historic farm exists, the City should explore purchasing development rights from the landowner to enable the farm to persist in perpetuity. Owners of prime farmland can work with the Connecticut Farmland Trust or the Connecticut Department of Agriculture’s Farmland Preservation Program, which funds the acquisition of development rights to allow continued production while protecting the soil.

## MIDDLETOWN GREENWAY CORRIDOR MAP



## MIDDLETOWN OPEN SPACE MAP





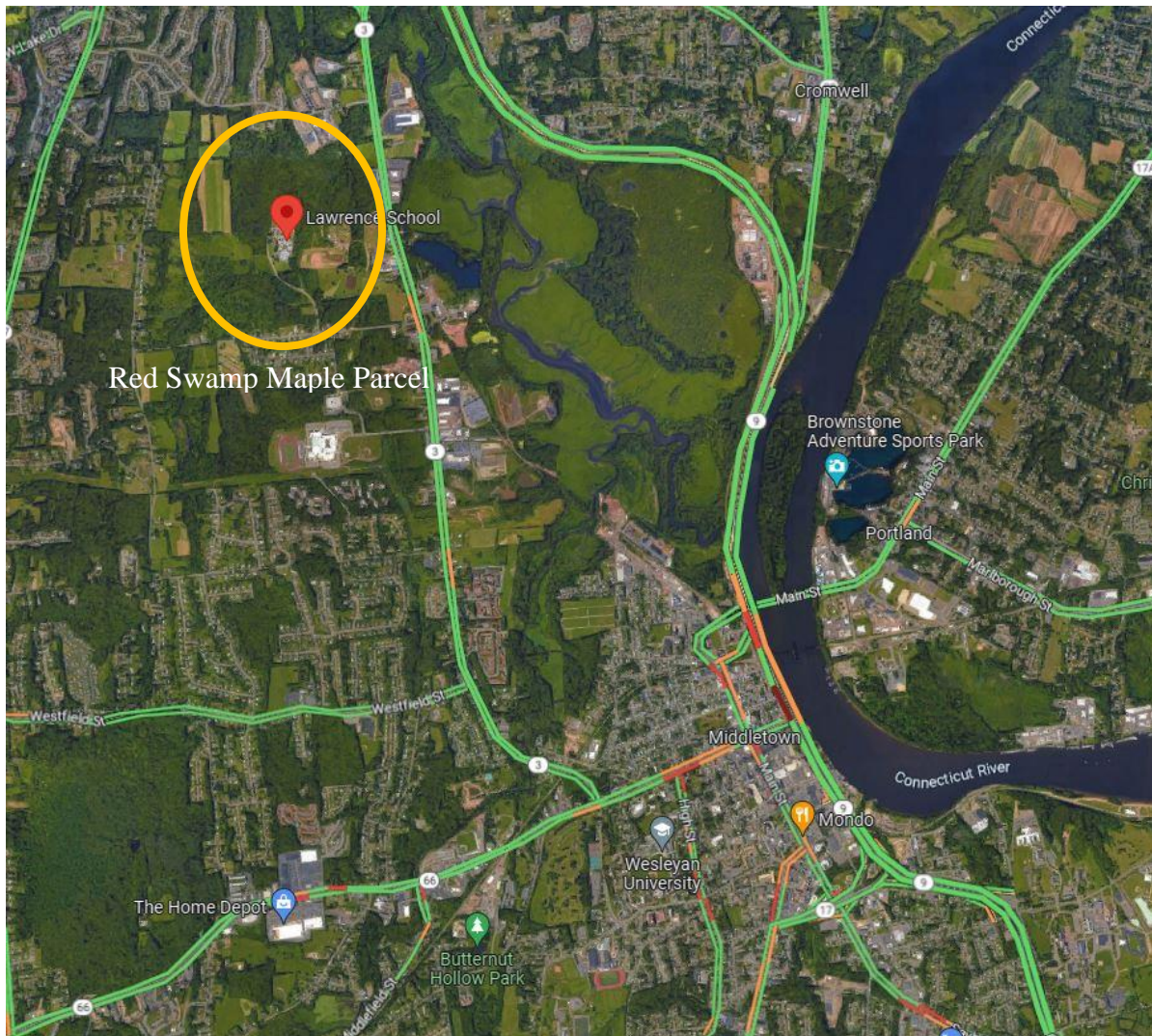
### Middletown-State POCD Conformity Notation

