# Eisenhower Park Revitalization
## Milford, Connecticut


# King's Mark
# Environmental Review Team Report

**King's Mark Resource Conservation and Development Area, Inc.**

# Eisenhower Park Revitalization
# Milford, Connecticut

**Prepared by the**
**King's Mark Environmental Review Team**
**Of the**
**King's Mark Resource Conservation and Development Area, Inc.**

**For the**
**Mayor**
**Milford, Connecticut**

**Report #350**

**June 2010**

**CT Environmental Review Team**
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**Haddam, CT 06438**
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## ACKNOWLEDGEMENTS

This report is an outgrowth of a request from the Mayor of Milford to the Southwest Conservation District (SWCD) and the King's Mark Resource Conservation and Development Area (RC&D) Council and ERT Subcommittee for their consideration and approval. The request was approved and the measure reviewed by the King's Mark Environmental Review Team (ERT).

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

The field review took place on Tuesday, November 18, 2008 and Tuesday, March 17, 2009.

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I would also like to thank MaryRose Palumbo, inland wetland compliance officer, City of Milford, Joanna Piscitelli, Joseph Agro and Mark Lofthouse, Eisenhower Study Committee, Philip Katz, Stantec Consulting Services, Inc, Glen Behrle, chief inspector, engineering department, City of Milford, John Mangen, GIS coordinator, MIS department, City of Milford, Bill Poutray, conservation commission, City of Milford, Bill McCarthy, recreation director, City of Milford and Marcia Winter, grant coordinator, City of Milford, for their cooperation and assistance during this environmental review.

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

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

The King's Mark RC&D Executive Council hopes you will find this report of value and assistance in the revitalization and management planning for Eisenhower Park.

If you require additional information please contact:

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# INTRODUCTION

## *Introduction*

The Mayor of Milford has requested Environmental Review Team (ERT) assistance in reviewing and identifying natural resources within Eisenhower Park for management and revitalization.

Eisenhower Park is located on Route 121 approximately 2.7 miles south of the Merit Parkway and 0.9 miles north of Route 1 in Milford. The 220 acre park is City owned space. Adjacent to the main body of the park across West Street is an additional +100 acre parcel of open space known as the Solomon Property.

The two properties contain +125 acres of wetlands, approximately 253 wooded acres, 41 acres of meadow and 16 acres of active recreation. The Wepawaug River traverses the Eisenhower Park parcel from north to south. A CL&P ROW bisects the parcel and forms the southern site boundary of the Solomon parcel. A pond with a dam is located just east of the Wepawaug River in Eisenhower Park. There is a diversion structure that diverts flows from the river into the pond. Both parcels have many existing trails and various access points.

Land-Tech Consultants prepared a natural resources inventory report in 2005 for the Eisenhower Park Study Committee and Stantec Consulting Services prepared a Master Plan for the park in 2007. The mission statement of the Eisenhower Park Study committee is “To create a park that will meet the recreational needs of Milford’s citizens today and in the future, while enhancing and protecting the site’s natural resources.”

The City if Milford would like to create a formal management plan for these two parcels and prioritize projects to both stabilize the natural resources and to add amenities to bring more users into the park. The two previously mentioned studies also studied what other towns had done to increase park usage and to determine what the citizens of Milford would like to see in their park.

## *Objectives of the ERT Study*

Milford would like to use the ERT report to determine what is feasible to do with Eisenhower Park and to prioritize maintenance and proposed improvements to revitalize this park that has been neglected for approximately 40 years.

Guidance is needed on:

- Protection and stabilization of the riparian corridor of the Wepawaug River
- Evaluation and repair/replacement of the existing dam and diversion on the Wepawaug River
- Removal of invasives and the replanting with natives
- Formalization of trail systems used by hikers, dog walkers and horseback riders
- Placement of passive and active recreation
- Condition of the pond and its maintenance

***The ERT Process***

Through the efforts of the Mayor of Milford this environmental review and report was prepared for the City of Milford.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the city. Team members were able to review maps, plans and supporting documentation provided by the applicant.

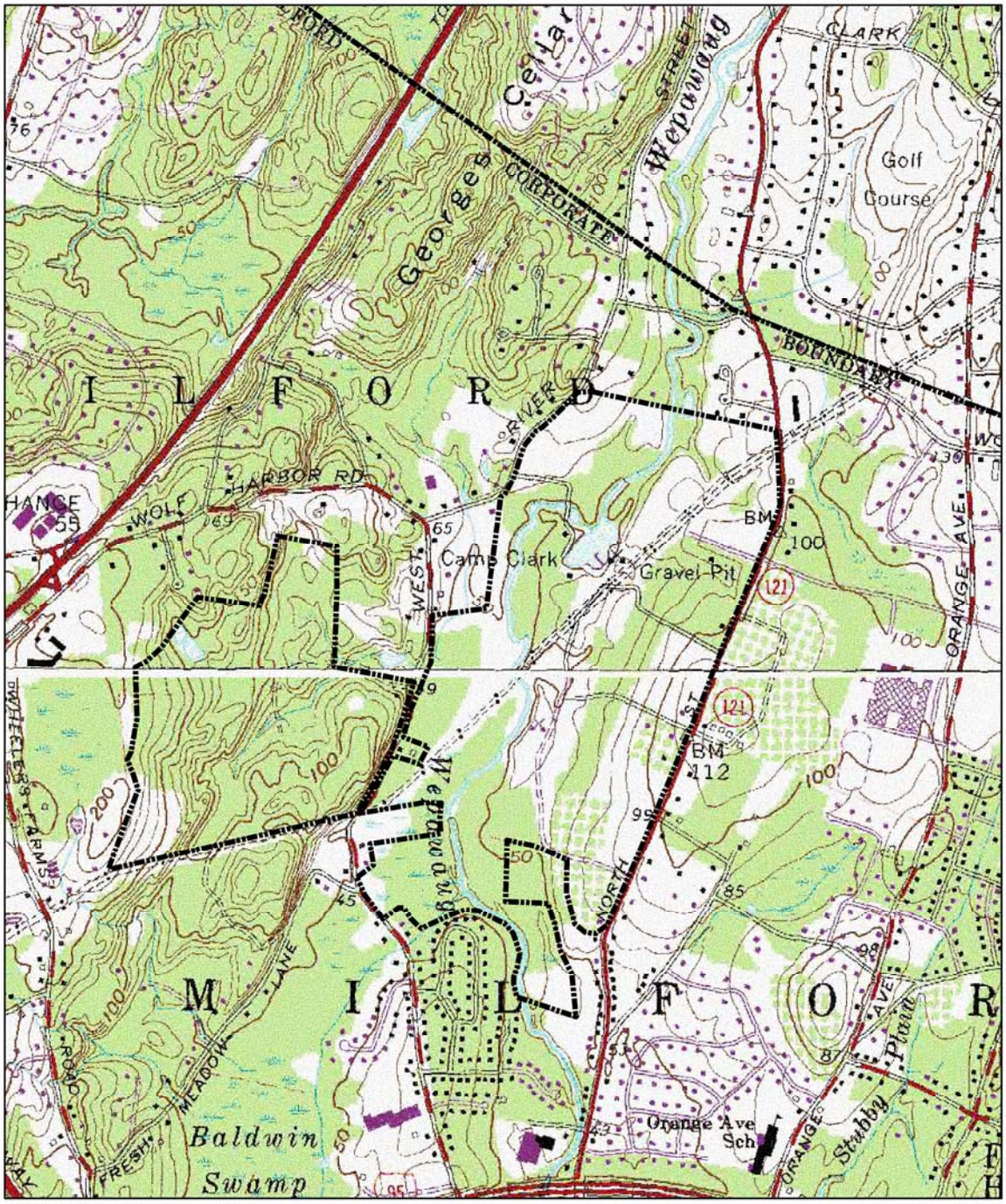
The review process consisted of four phases:

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

The data collection phase involved both literature and field research. The field review was conducted Tuesday, November 18, 2008 and Tuesday, March 17, 2009. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

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

# Eisenhower Park Site Map



# Eisenhower Park Aerial Map

The Connecticut Environmental Review Team

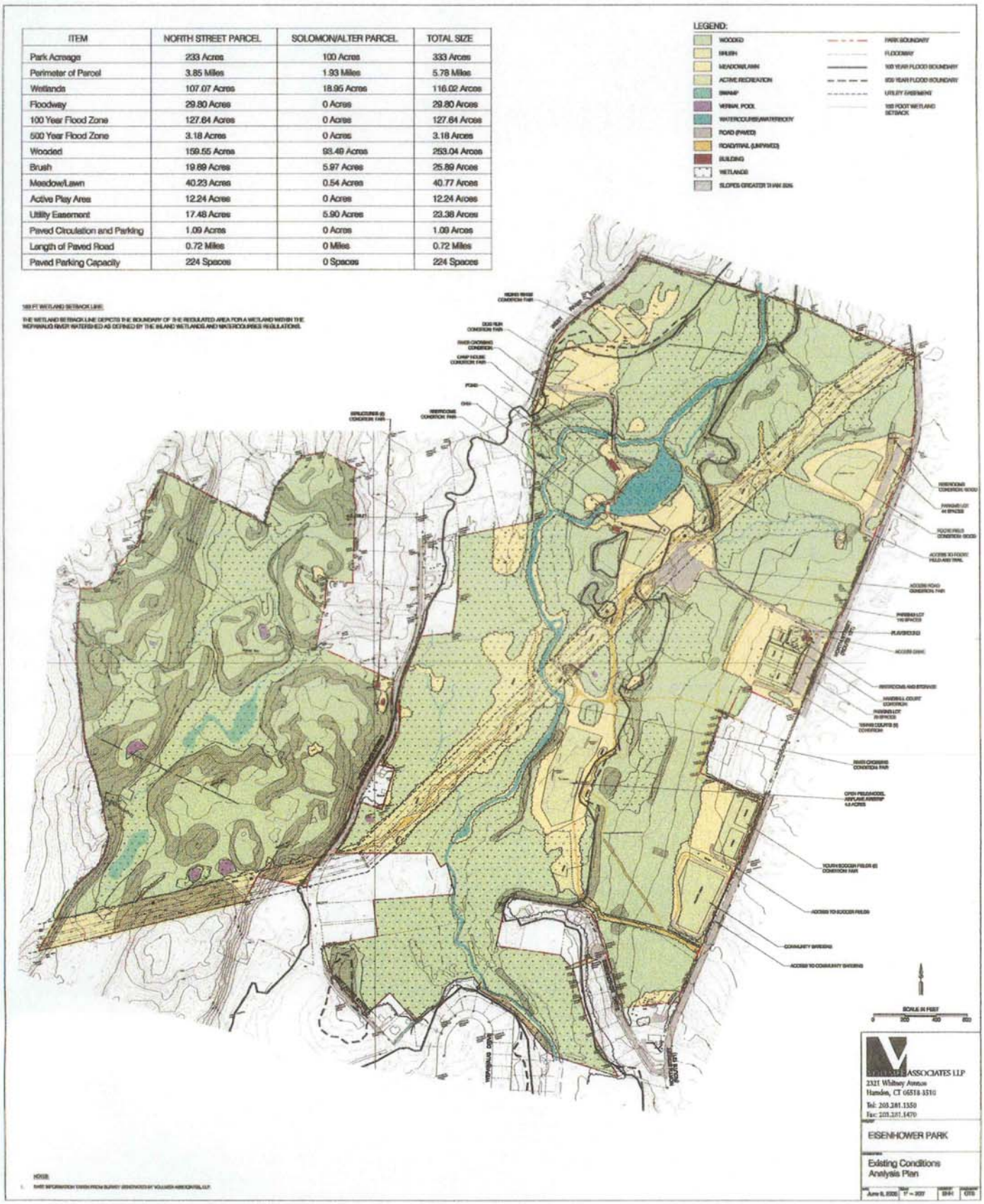
This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
June 2010.

0 0.1 0.2 0.4 0.6 Miles

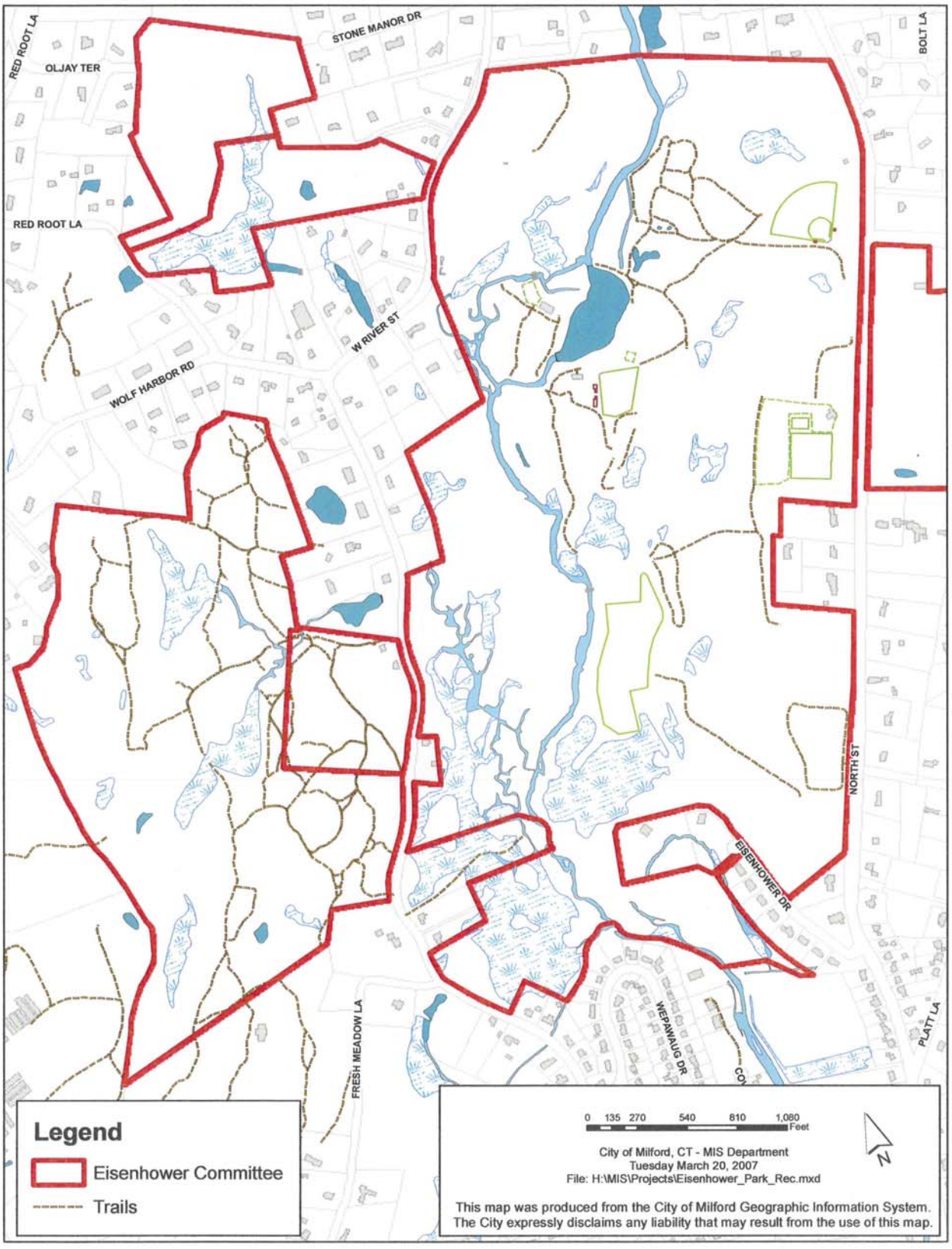
Approximate Property Boundaries

Milford, CT

| ITEM | NORTH STREET PARCEL | SOLOMON/ALTER PARCEL | TOTAL SIZE |
|---|---|---|---|
| Park Acreage | 233 Acres | 100 Acres | 333 Acres |
| Perimeter of Parcel | 3.85 Miles | 1.93 Miles | 5.78 Miles |
| Wetlands | 107.07 Acres | 18.95 Acres | 116.02 Acres |
| Floodway | 29.80 Acres | 0 Acres | 29.80 Acres |
| 100 Year Flood Zone | 127.64 Acres | 0 Acres | 127.64 Acres |
| 500 Year Flood Zone | 3.18 Acres | 0 Acres | 3.18 Acres |
| Wooded | 159.55 Acres | 93.49 Acres | 253.04 Acres |
| Brush | 19.89 Acres | 5.97 Acres | 25.89 Acres |
| Meadow/Lawn | 40.23 Acres | 0.54 Acres | 40.77 Acres |
| Active Play Area | 12.24 Acres | 0 Acres | 12.24 Acres |
| Utility Easement | 17.48 Acres | 5.90 Acres | 23.38 Acres |
| Paved Circulation and Parking | 1.09 Acres | 0 Acres | 1.09 Acres |
| Length of Paved Road | 0.72 Miles | 0 Miles | 0.72 Miles |
| Paved Parking Capacity | 224 Spaces | 0 Spaces | 224 Spaces |




Eisenhower Park
Milford, CT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This map was produced from the City of Milford Geographic Information System.
The City expressly disclaims any liability that may result from the use of this map.

# TOPOGRAPHY AND GEOLOGY

In 2005, the Town of Milford received a Natural Resources Inventory which describes the "Physiography/Topography" and "Geology" of Eisenhower Park on pp. 2-3. This report will not repeat that material, but will cast it in slightly different terms and add some physical description based on field observation.

## *Topography*

Eisenhower Park straddles the Wepawaug River in the northern part of Milford. It consists of an eastern and western upland area and a central river valley. The eastern upland area has a rather gentle almost streamlined topography. The high point on the eastern side of the park is slightly greater than 110 feet above sea level. The area is underlain by the thick glacial till of a drumlin. The westward slope into the valley is subdued, dropping to an elevation of around 50-60 feet where a gravel terrace laps onto the slope. The western upland area consists of several hilltops with elevations reaching up to 180 feet above sea level. It is more rugged with considerable area of relatively steep slopes. The area is underlain by thin glacial till with numerous bed rock (ledge) outcrops. The western upland area drops abruptly to a terrace that laps up onto its steep slopes. The Wepawaug River flows through a terraced valley. Terraces on either side of the river have an elevation from 5-15 feet higher than the adjacent flood plain of the river. The flood plain drops about 20 feet from an elevation of 56 feet where it enters the northern end of the park less than 40 feet where it leaves the southern end of the park, a distance slightly greater than a mile. The flood plain ranges in width from about 100 feet to more than 600 feet. It is underlain by modern river alluvium. Terraces, on both sides of the river, are from 100 to more than 600 feet wide. They are underlain by sand and gravel and have been extensively disturbed by mining (removal) and park development (construction of parking and other facilities) that involved placement of material, some of which was locally derived. The resulting topography is irregular to hummocky. A river dike has been constructed and a wetland excavated and tended.

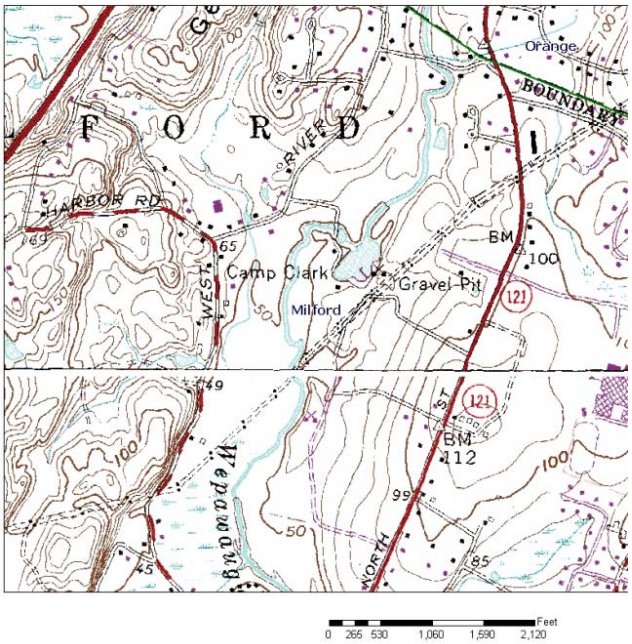


**Figure 1. Topographic map: contour interval = 10'**

## *Geology*

Bedrock only crops out in the western uplands part of the park. It is covered by glacial soils or sand and gravel elsewhere. It consists of gray rock belonging to the Wepawaug Schist.

**Figure 2. Wepawaug Schist. Upper left shows general concordance of bedding and schistosity seen at most (but not all) exposures (key chain in upper center is 2" in diameter). Lighter layers contain more quartz and feldspar and less muscovite mica. Lower left shows similar stratigraphy. Here garnets are a significant part of the mineral composition. Length of keys just to left and a little above center are 2.5". Right top shows garnetiferous schist. Garnets up to one-half inch in diameter (scale inadvertantly omitted: maple leaves are about 4" in diameter). Center right picture shows detail of schistosity (upper left to lower right), garnets and bedding (along bottom of picture) that is cut by schistosity. Letter on key chain disk is about ¾". Lower right shows bedding (manifest by garnet abundance) and schistosity (penny for scale).**

It is gray, dark gray and silvery gray. It consists of muscovite-garnet schist and contains muscovite and garnet with lesser amounts of quartz and feldspar. Some layers contain small amounts of staurolite. Some places graphite is reported, but none was observed during the field

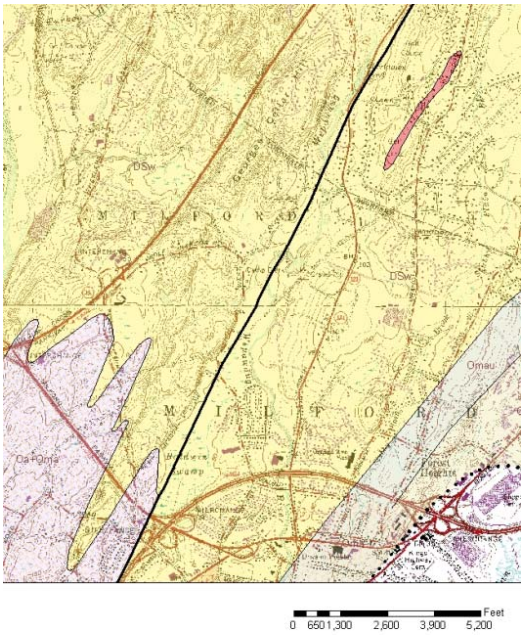


**Figure 3. Bedrock geological map (after Rodgers, 1985). Yellow area us underlain by Wepawaug Schist (Siluro-Devonian in age). Pale purple area is underlain by Ordovician-aged metamorphosed volcanic rocks and the light blue and green areas are underlain by additional metavolcanic rocks. Red area is younger intrusion of diabase of Jurassic age. This diabase is a feeder dike for the youngest lava flow in the Hartford Basin to the east. Diagonal black line is trace of fault that uplifted the west side relative to the east side.**

observations in the park. It is well foliated but indistinctly bedded. Bedding may be recognized in many outcrops because of changes is grain-size and slight variations in the mineral content. Changes in mica and garnet crystal-size and abundance appear to be stratigraphically controlled. Foliation is mostly schistosity caused by alignment of fine- and medium-grained muscovite mica. Gneissic foliation is local and not widespread. Foliation and bedding are parallel over much, but not all, of the area.

