KING'S MARK ENVIRONMENTAL REVIEW TEAM

REPORT FOR

NEPAUG RIVER WATERSHED

TORRINGTON,
CONNECTICUT

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

NEPAUG RIVER WATERSHED

TORRINGTON, 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.

Wallingford, Connecticut

for the

Torrington Inland Wetlands Commission

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the Inland Wetlands Commission and the City. The results of the Team action are oriented toward the development of a better environmental quality and long-term economics of the land use. The opinions contained herein are those of the individual Team members and do not necessarily represent the views of any regulatory agency with which they may be employed.

FEBRUARY 1990

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team Coordinator, Nancy Ferlow, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this study:

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I would also like to thank Susan Anderson, Secretary of the King's Mark Environmental Review Team for assisting in the completion of this report.

Finally, special thanks to Edward Lukacovic, Wetlands and Zoning Enforcement Officer, City of Torrington and Daniel McGuinness, Planner, City of Torrington for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

The Torrington Inland Wetlands Commission, with support from the Planning and Zoning Commission, requested that an environmental review be conducted on a 1,365-acre area in northeastern Torrington, which encompasses part of the Nepaug River Watershed. The City is experiencing development pressure and is concerned with the cumulative effects of developments on the water resources. Several developments have already been approved, and more are in the process of obtaining approval.

The study area is traversed by numerous brooks and wetland bands. Cedar Swamp, portions of which are owned by the DEP and Ducks Unlimited, receives much of the runoff from the northern sections of the study area. Dominant land use in the surrounding area is single-family residential homes with several areas of agriculture and light industry. The study area is served by City water and sewer lines. Presently, sewer lines are in place to Cedar Lane.

The purpose of this review is to inventory and assess existing natural resources, particularly wetland and water resources. This environmental information will then be used to assist the city in guiding conservation and development in this area.

Location, Land Use and Topography

The study area is located in northeast Torrington and contains approximately 5.6% of the Nepaug River Watershed. Land use in the area is characterized by low density residential and agricultural uses. A gas transmission line bisects the northern half of the study area. Zoning in the area includes R-40 north of West Hill Road and R-15 for the remainder of the study area. A proposed zone change will lower the density in most of the study area to R-25. Several developers are in the process of applying for a zone change to RRC. In general, the topography is moderately sloping with some areas of steep and gentle slopes. The main topographic features of the study area include the drumlins and Cedar Swamp.

Geology

The bedrock in the study area consists of Hoosac Schist and a hornblende gneiss and amphibolite. The depth to bedrock ranges from zero in rock outcrop areas to 40 feet below ground surface. The surficial geology includes unconsolidated materials that overlie bedrock. The entire study area is covered by till. The texture of the till ranges form sandy and loose to silty and compact (hardpan). Hardpan soils often result in a seasonally high watertable condition which can hinder development of septic systems, basements and cuts for driveways and roads. Overlying the till in several areas are pockets of swamp deposits. Many of the seasonal and permanent watercourses are paralleled by wetlands. Wetlands are important from an ecologic, biologic and hydrologic standpoint, and every effort should be made to protect them. The availability of public sewer and water allows for alternative types of development that can protect these areas.

Geologic Development Concerns

The availability of municipal water and sewer lines soften many of the hydrogeologic concerns. Several concerns still exist. Shallow bedrock will require blasting to place driveways, roads, utility lines and foundations. Blasting should proceed with great care. A geotechnical study and a pre-blast survey are recommended. Rock cuts will be needed for the Village of Fox Hollow. These will be close to buildings and roads. There is potential for a rock slide in the Hoosac Schist, where the slabs could slip if blasting weakens the foliation planes. This rock slide potential should be studied carefully. Housing densities might be lowered to reduce the threat of rock slides. If the blasted bedrock is used for fill and rip-rap, the minerals in the bedrock could change the quality of surface or groundwater. Experiments can be conducted to test the acid mine drainage potential of the bedrock. Moderate to steep slopes will create erosion and sedimentation problems, unless proper precautions are taken. Careful planning is required to minimize impacts to the water resources. Steep slopes should be avoided, and roads and driveways should cross slopes, rather than be placed perpendicular to hills. Hardpan till soils are unfavorable for on-site septic systems and require careful engineering. Deep cuts in hardpan soils are difficult to stabilize. In addition, these soils are susceptible to erosion, especially on steep slopes.