Conserve and restore the natural environment, cultural and historical resources, and traditional rural lands. Sustainability plays a central role in this plan, which offers strategies to conserve and restore the natural environment; these strategies include encouraging growth within the existing sewer service area, systematically preserving open space and agricultural land, and developing green infrastructure. This plan also promotes vibrancy and health within the city by valuing and protecting its historic structures, fostering cultural diversity, and supporting the arts.

### Transportation Considerations and Accessibility

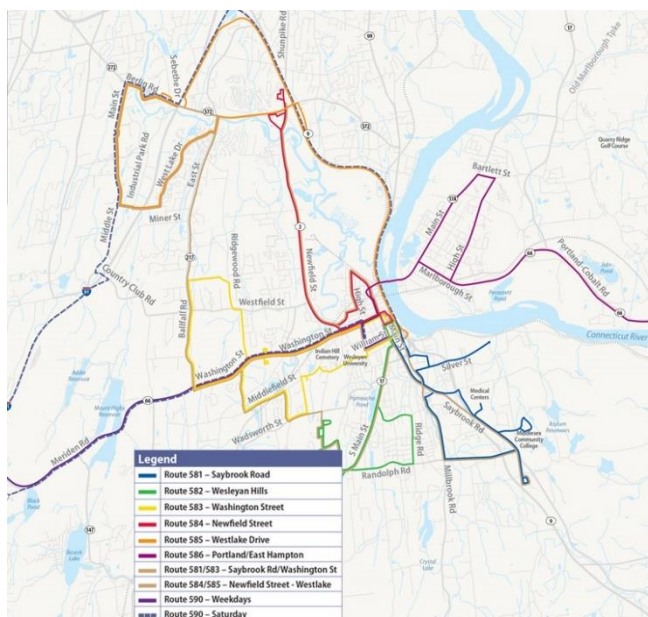
As noted in previous sections of this report, the Red Swamp Maple property is located in a transect of multiple and diverse land use systems, including those that promote automobile trip generation, higher than average residential traffic volumes due to proximity to major collector streets and transit route connections.

The property is accessed via Mile Lane with parking at the Lawrence School outside of school hours. There is a city-owned property on Ridgewood Road (opposite Higgins Farm house) which could provide a consistent means of access during school hours, but planning for access would need to be evaluated to avoid impact on critical species.

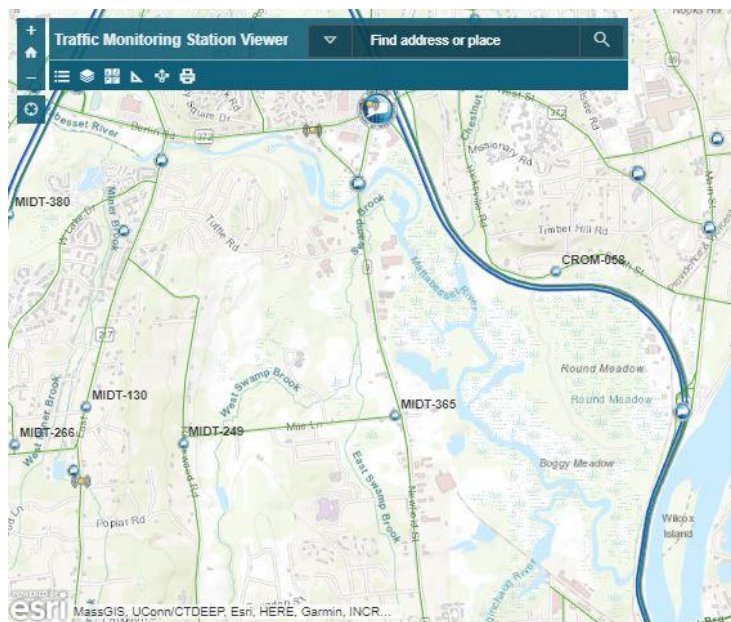


**Planning**

Traffic Congestion – Thursday- Midday - Middletown area depicts relatively low impact to road systems outside of commuter hours