Regional mapping (Rodgers, 1985) has revealed a major fault that bisects the park. Neither the fault itself, nor fractures parallel to the fault were recognized during the field visit, but is shown on a bedrock geologic map (Figure 3).

## *Surficial Geology*

Most of the surface is covered by glacial till: the till is thin in the western uplands but is thick on the eastern hill. The valley center contains gravel deposits. All the surficial material (except for the modern alluvium) was deposited at the end of the last ice age.

The thick till area on the east has a rather smooth topography that was formed beneath the last ice age glacier. It has the form of a drumlin and indicates glacial flow from the northeast toward the southwest (parallel to the elongation direction of the hill). It is thought that till from the last ice-age overlies till from an older ice-age

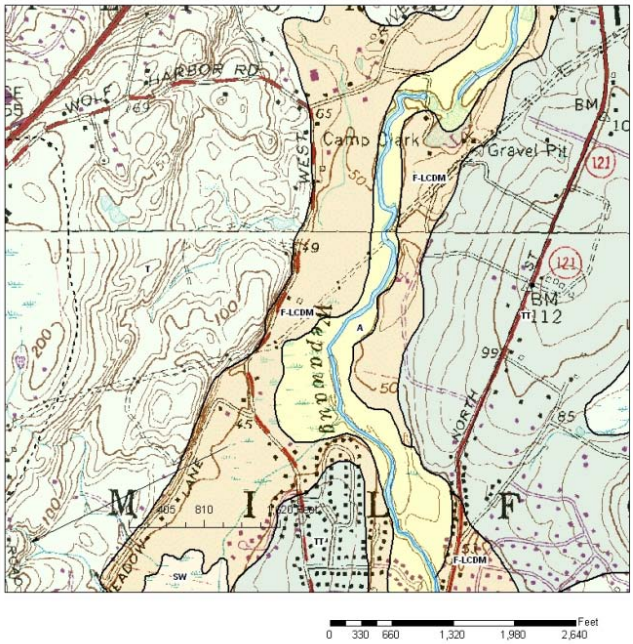


**Figure 4. Quaternary (surficial) geologic map of the area in and around Eisenhower Park (after Stone and others, 2005). Grayish green area on west is area of thick till, Pale green area on west is thin till. Pale orange area is underlain by gravel terrace-deposits and yellow area is underlain by modern alluvium and is part of the modern flood-plain. Note the scale is different than in Figure 3.**

and hence the till is thicker than most areas. The till area to the west is very thin and indeed, bedrock crops out in many areas where till has been eroded away or was not deposited. Natural bedrock exposures have been weathered and have a rough surface texture (Fig. 5). Along a recently (last 100 years ±) excavated road, the bedrock is smooth and even polished, *i.e.* it has not been weathered. These surfaces contain glacial striations, grooves in the rock created by the

**Figure 5. Image at left shows typical bedrock surface that has weathered since deglaciation. The surface although somewhat smooth is rough in detail and no surface marks caused by passage of the glacier remain. Image below shows ledge recently uncovered by construction of a road. The surface is very smooth and has glacial striations that cut diagonally across the outcrop. Notice the line of garnets (foliation of rock) parallel to the side of the compass and at an angle to the striations. Notice also that striations are not parallel to the roadway and hence were not made by bulldozers. Striations indicate ice movement toward the southwest, parallel to the elongation of the drumlin on the other side of the river.**

gouging of rocks that were frozen into the base of the glacier as it slowly scrapped over the ledge. It is likely that similar markings were present on most of the bedrock surfaces prior to their being exposed to the ravages of weathering.

The terraces, on both sides of the Wepawaug River are greatly disturbed. Where they appear undisturbed they have an irregular topography marked by and uneven, hummocky topography (Figure 6). They are underlain by sand and gravel that were deposited by glacial melt-water streams at the end of the last ice age. As such, they are younger than the drumlin

**Figure 6. Terrace topography, where undisturbed, is generally hummocky and uneven. Terraces are underlain by sand and gravel that most likely is stratified. The depression on left side of left image is possibly a shallow kettle.**

and the till deposits. The uneven topography is caused by melting of left-over chunks of ice that were buried by the sand and gravel deposited by melt-water streams. The sand collapses into the void where ice once lay.

**Figure 7. Wepawaug River and its flood plain just downstream from the pond in Eisenhower Park. Images were taken during March, 2009. Moderate to heavy rainfall during December caused minor flooding the extent of which can be recognized in the images by noticing here the past autumn's leaf-fall has been washed away by the high water. Image on left shows bend in the river with typical eroding cutbank on the outer part of the bend and the depositional point-bar on the inner part of the bend (partially obscured by trees on the right).**

The modern flood-plain is covered with a veneer of modern alluvium that likely buries older terrace gravel. Minor flooding occurs regularly (Figure 7).

**Figure 8. Artificial levee built to a height of 10± feet above flood stage. View taken near south central part of park near a wetland restoration area. Levee continues for about 1000 feet and ends abruptly in a swamp.**

***References***

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## SOIL RESOURCES

This soils report applies to the 333-acre parcel referred to as Eisenhower Park, which is bounded by North Street on the East, Wolf Harbor Road to the North, along the western limits of the parcel (Solomon Property) the border is approx. 1,500-feet east of Wheelers Farm Road and to the south the parcel is bounded by Fresh Meadow Lane and Wepawaug Drive. The information in this report is based on the historical soils series descriptions and the new digital mapping unit descriptions as presented in the Soil Survey of Connecticut, remote survey interpretations plus field observations.

Exhibit #1 (CT Soils Mapping) are derived from the new digital survey (Soil Survey of Connecticut). The soil survey utilizes recent aerial photographic base with one soil legend, which employs the numbering convention used by the USDA.

### *Section I - Mapping Units*

### Wetland Soils – Exhibit #1

1) **USDA Soil #3 - Map Unit RN – Ridgebury, Leicester and Whitman extremely stony fine sandy loams.** Consists of nearly level to gently sloping, poorly drained soils in drainage ways and depressions on glacial uplands. Ridgebury soils are very deep and derived mainly from gneiss and schist. Typically, they have a friable loam or fine sandy loam surface layer and subsoil over a firm fine sandy loam or sandy loam dense till substratum. Ridgebury soils have a perched watertable within 1.5 feet of the surface much of the year.

   **Buffering of Wetlands –** Most of the upland soils in close proximity to these wetlands have **moderate to severe erosion hazards** that relate to their composition and their topographic relief. Establishing well defined limits of disturbance and preserving the majority of the natural landscape reduces the risk of erosion and siltation on and off-site.

2) **USDA Soil #4 - Lc – Leicester extremely stony fine sandy loams.** Consists of nearly level to gently sloping, poorly drained soils in drainage ways and depressions on glacial uplands. Ridgebury soils are very deep and derived mainly from gneiss and schist. Typically, they have a friable loam or fine sandy loam surface layer and subsoil over a firm fine sandy loam or sandy loam dense till substratum. Ridgebury soils have a perched watertable within 1.5 feet of the surface much of the year.

   **Observation**
   The majority of wetland soil types #3 & #4 occur within the Solomon parcel where they developed in depressions and drainage ways of steeper glacial till uplands.

   **Concerns**

- **Erosion / Siltation** - Due to the severe erosion hazard that the surrounding upland soils present, the existing and proposed trail system plus any future uses should be kept to a

minimum and provide sufficient buffering to limit impact to the wetlands and critical habitats.

- **Trails** - Several vernal pools have been identified, located and inventoried within the Solomon parcel. Trails bisecting and paralleling these wetlands should be prioritized to protect and preserve these areas by limiting active uses such as mountain biking and equestrian traffic. Trail sides should be narrowed and re-vegetated plus provide adequate buffering distances with limited observation trails leading to significant pools.

**3) USDA Soil # 12 - Map Unit Rb – Raypol**

This map unit consists primarily of Raypol soils on 0 to 3 percent slopes. Raypol soils are very deep, poorly drained soils, formed in loamy over sandy and gravelly glacial outwash deposits. These soils have a watertable within 1.5 feet of the surface much of the year. Typically, they have a silt loam, very fine sandy loam surface layer and subsoil over a stratified and gravel substratum that extends to a depth of 60 inches or more.

**4) USDA Soil #108 – Map Unit Sc – Saco**

These soils are very deep, very poorly drained soils on low-lying floodplains. They formed in silty alluvial deposits. Saco soils typically have silt loam or very fine sandy loam textures to a depth of 40 inches and silt loam through loamy fine sandy textures below 40 inches. Saco soils have a watertable at or near the surface most of the year. They are subject to frequent flooding and commonly flood annually, usually in the spring.

**Observation**

**Wetlands** – The #12 -Rb wetlands are dispersed along the river corridor with the larger wetlands appearing in the southerly reaches, central and northeast sectors of the main park. The #108 – Sc alluvial wetland soils are primarily found in the upper half of the park.

**River Access** - Access to the river from established and blazed trails criss-cross these wetlands throughout the river corridor has reduced vegetative cover and given rise to significant erosion from traffic along the riverbanks.

**Vernal Pools & Riverine Vernal Pools** – The vernal pools identified in the Land-Tech report need protection from disturbances. Several riverine vernal pools were found along the river corridor during the Districts initial visits. Unfortunately, the nature of these pools viability depends on the frequency of inundations of the flood plain. Most of the pools found were lost to recent snowmelts and rain events that removed the existing biomass.

**Wetland Crossings and Trails** – Trails around these wetlands require greater buffering distances, erosion and siltation control and less intrusive, raised walkways across wetland areas. Active recreation such as mountain biking and equestrian uses should be relegated to specific areas to cross any wetlands or watercourses on site. Minimize the size of the crossing, provide hard armoring of the crossing and stabilize the upslope area leading to these crossings.

**Concerns**

- **Riverbank Stabilization** – Throughout the corridor, the dynamics of the river are significant during flood stage where velocities and volumes have eroded riverbanks, tributaries and undercut trees along its reach. The erosion of banks has introduced sediments in stream and affected downstream environments, which advances the aggrading of the river and allows the river to go out of bank more often.

- **Critical Area Access** – Unbridled access from all levels of use has damaged sensitive areas throughout this portion of the park. Reducing the number of minor trails that branch off and further fragment important habitats will go a long way in the recovery of vegetative cover that will restore and enhance every facet of this ecosystem.

- **Aquifer Protection** – Consideration should be given to potential high yield areas for preservation and protection for future municipal consumption. **"Ground-water Availability in CT".**

**Non-wetland Soils**

**5) USDA Soil #21A - Map Unit Nn – Ninegret fine sandy loam.**
These soils are very deep and moderately well drained. Ninegret soils formed in glacial outwash. Typically, they have a fine sandy loam surface and subsoil layer, overlying sand and gravel to a depth of 60 inches or more. They exhibit redoxamorphic features within a depth of 24 inches. These soils have a seasonally high watertable at 1.5 to 2.5 feet from late fall to early spring.

It constitutes approximately 13 % of the soils on site and the majority of these soils are located on both sides of the lower half of the river with segments in the north and northeastern reaches of the park. The soil has **poor to fair potential** for community development. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum.

**6) USDA Soil # 29A & B AfA – Agawan fine sandy loam, (A, 0-3 & B, 3-8 percent slopes.**
**USDA Soil # 29C – Agawan fine sandy loam, C, 8-15 percent slopes.**
This map unit consists of Agawam soils. These soils are very deep, well drained soils formed in loamy over sandy and gravelly glacial outwash deposits. Typically, they have a fine sandy loam surface layer and subsoil over a stratified sand and gravel substratum that extends to a depth of 60 inches or more.

This soil has **good potential for development**. Permeability is moderately rapid in the surface layer and subsoil and **rapid in the substratum**. Runoff is medium. Conservation measures are needed to prevent excessive runoff, erosion and siltation during construction.

**Observation**
These soils constitute approximately 12.1% of the total acreage and the majority of these soils are located in the northern portion of the main park. The proposed Equestrian Area and existing ball field to the east of the river are sited atop of these soil types.

**Concern**

- **NPS Contaminants** - The rapid permeability in the substratum requires that caution be taken to prevent ground water contamination from surface water runoff that may entrain horse waste (ecoli and nutrients) plus NPS contaminants in stormwater runoff from vehicles and impervious parking surfaces.

- **Recreation Fields** – Field management programs regarding fertilizer and pesticide uses should become part of the overall management plan for the park. Nutrients and pesticides can easily be introduced to the hydrologic regime of the area through the substratum of these soils, which acts as a conduit to the riverine environment and ultimately LIS.

**7) USDA Soil #32A - Map Unit HcA – Haven silt loam 0 to 3 percent slopes.**
These very deep well-drained soils formed in loamy over sandy and gravelly glacial fluvial deposits. Typically, they have a silt loam, loam or very fine sandy loam surface layer and subsoil over a stratified sand and gravel substratum.

This soil has a **good potential** for community development. The hazard of erosion is moderate. Permeability is moderate in the surface layer and subsoil and very rapid in the substratum. Runoff is medium.

These soils are found along the west and northwest border of the upper half of the river corridor of the main park. A narrow section of these soils are down-slope of and east of the fields on North Street.

**8) Map Unit HME - Hinckley and Manchester 15 to 35 percent slopes. USDA Soil # 38E**
This map unit consists of moderately steep to very steep, excessively drained soils on outwash terraces. The Hinckley and Manchester soils have rapid permeability in the surface layer and subsoil and very rapid permeability in the substratum. Runoff is rapid. Mainly the steep slopes limit soils.

**The hazard of erosion is severe.** Intensive conservation measures are needed to prevent excessive runoff, erosion and siltation during periods of construction.

**Concern**

- **Erosion** - Due to this soils proximity to the river and wetlands, its composition, steep topographic relief and the severe erosion hazard it presents when disturbed, any proposed uses should be carefully scrutinized or avoided altogether.

**9) USDA Soil # 60B - CfB – Charlton fine sandy loam, 3 to 8 percent slopes.**
This mapping unit is a well-drained soil on the side of slopes of hills and ridges and at the foot slopes of steep slopes. Permeability is moderate or moderately rapid. Runoff is medium to rapid. This soil has **fair potential for community development.** It is limited mainly by the steepness of slopes. However, it does have a **severe erosion hazard**.

Intensive conservation measures are needed to prevent excessive runoff, erosion and siltation during construction.

The ball fields and facilities along North Street utilize a significant portion of the 50-acres of Charlton soils.

**10) USDA Soil # 60C - CfC – Charlton fine sandy loam, 8 to 15 percent slopes.**
**USDA Soil # 60D - CfD – Charlton fine sandy loam, 15 to 45 percent slopes.**
Located on the sides of hills and ridges and at the foot slopes of steep hills that have been influenced by underlying bedrock. This soil has a **poor potential for community development**. It is limited mainly by steepness of slopes.

This soil has a **severe erosion hazard**. Permeability is moderate to moderately rapid. Runoff is rapid. Intensive conservation measures are needed to prevent excessive runoff, erosion and siltation during construction projects.

**11) USDA Soil #61C - ChC – Charlton very stony fine sandy loam, 8 to 15 percent slopes.**
This map unit consists primarily of Charlton soils, which are very deep, well-drained soils formed in glacial till, derived mainly from granite, gneiss and schist. Typically, they have a fine sandy loam surface layer and subsoil over a friable fine sandy loam or sandy loam substratum that extends to a depth of 60 inches or more.

**This soil has a fair potential for development. Permeability is moderate or moderately rapid.** Runoff is medium. . Stones and boulders may interfere with the installation.

- Both soils have a **moderate erosion hazard** associated with them and enhanced conservation measures are needed with the increase in steepness of slope as in the ChC soil type.

**12) USDA Soil #73C - CrC – Charlton-Hollis soil 3 to 15 percent slopes.**
This complex consists of well-drained soils located on uplands where the relief is affected by underlying bedrock. The Charlton component has moderate or moderately rapid permeability. Runoff is medium to rapid. The Hollis component has moderate to moderately rapid permeability above the bedrock.

This complex has **fair to poor potential** for community development. **The Charlton component has fair potential** for development and the **Hollis has poor potential** for development due to its shallowness to bedrock.

Intensive enhanced conservation measures such as temporary vegetation and siltation basins are frequently needed to prevent excessive runoff, erosion and siltation.

**Concerns**

- Hollis soils are limited by their shallowness to bedrock, which is approx. 10 to 20 inches in depth.

- The fine particulates of schist and gneiss associated with these soils stay in suspension for extended periods. This characteristic demands adequately sized temporary and permanent sedimentation basins to assure runoff pretreatment and minimize the potential for transport of solids and turbid water off-site.

**13) HpE – Hollis-Charlton-Rock Outcrop complex, 15 to 35 percent slopes. USDA Soil #73E**

This complex has a **poor potential for development**. One soil is named Hollis. Hollis soils are shallow and well drained. They have fine sandy loam textures overlying consolidated bedrock at a depth of 10 – 20 inches. The other soil is named Charlton. Charlton soils are very deep well drained soils formed in loose glacial till. Typically, they have fine sandy loam textures to a depth of 60 inches or more.

The rock outcrop consists of exposures of crystalline bedrock located on knobs and ledges. The Hollis soil dominates the area, followed by the Charlton and rock outcrop components. **Runoff is rapid** in both the Hollis and Charlton type soils. Both are limited by steepness of slopes and shallowness to bedrock, rock outcrops and stoniness. **There is a hazard of effluent seeping into cracks in the bedrock and polluting groundwater.**

These highly erodable slopes must employ intensive conservation measures such as the use of diversions, vegetative cover, mulching and siltation basins, which are needed to prevent excessive runoff, erosion and siltation.

**14) Map Unit HSE – Hollis-Rock outcrop complex, 15 to 25percent slopes. USDA Soil # 75E**

The map unit is limited mainly by steep-to-steep slopes, shallowness to bedrock and rock outcrops. This map unit has poor potential for development. **Onsite waste disposal systems will require very unusual design and installation. There is a hazard of system failure or that effluent may seep into the cracks in the bedrock and pollute the groundwater.**

**Erosion hazard is severe.** If these soils are disturbed for construction, intensive conservation measures, such as mulching, re-establish vegetative cover and siltation basins are needed to diffuse surface runoff to control excessive runoff, erosion and siltation.

***Items 10 thru 14 Soil Types***

**Observation**

The majority of these soils are found on the Solomon parcel, which has a large network of trails traversing the landscape.

**Concerns**

- **Erosion Control** - Trails running the fall lines of these steeper slopes have the potential to create rill and gully erosion. Redesign or reduce the number of trails plus provide erosion and sedimentation controls along these trail systems.

- **Soil Attributes** - All of the aforementioned non-wetland soils are easily suspended and transported by surface runoff. The minimization of land disturbance, avoiding or limiting exposure of steep slopes is important during all phases of any proposed disturbances.

- **Wetland Buffering** – Maintain adequate wetland setback distances to down-slope habitats to reduce impacts from erosion and siltation caused by up-slope land disturbances.

- **Habitat Loss / Disturbance –** Identify, restrict access and preserve up-slope habitats used by vernal pool species and potential endangered species such as the Eastern Box Turtle.

***Section II - Site Control Measures / Recommendations***

**Trails** - Establish a trail system guided by the protection and preservation of critical habitats, promotes the minimization land disturbance, which ultimately reduces potential impacts from erosion and siltation of sensitive habitats from recreation activities. Consideration should be given to isolating areas for more intense recreational uses such as mountain biking and horse back riding, which have a greater ability to disturb stable, vegetated ground cover, which ultimately leads to soil detachment, transport into sensitive areas of the park and water degradation.

- Increase buffers to sensitive areas such as wetlands and watercourses.
- Maintain narrow trails and stabilize trail sides with ground covers.
- Blazing of new trails atop of steeper sections should be discouraged.
- Install waterbars across trails at intervals dictated by slope angle shown.
- Established and proposed walking and riding trails should provide an adequate vegetated buffer between the proposed trails and wetlands.

**Note:**

**Waterbar Spacing Along Steeper Trails –**

**1% slope @ 440’ 2% slope @ 245’ 5% @ 125**
**10% slope @ 78’ 15% slope @ 58’**

**River Corridor Bank Stabilization / Maintenance**

**Observation**

**Erosion** - Bank erosion and undercutting of trees along the river is evident at various locations. The most significant location is at the mid-point of the park where the river takes a nearly 90-degree turn downstream between two concrete bridge abutments. The translation of large event flows have been impeded by blockages and restricted by these structures to the extent that the river had over-banked. The banks upstream of these features are subject to increased bank erosion and failure to contain flows within its banks.

**Downed Trees /Snags** - Maintenance of the watercourse regarding the removal of snags that redirect erosive flows needs to be addressed. Blockage of in stream flows by downed trees and other debris adversely affect the translation of flows downstream, increase bank erosion and aggravate additional flooding.

**Recommendation**

- Remove impediments to flows such as abutments, trees and debris.
- Armor or restore integrity of riverbanks by hard armoring, bank placed logs or a suitable combination of stabilization techniques adequately sized for severe flows.

**Dam / Spillway / Flood Control**

**Observation**

Even in the current state of outlet disrepair and overall eutrophic condition, the pond continues to serve many functions in the watershed. Serving as a sink for sediment loads transported by the river and flood storage, the pond also is a warm water habitat providing refuge and food source for aquatic and terrestrial species while providing a limited recreational use to the community.

Due to its unmanaged use, the build up of sediments has reduced the flood storage capacity, allowed the establishment of aquatic weeds, which has adversely affected the water quality within the pond and ultimately impacts the down-river inland and tidal aquatic environments. In an effort to correct and increase the functionality of the pond, its structures and improve the raw water quality, the following issues should be addressed over time.

- **Outlet Structure** - The dam spillway and sidewalls are in need of repair and upgrade as an outlet control structure. Once corrected, the dam control device will allow for greater water level control, which would facilitate draw downs to manage aquatic weeds, future dredging operations and access to all structures within the ponds confines.

- **River Inlet** – Periodically isolating flows from the river to the pond for maintenance and flood control would be beneficial to the pond. The control and diversion of in-flow from the river will allow for facility repairs, removal of sediments and restoration of storage capacity.