Hydrology

Most of the study area lies within the Nepaug River Watershed. A small portion lies within the Still River Watershed. The groundwater in the Nepaug River Watershed is classified as GAA, and groundwater in the Still River Watershed is classified as GA. Surface waters have not been classified, but are presumed Class AA in the Nepaug River Watershed. Residential development will increase the amount of runoff into the Nepaug River. The major concerns are the potential for flooding and erosion. Each developer must control the post-development runoff flows from their property. A detailed stormwater management plan will probably include control structures. The hydrologic calculations should show that the increased runoff will not cause problems on- or off-site. Every effort should be made to locate the structures in non-wetland soils. Due to the site conditions and anticipated development densities, the potential to degrade surface water is high. The City should police the E&S controls on a regular basis. The Best Management Practices for stormwater control should be used.

Soil Resources

Limiting soil conditions in the study area include the hardpan layer in the Paxton and Woodbridge soils, the soils that are shallow to bedrock, the steep slopes, "Prime Farmland" soils, "Important Farmland" soils and inland wetland soils. Federal funding for affordable housing may be limited if homes are built on "Prime Farmland" or "Important Farmland." Farmland can be protected through the Purchase of Development Rights Program. Inland wetlands should be preserved to retain their important hydrological and water quality preservation functions.

Erosion and Sediment Control

E&S control is a primary concern for development in the study area. Control plans should be developed and implemented for each project. Erosion controls are needed to keep the disturbed soil in place. Sediment controls are needed when erosion controls fail to keep the soil in place.

A stormwater management system controls excess runoff. The system must be compatible with the floodplain management and stormwater management systems of the City. If the primary purpose is to minimize flooding, the peak discharge from the 2-year, 10-year and 100-year storms should be analyzed. If the purpose is to minimize erosion and sedimentation, the peak flows from the 1-year, 2-year and 10-year storms should be analyzed. Another function of the stormwater management system is to remove pollutants. Wet basins remove pollutants better than dry basins, but there is no net gain for water quality if a natural wetland is destroyed for a man-made wetland. Cleaning the basins should be done carefully to prevent loss of wetland vegetation. Open water basins can increase water temperature, and in-stream basins are not recommended. To be effective over the design life, the stormwater management system must be properly maintained.

Water Quality Considerations

The primary goal of the DEP Bureau of Water management is to protect drinking water supply watersheds. The land use policies of the State suggest that development within a public water supply watershed should be supported by on-site water and septic systems and that public sewers should be used to solve problems, not support new development. The Nepaug Reservoir is a significant water resource. Water quality concerns include the incompatibility of the proposed development to the State Plan, the potential for adverse impacts downstream, the small lot size in the RRC zone and the dredging of wetlands for detention basins. Water quality recommendations include decreasing the percent of impervious cover from the developments, limiting the lawn areas, modifying the zoning, using streambelt buffers and dedicating more open space. The density of development appears excessive for a water supply watershed. Because the development is inconsistent with the State Plan, the DEP Bureau Water Management may reduce the Clean Water Fund financing.

Wetland Considerations

The U.S. Fish and Wildlife Service's National Wetland Inventory identified 10 distinct types of wetland units in the study area. Recommended measures which could minimize the adverse effects on the wetlands include maintaining setbacks, using bridges rather than culverts, placing stormwater detention basins in upland areas and developing and implementing a comprehensive E&S control plan.

Wildlife Considerations

Wildlife habitat in the study area includes woodlands, wetlands and old/ agricultural fields. As with any development, the impact on wildlife will be negative. The impact will be extensive because of the proposed intensity of development. The forested area will be fragmented. Landscaping and lawns will alter wildlife habitat. Humans, cats, dogs and traffic will increase, driving many species from the development area. Certain other species may increase and become nuisances. Cluster development leaves some land undisturbed and provides an opportunity for wildlife management. Beaver are present in the watershed. Beaver activity such as building dams can cause problems for property owners. Development should be set back away from wetlands, and wetland crossings should be minimized. Wetlands are beneficial to wildlife. They should be protected from silt and pollutants. Detention basins should be built on upland sites and designed to trap silt. Open space is important for wildlife. Setting aside an island of open space is undesirable. Travel corridors between open space areas are recommended. Measures which can minimize impacts to wildlife include buffer strips, natural landscaping, maintaining field borders and early successional stage vegetation and maintaining wildlife requirements.