Middletown Area Transit Routes



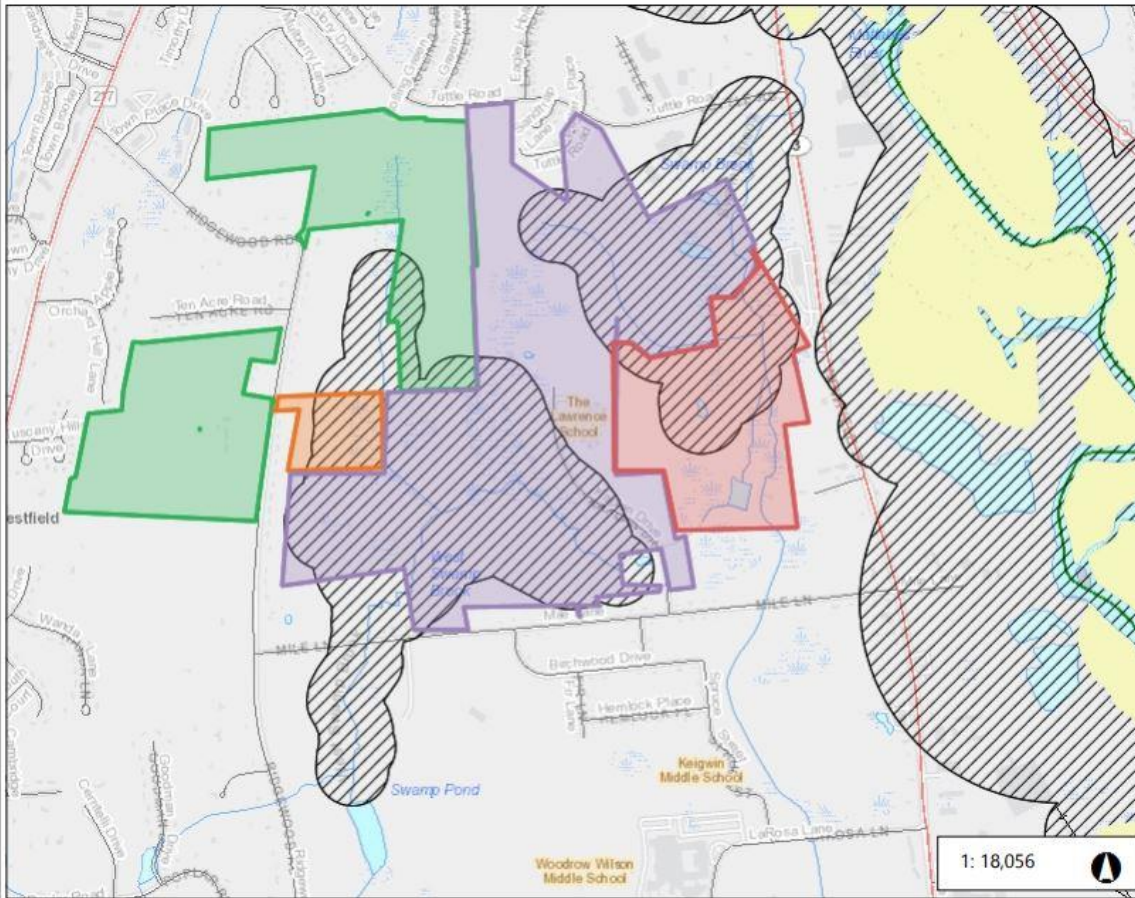
CTDOT Traffic Volume Data

[https://portal.ct.gov/DOT/PP\\_SysInfo/Traffic-Monitoring](https://portal.ct.gov/DOT/PP_SysInfo/Traffic-Monitoring)

## ERT PLANNING RECOMMENDATIONS

The Red Maple Swamp property is located, as noted in previous section, in particularly challenging geography given the natural resources identified on the property and the property's importance for habitat, watershed management, flood management. The objectives and goals of the state, regional and city align in many ways toward natural resource protection and the role of the property in conservation continuity. The following recommendations are based on a cross sectional analysis of the varied previously outlined objectives.