**Pond Restoration / Water Quality** - Managing the pond for water quality, aesthetics and utilizing the pond for an added component of education can be approached a couple of ways depending on the cost and intended use of these features.

**Warm Water Environment**

The following pond management practices can be employed to control inputs to the pond and limit water quality degradation.

- Create an in-pond forebay on the northerly end of the pond to sequester solids and temporarily trap detritus from the river emptying into the pond.

- Introduce barley straw into the pond's oxygenated inflow to serve as a natural toxin to the brown and green algae found throughout the pond. A porous sack containing a measured amount of barley straw sized to the pond could easily be introduced and maintained in the forebay area.

- Install bank stabilization measures around perimeter either utilizing emergent and submergent plant species, bank placed logs or coir fiber logs enhanced with appropriate wetland plants / shrub species. Bank stabilization will control the minor erosion of the pond sides introducing sediment that ultimately adds to the a-gradation of the pond, increase in temperature and loss of storage capacity.

- Introduction of a fountain or bottom aeration system would oxygenate and provide added circulation of the pond. This may require increasing the bottom depth where this device is located.

- Mechanically remove the pond lily, milfoil and algae through raking or chain drags throughout the affected areas of the pond. Avoid chemical treatment due to dramatic drop in dissolved oxygen levels, which cause fish kills and direct poisoning of aquatic wildlife.

  Note: Alternate practices involve the blocking of sunlight (photosynthesis) or draw down to expose aquatic vegetation to freezing temperatures.

**Dredging Option**

Creating a deeper / cooler water environment by dredging is another option, which is a significantly more involved process.

**Constraints to Dredging**

- Cost associated with dry dredging: Excavation and transport generally will range from $20 - $25 / cubic yard. Dredging a 1/10-acre 4' to 6' could range somewhere from 90 to 110 cubic yards of material to be excavated. The contractor can determine if the quality and quantity of the material. If there were sellable material found, the price would go down per yard.

**Minimize disturbance and exposure. The Contractor should provide drawings for the project that address the following:**

- **Bottom Profile** – Profiles of pond sides and bottoms should be incorporated into any engineering drawings along with adequately enhanced Erosion and Sedimentation Controls.

- **Low-Flow** - Project of this type needs to be conducted during periods of low-flow. August to September is preferred.

- **Dewatering** - Establish a dewatering area on upland soils.

- **Hazardous Materials Management** - Staging of all equipment and associated fueling and maintenance materials should be placed outside of the 100-year flood plain.

- **Maintenance –** Periodic assessment and evaluation of the pond and its facilities is necessary for its optimal performance and the preservation of water quality.

**Natural Resource History / Education Trails**

Trails are the key to bringing people and wildlife together. Trail systems should be located to take advantage of terrain and existing habitat and conform to existing landscape textures. Effective trail planning and layout can enhance the learning and aesthetic aspects of passive outdoor recreation by providing easy access to varied habitats. A nature trail, including informational signs, provides insight into the ecology of an area. The information provided increases awareness, allows the general public to appreciate a particular animal, plant or habitat and its ecological value and fosters a stewardship of our natural resources that will serve our communities for generations to come.

- **Guidance on developing a trail system can be obtained by contacting the CT Forest and Parks Association located on RT 66 in Middlefield, CT.**

This site also offers a wide array of science based educational opportunities from the study of aquatic and terrestrial flora and fauna, forestry management, and the enhancement of a diverse habitat base that will serve as a sanctuary to the wildlife.

Specific habitats on site could utilize strategically placed pavilions along well thought out trails systems that could serve as staging areas for outdoor living classrooms / laboratories throughout the property. This would expand and enhance all grade level science based curriculums in the Milford's school system, its citizenry and other environmental groups associated with the City**.**

- **CT DEP can facilitate the development or enhancement of existing environmental programs in the City's school system through Project Wet and Project Wild.**

**Equestrian Uses** – Whether entertaining on site stables or periodic riding events, the concentration of live stock populations in an area in such close proximity to water resources

should be carefully considered due to the potential contamination and degradation of water quality from agricultural waste storage facilities or in stormwater runoff. Ag waste presents a health hazard from e-coli and causes nutrient loading of water resources. Consideration should be given to limiting the access to and the crossing of wetlands and watercourses. **See Federal Administered Programs below.**

**Forestry Management / Invasive Plant Control**

**Observation**
The entire site is in need of a comprehensive assessment and evaluation of its forested areas and developing an invasive plant control program. Contacts as follow:

- **Forestry** – CT DEP, Division Of Forestry, Robert S. Rocks, Eastern District Headquarters, 209 Hebron Road, Marlborough, CT 06447, Tel # 860-295-9523.

- **Invasive Plants** – CT Invasive Plant Working Group, Donna Ellis at 860-486-6448 or www.hort.uconn.edu/cipwg.

**Federal Administered Programs**

**USDA / NRCS / RC&D – Programs – Guidance on Equestrian Issues**
**HEAP = Horse Environmental Awareness Program:** Guidance and assistance is available regarding the implementation of BMP's for agricultural waste management through either the Natural Resource Conservation Service or the Resource Conservation & Development agencies of the United States Department of Agriculture.

- King's Mark Resource Conservation & Development Area (RC&D), Mark Cummings, Coordinator, 900 Northrop Rd, Ste A, Wallingford, CT, 203-269-7509, x301

**Foot Bridges / Park Interior Access**
Consideration should be given to access across the river to other sectors of the park without extensive perimeter travel for foot traffic and lightweight emergency response vehicles. Proposed crossings at the spillway below the dam and another spanning the river in the area of the pavilion could be accomplished at a relatively low cost with the installation of wooden bridges.

Spans of no more than 60-feet seem to be required and the design specifications for these types of bridges seem to fall within this requirement. Designs for receiving abutments would be the higher cost of the bridges. Wooden bridge designs and specifications can be obtained from RC&D.

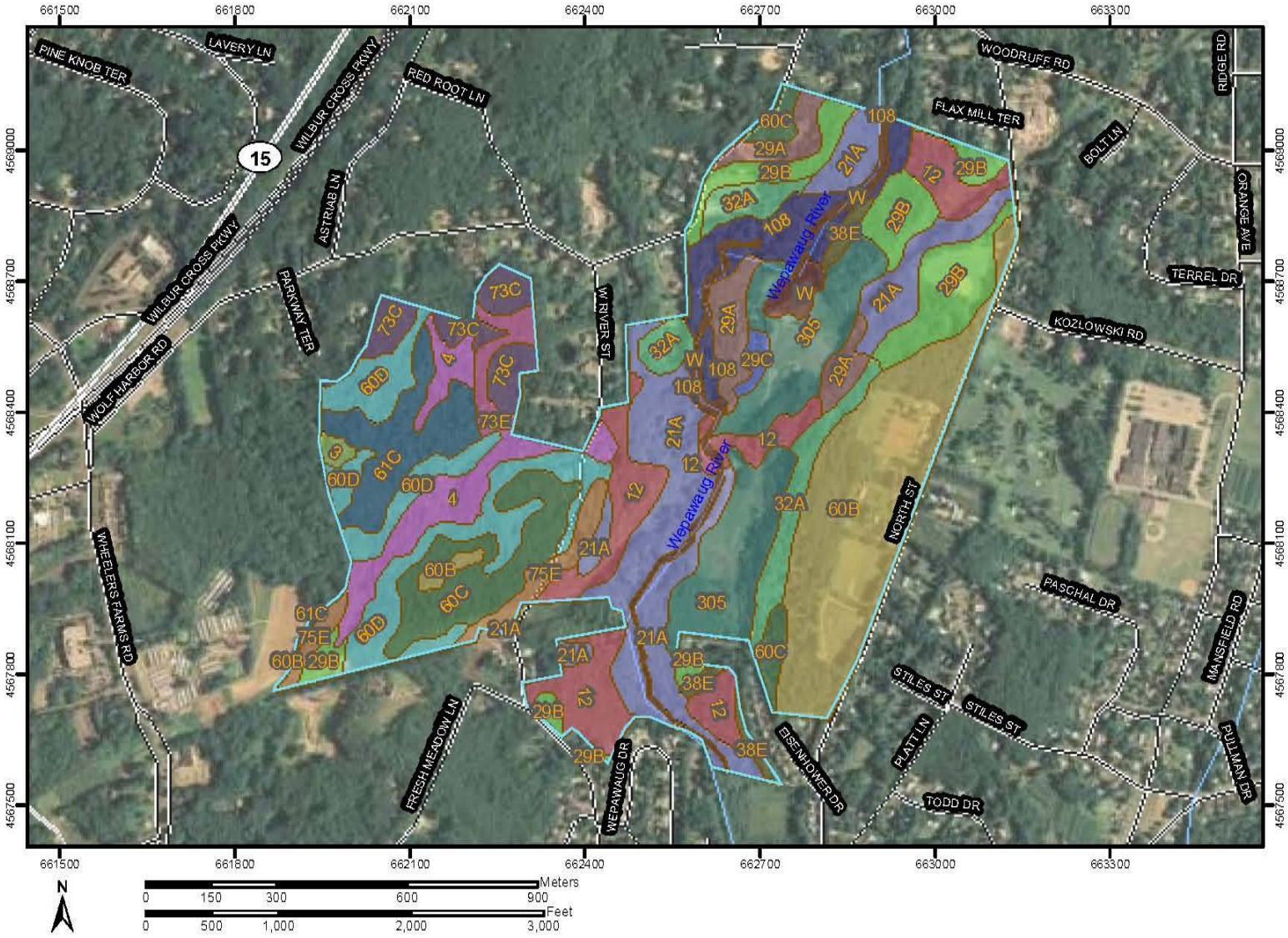
**Land Use Planning Opportunities**

The property needs to have a long-term natural resource conservation / forest management plan, which encompasses goals and objectives for increasing and maintaining biodiversity, integrates year round passive recreational uses that can provide a platform for education that showcases and

preserves its natural resources, provides public access, serves the citizenry of the City while advocating for all environs on and abutting this site.

Should you require any additional information or wish to have the Conservation District review the proposed site plan please contact the District office.

Map Unit Name–State of Connecticut



## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Units

**Soil Ratings**
- Agawam fine sandy loam, 0 to 3 percent slopes
- Agawam fine sandy loam, 3 to 8 percent slopes
- Agawam fine sandy loam, 8 to 15 percent slopes
- Canton and Charlton soils, 15 to 25 percent slopes
- Canton and Charlton soils, 3 to 8 percent slopes
- Canton and Charlton soils, 8 to 15 percent slopes
- Canton and Charlton soils, 8 to 15 percent slopes, very stony
- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky
- Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky
- Haven and Enfield soils, 0 to 3 percent slopes
- Hinckley gravelly sandy loam, 15 to 45 percent slopes
- Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes
- Leicester fine sandy loam
- Ninigret and Tisbury soils, 0 to 5 percent slopes
- Raypol silt loam
- Ridgebury, Leicester, and Whitman soils, extremely stony
- Saco silt loam
- Udorthents-Pits complex, gravelly
- Water
- Not rated or not available

**Political Features**

**Municipalities**
- Cities
- Urban Areas

**Water Features**
- Oceans
- Streams and Canals

**Transportation**
- Rails

**Roads**
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

## MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

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

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

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

Date(s) aerial images were photographed: 4/3/1991; 4/12/1991

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

# Map Unit Name

| Map Unit Name— Summary by Map Unit — State of Connecticut | | | | |
|---|---|---|---|---|
| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
| 3 | Ridgebury, Leicester, and Whitman soils, extremely stony | Ridgebury, Leicester, and Whitman soils, extremely stony | 1.1 | 0.3% |
| 4 | Leicester fine sandy loam | Leicester fine sandy loam | 14.9 | 4.3% |
| 12 | Raypol silt loam | Raypol silt loam | 30.5 | 8.7% |
| 21A | Ninigret and Tisbury soils, 0 to 5 percent slopes | Ninigret and Tisbury soils, 0 to 5 percent slopes | 46.2 | 13.2% |
| 29A | Agawam fine sandy loam, 0 to 3 percent slopes | Agawam fine sandy loam, 0 to 3 percent slopes | 12.5 | 3.6% |
| 29B | Agawam fine sandy loam, 3 to 8 percent slopes | Agawam fine sandy loam, 3 to 8 percent slopes | 28.2 | 8.1% |
| 29C | Agawam fine sandy loam, 8 to 15 percent slopes | Agawam fine sandy loam, 8 to 15 percent slopes | 1.7 | 0.5% |
| 32A | Haven and Enfield soils, 0 to 3 percent slopes | Haven and Enfield soils, 0 to 3 percent slopes | 14.8 | 4.2% |
| 38E | Hinckley gravelly sandy loam, 15 to 45 percent slopes | Hinckley gravelly sandy loam, 15 to 45 percent slopes | 3.3 | 0.9% |
| 60B | Canton and Charlton soils, 3 to 8 percent slopes | Canton and Charlton soils, 3 to 8 percent slopes | 50.8 | 14.5% |
| 60C | Canton and Charlton soils, 8 to 15 percent slopes | Canton and Charlton soils, 8 to 15 percent slopes | 21.2 | 6.1% |
| 60D | Canton and Charlton soils, 15 to 25 percent slopes | Canton and Charlton soils, 15 to 25 percent slopes | 28.8 | 8.2% |
| 61C | Canton and Charlton soils, 8 to 15 percent slopes, very stony | Canton and Charlton soils, 8 to 15 percent slopes, very stony | 15.3 | 4.4% |
| 73C | Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky | Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky | 10.6 | 3.0% |
| 73E | Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky | Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky | 4.3 | 1.2% |
| 75E | Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes | Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes | 7.1 | 2.0% |

| Map Unit Name— Summary by Map Unit — State of Connecticut | | | | |
|---|---|---|---|---|
| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
| 108 | Saco silt loam | Saco silt loam | 15.0 | 4.3% |
| 305 | Udorthents-Pits complex, gravelly | Udorthents-Pits complex, gravelly | 34.5 | 9.9% |
| W | Water | Water | 8.6 | 2.5% |
| Totals for Area of Interest (AOI) | | | 349.3 | 100.0% |

## Description

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

## Rating Options

*Aggregation Method:* No Aggregation Necessary

*Tie-break Rule:* Lower

# A WATERSHED PERSPECTIVE

***Introduction***

This section of the report provides an overview of water resources and related matters pertaining to Eisenhower Park (Park) in the Town of Milford (Town) and is based upon Connecticut Department of Environmental Protection (CT DEP) data and knowledge of the region. Recommendations are also offered with regard to measures the Town may wish to pursue in terms of protection, management and/or restoration of these resources.

These comments are given from the perspective of improving and maintaining water quality and supporting designated uses of the State's waters per the State of Connecticut Water Quality Standards[1]. This information also reflects CT DEP's commitment to address water resource concerns from a watershed perspective, taking into account the cumulative impact that various land use policies and activities within a given watershed may have upon water resources.

Please note that some of these comments may overlap with those of other Environmental Review Team (ERT) members who are dealing with more specialized aspects of the review (i.e. – fisheries, wetlands, etc.). In such cases, these comments are meant to support or supplement these specialized reviews, not supplant them.

## Watershed Context

As a way of describing Connecticut's water resources in terms of the landscape, CT DEP has divided the state along natural drainage boundaries into eight "major basins" or watersheds. These, in turn, are divided into increasingly smaller, nested watersheds which are described as "regional", "subregional" and "local" drainage basins. At each level, these watersheds are generally named after the brook, river or waterbody into which all of the water within that topographically-defined area ultimately flows. Each drainage area has also been assigned a number which reflects how it is connected to the rest of the watershed. Every water feature, no matter how small, has its own distinct watershed.

Eisenhower Park lies entirely within the Wepawaug River Subregional Drainage Basin (No. 5307) which drains directly to Milford Harbor and Long Island Sound. The Wepawaug River

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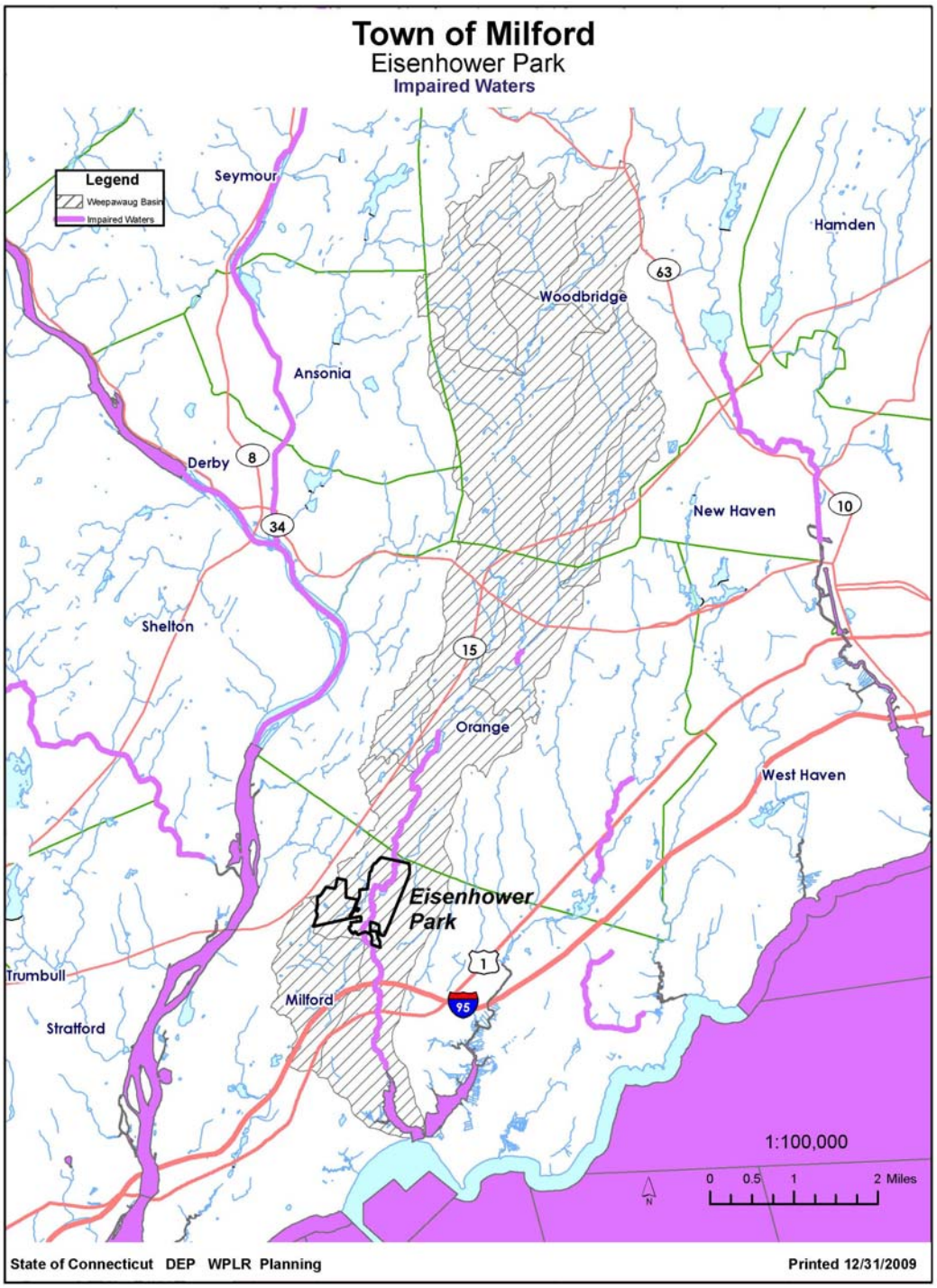
**[1] CT DEP Bureau of Water Management. Effective 2002 & 1996.Water Quality Standards. CT DEP. Hartford, CT. (This document can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325618&depNav_GID=1654 )**


Town of Milford
Eisenhower Park
Impaired Waters
Legend
Weepawaug Basin
Impaired Waters
Seymour
Hamden
63
Woodbridge
Ansonia
Derby
8
34
New Haven
10
Shelton
15
Orange
West Haven
Eisenhower Park
1
Trumbull
Milford
95
Stratford
1:100,000
0 0.5 1 2 Miles
N
State of Connecticut DEP WPLR Planning
Printed 12/31/2009

Subregional Basin lies within the South Central Western Regional Complex (No. 53) which, in turn, lies within the South Central Coast Major Basin (No. 5)[2].

Geographically, the Wepawaug River Subregional Basin encompasses portions of five towns. Although primarily located in Woodbridge, Orange and Milford, the watershed also includes very small portions of Ansonia and Derby. Altogether, this basin encompasses and drains just under 20 square miles of land.

***Water Quality***

This section is divided into three parts:

- Water Quality Standards and Classifications – which describes the criteria and goals that have been established for waters of the State;
- Water Quality Assessments – which summarizes water quality monitoring results and whether or not waterbodies are meeting State "Water Quality Standards" and designated use goals; and
- Impaired Waters List – which identifies those waterbodies which are not meeting State "Water Quality Standards" or designated use goals.

Together, these three elements can help to understand how the water resources in the Park are faring, and what course of action may need to be taken for correcting any identified problems.

Water Quality Standards and Classifications

Per Connecticut's Clean Water Act, the State has adopted "Water Quality Standards" which establish policy for water quality management throughout the state. The State classifies surface and ground water quality based upon these standards and describes water quality goals in terms of designated uses and criteria for each water quality class. Using these classifications, the State's water resources have been broadly evaluated and assigned a classification based upon presumed or known water quality as well as desired use goals. These classifications of State waters are depicted on "Water Quality Classifications" maps[3]. These classifications are used to make decisions as to how these water resources will be managed and what sorts of water-related withdrawals or discharges will be allowed or not allowed.

According to the "Water Quality Classifications" maps, the surface waters of the Wepawaug River and pond within the Park are classified as Class B/A[4]; ground waters within the Park are

[2] CT DEP. 1969-1984. Natural Drainage Basins in Connecticut (Map). Hartford, CT. (For maps, see "Connecticut Environmental Conditions Online" (CT ECO) on the UConn website at: http://cteco.uconn.edu/ )

[3] CT DEP 1993. Surface and Ground Water Quality Classifications for Connecticut (Maps). Hartford, CT. (For maps, see "Connecticut Environmental Conditions Online" (CT ECO) on the UConn website at: http://cteco.uconn.edu/ )

[4] **Class A surface waters** have overall excellent water quality and the following designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural, industrial supply

classified as Class GA[5]. For waters with a dual classification such as B/A, the first letter – in this case "B" - represents the current water quality (i.e. – "fishable-swimmable" quality), and the second of letter – in this case "A" - represents the water quality goal for that surface water resource (i.e. – "drinking water" quality). The designation of B/A indicates that although water quality is generally good, it may not be consistently meeting all the Class A water quality criteria.

