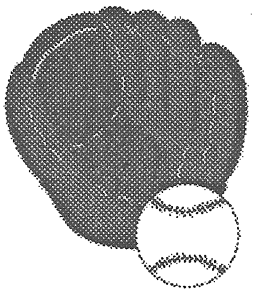


Trumbull High School Baseball Field

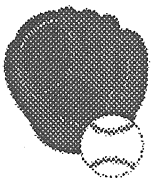
Trumbull, Connecticut

King's Mark Environmental Review Team Report

King's Mark Resource Conservation & Development Area, Inc.

Trumbull High School Baseball Field

Trumbull, Connecticut



Environmental Review Team Report

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

for the

First Selectman
Trumbull, Connecticut

August 2000

CT Environmental Review Teams
1066 Saybrook Road, P.O. Box 70
Haddam, CT 06438
(860) 345-3977

Acknowledgments

This report is an outgrowth of a request from the Trumbull First Selectman to the Fairfield County Soil and Water Conservation District (SWCD). The SWCD referred this request to the King's Mark Resource Conservation and Development Area (RC&D) Executive Council 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 Wednesday, June 28, 2000.

Douglas Hoskins	Wetland Specialist/Environmental Analyst III DEP - Inland Water Resources Division (860) 424-3903
Dawn McKay	Biologist/Environmental Analyst III DEP - Natural Resources Center (860) 424-3592
Thomas Mott	Environmental Analyst Fairfield County Soil & Water Conservation District (203) 269-7509
Roman Mrozinski	Executive Director New Haven County Soil & Water Conservation District (203) 269-7509
Don Mysling	Senior Fisheries Biologist DEP Fisheries Division Habitat Conservation & Enhancement Program (860) 567-8998

Peter Picone Wildlife Biologist
DEP - Sessions Woods Wildlife Management Area
(860) 675-8130

I would also like to thank James Wang, executive director, Greater Bridgeport Regional Planning Agency, Darcy Winther, DEP - Inland Water Resources Division, Ken Halaby, first selectman, Paul Kallmeyer, director of public works, Robert Ferrigno, chairman, Park Commission, Vernon Lentz, park superintendent, Joan Poarch, science instructor, Trumbull High School, Joseph DeSabin, Trumbull Legion, Michelle Noehren, student, Ralph Iassogna, superintendent of schools, and others representing the baseball interest for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project, location and soils maps, and a proposed field location map. Additional requested maps and reports were mailed to Team members after the review (a map showing all high school playing fields with seasonal uses indicated was not obtained). 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 town. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The King's Mark RC&D Executive Council hopes you will find this report of value and assistance in the review of this proposed baseball field.

If you require additional information please contact:

Elaine Sych, ERT Coordinator
CT ERT Program
P. O. Box 70
Haddam, CT 06438
(860) 345-3977

Table of Contents

List of Figures

Introduction

Introduction

The Trumbull First Selectman has requested Environmental Review Team (ERT) assistance in reviewing a proposed baseball field at Trumbull High School.

The project site is located at Trumbull High School located on Strobel Road. The high school, middle school and vo-ag school all adjacent to each other, occupy approximately 106 acres. It is being proposed to construct a full size, regulation baseball field south of the existing soccer field close to Beach Memorial Park. The proposal would cut and regrade approximately three (3) acres of woodland. The wooded area with a stream has been used by various high school science classes for a number of years as an outdoor laboratory and classroom.

Objectives of the ERT Study

The town is requesting an independent review of the proposal because of the controversy over the proposed use of the site for a ballfield. The ERT has been asked to provide a natural resource inventory, an evaluation of the proposal with regard to environmental impacts to the site from ballfield construction and use, and a discussion of prudent and feasible alternatives. The information will be used by the various boards and commissions to gain a better understanding of the proposed project and its potential impacts.

The ERT Process

Through the efforts of the First Selectman this environmental review and report was prepared for the Town of Trumbull.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the town. Team members were able

to review maps, plans and supporting documentation provided by the town and interested parties.

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 on Wednesday, June 28, 2000. 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.