- Based on objectives listed in the LCRV and Middletown POCD, the challenge for city officials, including the conservation commission will be the management of adjacent land uses on Route 3 as well as lower density residential septic systems near the parcel. There may be plans currently in progress to address Route 3 and its potential as an education innovation corridor. A recommendation of this report would include natural resource management planning in context with adjacent development as a key overlay of zoning in this area. The goal would be to both protect endangered and critical species, mitigate flood events while also promoting economically viable and sustainable growth as noted in Middletown's POCD.
- There appears to be significant justification based on the ERT teams evaluations of resources on site toward a permanent conservation easement as well as discussion and study toward property management and access.
- The CT River Coastal Conservation District would be an invaluable resource to support city land use staff and commissions toward optimal property management.
- The LRCV COG's environmental, agriculture and land use staff could provide support toward promoting zoning and land use policies that would both fulfill the objectives listed in Middletown's and the LRCV Plan of Conservation and Development.
- Industrially zoned properties on Route 3 could be optimized and planned toward innovation in agriculture industry, commercial, industrial or tech land use that would not endanger the area in the event of a flood event.
- Additionally, the proximity of the Higgins farm to the Red Maple Swamp property is a unique and valuable buffer on the west side of the property. Middletown's Conservation Commission might support work with the Higgin's family toward continued conservation easement and innovative farm practices that would also protect the Red Maple Swamp property. While NRCS and CTDOAG provide technical assistance toward practices which the Higgin's farm may already have in place, it is important for the city staff and the appropriate commissions and partners to become conversant in soil health and farmland practices that support land and natural resources preservation.
- Middletown's pollinator partnership would be a valuable contributor to the discussion on property management, especially with the agriculture use adjacent to the property.
- Connections ensure protection of the Red Maple Swamp property can be explored to provide educational connections via wildlife cameras, special visits with scientists and side trails near the property that will not impact critical specials. With two school systems proximate to the property, an opportunity to promote natural resource and land use education to school age population and the public is

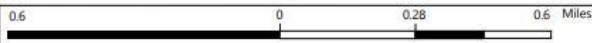


**Legend**

- Critical Habitat
- Natural Diversity Database Area
- Geographic Names7
- Geographic Place 3
- Airport
  - Airport
  - Heliport
- Railroad
- Streets
  - Interstate Highway
  - US Highway
  - State Highway
  - Primary limited-access
  - Ramp
  - Street
  - Ferry crossing
- County Line
  - State Boundary
  - County Boundary
  - Coastline
- County Name
- Town Line
  - State Boundary
  - Town Boundary
  - Coastline
  - CT Town Name

**Notes**

Green Shaded Parcels - Higgins Farm  
 Purple Shaded Parcel - Red Maple Swamp  
 Orange Shaded Parcel - Town of Middletown OS



This map is intended for general planning, management, education, and research purposes only. Data shown on this map may not be complete or current. The data shown may have been compiled at different times and at different map scales, which may not match the scale at which the data is shown on this map.



The Environmental Review Team (ERT) Program is reliant on volunteers who are experts in their field. The recommendations in this report are advisory only. The ERT program is partly funded by the Connecticut Department of Energy and Environmental Protection (CT DEEP) Passport to Parks Program. We are so grateful for our dedicated volunteers and partners.

*Thank you!*

- CT RC&D ERT Program Staff

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[CTRCD.ORG](http://CTRCD.ORG) | [CTERT.ORG](http://CTERT.ORG)