Please note that Connecticut's "Water Quality Standards and Classifications" are currently undergoing revision, and the information contained in this report may change slightly in the near future[6].

Water Quality Assessments

To determine whether the State's surface water resources are meeting the designated use goals assigned to them per the "Water Quality Standards and Classifications", CT DEP periodically assesses selected water bodies throughout the state. Generally, three basic designated uses are assessed for each surface water resource: fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. Through the assessment process, each of these designated uses is classified as being either "fully supporting"; "impaired" or "unassessed". In some cases, there is "insufficient information" to make an assessment. The ideal situation, of course, is when all three designated uses are determined to be "fully supporting" for a particular water resource. However, there are many instances where one designated use is found to be "fully supporting" while the other two uses may be "impaired" or "unassessed". These results (as well as a description of Connecticut's water quality management program and assessment process) are reported biennially to the federal government in the "Integrated Water Quality Report to Congress" [7]

When assessing water quality, CT DEP divides a river into segments for purposes of identification and reporting. The water quality in the section of the Wepawaug River that flows

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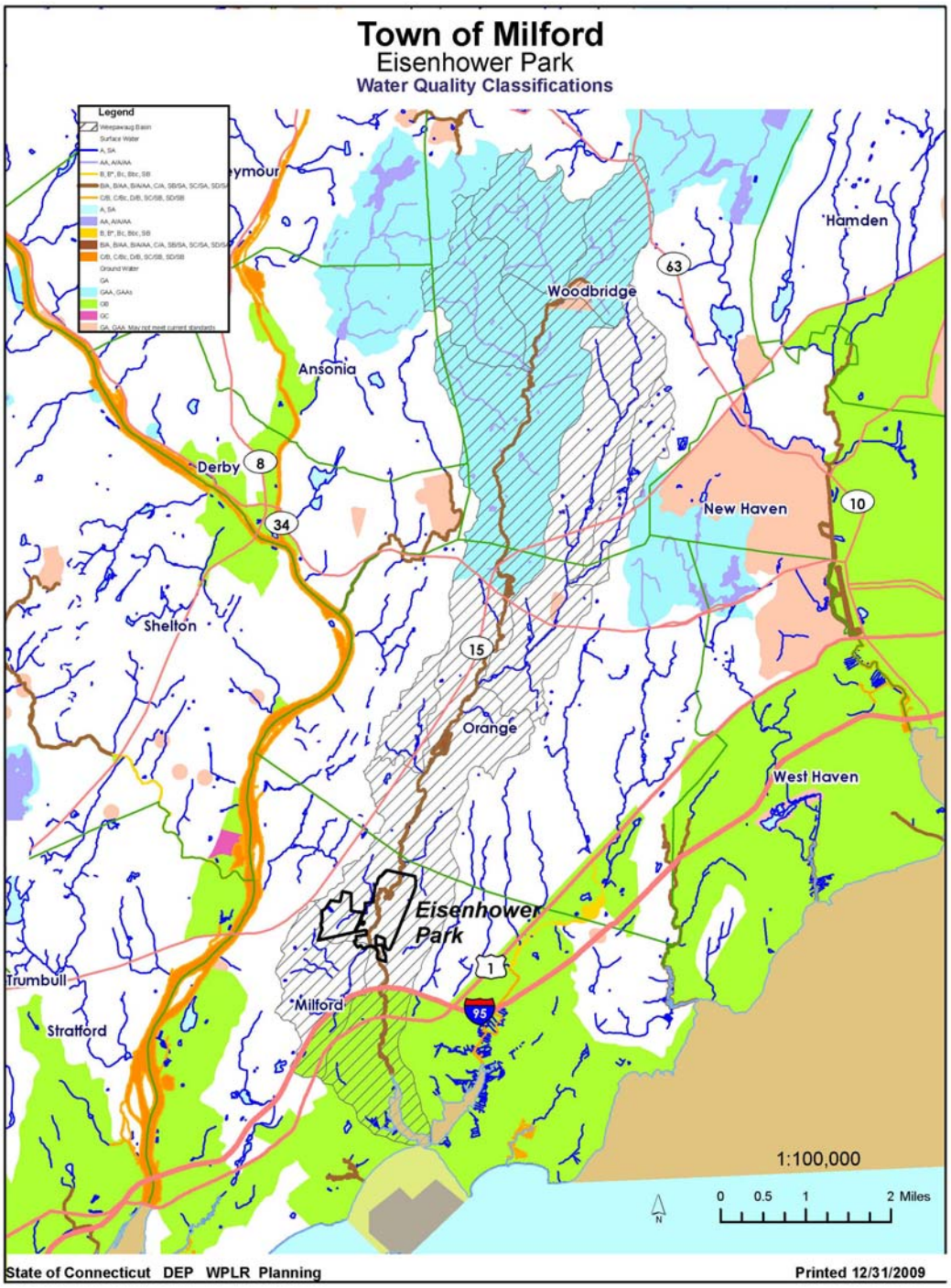
and other legitimate uses, including navigation. **Class B surface waters** have good to excellent water quality and the following designated uses: recreational use, fish and wildlife habitat, agricultural and industrial supply and other legitimate uses including navigation.

[5] **Class GA ground waters** have overall excellent water quality and the following designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

[6] On December 22, 2010, CT DEP posted a public notice regarding "Proposed Amendments to Connecticut's Water Quality Standards". Changes to the Water Quality Classifications Maps were also proposed. After closure of the public comment period on February 15, 2010, CT DEP will consider public comment, make final changes and issue the revised Water Quality Standards and Classifications Maps. Therefore, water quality classifications information presented in this ERT may change slightly after the revised standards and maps are issued. Contact the CT DEP Bureau of Water Protection and Land Reuse at (860)424-3020 for more information.

[7] For more information, see the most recent report: CT DEP Bureau of Water Protection and Land Reuse. August 2008. 2008 State of Connecticut Integrated Water Quality Report to Congress - pursuant to the requirements of Sections 305(b) and 303(d) of the Federal Clean Water Act. Hartford, CT. (This document can be viewed on CT DEP's website at: www.ct.gov/dep/iwqr .)


Town of Milford
Eisenhower Park
Water Quality Classifications
Legend
Hamden
Woodbridge
63
Ansonia
Derby
8
34
New Haven
10
Shelton
15
Orange
West Haven
Eisenhower Park
1
Trumbull
Milford
95
Stratford
1:100,000
0 0.5 1 2 Miles
N
State of Connecticut DEP WPLR Planning
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through the Park has been assessed and is part of a 4.2 mile segment, identified as Wepawaug River - 02 (No. CT5307-00_02) which begins downstream at the Route 1 crossing in Milford, and extends upstream to the Lake Wepawaug inlet in Orange. While this section was found to be fully supporting for fish consumption[8], it was found to be not supporting for recreation.[9] This section was not assessed for Aquatic Habitat. Because one of these assessed designated uses was found to be not supporting, this river segment is considered "impaired", and therefore is included on the State's "Impaired Waters List".

Impaired Waters

Through the water quality assessment process, a subset of waterbodies has been identified as not meeting Connecticut's "Water Quality Standards". These waterbodies are called "impaired waters" and are identified in a separate section of the "Integrated Water Quality Report to Congress" which is referred to as the "Impaired Waters List".

In the "Impaired Waters List", the Wepawaug River - 02 (No. CT5307-00_02) is identified as being impaired for "Recreation".[10] (See accompanying "Impaired Waters" Map.) The cause is identified as Escherichia coli which is considered an "indicator bacteria" because it is found in the intestines of warm blooded animals and, therefore, may be associated with other disease carrying organisms. The potential contributors of this bacterium have been identified as waterfowl and other unknown sources.

Obviously, "unknown sources" opens up a big question as to what other factors may be contributing to this problem.

***Other Potential Surface Water Quality Issues***

Although, indicator bacteria and its impact on water-based recreational activities is what shows up on CT DEP's "radar" of water quality concerns, the Town may also be interested in tracking other water quality parameters that could impact the water resources of the Park should levels become too high. In its "Natural Resources Inventory" of Eisenhower Park, Land-Tech

[8] Please note that in this context, "fully supporting for fish consumption" means: "No consumption advisory for any fish species or consumer group, other than the statewide advisory for Mercury in freshwater fish or PCBs in migratory saltwater fish (emphasis added)." (See "Table 1-4 Fish consumption use support and criteria" (p. 18) in "2008 State of Connecticut Integrated Water Quality Report to Congress". Also, see the CT DEP Bureau of Natural Resources "2010 Connecticut Angler's Guide", and accompanying CT DPH "Fish Consumption Advisory" which can be found on the CT DEP website at: www.ct.gov/dep/fishing ; Also see "Fish Consumption Advisory" on CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3140&Q=387460 .)

[9] See Table 2-1, Connecticut 2008, 305(b) Results in the CT DEP "2008 State of Connecticut Integrated Water Quality Report". Final - August 2008. Hartford, CT which can be found on the CT DEP website at: www.ct.gov/dep/iwqr

[10] See Table 3-3, Connecticut 2008 Impaired Waters List in the CT DEP "2008 State of Connecticut Integrated Water Quality Report". Final - August 2008. Hartford, CT which can be found on the CT DEP website at: www.ct.gov/dep/iwqr

Consultants (Land-Tech) reports on levels of nitrogen, phosphorus and total suspended solids at three sampling locations - one upstream of the pond, one in the pond, and one downstream of the pond[11]. In general, their results showed both nitrate and total phosphorus levels in the river to be elevated above what would be expected in natural water. In addition, Land-Tech observed a high ratio of nitrogen to phosphorus in the pond during summer months, indicating that this waterbody is in a eutrophic to highly eutrophic state[12]. While eutrophication is a natural process, it can be accelerated by cultural inputs. In general, the elevated levels of nitrogen and phosphorus found in the stream and pond indicate possible anthropogenic influences. As Land-Tech points out, "typical anthropogenic sources" of these nutrients "include sewage treatment plant effluent, septic system effluent, fertilizers, agriculture and urban runoff"[13].

With regard to total suspended solids, Land-Tech observed that "concentrations were low in most samples", although "some elevated concentrations were observed in several samples". They note that "elevated concentrations may have resulted from disturbance of the bottom sediments during sampling or may have resulted from storm water inputs"[14] .

***Observations***

Having identified existing and potential water quality issues affecting the surface water resources within the Park, the next step is to identify more specifically the sources of these problems, so that they can be addressed. Observations and discussion during an Environmental Review Team site visit to Eisenhower Park on March 17, 2009; review of CT DEP water quality information and maps; and perusal of "Bing - Microsoft Live Search – Bird's Eye View Maps"[15] reveal several potential sources that may be contributing to water quality issues in the Wepawaug River and the pond. These are as follows:

- Road System and Parking Areas – On the southeast side of the Park, the main road which comes in off of North Street /Route 121 drains down gradient towards the Pond. On the

[11] Land-Tech Consultants, Inc. December 2005. Natural Resources Inventory - Eisenhower Park - Milford, CT (Prepared for Vollmer Associates, LLP & The Eisenhower Park Study Committee). Southbury & Westport, CT. (pp. 19 – 23)

[12] Land-Tech Consultants, Inc. December 2005. Natural Resources Inventory - Eisenhower Park - Milford, CT (Prepared for Vollmer Associates, LLP & The Eisenhower Park Study Committee). Southbury & Westport, CT. (p. 27)

[13] Land-Tech Consultants, Inc. December 2005. Natural Resources Inventory - Eisenhower Park - Milford, CT (Prepared for Vollmer Associates, LLP & The Eisenhower Park Study Committee). Southbury & Westport, CT. (p. 22)

[14] Land-Tech Consultants, Inc. December 2005. Natural Resources Inventory - Eisenhower Park - Milford, CT (Prepared for Vollmer Associates, LLP & The Eisenhower Park Study Committee). Southbury & Westport, CT. (p. 23)

[15] For "Bing - Microsoft Live Search – Bird's Eye View Maps" of Eisenhower Park and Wepawaug River, see the following website link:
http://www.bing.com/maps/default.aspx?v=2&FORM=LMLTSN&cp=qw7yfn8xbs38&style=b&lvl=1&tilt=-90&dir=0&alt=-1000&phx=0&phy=0&phscl=1&scene=16091431&encType=1

northwest side of the Park, the road that comes in off of West River Street drains toward and crosses the Wepawaug River. Parking areas on either side of the Park, particularly the larger one on the southeast side, also drain towards the Pond. These roads as well as the parking areas may be a potential source of sediments and pollutants if stormwater from these areas is flowing into these waterbodies. If there are any direct connections between the parking area/roads and the river/pond via piping, ditches, etc., stormwater and any pollutants it may be carrying would be shunted directly into these waterbodies. In addition, stormwater flowing overland, particularly across the mown open spaces on either side of the pond, may also be conveying bacteria, nutrients, sediments and other pollutants into the stream and pond. In the case of overland flow, stormwater may infiltrate into the ground before reaching the pond when precipitation is light to moderate. However, infiltration may be limited during heavy storms. For example, on the "Bing - Microsoft Live Search – Bird's Eye View Maps" (see web link), note the sediment fan spreading away from the walking path that leads from the southeast parking area towards the pond.

- Open Space Areas Near Pond – There are areas of exposed soil within the open space area adjacent to the southeast side of the pond. Presumably these worn areas are related to various recreational activities in addition to general foot traffic. On the "Bing - Microsoft Live Search – Bird's Eye View Maps" (see web link), note "pathway" leading from bridge near the southeast parking area towards the west end of the pond; also note worn areas of playing field around bleachers. (Use rotational arrows on map to view from different angles.) Exposed sediments from these areas may be eroding and carried by stormwater into the pond.

- Dogs, Horses and Geese - Discussions during the March 17, 2009 site visit indicated that the Park is a popular area for local residents to walk their dogs and also let them run. As not all pet owners pick up after their animals, dog waste may be a concern, particularly in the open space areas near the pond and along trails adjacent to sections of stream. Horse manure deposited along streamside trails that are frequently used for horseback riding is another potential concern. From general conversation, it was not clear if geese frequent the open space areas adjacent to the pond, or if the presence of dogs tend to keep them away. However, under general circumstances, a grassy mown area adjacent to a waterbody is an invitation for geese to congregate, feed and leave droppings. Stormwater can carry fecal material – including bacteria and nutrients – from dog, horse and geese excrement deposited on land into nearby waterbodies.

- Trails Along Streams and Stream Crossings – During the March 17, 2009 site visit, trail and bank erosion was observed at numerous locations along streamside trails and at stream crossings. This has presumably resulted from a combination of factors, including: heavy foot traffic, horseback riding and trail bike riding; people straying off-trail to get closer to the stream and/or access the water; and trail drainage and maintenance issues. If left unchecked, erosion will worsen overtime and increase the sediment load to the stream.

- Upstream Influences Outside of Park – As described above, there may be number of potential sources of bacteria, nutrients, sediments and other pollutants within the Park that are affecting water quality of the Wepawaug River and the pond. However, since the Park is located in the lower portion of the Wepawaug watershed, it is also important to consider the

effect of land use activities in the upper watershed on the water quality of the pond and section of river that passes through the Park. Upstream influences are also implicated by the fact that the recreational impairment of the Wepawaug River due to bacteria extends upriver to the Lake Wepawaug inlet in Orange. As described previously, the Wepawaug watershed encompasses portions of Orange, Woodbridge, Ansonia and Derby. From a preliminary review of 2008 orthophoto maps, it appears that the upper watershed is moderately developed and primarily residential.

The foregoing list provides suggestions of possible sources contributing to water quality issues in the Wepawaug River and the pond. However, since this list is based on general observations, a more thorough assessment and investigation of these and other possible sources of bacteria, nutrients, sediments and pollutants is advised.

***Recommendations***

The Town may find the following recommendations, resources and references helpful with regard to addressing the potential sources of water quality issues described in the preceding section:

- Road System and Parking Areas – If it is determined that road and parking area drainage is impacting the river and pond, then current practices for handling stormwater may need to be modified by introducing best management techniques such as swales, detention basins or other suitable methods to redirect and/or treat run-off. For further guidance, the following resources are suggested:

❖ CT DEP "2004 Connecticut Stormwater Quality Manual"
Stormwater planning and practices with respect to roads and parking areas are discussed in various sections throughout this document. The manual can be found on the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704&depNav_GID=1654

❖ UConn CLEAR Nonpoint Education for Municipal Officials (NEMO)
See "Planning for Stormwater" under the "Stormwater" section on the NEMO website at: http://nemo.uconn.edu/tools.htm

- Open Space Areas Near Pond – Areas of exposed soil in the open space areas and playing fields need to be revegetated or otherwise protected to address erosion problems. Regular attention may need to be paid to areas of high use, and/or creative alternatives developed to limit maintenance requirements. For example, "pervious pavers" of the kind which allow grasses and other plants to grow up through spaces in the paver may be a good option for heavy traffic areas. For further guidance, the following resources are suggested:

❖ CT Council on Soil and Water Conservation in cooperation with the CT DEP "2002 Connecticut Guidelines for Soil Erosion and Sediment Control"
See particularly Chapter 5 on "The Functional Groups and Measures" which includes a section on "Vegetative Soil Cover" and permanent seeding mixtures for recreation

areas, etc. This manual can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2720&q=325660&depNav_GID=1654

- CT DEP "2004 Connecticut Stormwater Quality Manual"
  For discussion of pervious pavers, see the section of the manual on "Permeable Pavement" under "Secondary (S) Treatment Practices – Conventional Practices" which can be found on the CT DEP website at: http://www.ct.gov/dep/lib/dep/water_regulating_and_discharges/stormwater/manual/CH11_PP_S-6.pdf

- UConn CLEAR Nonpoint Education for Municipal Officials (NEMO)
  See "Permeable Pavements" on the NEMO website at: http://nemo.uconn.edu/tools/stormwater/pavements.htm

In addition to addressing exposed soil, the creation of a vegetated riparian buffer along the edge of the pond should be considered. This buffer can be designed in a manner which still allows the public to enjoy the pond and also provides access to the water at selected locations. Among other things, riparian buffers help filter out sediments and pollutants from stormwater runoff. For further guidance, the following resources are suggested:

- USDA Natural Resources Conservation Service (NRCS)
  See "Where the Land and Water Meet: A Guide for Protection and Restoration of Riparian Areas" (2003) on the USDA NRCS Connecticut website at: ftp://ftp-fc.sc.egov.usda.gov/CT/water/complete-bufferbook.pdf

- Southwest Conservation District (SWCD)
  See "Backyard Stream Buffers" (1998) and "Stream and Pond Buffers in Urban Landscapes" (1999) brochures on the SWCD website at: http://conservect.org/southwest/Education/tabid/267/itemid/121/Default.aspx

- Candlewood Lake Authority (CLA)
  See "Candlewood Lake Buffer Guidelines" (2005) under "Information Resources" and "Publications and Documents" on the CLA website at: www.candlewoodlakeauthority.org ; or you can also find this publication on the Southwest Conservation District website at: http://conservect.org/southwest/Education/tabid/267/itemid/121/Default.aspx

- Housatonic Valley Association (HVA)
  See guidance on "Protecting Your Water's Edge" on the HVA website at: http://www.hvatoday.org/show.cfm?page=water/streamsidebuffers.htm&folder=water

Whether revegetating exposed soil or creating a riparian buffer, special thought should be given to plant species used, particularly with regard to using native and non-invasive species. Further information on these topics can be found on the CT DEP website regarding:

- ❖ "Connecticut Native Tree and Shrub Availability List" (2005)
  http://www.ct.gov/dep/lib/dep/wildlife/pdf_files/habitat/ntvtree.pdf

- ❖ "Invasive Species"
  http://www.ct.gov/dep/cwp/view.asp?a=2702&q=323494&depNav_GID=1641

The Town may want to consider taking this one step further by adopting an organic land care policy for management of playing fields and similar public open spaces. This will help to reduce the amount of nutrients and pesticides entering nearby waterbodies that may occur as the result of conventional methods of maintaining these types of turf grass areas. Further information can be found on the CT DEP website under:

- ❖ "Transitioning to Organic Land Care in Your Town"
  http://www.ct.gov/dep/cwp/view.asp?a=2708&q=379676&depNav_GID=1763

- Dogs, Horses and Geese – With regard to dogs, horses and geese, the first step would be to identify the extent to which fecal materials are an issue within the Park. The next step would be to develop a plan to address each situation and implement it. Below are suggestions and resources, provided individually, for dogs, horses and geese. Particularly with regard to creating programs to address dog and horse manure, working directly with the stakeholders to develop a strong public education campaign will be an important part of the undertaking.

  Dogs - From discussion during the March 17, 2009 site visit, it sounded as though there had been a previous effort to encourage dog owners to pick up after their pets but that perhaps the initiative had not been as successful as hoped. However, reviewing projects undertaken by other groups might provide encouragement to renew efforts to address this issue within the Park. A bit of creativity and humor seem to be particularly effective ingredients in successful recipes that have been developed by others to address this pervasive problem. For further guidance, the following resources are suggested:

- ❖ See CT DEP "2004 Stormwater Quality Manual" section on "Animal Waste Management" under the "Source Control Practices and Pollution Prevention" chapter which can be found on the CT DEP website at:
  http://www.ct.gov/dep/lib/dep/water_regulating_and_discharges/stormwater/manual/Chapter_5.pdf

- ❖ "Give a Bark for a Clean State Park", an article in the CT DEP Pollution Prevention newsletter, describes a dog waste pick-up project in Chatfield Hollow State Park conducted by the CT River Coastal Conservation District. This article can be viewed on the CT DEP website at: http://www.ct.gov/dep/lib/dep/p2/newsletter/p2viewfall08.pdf

- ❖ "The Inside Scoop: How to Conduct a Pet Waste Outreach Campaign" (2007), published by the New Hampshire Department of Environmental Services (NH DES) provides detailed guidance on public education and outreach to help create a successful pet waste program. This document can be found on the NH DES website at:

http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-06-35.pdf

Horses – If it is determined that horse manure along streamside trails or within other areas of the Park is a concern, then the issue might best be approached by working with a stakeholder group such as The Connecticut Horse Council to develop a plan for raising awareness among horseback riders within the Park. For further information:

- ❖ See "The Connecticut Horse Council" website at: http://www.cthorsecouncil.org/ . Also, see their "Share the Trail" brochure which mentions trail manure management etiquette on their website at: http://www.cthorsecouncil.org/ShareTheTrailBrochure2008.pdf

Geese – Compared to dogs and horses, geese are a more difficult issue to address since they are not domestic animals. Many techniques have been developed to discourage or remove geese from grassy areas near waterbodies where they tend to congregate. For further information:

- ❖ See CT DEP "2004 Stormwater Quality Manual" section on "Animal Waste Management" under the "Source Control Practices and Pollution Prevention" chapter which can be found on the CT DEP website at: http://www.ct.gov/dep/lib/dep/water_regulating_and_discharges/stormwater/manual/Chapter_5.pdf

- ❖ See "Canada Goose Nuisance Problems" on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2723&q=325942&depNav_GID=1655

- Trails Along Streams and Stream Crossings – Erosion issues associated with streamside trails and stream crossings will need to be reviewed within the larger context of planning for the entire Park trail system to determine the best solutions. Depending on the context, choices may entail: improving trail drainage; protecting or stabilizing the trail surface; placing physical barriers to prevent access to sensitive areas; re-establishing streamside buffers; and closing and/or relocating trails or trail segments. Providing for regular trail inspection and maintenance will be an important consideration, particularly with regard to keeping on top of problem areas.