Figure 1

⇑
N

Topographic Map

Scale 1″ = 2000′

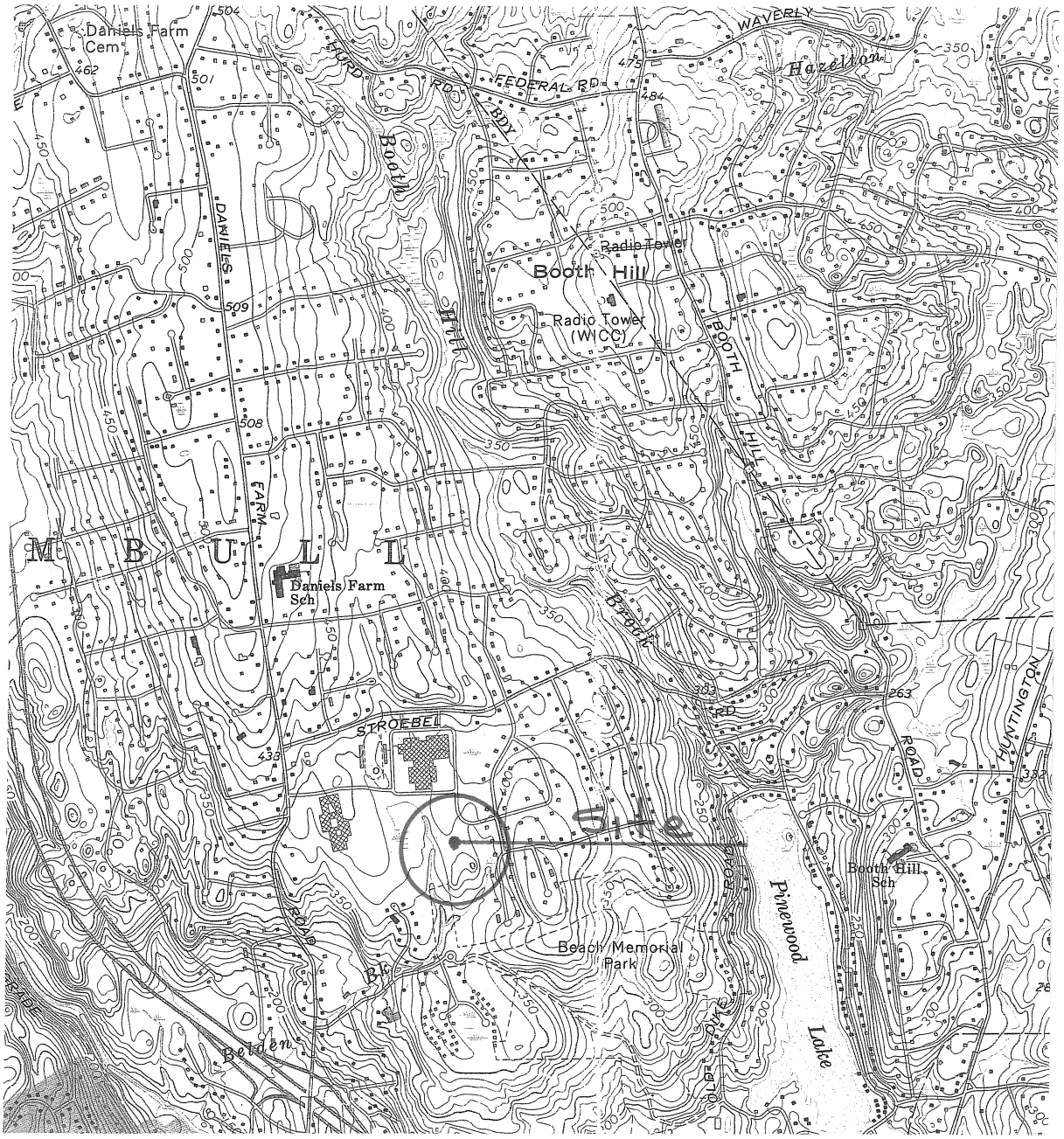


Figure 2

⇑
N

Location Map

Scale 1" = 1000'

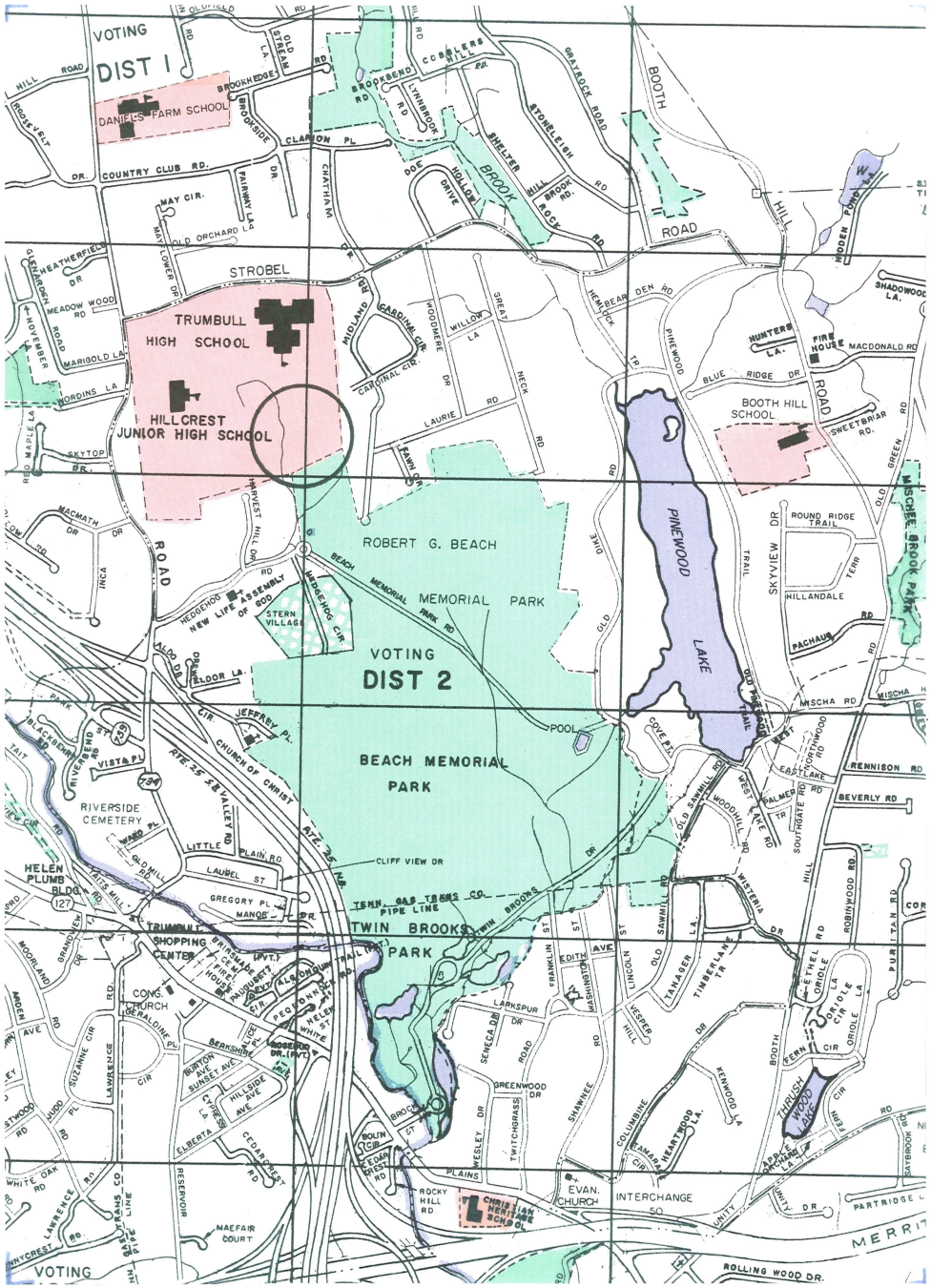
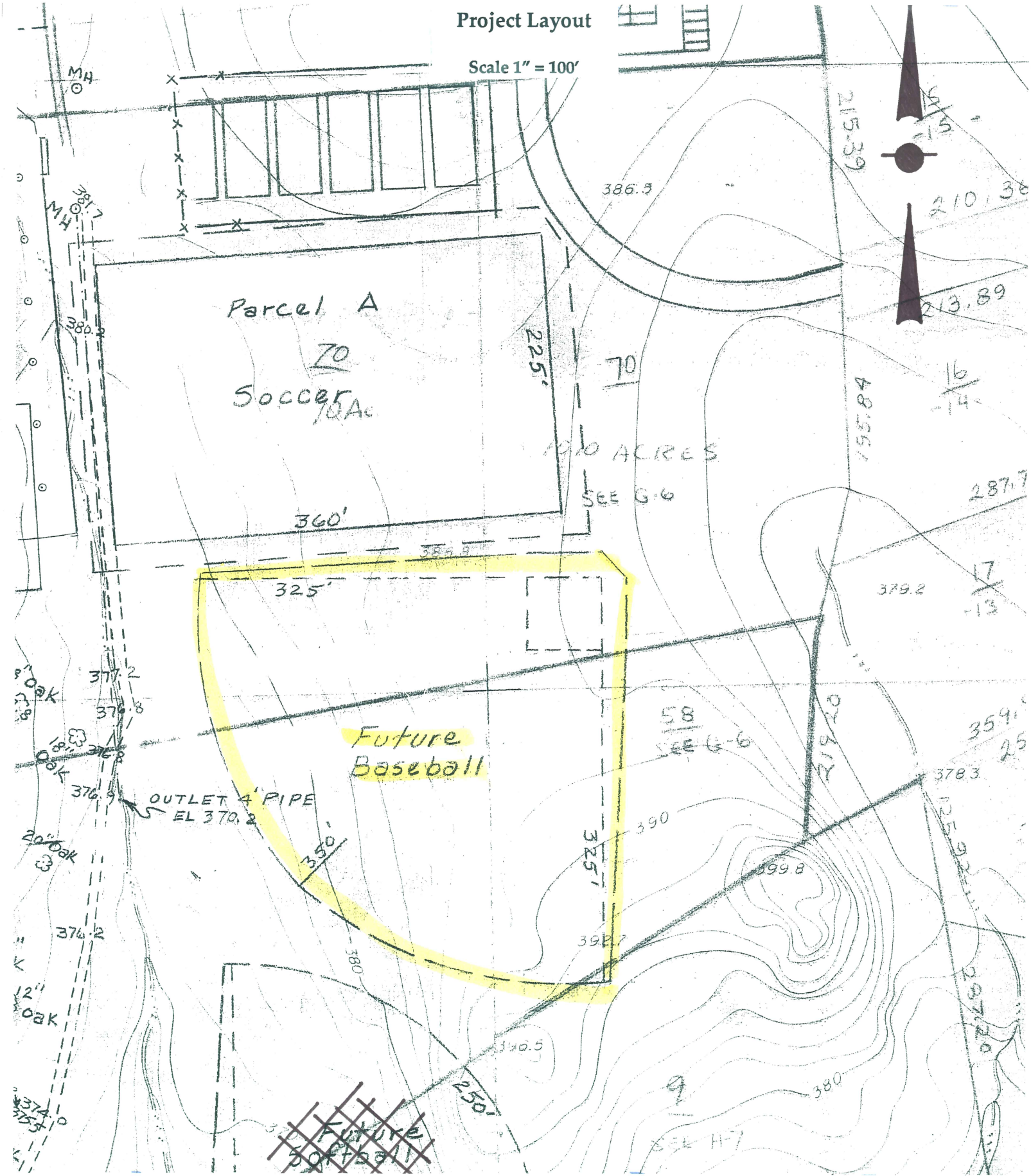