  General guidelines for soil erosion and sediment control, and stormwater management can be found in the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control" and "2004 Connecticut Stormwater Quality Manual" referenced previously. A list of publications and groups which provide guidance on re-establishing riparian buffers has also been provided previously. Beyond these resources, however, programs and organizations that promote trail creation and management would probably provide the best information for dealing specifically with trail-related issues. For guidance documents and potential funding opportunities:

- ❖ See the "National Recreational Trails Grant Program" on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2707&q=323866&depNav_GID=1642 as well as the

link to the "Recreational Trails Program" on the U.S. DOT Federal Highway Administration website at: http://www.fhwa.dot.gov/environment/rectrails/index.htm

Organizations that are actively involved with trails that may be able to provide guidance include:

- ❖ The "Connecticut Forest and Park Association" (CFPA) which oversees the "Blue-Blazed Hiking Trail System" in Connecticut. For more information, visit CFPA's website at: http://www.ctwoodlands.org/

- ❖ The "Appalachian Mountain Club" which is perhaps best known for its association with the Appalachian Trail, a segment of which passes through western Connecticut. The Connecticut AMC Chapter has an active trails committee. For more information, visit AMC's website at: http://www.outdoors.org/

- Upstream Influences Outside of Park – As described in the previous sections, much can be done within the Park to help reduce sources of bacteria, nutrients, sediment and other pollutants to the Wepawaug River and pond. However, resolving water quality issues affecting these waterbodies will most likely also require looking outside the Park to identify and address sources of pollution in the upstream watershed area. This is a separate project which the Town may wish to consider pursuing in conjunction with the towns of Orange, Woodbridge, Ansonia and Derby to improve the overall water quality of the Wepawaug River and its tributaries. In this case, the suggested course of action would be to develop a "watershed management plan" that takes a holistic look at the relationship between water resources and land uses throughout the Wepawaug basin. The primary goal of a plan would be to develop a strategy to address existing water quality and quantity issues, and prevent future problems. For more information on developing a watershed management plan:

- ❖ See the U.S. EPA "Handbook for Developing Watershed Plans to Restore and Protect Our Waters" (March 2008). This guidance document was developed by the U.S. Environmental Protection Agency (U.S. EPA) for agencies and organizations, and is specifically intended for watersheds where there are impaired or threatened waters. This handbook is available on the U.S. EPA's website at: http://www.epa.gov/nps/watershed_handbook/ . Funding to develop and implement these types of watershed management plans may be available through federal Clean Water Act Section 319 funding which is administered through the CT DEP Nonpoint Source Program. More information on this grant program can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325588&depNav_GID=1654

- ❖ Examples of watershed management plans, some of which follow the U.S. EPA model and some which follow a slightly different format, can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=335504&depNav_GID=1654

Additional watershed planning materials and tools are also available through organizations such as:

- The "Center for Watershed Protection" (CWP)
  For more information, visit CWP's website at: http://www.cwp.org/

***Conclusion***

Identifying and addressing causes and sources of water quality issues will not only improve the ecological health of water resources within the Park but will also contribute towards visitor enjoyment by providing higher aesthetic and recreational values.

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# AQUATIC HABITATS AND FISHERIES RESOURCES

## Waterbody and Watershed Characteristics

Eisenhower Park encompasses a $330^{\pm}$ -acre tract of land in the north-central section of Milford. The Wepawaug River and an unnamed pond are found within the bounds of Eisenhower Park.

The Wepawaug River originates in Woodbridge as the outfall from a group of small ponds. The $5{,}000^{\pm}$ foot reach of river within Eisenhower Park is contained in a channel that is roughly 30 feet in top of bank width and is low to moderate in grade. Surface flow of the river is predominated by pool and run interspersed by shallow riffle. The normal flow depth in the riffles is approximately 1 foot with greater depths (2-3 feet) found in pools and runs. The riverbed is composed of small boulder, cobble, gravel, coarse sand, and sand. Instream habitat is provided by the water depth in pools and runs, boulders, undercut banks, and fallen or overhanging vegetation.

**The Wepawaug River within Eisenhower Park.**

There are three large impoundments of the Wepawaug River upstream (north) of Eisenhower Park, these being Clarktown Pond, Lake Wepawaug and Wepawaug Reservoir (a water supply reservoir). As reported in the yet-unpublished Inland Fisheries document ***A Fisheries Guide to Rivers and Streams of Connecticut***, the Wepawaug River is nutrient rich and very productive (in terms of aquatic insect and plant production). This condition is common to rivers that have been impounded by relatively shallow (depth to surface acreage) lakes or ponds.

Likely due in part to the nutrient enrichment, the Department of Environmental Protection classifies the Wepawaug River reach within Eisenhower Park as *Class B/A* surface waters. Surface waters of this classification may not be meeting *Class A* water quality criteria for one or more designated uses. The designated uses for *Class A* surface water are potential drinking

water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply and other legitimate uses. The goal of *Class B/A* surface waters is to achieve *Class A* standards. The Wepawaug River within Eisenhower Park can be classified as a coolwater stream based on its physical characteristics and water quality conditions.

The unnamed pond within Eisenhower Park is an artificial waterbody that was created by excavation in the riparian area adjacent to the Wepawaug River. The $2.5^{\pm}$ acre pond receives most of its water supply from the bypass of flow from the Wepawaug River. Land-Tech Consultants, Inc. of Southbury conducted an evaluation of the unnamed pond and presented their findings in a report entitled ***Natural Resources Inventory Eisenhower Park*** (the Land-Tech Report) that was dated December 2005. The evaluation, completed during the summer and early fall of 2005, indicated that the pond had a maximum water depth of 5 feet and an average water depth (readings from 11 sampling points) of slightly more than 3 feet. A significant deposit of sediments in the pond was noted; the depth of accumulated sediment varied throughout the pond and ranged from 0.5 to 2 feet in the northern to middle sections of the pond and up to 6 feet in the southern portion of the pond near the outlet. The accumulation of flow-transported sediments into lakes or ponds constructed as either impoundments on rivers or as flow bypass waterbodies is commonplace.

**The unnamed pond within Eisenhower Park.**

Although not apparent on the date of the field review (March 17, 2009), the Land-Tech Report noted that on July 23, 2005, approximately 50 percent of the unnamed pond was covered with filamentous algae, the eastern and western shores were dominated by pickerelweed, white water lily had established through the entire pond with a dominance at the southern end, and that elodea and milfoil were present throughout the pond basin. The proliferation of emergent and submergent plants is routinely seen in nutrient rich ponds where shallow water allows sunlight to reach all areas of the pond bottom. The Land-Tech Report provided the results of water chemistry (total phosphorous and total nitrogen) sampling that had been conducted during the 2005 pond evaluation. The high ratio of nitrogen to phosphorous and the elevated levels of both nitrogen and phosphorous indicate the unnamed pond is in a eutrophic to highly eutrophic state when compared with the State of Connecticut Lake Trophic Classification criteria.

The aquatic plant growth and fallen or overhanging shoreline vegetation provide the physical habitat within the unnamed pond. Based on the habitat characteristics, shallow water depths and the trophic status, the unnamed pond is considered a warm-waterbody.

Although there has been prior development within Eisenhower Park, nearly the entire corridor along the Wepawaug River and most of the shoreline around the unnamed pond is vegetated with dense growths of hardwoods and woody shrubs. A well-vegetated shoreline (riparian area) is critical to the ecosystem health of theses waterbodies. Roots of the trees and shrubs bind the shoreline bank soils and provide a resistance to the erosive forces of flowing water. Stems and leaves of bank vegetation provide shade that prevents high water temperatures. Leaves, stems, and other plant parts that fall into the water provide food for aquatic insects. Large woody debris that fall into the waterbodies enhance physical habitat.

**Riparian vegetation along the Wepawaug River within EisenhowerPark.**

Abundant riparian vegetation softens rainfall and enables the riparian area to serve as a reservoir storing surplus runoff for a gradual release to the waterbodies during low flow periods of summer and early fall. The riparian area is a natural filter that removes nutrients, sediments, and other non-point source pollutants from overland runoff.

### *Fisheries Resources*

The DEP Inland Fisheries Division ("Division") has conducted only one fish survey of the Wepawaug River within Eisenhower Park. The survey was completed on August 22, 1990 and encompassed a $450^{\pm}$ foot reach of the river upstream of the power line crossing. The fish collected in the survey included the following riverine species: brown trout, blacknose dace, fallfish, tessellated darter, redbreast sunfish, white sucker, and American eel. A fish species assemblage such as this is common to coolwater stream systems in Connecticut. Also collected were the following lake and pond species: largemouth bass, pumpkinseed, rock bass, and chain pickerel.

Land-Tech Consultants, Inc. surveyed the Wepawaug River in two locations within Eisenhower Park (upstream and downstream of the unnamed pond) on July 22, 2005. The Land-Tech Report described a fishery population similar to that identified by the Division in 1990 and stated accurately stated that the fish population is stable.

Public fishing is allowed in intermittent sections of the Wepawaug River in Woodbridge, Orange, and Milford. To satisfy angler demand, the Division stocks the river twice- annually with a total of 1,200 to 1,500 adult-sized brook, brown and rainbow trout. Approximately 400 to 500 trout are allotted to the Wepawaug River reach within Eisenhower Park. Division staff report that most of the angling occurs during the spring (mid-April through May).

Fish surveys have not been conducted in the unnamed pond and there are no known records of the Division stocking the pond. Based on its warmwater characteristics, the pond is likely to provide habitat for the following fish species: largemouth bass, bluegill, pumpkinseed, yellow perch, golden shiner, chain pickerel and brown bullhead.

***Recommendations***

In the request for this ERT, the City of Milford requested guidance on several topics that have a direct impact on the aquatic habitats and fisheries resources of both Wepawaug River and the unnamed pond. The topics include the protection and stabilization of the riparian corridor of the Wepawaug River; an evaluation of the repair, replacement, or removal of the existing dam along a portion of the Wepawaug River; dredging of accumulated sediments from the pond; and the formalization of trail systems for use by hikers, dog walkers and horseback riders. The following are recommendations for each topic:

***Protection and stabilization of the riparian corridor of the Wepawaug River.***

***a) Riparian corridor protection.*** The enhancement and/or protection of well vegetated riparian buffers would be an extremely effective mechanism to assure the long-term viability of the aquatic habitats and resources found within the Wepawaug River and the unnamed pond. The functions of riparian buffers were previously explained. It is recommended that the City of Milford adopt the Division's policy of maintaining a 100 foot wide buffer along the Wepawaug River and the unnamed pond. A 50 foot wide buffer should be maintained along intermittent drainages. Research has indicated that protected riparian buffers along watercourses prevent damage to aquatic ecosystems that are supportive of diverse species assemblages. The buffer zone boundaries should be measured from either, (1) the edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of riparian wetlands, the edge of the stream bank based upon bank-full flow conditions. There

should be no development of permanent structures (excepting river crossing structures) within the riparian buffers. Activities to enhance the vigor of vegetation within the riparian buffers (e.g. timber harvesting, invasive species removal, native vegetation reestablishment) should be allowed.

Please refer to the attached documentation presenting the Division ***Policy Statement*** and ***Position Statement*** regarding riparian buffers for additional information.

***b) Riparian corridor stabilization.*** Although the banks along the Wepawaug River within Eisenhower Park are quite stable, there are a number of discrete sections that exhibit significant and active erosion. As the riverbanks erode, fish habitat (such as bank undercuts) are eliminated.

Eroded soils are transported and are eventually deposited within the river channel leading either to the elimination or degradation of habitat. Therefore, measures that provide both bank stability and fish habitat should be installed.

The need for installing measures to abate riverbank erosion was noted in an April 18, 2007 report entitled ***Master Plan for Eisenhower Park City of Milford, CT*** prepared for the Eisenhower Park Study Committee by Stantec Consulting Services, Inc (the Stantec Report). The Stantec Report rightly endorses the use of bioengineering techniques and boulder vanes to stabilize the river banks. A bioengineered technique consists of both a structural or mechanical element (e.g. hard armoring such as bank placed boulders) and vegetative elements working together to stabilize a site-specific condition. The structural components are employed to allow the establishment of vegetative elements while at the same time providing a level of protection for stability.

**An example of bank placed boulders with reestablished vegetation.**

The vegetative components are not just landscaping plantings for a structural project, but perform a functional role in preventing erosion by protecting the surface while also stabilizing soil by preventing shallow mass movements. Bioengineered technique(s) should be designed to provide not only for bank stability but also for fish habitat enhancement.

Rock vanes are single-arm structures which are partially embedded into the riverbed such that they are partially submerged during normal flows. When properly positioned, rock vanes induce

secondary circulation of flow thereby promoting the development of scour pools. Scour pools are critical for fish survival either during low flow periods of the summer months or during the winter when ice may encapsulate shallow water. Rock vanes can also be paired and positioned in a river reach to initiate meander development.

**An example of a rock vane.**

The installation of bioengineered bank stabilization and rock vanes require the use of machinery. There is limited access for machinery along most of the Wepawaug River within Eisenhower Park. However, there is one readily accessible area that is in dire need of bank restoration and instream habitat enhancement. The location is immediately downstream of the unnamed pond outlet where horseback riders reportedly cross the river. Apparently unauthorized (as evident by the City of Milford's installation of large concrete block as a barricade) there is evidence of continual crossing. The banks are completely worn, there is a minimal growth of riparian vegetation, and the instream habitat lacks diversity. The site is ideally suited for rebuilding the banks with boulders, organic soil and vegetation along with a series of rock vanes to enhance instream habitat and create a meandering flow pattern

**Unauthorized crossing of the Wepawaug River.**

The installation of engineered log jams are recommended for the less accessible reaches of the Wepawaug River where there is active bank erosion. Engineered log jams are intended to replicate natural accumulations of large woody debris. These structures consist of a skeleton of logs secured to the river bank and bed either with aircraft cable or steel rod. The internal pockets are filled either with smaller diameter logs or branches that are lashed together. To be effective, the structures should be either parallel to the riverbank or angled downstream into the river channel. The engineered log jams should be supported approximately 2 feet above the streambed.

The length and weight of the material used to construct the engineered log jams should be such that it can be transported to the sites by manual labor or small mechanized equipment. Once at the sites, the engineered log jams are readily installed by hand.

The photograph at the right shows an engineered log jam constructed solely by a four-man work crew.

The Stantec Report recommends stabilizing the banks along the Wepawaug River and enhancing riverine habitat in Phase I of a three phase plan for park improvements. Staff of the Inland Fisheries Division can provided the City of Milford with further guidance relative to site selection for the aforementioned stabilization and enhancement structures and/or oversight during the structure installation.

***Repair, replacement, or removal of the existing dam along a portion of the Wepawaug River.***

The unnamed pond in Eisenhower Park had been created by excavation with its water supply provided primarily by the diversion of flow from the Wepawaug River. The diversion structure consists of large concrete blocks placed across the river channel that shunt a portion of the flow into the northern end of the pond. A dam is located at the pond's southern end. The dam consists of staked concrete block with a central spillway that is 44 feet in length and approximately 9 feet in width. A low level outlet discharges flow to a channel that ultimately rejoins the Wepawaug River.

**The diversion structure in the Wepawaug River.**
**View of the structure is partially obstructed by fallen trees.**

The Stantec Report states that both the dam and diversion structure have deteriorated beyond repair and has recommend the reconstruction of both. The Stantec Report recommends reconstructing the dam and diversion structure in Phase I of a three phase plan for park improvements. Should the Town of Milford choose to repair the dam and diversion structure the following are recommended:

1. A water control structure should be incorporated into the dam so that the water surface elevation in the pond can be actively controlled. The invert of the water control structure should

**Dam at the outlet of the unnamed pond.**

be set at an elevation that would enable the pond to be completely drained. This feature would allow for the removal of undesirable fish, sediment excavation, and aquatic plant control that may be required in the future.

2. The crest of the diversion structure should be set at an elevation that allows for the discharge of flows up to the 1.5 to the 2-year storm frequency downstream in the Wepawaug River.

**An example of a vortex rock weir.**

In Connecticut, the 1.5 to 2-year frequency flow is considered optimal for sediment transport that is essential to maintaining the channel morphology. A vortex rock weir rather than a concrete "dam" is preferred for the diversion structure. The vortex rock weir is constructed in a manner that spaces between the rock allow for fish passage yet create an impoundment. The Division can provide a design detail for a vortex rock weir and provide staff to guide the weir installation.

***Dredging of accumulated sediments from the pond.***

The Land-Tech Report said that the pond had a maximum water depth of 5 feet, an average depth of slightly more than 3 feet and that there was a significant deposition of sediment that ranged in thickness from 0.5 to 6 feet in the northern to middle sections of the pond and up to 6 feet in the southern portion of the pond near the outlet. The sediment deposition is one factor contributing to the eutrophication process that is made evident by the overabundance of aquatic plants. As the eutrophication process advances, the ability of a pond to support a diverse aquatic community becomes lessened.

Dredging is recommended to reverse the eutrophication process in the pond and to restore aquatic habitat. Ideally, the dredging should create a maximum water depth of 10 feet and encompass a minimum of one-quarter of the pond area. The bottom contour along the pond shoreline should be graded to a 3:1 slope (3 feet horizontal for every 1 foot vertical) and extend out to a water depth of at least 4 feet.

A sediment forebay should be constructed in the pond at the point of inflow from the Wepawaug River. The forebay would allow for the entrapment of sediments before they accumulate in the pond. An access road to the forebay will be required to provide access for machinery to periodically remove the collected sediments.

The Stantec Report recommends pond restoration (dredging) in Phase I of a three phase plan for park improvements.

***Trail systems.***

***a) River crossings.*** Eisenhower Park consists of two parcels of property; the largest parcel being Eisenhower Park proper (220 $\pm$ acres) is easterly along the Wepawaug River and 110 $\pm$ acre Solomon and Alter properties west of the river. Trails on the parcels are connected by two bridges; the "north bridge" is a pre-stressed concrete span length of 31 feet and width of 17.5 feet and is founded on horizontally laid concrete piles. The "south bridge" is an aluminum, movable military style bridge with a span length of 30 feet and a width of 5.8 feet. The bridge is supported by stocked concrete block. There is an 18-inch step from the trail to the bridge deck that may hinder pedestrian use.

The Stantec Report indicates that the "north bridge" is in generally fair condition however, repairs are necessary. Short term recommendations are the replacement of the existing railing while long term recommendations are for a complete replacement. The "south bridge" is in poor condition; it has been recommended that the bridge either be replaced or removed entirely depending on the intended need for the crossing. The Stantec Report had recommended the bridges be rehabilitated and/or replaced in Phase I of a three phase plan for park improvements.

**"South bridge" over the Wepawaug River within Eisenhower Park.**

Should either of the bridges be replaced, the new structures should be clear span. The bridge should span an area 1.2 times the bankfull width of the Wepawaug River. In Connecticut streams and rivers, bankfull width equates to the channel width wetted at the 1.5 to 2 year frequency flow. A span of this width allows for the restoration of a portion of the river floodplain and a passage area for amphibians, reptiles and mammals.

***b) Trail routing and maintenance.*** There is network of trails within Eisenhower Park that are used for either for hiking, dog walking, and horseback riding. Unfortunately, the development of some trails apparently have come into being without regard to their crossing of wetlands or the Wepawaug River. One particular trail runs parallel to the Wepawaug River along the eastern bank from the pond to the "south bridge". Trail usage has caused significant erosion. Left unchecked, sediments from the erosion on trails sloping toward the river can degrade riverine habitat once deposited. Ultimately, such deposition may adversely affect the aquatic insect or fish population of the river.

It is recommended that there be a rerouting of some trails to avoid wetland or river crossings. Pedestrian traffic should be limited to the rerouted trail. The development of unauthorized trails should not be allowed and be eliminated if they are noted. As a best management practice, a trail maintenance plan needs to be developed to conduct routine trail inspections and make corrective repairs to those situations potentially causing erosion and sediment events.

The Stantec Report had recommended trail improvements, particularly in the former Solomon and Alter properties, in Phase I of a three phase plan for park improvements.

**Trail crossing of the outlet of a drainage to the Wepawaug River within Eisenhower Park.**

DEPARTMENT OF ENVIRONMENTAL PROTECTION
INLAND FISHERIES DIVISION

# POLICY STATEMENT
# RIPARIAN CORRIDOR PROTECTION

## I. INTRODUCTION, GOALS, AND OBJECTIVE

Alteration and exploitation of riparian corridors in Connecticut is a common event that significantly degrades stream water quality and quantity. Inasmuch as riparian ecosystems play a critical role in maintaining aquatic resource productivity and diversity, the Inland Fisheries Division (Division) recognizes that rigorous efforts are required to preserve, protect, and restore these valuable resources. Consequently, a riparian corridor protection policy has been developed to achieve the following goals and objective:

Goals

Maintain Biologically Diverse Stream and Riparian Ecosystems, and

Maintain and Improve Stream Water Quality and Water Quantity.

Objective

Establish Uniform Riparian Corridor Buffer Zone Guidelines.

## II. DEFINITIONS

For the purpose of implementing a statewide riparian corridor protection policy, the following definitions are established:

Riparian Corridor: A land area contiguous with and parallel to an intermittent or perennial stream.

Buffer Zone: An undisturbed, naturally vegetated area adjacent to or contained within a riparian corridor that serves to attenuate the effects of development.

Perennial Stream: A stream that maintains a constant perceptible flow of water within its channel throughout the year.

Intermittent Stream: A stream that flows only in direct response to precipitation or which is seasonally dry.