Figure 3

Project Layout

Scale 1" = 100'



Soil Resources

The study area is approximately three acres of wooded land located to the south of an existing soccer field on Trumbull High School property. The information in this report is based on the soil series description and the mapping units descriptions as presented in the 1981 USDA Soil Survey of Fairfield County, and on field observations.

The site can be found in sheets 44 and 45 of the Fairfield County Soil Survey. (Figure 4)

Mapping Units

Wetland Soils

1. Map Unit Rn

The Rn map unit is composed primarily of three soils. This unit consists of poorly drained and very poorly drained soils in depressions and drainageways. The major soils in this unit have a seasonal high water table at or near the surface from fall through spring. The high water table, ponding, and stones and boulders on the surface limit development of these soils.

Non-wetland Soils

2. Map Unit CrC

The Charlton-Hollis map unit is composed primarily of two soils that are so intermingled on the ground that they could not be separated on the map. Slopes range from 3 to 15 percent. One soil is named Charlton. Charlton soils are very deep and well drained. Typically, they have fine sandy loam textures to a depth of 40 inches or more. Depth to the seasonally high watertable is greater than 6.0 feet.

The Charlton soil has moderate or moderately rapid permeability. Runoff is medium to rapid. The soil has a slow shrink-swell potential. The Hollis soil has moderate or moderately rapid permeability above the bedrock.

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

3. Map unit SwB

Sutton very stony fine sandy loam, 3 to 8 percent slopes. Moderately well drained soil found in slight depressions and on the sides of hills and ridges. This series has a seasonal high water table at a depth of about 20 inches from late fall until midspring. The permeability of the soil is moderate or moderately rapid. The hazard of erosion is moderate. Quickly establishing plant cover, mulching, and using siltation basins and diversions help to control erosion and sedimentation during construction.

Discussion

Although the soil resources don't inhibit the feasibility of placing the proposed baseball field in the area of the existing outdoor classroom and portion of the cross-country trail, it seems unnecessary. Placing the baseball field in the proposed area will cause the deforestation of an area that now serves the school in two ways, and will replace it with a field that will serve only one purpose, this does not seem to be a good trade off. The re-orientation of the existing fields seems to be a more practical approach to the athletic and educational needs of the school. A more environmentally sensitive and cost effective manner of utilizing land that is already cleared for construction reduces costs and allows resources to applied to "parcel B." "Parcel B" if planted Fall 2000 could be used as a playing field sooner that was indicated during the field walk on June 28, 2000. The Conservation District has offered one possibility that can be seen (Figures 5 and 6).

An outline of proposal:

1) Cut back into slope of existing softball field, top of existing slope to be out of bounds line for new field.
2) Use noted dimensions for "future field", 350' to center field fence, 325' to side line boundary.
3) Field F to be moved to unused area, "parcel B."
4) Field H to be shifted beyond fence for new field.

⇑

Figure 4

Soils Map

Scale 1″ = 1320′

Figure 5

Existing Fields

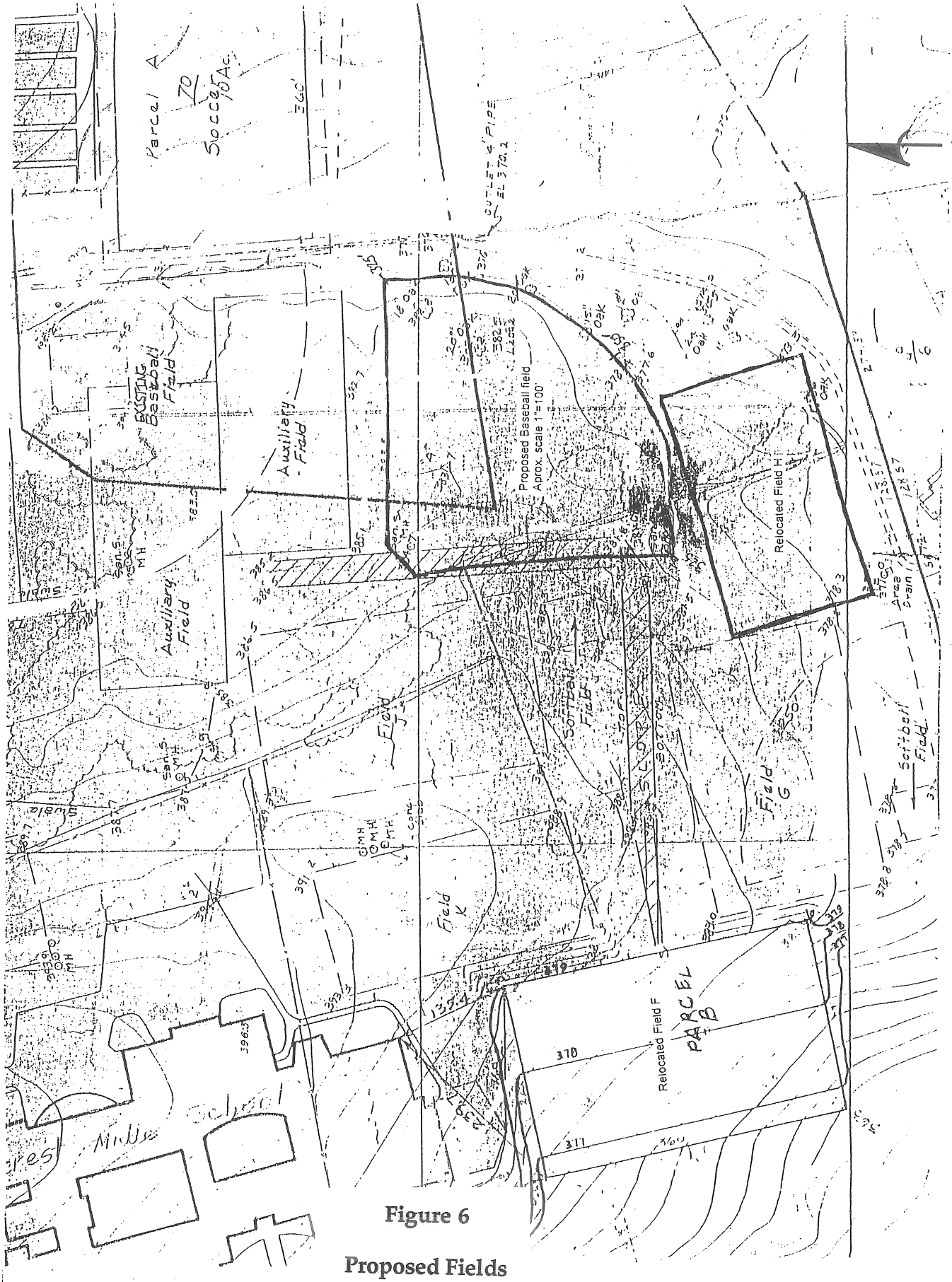


Figure 6

Proposed Fields

Wetland Review

Existing Wetland and Watercourse Resources

The field is proposed to be built within the Belden Brook watershed adjacent to the upper reaches of Belden Brook itself. This watercourse was flowing well at the time of the inspection and, at the point of construction, drains an area of 115 acres. This watershed size is very approximate since it exists within an urbanized area with stormwater drainage systems that may or may not conform to the topographical contours used to delineate this watershed. Given the relatively small size of this watershed and the observations of others, that the stream flows nearly year round, perhaps drying only in the driest portions of the year, this watercourse is most likely to be perennial.

Its watershed encompasses a majority of the high school, some of the junior high and the VO-AG school, extending up to and just beyond the Daniels Farm School. This watershed consists of what appears to be an even mix of institutional, residential and wooded areas. Belden Brook flows into the Pequonnock River approximately one mile from the site in question. The watercourse itself has been culverted as it passes under the high school.

According to the *Water Quality Classification Map of Connecticut* (1987), Belden Brook is not classified, but it is considered to be Class A because it is not otherwise classified. However, the water quality of the Pequonnock River is classified B/A. This signifies that the watercourse may not be meeting Class A water quality criteria or one or more designated uses including potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply. The goal is to restore water quality of the Pequonnock River to the Class A level.

The ERT request mentioned that a vernal pool existed on the site, however none was observed in the field. Pictures were offered that were to represent a vernal pool, however, the feature represented does not appear to attain the water depths necessary to create a functional vernal pool habitat that supports the requisite amphibian populations. If there is more information documenting the existence of obligate vernal pool species, it should be produced.

The extent of the watercourse inspected revealed excessive siltation in the streambed as well as some moderate streambank erosion. Sources of upstream sediments were observed around the high school including exposed soils on sloping land with inadequate erosion and sedimentation protection measures installed.

Proposed Activities

Assuming that the baseball field has similar dimensions as the nearby baseball field, an approximate representation of the proposed activities was sketched onto town planimetric mapping (see Figure 7).

Given the topography, there will most likely need to be some grading of the site to create a level playing field. Possible shallow depth-to-bedrock in the southeastern portion of the proposed playing area may dictate that there be more addition of earth material than removal of earth material to achieve the desired elevations, unless blasting of bedrock is performed if encountered.

At any rate, some amount of filling will most likely be needed in close proximity to the watercourse. Therefore an area of graded slope should be incorporated into the plan. With estimated fill of between 10 and 20 feet, this could mean an additional 20 to 40 feet of graded fill slope added on to the playing surface. This means that, according to Figure 7, disturbance may come as close as 10 feet from the watercourse and never more than 30 feet away.

Resource Function and Value

Please refer to the Fisheries section of this ERT report for a discussion of the value of this watercourse for fisheries production. Another primary value of this resource is its educational usefulness. According to DEP Bulletin No. 9. *Method for the Evaluation of Inland Wetlands in Connecticut* (1986), the educational value of a wetland or watercourse is increased with the proximity to educational facilities. High value is assigned if the resource is within safe walking distance and includes a watercourse as this site does. It is evident from the many testimonials received by this team member concerning the value of the existing and on-going scientific studies conducted by the students that this watercourse does indeed provide an exceptionally high educational value.