## III. RIPARIAN FUNCTION

Naturally vegetated riparian ecosystems perform a variety of unique functions essential to a healthy instream aquatic environment. The delineation and importance of riparian functions are herein described. Vegetated riparian ecosystems:

* Naturally filter sediments, nutrients, fertilizers, and other nonpoint source pollutants from overland runoff.

* Maintain stream water temperatures suitable for spawning, egg and fry incubation, and rearing of resident finfish.

* Stabilize stream banks and stream channels thereby reducing instream erosion and aquatic habitat degradation.

* Supply large woody debris to streams providing critical instream habitat features for aquatic organisms.

* Provide a substantial food source for aquatic insects which represent a significant proportion of food for resident finfish.

* Serve as a reservoir, storing surplus runoff for gradual release into streams during summer and early fall base flow periods.

## IV. RIPARIAN CORRIDOR BUFFER ZONE GUIDELINES

Recognizing the critical roles of riparian corridors, the Division provides buffer zone guidelines that are designed to bring uniformity and consistency to environmental review. The guidelines are simple, effective, and easy to administer. The following standard setting procedure should be used to calculate buffer zone widths.

**Perennial Stream: A buffer zone 100 feet in width should be maintained along each side.**

**Intermittent Stream: A buffer zone 50 feet in width should be maintained along each side.**

Buffer zone boundaries should be measured from either, (1) edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of a riparian wetland, the edge of the stream bank based on bank-full flow conditions.

The riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition. All activities that pose a significant pollution threat to the stream ecosystem should be prohibited.

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths and allowable development uses within these areas, local authorities should be encouraged to adopt the more restrictive regulations and policies.

12/13/91
Date

James C. Moulton
Acting Director

# POSITION STATEMENT
# UTILIZATION OF 100 FOOT BUFFER ZONES TO PROTECT RIPARIAN AREAS IN CONNECTICUT

BY
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## I. INTRODUCTION

One tenet of the Inland Fisheries Division Policy on Riparian Corridor Protection is the utilization of a 100 foot buffer zone as a minimum setback along perennial streams. The adoption of such a policy is sure to be controversial. Laymen, developers and natural resource professionals alike will ask questions such as: Why was a standard setting method adopted? What's magical about 100 feet? Will 100 feet be sufficiently protective, or will it be overly protective? In response, this paper outlines the ramifications of adopting a riparian corridor policy including the use of a 100 foot buffer zone.

## II. STANDARD SETTING VERSUS SITE SPECIFIC BUFFER ZONES

There are two approaches for determining buffer zone width; standard setting and site specific. Standard setting methods define an area extending from the streambank edge or highwater mark to some landward fixed point boundary. Site specific methods utilize formulas that incorporate and consider special site specific land characteristics, hence, the calculation of a variable width buffer zone. In both case, buffers are employed to define an area in which development is prohibited or limited.

A major advantage of standard setting methods is that they are easy to delineate and administer, thereby improving the consistency and quality of environmental assessments. Furthermore, valuable staff time would not be required to determine site specific buffer zones along each and every watercourse of concern.

The exact width of a buffer zone required for riparian corridor protection is widely disputed (Bottom et al. 1985 and Brinson et al. 1981). Buffer width recommendations found in the literature vary from as little as 25 feet to as great as 300 feet (Palfrey et al. 1982). The 100 foot buffer is widely accepted in Connecticut having been adopted by numerous inland wetland and conservation commissions as an appropriate minimum setback regulation for streambelts. In addition, Division staff have been recommending the utilization of the 100 foot buffer zone to protect streambelts since the early 1980's. Scientific research has not been generated to dispute the adequacy of utilizing 100 foot buffer zones to protect Connecticut's riparian corridors. In fact, to ensure that riparian functions are not significantly altered, recent scientific information points towards maintaining buffer zones that would be at a minimum, 100 feet in width (see section III).

Site specific methods define buffer widths according to the character and sensitivity of adjacent streamside lands. These buffer widths, also referred to as "floating buffers," consider physical site characteristics such as slope, soil type, and vegetative cover. The advantage of site specific methods is that buffer widths are designed using site characteristics and not an arbitrary predetermined width. Unfortunately, there is no "one" universally accepted formula or model and none have been developed for use in Connecticut. Most formulas are based on the degree to which sediment can be removed or filtered by natural vegetation, thus, the primary useage is sediment control. Other weaknesses of site specific techniques are (1) all areas must be evaluated on a case-by case basis and, (2) the subjectivity of different techniques (i.e. if the evaluation technique is inadequate, the buffer width will also be inadequate).

Additionally, these formulas only concentrate on one specific riparian function at a time and do not take into account multiple riparian functions, especially those of inland fisheries values as discussed in Section III. Consequently, site specific formulas approach riparian function on a single dimension rather than taking a more realistic, holistic approach.

In the absence of a scientific model to determine buffer widths suitable to protect Connecticut's riparian corridors, the utilization of a standard setting method is environmentally and politically prudent.

## III. RIPARIAN FUNCTION

To assess the efficacy of a 100 foot buffer zone, the literature was searched to identify studies which have applied a quantitative approach to buffer width determination. Literature was searched for studies which both support and dispute the 100 foot zone. The following is a summary "by riparian function" of quantitative studies which assess buffer widths.

### Sediment Control

Width, slope and vegetation have been cited as important factors in determining effectiveness of buffer zones as sediment filters (Karr and Schlosser 1977). Wong and McCuen (1981), who developed and applied a mathematical model to a 47 acre watershed, found that a 150 foot zone along a 3% slope reduced sediment transport to streams by 90%. Mannering and Johnson (1974) passed sediment laden water through a 49.2 foot strip of bluegrass and found that 54% of sediment was removed from the water. Trimble and Sartz (1957) developed recommendations as to width of buffer areas between logging roads and streams to reduce sediment load. They determined a minimum strip of 50 feet was required on level land with the width increasing 4 feet for each 1% slope increase. Buffer widths as determined by Trimble and Sartz (1957) have been characterized as evaluated guesses rather than empirically defined widths (Karr and Schlosser 1977). Rodgers et al. (1976) state that slopes greater than 10% are too steep to allow any significant detention of runoff and sediment regardless of buffer width. After a critical review of the literature, Karr and Schlosser (1977) determined that the size and type of vegetative buffer strip needed to remove a given fraction of the overland sediment load cannot be universally quantified. Existing literature does suggest that 100 foot riparian buffers will assist with sediment entrapment, although efficacy will vary according to site conditions.

### Temperature Control

Brown and Brazier (1973) evaluated the efficacy of buffer widths required to ameliorate stream water temperature change. They concluded that angular canopy density (ACD), a measure of the ability of vegetation to provide shading, is the only buffer area parameter correlated with temperature control. Results show that maximum angular canopy density or maximum shading ability is reached within a width of 80 feet. Study sites were 9 small mountain streams in Oregon that contained a conifer riparian vegetative complex. Whether or not maximum angular canopy density is reached within 80 feet in a typical Connecticut deciduous forest riparian zone is doubtful. Tree height in Connecticut riparian zones is smaller than in Oregon (Scarpino, personal communication), therefore buffers greater than 80 feet in width would be required for temperature maintenance in Connecticut.

### Nutrient Removal

Nutrient enrichment is caused by phosphorous and nitrogen transport from, among other things, fertilized lands and underground septic systems. Most research on nutrient enrichment has focused on overland surface flow. Karr and Schlosser (1977) report that 88% of all nitrogen and 96% of all phosphorous reaching watercourses in "agricultural watersheds" were found to be attached to sediment particles; thus, successful nutrient removal can be accomplished through successful sediment removal. There are conflicting reports on the ability of buffer widths to remove nutrients with most research being tested on grass plots. Butler et al. (1974) as cited by Karr and Schlosser (1977) found that a 150 foot buffer width of reed canary grass with a 6% slope caused reductions in phosphate and nitrate concentrations of between 0–20%. Wilson and Lehman (1966) as cited by Karr and Schlosser (1977) in a

study of effluent applied to 300 m grass plots found that nitrogen and phosphorous concentrations were reduced 4 and 6%, respectively. Studies on subsurface runoff as cited in Clark (1977) found high concentrations of nitrates at 100 feet from septic systems with unacceptable levels at 150 feet. Clark (1977) recommended that a 300 foot setback be used whenever possible, with a 150 setback considered adequate to avoid nitrate pollution. Environmental Perspective Newsletter (1991) states that experts who commonly work with the 100 foot buffer zone set by the Massachusetts Wetlands Protection Act are increasingly finding that it is insufficient since many pollutants routinely travel distances far greater than 100 feet with nitrate-nitrogen derived from septic systems moving distances of greater than 1000 feet. Research indicates that the adoption of 100 foot buffer widths for Connecticut riparian zones will assist with the nutrient assimilation; albeit, complete removal of all nutrients may not be achieved.

Large Woody Debris

The input of large woody debris (LWD) to streams from riparian zones, defined as fallen trees greater than 3 m in length and 10 cm in diameter has been recently heralded as extremely critical to stream habitat diversity as well as stream channel maintenance. Research on large woody debris input has mainly been accomplished in the Pacific Northwest in relation to timber harvests. Murphy and Koski (1989) in a study of seven Alaskan watersheds determined that almost all (99%) identified sources of LWD were within 100 feet of the streambank. Bottom et al. 1983 as cited by Budd et al. (1987) confirm that in Oregon most woody structure in streams is derived from within 100 feet of the bank. Based on research done within old-growth forests, the Alaska region of the National Marine Fisheries Service, recognizing the importance of LWD to salmonid habitat, issued a policy statement in 1988 advocating the protection of riparian habitat through the retention of buffer strips not less than 100 feet in width (Murphy and Koski 1989). All research findings support the use of a 100 foot buffer zone in Connecticut for large woody debris input.

Food Supply

Erman et al. (1977) conducted an evaluation of logging impacts and subsequent sediment input to 62 streams in California. Benthic invertebrate populations (the primary food source of stream fishes) in streams with no riparian buffer strips were compared to populations in streams with buffer widths of up to 100 feet. Results showed that buffer strips less than 100 feet in width were ineffective as protective measures for invertebrate populations since sediment input reduced overall diversity of benthic invertebrates. Buffer strips greater than 100 feet in width afforded protection equivalent to conditions observed in unlogged streams. The ultimate significance of these findings is that fish growth and survival may be directly impacted along streams with inadequate sized riparian buffer zones. All research supports the feasibility of implementing a 100 foot buffer zone in Connecticut to maintain aquatic food supplies.

Streamflow Maintenance

The importance of riparian ecosystems in terms of streamflow maintenance has been widely recognized (Bottom et al. 1985). In Connecticut, riparian zones comprised of wetlands are of major importance in the hydrologic regime. Riparian wetlands store surplus flood waters thus dampening stream discharge fluctuations. Peak flood flows are then gradually released reducing the severity of downstream flooding. Some riparian wetlands also act as important groundwater discharge or recharge areas. Groundwater discharge to streams during drier seasonal conditions is termed low flow augmentation. The survival of fish communities, especially coldwater salmonid populations is highly dependent upon low flow augmentation (Bottom et al. 1985). Research, although documenting the importance of riparian zones as areas critical to streamflow maintenance, has not investigated specific riparian buffer widths required to provide the most effective storage and release of stream flows.

## IV. OTHER POLICY CONSIDERATIONS

### Measurement Determination

The proposed policy states that buffer zone boundaries should be measured from either the edge of the riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or in the absence of a riparian wetland, the edge of the streambank based on bank–full flow conditions. This boundary demarcation is absolutely necessary to ensure that all riparian wetlands are protected. For example, if all measurements were to start from the perennial stream edge and extend landward for a distance of 100 feet, many riparian zones that contain expansive wetlands greater than 100 feet in width would be left unprotected.

Also, since boundary demarcation includes wetland delineation, the ultimate width of the buffer will vary according to site specific features. Consequently, buffer width determination as stated by Division policy is a "hybridization" of both standard setting and site specific methods. This hybridization of methods is advantageous since it acknowledges the sensitivity of streamside wetlands.

### Home Rule

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths, local authorities would be encouraged to adopt the more restrictive regulations and policies. This feature incorporates flexibility to acknowledge the importance of local "home rule" regulations or policies already in accepted practice. Conversely, towns and cities without accepted policies and regulations could choose to enact the Division policy.

### Allowable Uses in Buffer Zones

The Division policy states that "the riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition and that all activities that pose a significant pollution threat to the stream ecosystem should be prohibited." In essence, the buffer zone becomes an area where no development should be allowed. For this policy to be effective, there should be no exceptions, a blanket restriction of all uses would be recommended. Further clarification and more precise definitions of allowable uses will, however, be required in the future if the policy evolves into a departmental regulation.

Recently, the Connecticut Supreme Court has ruled that local agencies can prohibit specific development within buffer zones. The *Lizotte v. Conservation Commission of the Town of Somers, 216 Conn.320 (1990)* decision ruled that the construction or maintenance of any septic system, tank, leach field, dry well, chemical waste disposal system, manure storage area or other pollution source within 150 feet of the nearest edge of a watercourse or inland wetland's seasonal high water level can be prohibited (Wetlands Watch 1990). If this decision is a precursor of the future, Connecticut courts will continue to the support the use of buffers, especially those which restrict or prohibit detrimental activities.

## V. CONCLUSIONS

The following actions are required to preserve, protect, and restore Connecticut's riparian corridors:

1. The Inland Fisheries Division needs to adopt and implement the proposed policy so that staff can use it as a guideline to assist cities, towns, developers and private landowners with making sound land use decisions. This policy will act to solidify a collective position concerning riparian corridor protection.

2. While the proposed policy in its "current form," represents a recommendation from the CTDEP Inland Fisheries Division, the ultimate goal of the Division should be to progressively implement this policy as either a CTDEP regulation or State of Connecticut statute.

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## LANDSCAPE ECOLOGY AND INVASIVE SPECIES MANAGEMENT

### *Invasive Plants Reported at Eisenhower Park*

Although the 2005 inventory includes a phrase saying there were 10 plant species considered widespread and invasive (a category from the 2003 invasive plant list), the details in the text include more than 10 invasives. By the current (2004) list (which categorizes invasive plants as invasive" or "potentially invasive" as opposed to "widespread", "restricted", or "potentially invasive"), this reviewer saw mention of 13 recognized invasive species in the 2005 inventory. They are listed below along with some additional details.

- **Autumn-Olive** *(Elaeagnus umbellate)]* shrub/small tree of highly disturbed sunny sites

- **Coltsfoot** *(Tussilago farfara)]* herbaceous (Note that my copy of the inventory did not have scientific names and "Coltsfoot" has been applied to other herbaceous species)
- **Common Reed** *(Phragmites australis)]* , huge reed-like grass of wetlands
- **Japanese Barberry** *(Berberis thunbergii);* shade-tolerant shrub
- **Japanese Honeysuckle** *(Lonicera japonica)]* vine
- **Japanese Knotweed** *(Polygonum cuspidatum;* aka *Fallopia japonica)]* giant, bamboo-like herb of wet soils
- **Morrow's Honeysuckle** *(Lonicera morrowii)]* shrub
- **Multiflora Rose** (Rosa *multiflora)]* shrub; sunny wetlands and uplands; lots of this in park
- **Norway Maple** *(Acer platanoides)]* shade-tolerant tree
- **Oriental Bittersweet** *(Celastrus orbiculatus]* aka Asiatic Bittersweet); woody vine
- **Privet** (multiple species of *Ligustrum);* very invasive in Southeast US and, in 2004, considered Potentially Invasive in Connecticut; somewhat shade tolerant shrubs
- **Tree-of-heaven** *(Ailanthus altissima);* tree
- **Winged Euonymus** *(Euonymus alatus]* aka Burning Bush); shade-tolerant shrub.

With the exception of Coltsfoot and Privet species, the above invasives are widespread in Connecticut; and information on how to identify them is available at http://www.ct.nrcs.usda.qov/invas-factsheets.html. For a truly excellent source of additional photographs (including *Tussilago farfara)* see http://www.invasive.org/species/weeds.cfm .

### *General Thoughts about Invasive Plant Management*

Invasive plant control is something that requires a long-term commitment. Unlike when you clean up old fence wire in the woods, invasive plants come back after they have been removed. They may sprout from roots that didn't get killed or there may be buried seeds that sprout after

the existing invasives are killed when the soil receives extra light and warmth. Invasive plants are tied to multiple aspects of vegetation management.

From a logistical point of view, it is very important to be clear about which places the presence of invasive plants is strongly harming your desired use of the land. And, within that subset of places, it is important to recognize that follow-up control efforts often will be needed year after year. The point this reviewer is making is that when you are contemplating doing invasive plant control, it is important not to bite off more than you can chew. (Remember there likely will be long term demands for labor following the initial control efforts the first year).

In a general way, the presence of invasive plants takes up space that could otherwise be occupied by native plants; and in this way, the diversity of native plants (particularly the uncommon species) gets reduced. This is one reason invasive plants are undesirable. However, in a world of limited time and money, unless the common invasives are strongly harming the desired management goal for a particular site, or it is a new incursion involving a small number of plants, it may be not feasible to make control a high priority because there are too many seed sources onsite and in the surrounding landscape. In a small area of particularly high understory diversity, or in a place where invasives were crowding out a rare species, the particularly high value of the site would make invasive plant control strongly desirable.

***Some Thoughts about Invasive Plant Control in Eisenhower Park***

In 2003, *Tussilago farfara* (Coltsfoot) was considered restricted in its distribution across Connecticut. It would be worth checking the scientific name of the "Coltsfoot" in the 2005 Eisenhower Natural Resources Inventory to determine if it is indeed *Tussilago farfara*. Then, if *Tussilago farfara* is found to be very uncommon in the park, it might be worth attempting to eradicate it before it becomes widely established. Note that it is a prolific seeder so it is good to catch it early. Still, control would have to involve several years of follow-up to ensure that all the seeds buried from previous years sprouted and got pulled out too. Note also that Coltsfoot (restricted in its distribution in 2003) is already is becoming more common. Coltsfoot was reported from the Deciduous Forests habitat type which included sample plots (U-5, U-6, U-8, U-13, and U-18).

An invasive plant that that this reviewer did not observe is Garlic Mustard (*Alliaria petiolata*). It comes up early and crowds out native wildflowers. It also is thought to put out chemicals that are harmful to the roots of woody plant seedlings. It is a particular menace on floodplains and trailsides. It spreads by seeds that are easily transported by hikers, bicyclers, animals, and (possibly) moving water. It is recommended putting this species on a Watch List, and gathering a group of volunteers to attempt to eradicate it should it appear in a small area. Note that flowering Garlic Mustard stems can produce seeds even after the plant is pulled up. Therefore, all pulled-up flowering Garlic Mustard should be bagged.

A similar strategy is recommended for Japanese Stilt Grass (also a problem in floodplains).

***Invasives in Early-Successional Habitat***

Eisenhower Park includes several areas of early-successional habitat. "Succession" refers to the process of sequential change in plant species that begins with the weedy species that first come in and ends with a set of species that is relatively stable. Old-field succession begins with the abandonment of a farm field and ends with a forest composed primarily of shade-tolerant species. The first species that come in are those that thrive in bright sun on disturbed soils. Initially, fast growing species get the best foothold. Early-successional habitats such as grasslands and old fields with grass, herbaceous plants and shrubs are habitat types that are necessary for certain types of birds. These birds are becoming less common in Connecticut because when former croplands, haylands, and pasture undergo succession, they ultimately change from early-successional habitats into young, then older, forests. Because early-successional upland habitats are now uncommon and they support desired species of birds and other animals, keeping these habitat types often is a desired management goal.

In order to keep a site in early-successional vegetation, periodic management must be done to set back the sequence of vegetation change and prevent a forest from growing. This often is done by mowing or brush-hogging. (And, incidentally, while the appearance of the site is not aesthetically pleasing immediately after the plants are cut down, the plants do sprout back.)

Many invasive plants are very aggressive examples of early-successional species and are likely to be found in open sites. Brush-hogging helps control their spread. But frequently, specific attention to the invasive species also is required. For initial control, removal of specific invasive individuals (large ones with many fruits) often is a good strategy to allow the native early-successional species more room. In general, control (beating back the invasives) as opposed to eradication (completely getting rid of the invasives) is a reasonable strategy in an early-successional habitat where you will have to be going back periodically anyway in order to create the disturbances that keep the site from converting to trees.

When it is time to brush-hog a grassy or brushy early-successional habitat, it should be done in sections so that not all the habitat over a large area is cut down in one year. For grassland bird habitat, mowing or brush-hogging should be done when the birds are not nesting (after August 1 and before the next April 15, so that there is vegetative cover in the summer).

***Invasive Plants, Native Plants, and Deer***

Invasive shrubs in old fields do provide shelter for desired birds. At the same time, native plants are more desirable than invasive plants because they provide more food for the insects that the birds need in order to successfully raise their young.

In areas where there are large numbers of deer (typical across much of Connecticut), the effect of deer on the growth of native plants is something to consider before engaging in a wholesale removal of invasives. One reason Connecticut's widespread invasives are so successful is that deer don't like them. In contrast, deer do like many native plants.

In areas of heavy deer browsing, when invasives are removed and native plants are planted or they sprout from buried seeds, the deer demolish the natives. For restoration of native plants, a

site may need to be fenced until the plants grow taller than the deer can reach. And, slow-growing species that deer particularly like should not be planted.

In areas of heavy deer browse where the desired vegetation includes shrubs and the site is dominated by invasive shrubs (such as multiflora rose or non-native shrubby honeysuckles), it is wise to consider whether invasive shrubs are better than no shrubs at all.

At Eisenhower Park, the level of deer browse on the shrubs planted next to the mitigation wetland suggests there is a large population of hungry deer.

***Hemlock Woolly Adelgid***

On the ERT walk downstream of the pond, this revewer observed a small hemlock tree that had hemlock wooly adelgids on the underside of its foliage. Hemlock woolly adelgids are tiny insects that encase themselves in what looks like a speck of cotton fluff. An infestation can kill hemlock trees. In a garden landscape situation, people set up spraying programs to control adelgids. This is not practical in the wild. Consideration should be given to learning to recognize hemlock wooly adelgids and keeping an eye on the hemlocks in the mature deciduous forest on the west side of West River Street. If those hemlocks are killed, then invasive plants may become a problem in sunny openings.