Potential Impacts

As is proposed in this case, construction on or alteration of those areas next to watercourses can have many negative consequences. Much has been written on the benefits of maintaining an undisturbed "buffer" along side of watercourses. In general, these "riparian" areas provide many beneficial functions. The streamside vegetation and subsequent insects etc., provides a source of material, and in turn energy, to the ecosystem of the watercourse. The overhanging vegetation also regulates the temperature of the water by providing shading. An undisturbed buffer best provides excess sediment and nutrient removal from stormwater runoff as it flows overland and underground from the surrounding uplands. Healthy streamside vegetation secures the soil preventing streambank erosion and subsequent downstream sedimentation.

Please refer to the Fisheries section of this ERT for a discussion on recommended riparian buffer widths. Essentially, the policy of our Fisheries Division is to maintain a 100 foot wide buffer on both sides of perennial streams and a 50 foot

buffer around intermittent streams. An adequate, intact, undisturbed riparian buffer should be valued even further if it occurs in an urban/suburban environment such as this. Rainwater that falls on the rooftops, streets, fertilized lawns and ball fields picks up a whole suite of pollutants such as gasoline, oil, heavy metals, fertilizers, pesticides, feces and sediment. The pollutant removal capability of riparian buffers are even more necessary under urban conditions such as these.

Given the amount of excessive sediment observed in the stream and the probable sources located up-slope in the form of unprotected disturbed slopes around the educational facilities, it is reasonable to assume that the additional disturbed areas and exposed slopes that will be part of the proposed ball field construction is likely to contribute even more damaging sediment to this valuable watercourse.

Impact Mitigation

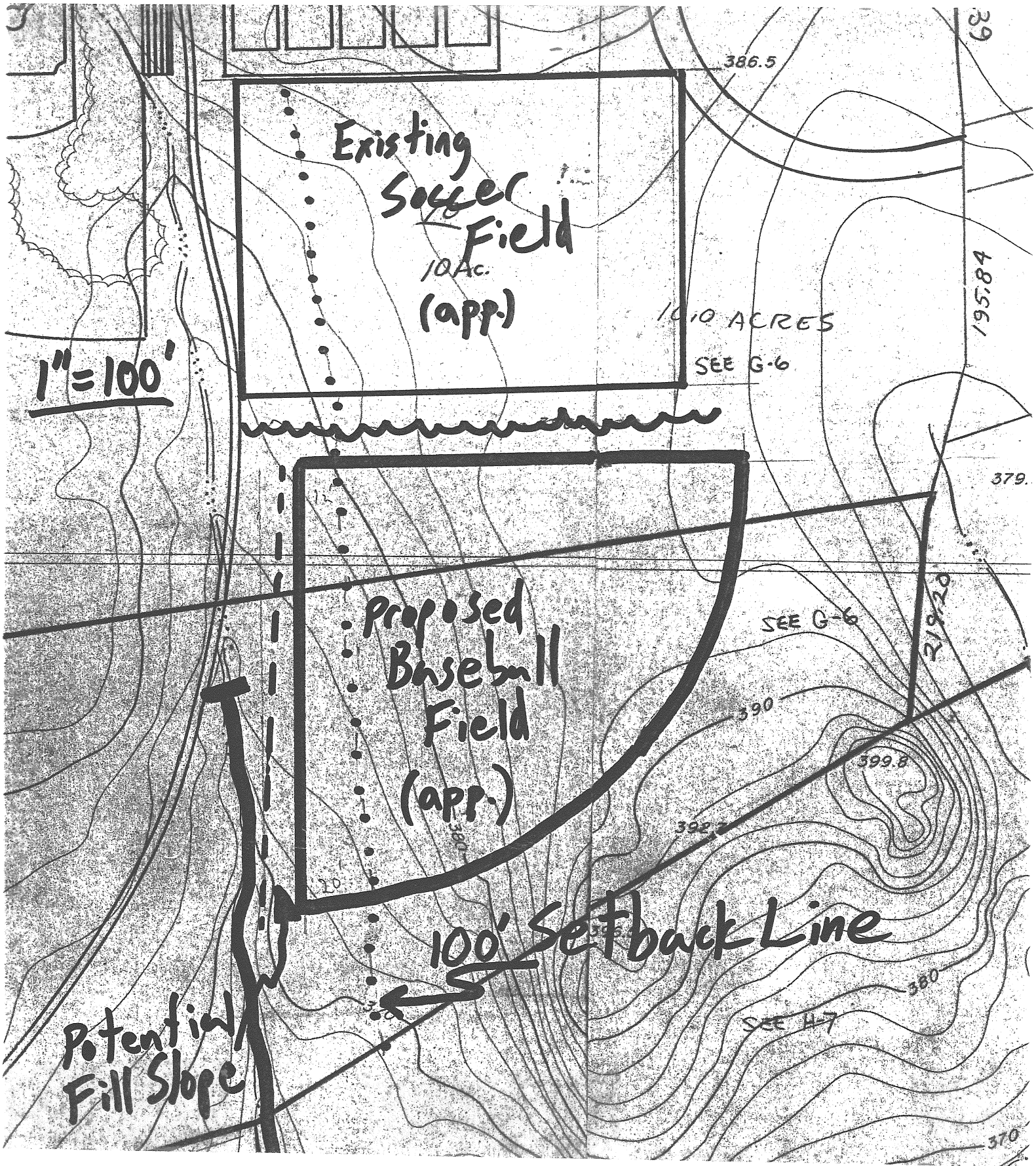
As previously mentioned, the amount of undisturbed riparian buffer left once the proposed ball field is in place will be minimal and most likely ineffective. In fact, many times in situations like this, the narrow band of natural vegetation that remains is eventually removed through periodic mowing.

It is suggested that the Town of Trumbull seriously consider alternatives to this proposed activity in order to reduce the potential for impacts as cited above. If possible, shifting the field as far to the east as possible, away from the watercourse should be investigated. However, the further to the east or south it is shifted, the higher the chance of encountering bedrock. Reducing the size of the field may be problematic if the goal of the proposal is to build an adult-sized baseball field as has been stated. There does not seem to be any reasonable realignment of the field that would reduce impacts without considerable expenditures for earth

removal and/or bedrock blasting. Options for utilizing currently open, yet un-formalized sporting areas at this facility should be a primary consideration.

Figure 7.

Wetland Review Map



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 no known extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur at the site in question.

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 & 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.

Aquatic Resources

Aquatic Habitat Description

The Trumbull High School baseball field is proposed for development on a three acre wooded parcel of school property easterly of Belden Brook. Historically, the headwaters of Belden Brook were located on the property now developed to the Trumbull High School complex. The headwaters of the stream are now contained within a culvert system which discharges from a 4 foot diameter pipe to an open channel westerly of the proposed baseball field.