There are additional photos of hemlock wooly adelgid (*Adelges tsugae*) on the internet at: http://www.invasive.org/species/subiect.cfm?sub=289

*Hemlock Wooly Adelgid infested branch.* http://na.fs.fed.us/fhp/hwa/gallery/photo_gallery.shtm

***Other Comments***

One item that perhaps did not come out in the ERT visit is that regardless of the current management issues and the desire for revitalizing decaying infrastructure, it has been documented that the tract has a high ecological value by virtue of its multiple habitat types as well as its relatively large size. (Refer to the Natural Resources Inventory report of December 2005, page 43 -Conclusion and additional details given page 39.) This reviewer hopes that the heavy focus of the Master Plan on infrastructure and aesthetics will not create any future scenarios in which developed infrastructure is added to otherwise undeveloped portions of the park.

In this reviewer's opinion, the most pressing environmental issues are those that relate to the physical management of water in the stream, streambanks, and pond. These issues are covered by other Team members.

The "readiness" of the town and community to engage themselves in the full list of items in the 2007 park master plan is questionable. There is a quotation this reviewer once read that said something to the effect that a plan is an on-going process rather than a final document. It is possible that at some point it may be desirable to revisit the planning process. And, at that time, it is recommended giving more attention to elucidating the natural values of the 330+ acres. It is worth making more public the fact that the park is a large chunk of land with many valuable habitat types including (but not limited to) a diverse, mature deciduous forest; rock ledges; perennial and intermittent streams; pond; vernal pools; shrub wetlands; other wetlands; and early-successional old-field habitat (including under the powerline). The existing December 2005 Natural Resources Inventory would be a good place to start on following up on these details. In the meantime, low-key public events to bring people out to enjoy the natural aspects of the park might be useful in making the public value the natural aspects of the property (bird walks, tree identification, spring wildflower walk, vernal pool watch, etc.).

Finally, in regard to the dog poop issue, it is suggested a thorough exploration of the "Give A Bark!" section of the Connecticut River Coastal Conservation District's website - http://www.conservect.org/ctrivercoastal/. It has a lot of information and links. In particular, the information on the Chatfield Hollow Pet Waste Project and the associated pet management outreach materials are very useful. http://www.conservect.org/ctrivercoastal/qive a bark.shtml

## THE NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are records for State Special Concern *Terrapene carolina carolina* (Eastern box turtle) from the vicinity of this project site.

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

If Eastern box turtle habitat is going to be impacted by this proposed project, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of this species conduct surveys between April and September to see if they are present. A report summarizing the results of such surveys should include habitat descriptions, reptile species list and a statement/resume giving the herpetologist' qualifications. The DEP doesn't maintain a list of qualified herpetologists. A DEP Wildlife Division permit may be required by the herpetologist to conduct survey work, you should ask if your herpetologist has one. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Standard protocols for the protection of wetlands should be followed and maintained during the course of the project. Additionally, all silt fencing should be removed after soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.

Please be advised that the Wildlife Division has not made a field inspection of the project nor have we seen detailed timetables for work to be done. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. The time of year when this work will take place will affect these species if they are present on the site when the work is scheduled. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested. If the proposed project has not been initiated within 6 months of this review, contact the NDDB for an updated review. If you have any additional questions, please feel free to contact Julie.Victoria@ct.gov , please reference the NDDB #13595 and #16528.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental and Geographic Information Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new

contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

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# WILDLIFE IN CONNECTICUT

STATE SPECIES OF SPECIAL CONCERN

## Eastern Box Turtle

*Terrapene carolina carolina*



### *Description*

The eastern box turtle is probably the most familiar of the 8 species of turtles found in Connecticut's landscape. It is known for its high-domed carapace (top shell). The carapace has irregular yellow or orange blotches on a brown to black background that mimic sunlight dappling on the forest floor. The plastron (under shell) may be brown or black and may have an irregular pattern of cream or yellow. The length of the carapace usually ranges from 4.5 to 6.5 inches, but can measure up to 8 inches long. The shell is made up of a combination of scales and bones, and it includes the ribs and much of the backbone.

Each individual turtle has distinctive head markings. Males usually have red eyes and a concave plastron, while females have brown eyes and a flat plastron. Box turtles also have a horny beak, stout limbs, and feet that are webbed at the base. This turtle gets its name from its ability to completely withdraw into its shell, closing itself in with a hinged plastron. Box turtles are the only Connecticut turtle with this ability.

### *Range*

Eastern box turtles are found throughout Connecticut, except at the highest elevations. They range from southeastern Maine to southeastern New York, west to central Illinois, and south to northern Florida.

### *Habitat and Diet*

In Connecticut, this terrestrial turtle inhabits a variety of habitats, including woodlands, field edges, thickets, marshes, bogs, and stream banks. Typically, however, box turtles are found in well-drained forest bottomlands and open deciduous forests. They will use wetland areas at various times during the season. During the hottest part of a summer day, they will wander to find springs and seepages where they can burrow into the moist soil. Activity is restricted to mornings and evenings during summer, with little to no nighttime activity, except for egg-laying females. Box turtles have a limited home range where they spend their entire life, ranging from 0.5 to 10 acres (usually less than 2 acres).

Box turtles are omnivorous and will feed on a variety of food items, including earthworms, slugs, snails, insects, frogs, toads, small snakes, carrion, leaves, grass, berries, fruits, and fungi.

### *Life History*

From October to April, box turtles hibernate by burrowing into loose soil, decaying vegetation, and mud. They tend to hibernate in woodlands, on the edge of woodlands, and sometimes near closed canopy wetlands in the forest. Box turtles may return to the same place to hibernate year after year. As soon as they come out of hibernation, box turtles begin feeding and searching for mates.

The breeding season begins in April and may continue through fall. Box turtles usually do not breed until they are about 10 years old. This late maturity is a result of their long lifespan, which can range up to 50 to even over 100 years of age. The females do not have to mate every year to lay eggs as they can store sperm for up

to 4 years. In mid-May to late June, the females will travel from a few feet to more than a mile within their home range to find a location to dig a nest and lay their eggs. The 3 to 8 eggs are covered with dirt and left to be warmed by the sun. During this vulnerable time, skunks, foxes, snakes, crows, and raccoons often raid nests. Sometimes, entire nests are destroyed. If the eggs survive, they will hatch in late summer to early fall (about 2 months after being laid). If they hatch in the fall, the young turtles may spend the winter in the nest and come out the following spring.

As soon as the young turtles hatch, they are on their own and receive no care from the adults. This is a dangerous time for young box turtles because they do not develop the hinge for closing into their shell until they are about 4 to 5 years old. Until then, they cannot entirely retreat into their shells. Raccoons, skunks, foxes, dogs, and some birds will prey on young turtles.

## *Conservation Concerns*

The eastern box turtle was once common throughout the state, mostly in the central Connecticut lowlands. However, its distribution is now spotty, although where found, turtles may be locally abundant. Because of the population decline in Connecticut, the box turtle was added to the state's List of Endangered, Threatened, and Special Concern Species when it was revised in 1998. It is currently listed as a species of special concern. The box turtle also is protected from international trade by the 1994 CITES treaty. It is of conservation concern in all the states where it occurs at its northeastern range limit, which includes southern New England and southeastern New York.

Many states have laws that protect box turtles and prohibit their collection. In Connecticut, eastern box turtles **cannot** be collected from the wild (DEP regulations 26-66-14A). Another regulation (DEP regulations 26-55-3D) "grandfathers" those who have a **box turtle collected before 1998**. This regulation limits possession to a single turtle collected before 1998. These regulations provide some protection for the turtles, but not enough to combat some of the even bigger threats these animals face. The main threats in Connecticut (and other states) are loss and fragmentation of habitat due to deforestation and spreading suburban development; vehicle strikes on the busy roads that bisect the landscape; and indiscriminate (and now illegal) collection of individuals for pets.

Loss of habitat is probably the greatest threat to turtles. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated.

Adult box turtles are relatively free from predators due to their unique shells. The shell of a box turtle is extremely hard. However, the shell is not hard enough to survive being run over by a vehicle. Roads bisecting turtle habitat can seriously deplete the local population. Most vehicle fatalities are pregnant females searching for a nest site.

## *How You Can Help*

- *Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.*
- *Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.*
- *Do not disturb turtles nesting in yards or gardens.*
- *As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often pregnant females and they should be helped on their way and not collected. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side they are headed. Never relocate a turtle to another area that is far from where you found it.*
- *Learn more about turtles and their conservation concerns. Spread the word to others on how they can help Connecticut's box turtle population.*

State of Connecticut
Department of Environmental Protection
Bureau of Natural Resources
Wildlife Division
*www.ct.gov/dep*

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5/2008

## WILDLIFE MANAGEMENT

The following brief comments are provided to help guide the city of Milford in managing the wildlife resources within Eisenhower Park. The assessment is based on a review of the maps provided by the Connecticut Environmental Review Team Program and available DEP mapping data, as well as the Natural Resources Inventory report prepared by Land-Tech Consultants, Inc. Personnel limitations precluded the Wildlife Division from conducting a site inspection.

According to the report, the two parcels total approximately 320 acres, the bulk of which is forested, with about 125 acres of wetlands, 41 acres of meadows/grasses, 16 acres of recreation areas, and a power line right-of-way. There is an existing trail network already in place, and the park serves multiple user types. The park is located in a highly developed urbanized area between I-95 and Route 15, and, according to the above-referenced inventory report, is home to typical and abundant urban wildlife species, with the exception of the eastern box turtle, which is a state-listed species of concern (note: the above-referenced report states that the state-listed wood turtle has been recorded on or near the property, however, correspondence from the Natural Diversity Database indicates it is the eastern box turtle that has been recorded).

The city of Milford is looking to stabilize the natural resources and to increase the number of citizens using the park. Generally speaking, any significant increase in human traffic can potentially be detrimental to wildlife. Typically, increased use brings more disturbances to wildlife including noise, habitat degradation from bicycles and foot traffic causing erosion, and harassment of wildlife by dogs (particularly off-leash).

There are, however, several steps that could be taken to benefit wildlife. Management techniques could be incorporated in the park's early successional habitats (fields, old fields, meadows, grasslands, etc.). These have been identified in Connecticut's Comprehensive Wildlife Strategy (Chapter 4 Habitat 12, Intensively Managed) as a key habitat type that provides critical habitat to many species considered to be of greatest conservation need. It is important to manage this type of habitat; otherwise it will eventually grow or succeed into forestland. Early successional stages habitats are rapidly declining for a variety of reasons, including natural succession, development, and interruption of natural disturbance patterns such as fire. Additionally, many are intensively managed for agriculture. Many early successional dependent species are experiencing significant population declines in large part due to habitat loss.

Because most grassland-nesting birds require larger acreages than found in Eisenhower Park, those fields/lawns not currently used for recreational purposes should be managed as wildflower meadows and fields in order to maximize wildlife usage. Practices should include periodic mowing, preferably once every few years, outside of the bird nesting season (typically April 15 – August 15). This would allow these areas to revert to a less manicured state which would be both appealing to wildlife and require a lower level of maintenance by park staff. This type of habitat could also be encouraged by planting field acres with a native wildflower mix that would be beneficial to various butterfly species. Additionally, bluebird nest boxes should be installed and brush piles created (see attached Wildlife Habitat Series on *Butterfly Gardens*, *Nest Structures for Wildlife*, and *Brush Piles for Wildlife* for more information). For more

information on managing early successional habitats, please visit http://www.ct.gov/dep/cwp/view.asp?a=2723&q=325732&depNav_GID=1655 to download a pdf version of the manual *Managing Grasslands, Shrublands, and Young Forest Habitats for Wildlife: A Guide for the Northeast.*

The forested portions of Eisenhower Park provide habitat for many species to nest, feed and take cover. According to the Natural Resources Inventory report, the forested area contains multiple vernal pools, providing breeding habitat for a multitude of species, including wood frogs and spotted salamanders. Species dependent on vernal pools for breeding are also dependent on healthy upland habitat around the vernal pools. According to Calhoun and Klemens (2002), upland areas around breeding pools up to a distance of 750 feet should be considered critical upland habitat, and at least 75% of that zone should be kept undisturbed and a partially closed-canopy stand be maintained. Any significant forestry operations should be done in consultation with a certified consulting forester, in order to conserve both wildlife and forestry values.

The Wepawaug River runs through the park from north to south. Forested habitat along rivers provide habitat to birds as a resting/feeding place while migrating north or south, as well as habitat for many other species to feed, reproduce, and find cover. Steps should be taken to improve the current trail system to remove wetland crossings, which can severely degrade habitat quality (see Attachment A).

***References***

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ATTACHMENT A

General Guidelines For Protecting Wildlife Resources When Developing Trails

Some properties may lend themselves to providing a variety of recreational opportunities (e.g., hiking, hunting, fishing, nature study and photography, horseback riding, mountain biking.) Properly designed trails can provide excellent opportunities to increase public appreciation for wildlife and the ecological values of various habitats. Trails should be designed to enhance the learning and aesthetic aspects of outdoor recreation while minimizing damage to the landscape. They should be laid out to pass by or through the various cover types and other special features represented on the property while avoiding those areas prone to erosion or that contain plants or animals that may be impacted by human disturbance. Uses that are generally considered "compatible" could impact sensitive resources depending on the location, timing and frequency of their occurrence. For example, while regulated fishing is considered an accepted form of outdoor recreation, there could be impacts associated with it, such as streambank erosion at heavily used sites. The overall level of disturbance to vegetation/habitat and wildlife can be significantly reduced by establishing one or two (will depend on property size and degree of importance to natural resources) multiple-use trails rather than several single/exclusive-use trails.

Some guidelines to follow when developing a trail system include:

- Narrow, passive-use recreation trails with natural substrate that would require minimal vegetation removal, maintain forest canopy closure, prohibit the use of motorized vehicles,

and require dog owners to keep their dogs under control, are preferred to reduce environmental impacts and disturbance to wildlife. Abandoned roadways (e.g., farm/logging roads) should be incorporated into the trail system whenever possible and appropriate to minimize cutting activity/vegetation removal;

- If a paved, multi-purpose trail is established, avoid the use of curbing. If it is necessary, Cape Cod style curbing (curbing at 45 degree angle) is recommended;
- Know the characteristics of the property and plan the layout so that the trail passes by or through a variety of habitat types;
- Make the trail as exciting and safe as possible and follow a closed loop design. Avoid long straight stretches of >100'; trails with curves and bends add an element of surprise and anticipation and appear more “natural”;
- Traversing wetlands and steep slopes should be avoided whenever possible to minimize erosion and sedimentation problems; where wetlands must be crossed, a boardwalk system should be used;
- The property boundaries and trail should be well marked. It is best to provide a map/informational leaflet describing the wildlife values associated with the property (e.g., value of wetlands, various habitat types/stages of succession, habitat management practices) and guidelines for responsible trail use;
- Potential impacts of trails on private property owners should be identified. Where trails bisect private property, the access should be of adequate width and the trail well-marked to help avoid potential conflicts (e.g., trespass by trail users);

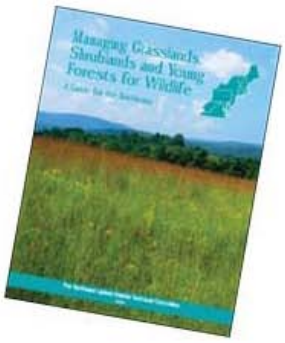
- For more specific guidance on trail design and construction contact the Connecticut Forest & Park Association (860-346-2372 or www.ctwoodlands.org) or Appalachian Mountain Club (www.outdoors.org);
- For an extensive literature review about the effects of different types of recreation activities on wildlife, visit web site www.Montanatws.org – 307 page document published in 1999 entitled, "Effects of recreation on Rocky Mountain wildlife: A review for Montana."

*Prepared by the CT DEP Wildlife Division for the Partners In Stewardship Program (June 2002)*

*Questions? Contact CT DEP Wildlife Division at 860-295-9523 (Eastern CT) or 860-675-8130 (Western CT)*

# Connecticut Department of Environmental Protection

## Managing Grasslands, Shrublands, and Young Forest Habitats for Wildlife: A Guide for the Northeast




**Edited by:** James D. Oehler - New Hampshire Fish & Game Department, Darrel F. Covell - University of New Hampshire Cooperative Extension, Steve Capel - Virginia Department of Game & Inland Fisheries, and Bob Long - Maryland Department of Natural Resources

**Published by:** The Northeast Upland Habitat Technical Committee and the Massachusetts Division of Fisheries & Wildlife

Grasslands, shrublands, and young forest habitats (collectively referred to as early-successional habitats) have been declining throughout the Northeast for decades as have the wildlife species associated with them. For instance, twelve of sixteen shrubland birds and seven of ten grassland birds have declining population trends in the region. Many are listed as threatened or endangered in several northeastern states. Additionally, American woodcock have declined by 40% over the past 30 years, and New England cottontails occur in only 20% of the area that this species was historically found. Given that more than 73% of forestland in the region is privately owned, it is imperative that landowners and the professionals that provide guidance to them help to address the decline of these habitats.

Written primarily by state and federal wildlife biologists and foresters, this guide will provide you with important information on how to maintain and restore these habitats on the lands you own or manage. Whether you are a novice or an experienced land manager, this guide will provide helpful information anyone can use to better manage early-successional habitats.

- Contents *(PDF 266k)* -- Title Page, Preface, Acknowledgements, Contents
- Introduction *(PDF 441k)* -- Darrel Covell, University of New Hampshire Cooperative Extension
- Looking in a Landscape Perspective *(PDF 888k)* -- John Litvaitis, University of New Hampshire
- Maintaining and Restoring Grasslands *(PDF 675k)* -- Paul Rothbart, Connecticut Department of Environmental Protection and Steve Capel, Virginia Department of Game & Inland Fisheries
- Managing Shrublands and Old Fields *(PDF 402k)* -- Brian Tefft, Rhode Island Division of Fish & Wildlife
- Managing Regenerating and Young Forest Habitat *(PDF 643k)* -- John W. Lanier, New Hampshire Fish & Game Department
- Managing Small Forest Openings *(PDF 293k)* -- Judy Wilson, Connecticut Department of Environmental Protection
- Managing Abandoned Orchards and Apple Trees *(PDF 410k)* -- Judy M. Wilson, Connecticut Department of Environmental Protection
- Invasive Exotic Plants in Early-successional Habitats *(PDF 1,346k)* -- James D. Oehler, New Hampshire Fish & Game Department
- Riparian Areas: Managing Early-successional Habitats Near The Water's Edge *(PDF 1,051k)* -- Thomas P. Hodgman, Maine Department of Inland Fisheries and Wildlife
- **Habitat Management Tools**
  - Using Prescribed Fire to Manage Habitats in the Northeast *(PDF 367k)* -- Tim Simmons, Massachusetts Natural Heritage & Endangered Species Program
  - Herbiciding *(PDF 814k)* -- James D. Oehler, New Hampshire Fish & Game Department
  - Grazing for Wildlife Habitat Enhancement *(PDF 135k)* -- Tyler Webb, Vermont Natural Resources Conservation Service
  - Mechanical Tools *(PDF 509k)* -- Steve Hill, U.S. Fish & Wildlife Service

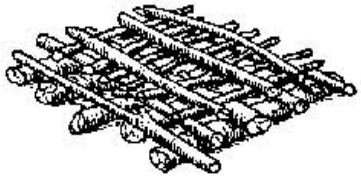
- **Habitat Management Case Studies**
  - Creating Early-successional Habitat on a Small Woodlot in Southeastern New Hampshire *(PDF 477k)* -- Matt Tarr, University of New Hampshire Cooperative Extension
  - Grouse Management at the Monongahela National Forest, West Virginia *(PDF 776k)* -- Gary Foster, West Virginia Division of Natural Resources
  - Massachusetts Woodlands Cooperative: A New Tool for Landscape Planning and Management *(PDF 1,376k)* -- Paul Catanzaro, University of Massachusetts Cooperative Extension
  - Quail and Cottontail Management on Buck Range Farm, Maryland *(PDF 1,364k)* -- Bob Long, Maryland Department of Natural Resources and Donald Webster, Maryland Department of Natural Resources
  - Pennsylvania's Conservation Reserve Enhancement Program *(PDF 370k)* -- Colleen A. DeLong, Pennsylvania Natural Resources Conservation Service and Jefferey D. Finn, Pennsylvania Natural Resources Conservation Service
- Opportunities to Obtain Financial Assistance for Wildlife Habitat Management Projects *(PDF 187k)* -- Jim Oehler, New Hampshire Fish & Game Department
- Appendix A: Contact Information for Selected Federal and State Agencies *(PDF 158k)*
- Appendix B: List of Common and Scientific Names of the Plant and Animal Species Mentioned in This Guide *(PDF 171k)*

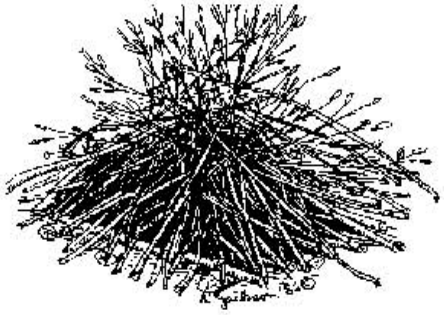
# WILDLIFE IN CONNECTICUT

**WILDLIFE HABITAT SERIES**

No. 2

## Brush Piles for Wildlife





### General Information

Wildlife have four basic requirements: cover, food, water and living space. Each must be present in an animal's habitat. Cover is the protective element within the habitat which may come in different forms for various wildlife species. It may be a hedgerow for rabbits, a young hemlock thicket for deer, a spruce tree for a golden-crowned kinglet or a brush pile for small mammals and birds. Whatever form cover takes, it contributes to one or more of the necessary functions in the lives of animals: breeding, nesting, hiding, resting, sleeping, feeding and traveling.

When natural cover is limited in wildlife habitat, brush piles may be provided. If possible, brush piles should be a by-product of other land management activities, rather than a specific practice. Timber harvest, timber stand improvements, pasture or cropland clearing, and firewood cutting all provide woody limbs suitable for brush piles.

### Location of Brush Piles

Brush piles benefit wildlife most when they are located at the edges of forest openings. They should not be further than 10 feet from the woodland border. Other suitable locations for brush piles are along road edges, streams, marshes and yard borders within or next to woodlands.

Four to eight brush piles per acre, spaced 100 to 150 feet apart, is a sufficient amount and will supply the needed cover requirements for most wildlife species.

### Construction of Brush Piles

Materials used in brush piles will depend largely on what is available. Oak, locust and other hardwoods which are rot resistant make durable bases. Other suitable materials include large stumps, cull logs, old fence posts and stones. The largest material should form the base and layers of smaller limbs and branches should be added as filler.

Brush piles are usually mound- or tepee-shaped. Ideally, they should be six to eight feet high and 15 feet in diameter. An alternate method of providing cover is to windrow the brush along a stone wall or woods' edge. In this case, brush should be piled in one direction with the tops facing the edge of the woods. Covering brush piles and windrowed brush with evergreen boughs will provide wildlife with additional cover.