From the outlet pipe Belden Brook is contained within a channel nearly 20 feet in top of bank width and normal flow depths averaging 9 inches. The moderate grade channel creates surface flow predominated by shallow riffle interspersed by moving pool. Substrate of Belden Brook is composed of small boulder, cobble, gravel, coarse sand, and sand-silt fines.

An unnamed tributary stream enters easterly to Belden Brook in the Robert G. Beach Memorial Park. The stream is similar in character to Belden Brook although it is significantly smaller being some 10 feet in top of bank width and normal flow depths averaging 6 inches or less.

Despite extensive development in the watershed, dense growths of hardwoods and woody shrubs predominate as riparian vegetation along the open channel areas of Belden Brook on the high school and adjacent park properties and provide the stream and the unnamed tributary stream with a nearly complete canopy. Physical in-stream habitat is provided by the water depth in pools, undercut banks, and fallen or overhanging riparian vegetation.

The extensive development within the Belden Brook watershed (as exemplified in several stormwater drainage discharges to the culverted stream segment) has however, impacted the physical habitat of the watercourse and water quality. The physical habitat of the Belden Brook reach from the culvert downstream to a remnant dam is being impacted by sediment deposition. The sediments are likely to have originated from the runoff of parking areas and roadways draining into the Belden Brook culvert. A portion of the sediments may also originate from areas of extensive bank failure attributable to stormwater collected from impervious surfaces and transferred to the Belden Brook culvert.

The Department of Environmental Protection classifies Belden Brook and the unnamed tributary stream as *Class A* surface waters. Surface waters so classified are known or are presumed to meet water quality criteria which support the following designated uses: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply and other legitimate uses.

Aquatic Resources

Based upon channel grade, morphology, and substrate composition, Belden Brook can be classified as cold water resource. The Fisheries Division has never formally surveyed the stream's fish population. Based upon surveys of similar streams in the immediate watershed, Belden Brook and the unnamed tributary are anticipated to provide habitat for brook trout *(Salvelinus fontinalis)*, blacknose dace *(Rhinichthys atratulus)*, longnose dace *(Rhinichthys cataractae)*, tessellated darter *(Etheostoma olmstedi)*, and white sucker *(Catastomus commersoni)*. These species are native to cold water rivers and streams in Connecticut. Blacknose dace were observed the day of the ERT field review. The fish population in Belden Brook near the proposed baseball field may be limited to blacknose dace due to the alteration of physical habitat caused by extensive sediment deposition on the streambed.

Impacts

As currently proposed, the Trumbull High School baseball field will not alter or directly impact Belden Brook. However, development of the baseball field will encroach into the riparian habitat associated with the watercourse. The encroachment and alteration of undisturbed riparian habitat along Belden Brook can promote adverse impacts to aquatic habitats. The impacts result from:

- The removal of riparian vegetation eliminates the natural "filtering" effect of vegetation which has the ability to prevent sediments, nutrients, fertilizers, and other non-point source pollutants from upland sources from entry into streams. Riparian vegetation removal also increases stream water temperature during the summer months (thermal loading); decreases stream bank stability thereby increasing surface water siltation and habitat degradation; eliminates or drastically reduces the supply of large woody debris provided to streams (such material provides critical physical habitat features for numerous species of aquatic organisms; reduces a substantial proportion of food for aquatic insects which in turn constitutes a reduction in a significant proportion of food available for resident fish); stimulates excessive aquatic plant growth; and decreases the riparian corridor's ability to serve as a "reservoir" storing surplus runoff for gradual release back into the streams during summer and early fall low flow periods.

- Stormwater runoff from the baseball field and associated structures can affect stream hydraulics resulting in higher peak flows, more frequent floods, accelerated bank and streambed erosion, lower water quality and a lessened diversity of aquatic habitat and species composition.

- Nutrient enrichment from fertilizer runoff from grassed areas of the baseball field can stimulate aquatic plant growth. Herbicide runoff may result in fish kills and water quality degradation.

Recommendations

The habitats and resources of Belden Brook will be afforded the greatest protection by developing the baseball field elsewhere on open field areas of Trumbull High School. The following are recommended should this alternative prove infeasible and the baseball field remain at the site currently proposed:

- Increase the width of the wooded area between the baseball field and stream. The Fisheries Division recommends at a minimum, a 100 foot buffer zone of undisturbed habitat adjacent to streams such as Belden Brook. 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. Please refer to the attached documentation presenting Fisheries Division policy and position regarding riparian buffers for additional information (see Appendix).

- Institute a phased development of the site with an approved and completely functional stormwater management system installed initially. Fisheries Division staff admittedly lack the ability to determine the site specific efficacy of the current design for the proposed stormwater detention basin. However, the Division does recommend that the stormwater detention basins be enhanced with a "biofilter" capability to further the system's capacity for nutrient removal.

- Establish comprehensive erosion and sediment control plans with mitigative measures (haybales, silt fence, etc.) to be installed prior to and maintained through all development phases. Land clearing and other disturbance should be kept to a minimum with all disturbed areas being protected from storm events and restabilized in a timely manner.

Additional Recommendations

The segment of Belden Brook on Trumbull High School property reportedly has served as an outdoor environmental education classroom and should be allowed to continue to serve that function into the future. For that function to continue, the stream reach should receive a special designation (e.g. conservation area, open space area) which formally protects the stream from encroachment.

Topography of land adjacent to Belden Brook lends itself well to an interpretive trail which can provide a "birds-eye" view of the stream and controlled access points to view significant channel features. Signage could be erected along the trail at the select access locations to describe the function of key features of the stream such as pools, riffles, riparian area, and the consequence of stormwater discharges. An initial scheme for such signage include:

1. Stream habitat overview. A key characteristic of any productive in-stream habitat is diversity. It is imperative that the proper blend of water depths, water velocities, and substrate types be present together to form the necessary food production, spawning-incubation, and cover areas that combine to form a complete stream habitat.

2. Pools. Loosely defined, a pool is a region of deeper, slower moving water with fine bed materials. With overhanging banks and vegetation, pools provide cover, shelter, and resting areas primarily for larger finfish. During low flows pools can become isolated pockets of water which allow survival of finfish and other aquatic organisms.

3. Riffles. Areas of shallower, faster moving water with coarser bed materials. Riffles are most often associated with "white water", a turbulence which adds oxygen to water. Riffles tend to support higher densities of aquatic insects and are thus important areas of finfish food production. Riffles also serve as a spawning

site for most stream finfish. Due to competition and predation, juvenile and small sized finfish tend to inhabit riffles.

4. Riparian area. The riparian area is that section of land which adjoins the river channel. A well vegetated riparian area is critical to the health of the river ecosystem. Roots of trees, shrubs, and grasses bind the river bank soils and provide a resistance to the erosive forces of flowing water. Stems and leaves of river bank vegetation provide shade which prevents high water temperatures. Leaves, stems, and other plant parts that fall into the river provide food for aquatic insects. Large woody debris that fall into the river enhance physical habitat. Abundant riparian vegetation softens rainfall and enables the riparian area to serve as a reservoir storing surplus runoff for a gradual release to the river during low flow periods of summer and early fall. The riparian area is a natural filter which removes nutrients, sediments, and other non-point source pollutants from overland runoff.

5. Stormwater discharge. Urban development typically results in large impervious areas such as roadways, sidewalks, parking lots, and rooftops that shed water during rainstorms. Unlike vegetated areas, where water can soak into the ground after storms, runoff from impervious areas of urban areas increase the amount and velocity of water runoff causing dramatic fluctuations of river flow resulting in bank erosion, damage to riparian vegetation, and widening of the river channel. This will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, and higher water temperatures.

The quality of river water can be significantly affected by stormwater discharge. Motor oil, grease, gasoline, and sediment are commonly found in stormwater drainage. In addition, a variety of fertilizers and pesticides are used to maintain lawns and gardens; these substances often find their way into stormwater.

Native finfish and other aquatic life cannot survive in rivers severely impacted by stormwater runoff.

Wildlife Resources

This section will address the following wildlife resource issues:

1. Current Conditions / Site Inspection
2. Wildlife-related Impacts of Regarding The Development of the Baseball Field
3. Other Considerations and Conclusion

Current Conditions / Site Inspection

The following wildlife were observed during the site visit on June 28, 2000 either directly or indirectly by identifying calls, tracks, scat or other sign: white-tailed deer *(Odocoileus virginianus)*, gray squirrel *(Sciurus carolinensis)*, American robin *(Turdus migratorius)*, blue jay *(Cyanocitta cristata)*, American crow *(Corvus brachyrhychos)*, red-eyed vireo *(Vireo olivaceus)*, American goldfinch *(Carduelis tristis)*, and downy woodpecker *(Picoides pubescens)*. These are just a few examples of the types of wildlife that utilize the forested habitats and edge. It can be expected, with more thorough investigations, that the species list will be much larger for the property.

Wildlife-Related Impacts Regarding the Development of a Baseball Field

The development of a baseball field requires landscaping a parcel of land to make it suitable for playing the sport and in this case requires the removal of forest cover and grading and shaping of the ground to create a playing field. The forested area which is proposed to be removed is connected to a larger forest that comprises Beach Memorial Park.

- **Impact 1- Forest Fragmentation and Shrinking Forest Size** - forest fragmentation and shrinking forest sizes due to human development are considered major wildlife conservation issues in the northeastern United States (Whitcomb et al. 1981, Askins et al. 1987). This impact is best described or understood from a landscape-level perspective. As more forested land is removed, remaining forests are smaller and further fragmented. Some wildlife species such as wood thrushes *(Hylocichla mustelina)*, red-eyed vireos, and ovenbirds *(Seiurus aurocapillus)* require large, unbroken forests to maintain breeding habitat. As forest and habitat sizes shrink in size, they are less viable as breeding places for interior forest birds and an increase in predation and parasitism of nests occurs (Blake and Karr 1985).

- **Impact 2- Conversion of Forested Habitat to Mowed Grass / Field** - the conversion of forested habitat to mowed grass conditions will alter the type and number of wildlife species using the altered area. This impact is best described or understood from a local site specific perspective. Although, this may also have landscape-level importance.

  The wildlife species that are likely to benefit from the open and mowed habitats are the generalists. Generalists are adaptable species such as American crows, American robins, bluejays, and northern cardinals. This proposed development in particular, will benefit birds like the Canada geese which have been associated with causing nuisance situations on mowed turf. They congregate in large numbers, feed on turf grasses, and leave large volume of feces on lawns and in waterbodies. Other detrimental wildlife species that benefit from open and mowed areas are European starlings *(Sturnus vulgaris)*, house sparrows *(Passer domesticus)* and brown-headed cowbirds *(Molothrus ater)* which parasitize the nests of other birds which leads to lower recruitment especially for many area-sensitive songbirds that are already declining due to forest fragmentation.

- **Impact 3 - Loss of Outdoor Classroom Area for Trumbull High School -** The area being considered for baseball field development has been used by several Trumbull high school classes to learn and study about the natural environment and wildlife. This natural corner of the Trumbull high school property is a small fraction of the school's property. The majority of the Trumbull high school property has been altered to either buildings, asphalt or mowed fields.

Open Space, Wildlife Habitat and The Future

Connecticut is the fifth most densely populated state in the United States. As urban areas become developed, habitats are divided into smaller and more isolated pieces. Land that is in public ownership can be maintained and managed for the long term. In contrast, private land, which makes up over 80 percent of the land in Connecticut, usually changes ownership and is not managed for wildlife for the long term. The proposed development will alter or reduce the size of forested habitat types found on this town-owned property. As forest fragmentation continues, town owned natural areas will gain in importance as wildlife habitat and refugia. Retaining nature areas in close proximity to schools should be carefully planned and considered. Wildlife areas that are close to schools serve as outdoor learning areas and valuable wildlife habitat. Establishment and use of outdoor learning and study areas on school property is increasing nationwide.

How Much of Trumbull is Forested ?

Trumbull's land base (15,098 acres) is covered with 39.8 percent forest (DEP Land Use Statistics using Geographic Information Systems, 1996). The State of Connecticut average for forestland statewide is about 59 percent. To its benefit, Trumbull contains sizeable parcels of publicly owned forestland which will in crease in significance as private land continues to be developed.

Wildlife resources benefit greatly from a diverse landscape with a mosaic of natural habitats arranged with natural corridors and connections. Some wildlife species require larger unbroken or unfragmented parcels (300 acres and up) to maintain viable breeding habitat. Bird species such as the red-eyed vireo, wood thrush, and ovenbird benefit from larger unfragmented older forests. There are also bird species that require young larger forest stands of sapling stage growth such as the chestnut-sided warbler *(Dendroica dominica)*, yellow-breasted chat *(Icteria virens)*, blue-winged warbler *(Vermivora celata)* and whip-poor will (*Caprimulgus vociferus)*. In the past, farm abandonment, fires, and hurricanes created greater amounts of habitat for these species. Today, their habitats need to be maintained through selective forestry practices.