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION ● WILDLIFE DIVISION

Brush piles are short lived (six to eight years). In order to provide continual cover, new ones should be developed periodically.

## Benefits

When properly constructed and located, brush piles can benefit many species of wildlife, including bobwhite quail, cottontail rabbits, ruffed grouse, wild turkeys, skunks, raccoons, opossums, woodchucks, chipmunks, mockingbirds, white-throated sparrows and juncos. Predators such as foxes, bobcats, hawks, owls and coyotes benefit from the small mammal and bird populations found in or around brush piles.

Grasses, forbs and vines, which are highly valuable to wildlife, will grow up through brush piles and add density and permanence to the piles.

Caution should be taken when creating brush piles in densely populated areas, for they may lead to nuisance wildlife problems. Skunks, opossums and raccoons will, on occasion, live in or under these brush piles and may cause a nuisance situation for nearby homeowners.

## Glossary

***Cull*** *trees, logs or lumber which have been rejected because they do not meet certain specifications.*

***Forb*** *any herbaceous plant species other than those in the grass, sedge and rush families; fleshy leaved plants.*

***Stand*** *plant communities, particularly of trees, sufficiently uniform in composition, constitution, age, spatial arrangement or condition to be distinguishable from adjacent plant communities; may delineate a silvicultural or management entity.*

***Timber stand improvement*** *the use of methods, such as thinning, firewood cutting and selection cutting, to improve the growth and condition of a stand of timber.*

## References and Further Reading

Martin, C. O. and J. L. Steele, Jr. 1986. Brush piles, Section 5.3.1, U.S. Army Corps of Engineers wildlife resources management manual. 19 pp.

Yoakum, J., W. P. Dashmann, H. R. Sanderson, C. M. Nixon and H. S. Crawford. 1980. Habitat improvement techniques. Pages 329-403 in S. D. Schemnitz, ed., Wildlife management techniques manual, 4th ed. The Wildlife Society, Washington, D.C. 686 pp.

*Illustrations by Steve Jackson and Paul Fusco*

*The Technical Assistance Informational Series is 75 percent funded by Federal Aid to Wildlife Restoration—the Pittman-Robertson (P-R) Program. The P-R Program provides funding through an excise tax on the sale of sporting firearms, ammunition and archery equipment. The remaining 25 percent of the funding is matched by the Connecticut Wildlife Division.*

*Rev. 12/99*

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# WILDLIFE IN CONNECTICUT

**WILDLIFE HABITAT SERIES**

## Butterfly Gardens

### General Information

Gardens designed to attract butterflies are most successful when careful thought is given to site and plant selection. Consideration of the needs of butterflies and their life histories is also important. By following a few simple tips, a garden can easily become alive with fluttering visitors.

Most butterflies are sun-loving insects, so be sure to plant the garden in a sunny location. Butterflies use the sun's heat to warm the muscles in their thorax (the middle part of an insect's body), which enables them to fly. Many butterfly gardeners place flat surfaces, such as rocks, among the plants for butterflies to bask on. As long as the site chosen has sun for a good part of the day, it will be used by butterflies.

When choosing plants for your butterfly garden, be sure to provide both larval (caterpillar) "host" plants and adult nectar sources. For example, many caterpillars of fritillary butterflies eat the leaves of violets, their host plants; later, the adults visit the blooms of a different plant, such as purple coneflower, for nectar. Sometimes, one plant can serve the needs of both butterfly and caterpillar, as is the case with butterfly weed. Trees and shrubs also serve as host plants for many caterpillars. It is important to remember that gardeners who provide host plants for larvae must tolerate the sometimes "unsightly" look to their plants as the foliage is being consumed by the caterpillars. Remember, do not use insecticides because this will defeat the purpose of the garden.

Two other important considerations when gardening for butterflies are to provide a series of blooms throughout the season and to emphasize the planting of native species. Suggestions for spring-blooming native plants include wild columbine and violets. Columbine will grow in a sunny, rocky area in addition to its usual woodland habitat. Both of these examples are host plants for caterpillars. Mid-season blooming plants include mountain mint, dogbane, coreopsis, milkweed, butterfly weed, thistle (only field or pasture should be used) and wild bergamot. Black-eyed Susan and purple coneflower are also mid-season bloomers and, although not native to New England, are native to the midwestern United States. Late-season blooming plants for attracting butterflies include New England aster and goldenrod. Both of these plants can reach heights above three feet, but cultivars are available for growing shorter plants. Cultivars

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are propagated from cuttings not from seed. Some native plant gardeners prefer not to use cultivars because they do not grow exactly as the parent plant in the wild. It is best to refer to a field guide to determine the color of the flowers and the soil in which the plants grow best.

Finding a source for the plants is the final step in planning a butterfly garden. Plants **should not** be collected from the wild because many will not transplant well and they have an ecological role to perform in the natural landscape. With some plants, such as goldenrod and milkweed, seed can be collected (only a small quantity of seed should be collected from a large stand of the plant) and later sowed in the garden. Success will be dependent, in part, on the maturity of the seed being collected. There are a few nurseries in Connecticut and in other states where nursery-propagated native wildflowers can be obtained.

## Recommended Guides for Butterfly Identification

Glassberg, Jeffrey. 1993. *Butterflies through Binoculars*. (New York: Oxford University Press), 160 pp.

Pyle, Robert Michael. 1985. *The Audubon Society Field Guide to North American Butterflies*. (New York: Alfred A. Knopf, Inc.), 924 pp.

Stokes, Donald and Lillian and Ernest Williams. 1991. *The Butterfly Book*. (Boston: Little, Brown and Company), 95 pp.

Wright, Amy Bartlett. 1993. *Peterson's First Guide to Caterpillars*. (Boston: Houghton Mifflin Company), 128 pp.

## Plant List

### *Wildflowers*

- *Achillea* (Yarrow) (A)
- *Apocynum* (Dogbane) (A)
- *Asclepias* (Milkweeds) (A, L)
- *Aster* (A, L)
- *Cirsium* (Thistle, use field or pasture only) (A, L)
- *Coreopsis* (A)
- *Echinacea* (Coneflower) (A)
- *Eupatorium* (Joe-pye-weed) (A)
- *Geranium* (A)
- *Monarda* (Beebalm) (A)
- *Pycnanthemum* (Mountain mint) (A)
- *Rudbeckia* (Black-eyed Susan) (A)
- *Solidago* (Goldenrod) (A)
- *Verononia* (Ironweed) (A)
- *Viola* (Violets) (A, L)

### *Shrubs*

- *Clethra* (Pepperbush) (A)
- *Lindera* (Spicebush) (L)
- *Rhododendron* (A)
- *Vaccinium* (Blueberry) (A, L)
- *Viburnum (A)*

### *Trees*

- *Cornus* (Dogwood) (A, L)
- *Juniperus* (Red cedar) (L)
- *Prunus* (Wild cherry) (L)
- *Sassafras (L)*

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A=*Adult nectar source*

L=*Larval food plant*

Illustrations by Paul Fusco

11/99

# WILDLIFE IN CONNECTICUT

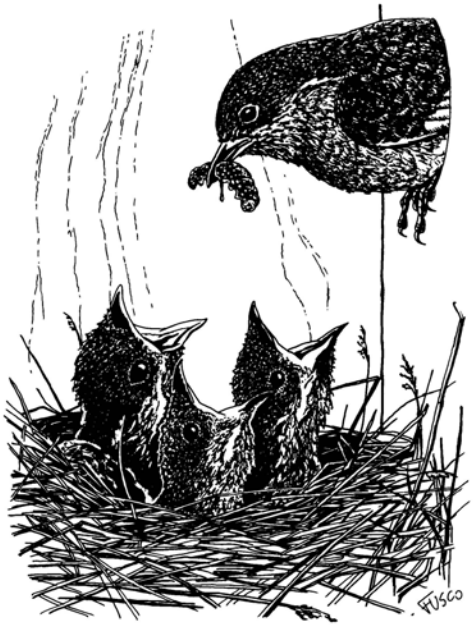
**WILDLIFE HABITAT SERIES**

## Nest Structures for Wildlife

Many species of wildlife are attracted to backyards and woodlots when artificial nest structures are available. Wildlife use a variety of manmade structures for nesting, sometimes to the disappointment of people. Squirrels and bats may take refuge in an attic, raccoons in the garage or swallows under the porch roof. Birdhouses have been readily accepted by many natural cavity nesters, and the placement of houses in your backyard can be an effective way of providing for a number of resident birds.

The supply of nest sites available to cavity nesting wildlife has declined in certain areas due to the clearing of land for development, the removal of snags, standing dead trees, during agricultural and forestry operations, the use of treated fence posts that do not develop cavities and competition with introduced species, such as the European starling and the house sparrow.

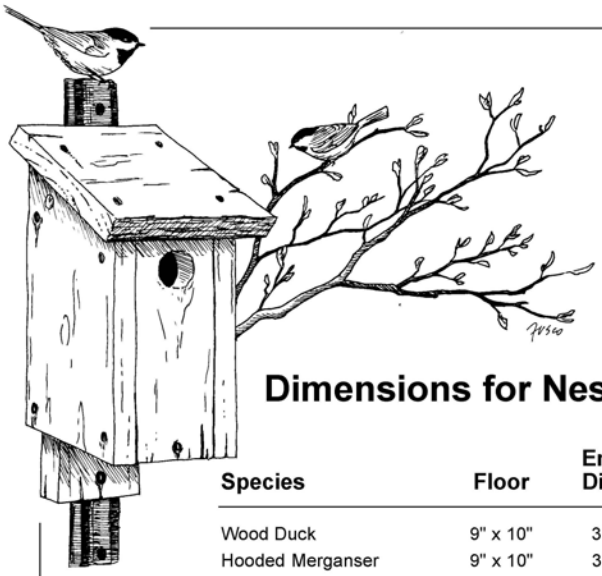
Nest boxes have been used successfully as a wildlife management tool where surveys have shown that virtually no natural nest sites occur. In Connecticut, eastern bluebird, wood duck and osprey populations have increased, partially due to the erection of nest structures in suitable habitat. Nest boxes are used by many other wildlife species such as gray and flying squirrels, screech and barn owls, hooded mergansers, house wrens and kestrels.




### Additional Comments

Nest boxes should be properly designed, erected and maintained for beneficial results. They should also be durable, predator-proof, weather-tight, lightweight and economical to build. Boxes for a target species should be constructed with the correct dimensions, placed at the appropriate height above the ground and installed in suitable habitat. When constucting nest boxes, do not use pressure treated lumber and do not paint or stain the inside of the box. Whether there are one or 1,000 boxes, they should be inspected annually for needed repairs, replacement and cleaning. Keeping an inventory of the location of each box and a history of wildlife use will not only provide important information, but will also prove to be a rewarding experience.

For specific nest box plans (including boxes for bluebirds and bats), contact the DEP Wildlife Division, at the Sessions Woods Wildlife Management Area, (860) 675-8130.



# Dimensions for Nest Boxes and Platforms

| Species | Floor | Entrance Diameter | Depth | Entrance Above Floor | Height Above Ground |
|---|---|---|---|---|---|
| Wood Duck | 9" x 10" | 3 1/2" x 4" | 25" | 18" | 3-20'(a) |
| Hooded Merganser | 9" x 10" | 3 1/2" x 4" | 25" | 18" | 3-20'(a) |
| Kestrel | 8" x 9 1/2" | 3 1/4" | 12-15" | 9-12" | 20-30' |
| Barn Owl | 10" x 18" | 6" | 15-18" | 4" | 12-18' |
| Screech Owl | 8" x 8" | 3" | 12-15" | 9-12" | 10-30' |
| Saw-whet Owl | 6" x 6" | 2 3/4" | 10-12" | 8-10" | 12-20' |
| Red-bellied Woodpecker | 6" x 6" | 2" | 12-15" | 10" | 10-20' |
| Downy Woodpecker | 4" x 4" | 1 1/4" | 9-12" | 6-8" | 6-20' |
| Hairy Woodpecker | 6" x 6" | 1 1/2" | 12-15" | 9-12" | 12-20' |
| Flicker | 7" x 7" | 2 1/2" | 16-18" | 14-16" | 6-20' |
| Great Crested Flycatcher | 6" x 6" | 2" | 8-10" | 6-8" | 8-20' |
| Tree Swallow | 5" x 5" | 1 1/2" | 6" | 5" | 6-16' |
| Black-capped Chickadee | 4" x 4" | 1 1/8" | 8-10" | 6-8" | 6-15' |
| Tufted Titmouse | 4" x 4" | 1 1/4" | 8-10" | 6-8" | 6-15' |
| White-breasted Nuthatch | 4" x 4" | 1 1/4" | 8-10" | 6-8" | 12-20' |
| Carolina Wren | 4" x 4" | 1 1/8" | 6-8" | 6" | 6-10' |
| House Wren | 4" x 4" | 1 1/8" | 6-8" | 6" | 6-10' |
| Eastern Bluebird | 4" x 4" | 1 1/2" | 8" | 6" | 5-6' |
| Prothonotary Warbler | 5 1/2" x 4" | 1 1/4" | 8-10" | 6-8" | 6-15' |
| Gray Squirrel | 10" x 11" | 4"(b) | 24" | 20" | 12-30' |
| Flying Squirrel | 6" x 6" | 1 1/2" | 8-10" | 6-8" | 10-36' |
| **Open Platforms** | | | | | |
| Phoebe | 7" x 8" | | 8-12" | | 8-12' |
| Barn Swallow | 7" x 8" | | 6" | | 8-12' |
| Robin | 7" x 8" | | 8" | | 6-15' |

(a) Height above water surface
(b) Entrance on side of box

*The Technical Assistance Informational Series is 75 percent funded by Federal Aid to Wildlife Restoration—the Pittman-Robertson (P-R) Program. The P-R Program provides funding through an excise tax on the sale of sporting firearms, ammunition and archery equipment. The remaining 25 percent of the funding is matched by the Connecticut Wildlife Division.*

Illustration by Paul Fusco

Rev. 4/01

## RECREATION PLANNER REVIEW

Eisenhower Park is a roughly 320 are open space property owned by the City of Milford. It consists of two adjoining, but physically very different sections. The western +100 acre tract, known as the Solomon Property, is a block of rough, wooded terrain intersected with extensive wetland areas occupying swales between upland areas, some of which are rather rugged in character. The main section, approximately 220 acres in size, basically consists of the floodplain of the Wepawaug River, along with a fringing wetland area bordering it on the east. As such, it contains a high percentage of wetland soils, varying considerably in drainage capability, but all subject to periodic flooding.

The potential use of a piece of land is dependent upon several factors. One is physical character which determines in large part what can or cannot be done with the property. Thus Eisenhower Park contains two very different areas, each of which has significant limitations. For example, the Solomon Parcel clearly should be managed as a tract of natural, undeveloped open space. Similarly the eastern portion offers an attractive although flood prone corridor along with some upland offering greater opportunity for recreational development.

A second factor involves the degree of civic need to develop an area more intensely. Although the Park's Master Plan (Stantec, 2007) mentions the public desire to develop more facilities in the park, information provided does not enable reviewers to ascertain the present adequacy of recreational facilities in Milford and the possible need to meet any such deficiencies at Eisenhower Park. Also it does not address whether or not there are more suitable locations in Milford where such deficiencies can be located.

A third factor relates to fiscal reality. Although this is an issue beyond the scope of an ERT review, obviously civic leaders must balance a "Cadillac" level of development against financial resources likely to be available in the foreseeable future. Thus civic leaders must decide which suggested development phase is more likely to be realistic.

With these introductory comments in mind, this reviewer feels that Milford already has both the natural resource information and the use recommendations needed to guide the community in shaping the future of Eisenhower Park. Both the Land-Tech study and the Park Master Plan contain the basis for intelligent action. Also the public input from the Eisenhower Park Study Committee lends further credibility to any future action program. This reviewer lacks the intimate knowledge which local interests possess, but will endorse the following specific plan elements:

1. Managing the river corridor proper as the park's focal natural and recreational feature, as well as with the connected artificial wetland providing additional flood storage protection to downtown Milford.
2. Utilizing the central meadow as a site for special civic events.
3. Maintenance and improvements as funding permits of existing recreational facilities plus community gardens on eastern upland, including development of a winter sledding hill.
4. Redevelopment of former picnic area/day camp area on island between river and pond.
5. Maintenance of pond as scenic feature and providing some recreational opportunity.

6. Development of integrated, internal tail system, controlling problem access from outside park and separating trail uses where incompatible or causing environmental damage.
7. Development of vehicular bridge connecting #2 and #4 above plus two pedestrian bridges at upper and lower ends of park as part of trail system development.
8. Separation of incompatible uses by relocating dog run area from equestrian center to suggested Foote Field area.

At the same time, based upon the three site use factors discussed above, this reviewer has an admitted bias toward a more natural, low intensity development approach to Eisenhower Park. Therefore this reviewer questions several major development proposals including:

1. Major community center.
2. Swimming or splash pool.
3. Various toilet building facilities in an unsewered and/or floodplain area where port-a-potties may be a more practical approach.

In addition this reviewer will offer a number of additional, miscellaneous comments which may be relevant to local decision-makers as follows:

1. **Wepawaug River** – containing Escherichia coli from waterfowl and other unknown sources. IS corrective action called for? Re: 1982 flood, river caused flooding downstream, although development of artificial wetland may provide more flood storage. Presence of three downstream dams prevents short term development of anadromous fishery potential.
2. **Pond** – an excavated pass-through waterbody with typical problems of such facilities including silting in, contamination from feeder stream and tendency to entrophy from collected nutrients and weed growth. Lack of control structure prevents drainage for silt and weed removal. Fishing, viewing are available uses, but skating may be a safety issue in view of existing depth combined with mild coastal winters not conducive to ready freezing.
3. **Pond dam** – reportedly needs repair, but a review by an appropriate engineer is necessary..
4. **Trails** – a more formalized trail system is needed, one which will prevent environmental damage in wetland areas, discourage if not prevent misuse by motorized trail users entering from outside the park (primarily from the west?) and which will separate trail uses which are incompatible or causing impact to the fragile wetland soils. Trail hardening may be necessary in such areas.
5. **Administration** – apparently control of the facility is split between several municipal agencies. This reviewer suggests that locating direct administrative control and responsibility in one agency may be a more appropriate approach in establishing goals and operational priorities for the park. This is an issue for local discussion and possible resolution.

**ERT Coordinator's Note:** The following properties have very active successful "Friends" groups or a town commission that assist the municipality in the planning, maintenance, repair, upgrades, educational opportunities and fund raising for their specific parks. ERT reports were prepared for each of them and may be found on our website www.ctert.org. Also below are links to some of their information.

**Selleck's and Dunlap's Woods – Darien, Connecticut**

http://www.sellecks woods.com/

We are a private 501(c)3 non-profit organization that cares for Sellecks Woods on behalf of the Darien Parks and Recreation Commission.

**Cranbury Park – Norwalk, Connecticut**

http://friendsofcranburypark.org/wordpress/

**Our Mission**

Friends of Cranbury Park is a nonprofit citizens alliance working in partnership with the public and the city of Norwalk to preserve, protect, and enhance Cranbury Park and to foster an atmosphere of harmony and respect among all park users present and future.

Our core values will shape our organization and guide our decisions. As FCP board members, we pledge to:

- Cultivate a sense of community and encourage broader participation in FCP projects and initiatives by motivating and supporting committed volunteers to serve as stewards of the park.
- Educate visitors unfamiliar with park rules and regulations, and familiarize them with all that the park has to offer.
- Preserve and protect park wildlife and plant life, and preserve its natural open space.
- Beautify, enhance and improve the park's grounds and wooded trails.
- Work closely and collaboratively with the appropriate city agencies and officials to guide park policy, provide oversight, and maintain an advisory role in park-related matters.
- Value park users' diverse perspectives, invite a wide range of ideas, and receive all with open-mindedness and respect.
- Celebrate and appreciate our good fortune at having daily access to the natural world of Cranbury Park.
- Share our expertise and knowledge as we deem appropriate with organizers of other city park groups.

**Bauer Farm – Madison, CT**
**Bauer Farm Advisory Committee**

http://www.madisonct.org/bauerpark.html

http://www.madisonct.org/Bauer_Farm/bauera-z.htm

http://www.madisonct.org/Bauer_Farm/docs/Newsletter%20Summer%20'10%20insert.pdf

http://www.madisonct.org/Bauer_Farm/docs/Newsletter%20Spring%202010%20for%20web.pdf

**Mukluk Preserve – Sprague, Connecticut**
**Sprague Conservation Commission**

http://www.ctsprague.org/Mukluk%20Broschure.pdf

**Bittner Park – Guilford, Connecticut**
**Park and Recreation Commission**

http://www.scrcog.org/Trails_files/TrailMapGuilfordBittner.pdf

## ARCHAEOLOGICAL AND HISTORICAL REVIEW

The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) reviews consider the large acreage of Eisenhower Park and its previous landuse history in our evaluation of cultural resources which may exist within the park's boundaries. The southern and western portions of the park which abuts Baldwin Swamp and the Wepawaug River possess a moderate-to-high sensitivity for archaeological resources. Environmental and topographic features, especially the high terraces overlooking the swamp and river may contain archaeological sites associated with prehistoric Native American encampments.

OSA and SHPO highly encourage the Town of Milford to apply for an archaeological survey grant through the Commission on Culture and Tourism (CCT) to identify and preserve any cultural resources which may exist on the project area.

Information on CCT's Survey and Planning grants can be obtained at

http://www.cultureandtourism.org/cct/cwp/view.asp?a=2127&q=414860&cctPNavCtr=|49155|#49156

All archaeological studies of the proposed project area must be carried out pursuant t current state-of-the-art standards and SHPO's Environmental Review Primer for Connecticut's Archaeological Resources.

The OSA and SHPO are available to provide technical assistance in the identification and evaluation of cultural resources on the parcels under consideration.

# About the Team

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists and landscape architects, recreational specialists, engineers and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - an 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns within the King's Mark RC&D Area - *free of charge.*

## *Purpose of the Environmental Review Team*

The Environmental Review Team is available to assist towns in the review of sites proposed for major land use activities or natural resource inventories for critical areas. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments and recreation/open space projects.

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

## *Requesting an Environmental Review*

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Conservation District and through the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner / developer allowing the Team to enter the property for the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Conservation District and approved by the King's Mark RC&D Executive Council, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

For additional information regarding the Environmental Review Team, please contact the King's Mark ERT Coordinator, Connecticut Environmental Review Team,Connecticutert@aol.com, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977. www.ctert.org