Are There More Prudent and Feasible Alternatives ?

On the positive side, the proposed field is being kept along the edges of the forest and not penetrating deeper. The creation of another baseball field by cutting down a few acres of forest appears to be a minor impact when one considers that there are several hundred acres of town-owned land nearby and connected to Trumbull high property. Incrementally, however, the continued fragmentation and shrinking of the forest does have an effect on the local health of the forest ecosystem including the wildlife species that require larger forests. It is wise for the town officials to judge whether or not there are more prudent and feasible

alternatives to this type of configuration of the baseball field and lessen the loss or impact to natural resources. For example, are there ways in which a new baseball field can be retrofitted into an existing field area rather than this forested area ?

Conclusion

Forests are valuable for many reasons including the provision of wildlife habitat. Reduction of forest size and fragmentation incrementally occurs throughout the landscape over time and has direct and indirect effects on wildlife, as mentioned earlier. The Trumbull town officials need to decide whether or not there are more prudent and feasible alternatives to removing forest cover to build a large baseball field. Forests have a greater diversity of plants and animals associated with it than manicured and mowed fields. If there are opportunities to build the proposed full-size baseball field in an existing field area, it would be less detrimental to the wildlife resource. The team biologist is available for further consultation if needed.

Literature Cited

Askins, R. A., Philbrick, M. J., and Sugeno, D. S., 1987. Relationship between the regional abundance of forests and the composition of forest bird communities, Biol. Conserv. 39: 129-152.

Blake, J.G and J.R.Karr. 1984. Species composition of bird communities and the conservation benefit of large versus small forests. Biological Conserv. 30:173-187.

DEP Connecticut landuse statistics, Geographic Information Systems. 1996. On file, DEP Sessions Woods Wildlife Management Area, Urban Wildlife Program, Burlington, CT 06013. Tel. 860-675-8130.

Whitcomb, R.F.; Robbins, C.S.; Lynch,J.F.; Whitcomb, B.L.; Klimkiewicz, M.K.; Bystrak, D. 1981. Effects of forest fragmentation on avifauna of eastern deciduous forest. In: Burgess, R.L.; Sharpe, D.M. (eds). Forest island dynamics in man-dominated land scapes. Springer-Verlag, New York.

Appendex

Department of Environmental Protection Inland Fisheries Division

Policy Statement - Riparian Corridor Protection

Position Statement - Utilization of 100 Foot Buffer Zones to Protect Riparian Areas in Connecticut

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
BRIAN D. MURPHY
TECHNICAL ASSISTANCE BIOLOGIST
INLAND FISHERIES DIVISION

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

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.

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.

LITERATURE CITED

Bottom, D.L., P.J. Howell, and J.D. Rodger. 1983. Final research report : fish research project Oregon, salmonid habitat protection. Oregon Dept. of Fish and Wildlife, Portland, OR. 155pp.

Bottom, D.L., P.J. Howell, and J.D. Rodger. 1985. The effects of stream alterations on salmon and trout habitat in Oregon. Oregon Dept. of Fish and Wildlife, Portland, OR. 70pp.

Brinson, M.M., B.L. Swift, R.C. Plantico, and J.S. Barclay. 1981. Riparian ecosystems: their ecology and status. U.S. Fish Wildl. Serv. FWS/0BS-81/17. Kearneysville, W.V. 154pp.

Brown, G.W. and J.R. Brazier. 1973. Buffer strips for stream temperature control. Research Paper 15, Forest Research Lab, School of Forestry, Oregon State University, Corvallis, OR. 9pp.

Budd, W.W., P.L. Cohen, P.R. Saunders, and F.R. Steiner. 1987. Stream corridor management in the pacific northwest: determination of stream corridor widths. Environmental Management. 11(5) 587-597.

Butler, R.M., E.A. Meyers, M.H. Walter, and J.V. Husted. 1974. Nutrient reduction in wastewater by grass filtration. Paper No. 74-4024. Presented at the 1974 winter meeting, Amer. Soc. Agr. Eng. Stillwater, OK. 12pp.

Clark, J. 1977. Coastal Ecosystem Management. The Conversation Foundation. John Wiley & Sons, New York, NY.

EPN (Environmental Perspective Newsletter). 1991. Protecting watersheds takes more than 100 feet. Environmental Perspective Newsletter. 2(2) 1-3.

Erman, D.C., J.D. Newbold and K.B. Ruby. 1977. Evaluation of streamside buffer strips for protecting aquatic organisms. California Water Resources Institute. Contribution NO. 165, Univ. of Calif., Davis, CA. 48pp.

Karr, J. R. and I.J. Schlosser. 1977. Impact of nearstream vegetation and stream morphology on water quality and stream biota. U.S. Environmental Protection Agency, Report EPA-600/3-77-097, Athens, GA. 84pp.

Mannering, J.V. and C.B. Johnson. 1974. Report on simulated rainfall phase. Appendix No. 9. First Annual Report, Black Creek Study Project, Allen County, Indiana, Indiana Soil and Water Conservation District. Fort Wayne, IN.

Murphy, M.L. and K.V. Koski. 1989. Input and depletion of woody debris in Alaska streams and implications for streamside management. North American Journal of Fisheries Management. 9:427-436.

Palfrey, R., and E. Bradley. 1982. The buffer area study. Maryland Dept. of Natural Resources. Tidewater Administration. Annapolis, MD. 31pp.

Rodgers, J., S. Syz, and F. Golden. 1976. Maryland uplands natural areas study. A report by Rodgers and Golden, Inc., Philadelphia, PA, for the Maryland Department of Natural Resources.

Scarpino, R. Personal Communication. Connecticut Department of Environmental Protection, Forestry Division, 165 Capitol Avenue, Hartford, CT.

Trimble, G.R. Jr., and R.S. Sartz. 1957. How far from a stream should a logging road be located? Journal of Forestry 55:339-341.

WWN (Wetlands Watch Newsletter). 1991. Regulatory authority of inland wetland agencies expanded. Wetlands Watch Newsletter. Robinson & Cole. 1(2) 1–12.

Wilson, L.G. and G.S. Lehman. 1966. Grass filtration of sewage effluent for quality improvement prior to artificial recharge. Presented at the 1966 winter meeting Amer. Soc. Agr. Eng. Chicago, IL.

Wong, S.L. and R.H. McCuen. 1981. Design of vegetative buffer strips for runoff and sediment control. Research Paper, Dept. of Civil Engineering, University of Maryland, College Park, MD.

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 Soil and Water 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 Soil and Water 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, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977.