Fisheries Resources

The Nepaug River and tributaries support a coldwater fishery population. The DEP manages 3 streams in the watershed for fishing. The Still River and tributaries are of questionable quality to support fish, and the DEP currently does not manage any streams in this watershed. Potential impacts from development include road crossings, erosion and sedimentation, introduction of pollutants, introduction of nutrients from lawns and increased stormwater runoff. Recommendations include crossing perennial streams with bridges, maintaining open space buffers around streams, maintaining comprehensive E&S controls, using detention basins for stormwater and limiting lawn fertilizers and chemicals.

Threatened and Endangered Plant and Animal Species

According to the Natural Diversity Data Base, there are no known populations of Federally Endangered and Threatened Species or Connecticut "Species of Special Concern" within the study area. A Natural Area Inventory site, Cedar Swamp, is found in the study area.

Archaeology

The Nepaug River Watershed lies within the proposed Torringford Historic District. Several accounts suggest that remnants of Revolutionary Era settlements may exist in the area. Stone ruins and walls from early historic settlements are still visible and should be considered in any development proposed in the area. In addition, the watershed possesses areas of high potential for prehistoric Native American sites adjacent to extensive wetlands. These areas should have archaeological surveys conducted prior to any construction activities.

Planning Considerations

The study area is primarily zoned R-15. Smaller lot sizes are possible through the RRC zone or clustering. The recent City Plan calls for upzoning the area to R-25 and considers upzoning the area to R-40. Upzoning the study area is more consistent with the density of development in adjacent communities. The State Plan identifies the wetlands portion of the study area as a Preservation Area and the remainder as a Conservation Area. The LHCEO encourages development that preserves environmentally sensitive areas and retains community character. The new City Plan calls for protecting wetlands. The City's open space and recreation regulations are progressive and should provide for the long-term needs of the area, if used prudently.

The City Plan calls for upzoning the study area. From an environmental standpoint, as the density of development increases, the threat to water quality increases. Therefore decreasing the density of development should improve the probability of preserving the water quality. In addition, cluster development units should not exceed the amount of units allowed by a conventional subdivision.

Traffic Considerations

The major access for the proposed developments will be Torringford Street. These developments will add approximately 1,003 new residential units to the area, with the possibility of 500 more units allowed at current densities. The additional 1,500 units could add 9,000 to 12,000 vehicle trips per day to Torringford Street. Torringford Street has an ideal capacity of 2,000 cars per hour. The additional 9,000 trips per day should generate a peak hour volume of 900 vehicles per hour. This will not exceed the theoretical volume, but may decrease the ease of flow on Torringford Street. The City may need to put in extra signals and turning lanes.

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INTRODUCTION

The Torrington Inland Wetlands Commission, with support from the Planning and Zoning Commission, requested that an environmental review be conducted on a 1,365-acre area in northeastern Torrington, which encompasses part of the Nepaug River Watershed. The eastern boundary of the study area is the Torrington City Line (see Figure 1). Access is provided by Torringford Street (Route 183), Cedar Lane, Spencer Road and West Hill Road.

A majority of the study area is a water supply watershed for the Nepaug Reservoir which serves the City of Hartford. The City of Torrington is experiencing development pressure and is concerned with the cumulative effects of developments on the water resources. Several developments have already been approved, and more are in the process of obtaining approval (see Figure 2). Stone Hill Subdivision includes 19 lots and has been approved by the Inland Wetlands Commission. The Patero Property is currently slated for development, although no plans have been drawn. Cedar Hill Subdivision contains 52 lots and is currently before the Inland Wetlands Commission. Torringford Farms consists of 3 phases of development, totalling 300 housing units. Phase 1 has already been approved. The Reilly Property, which includes 135 lots, is currently before the Inland Wetlands Commission. The Village of Fox Hollow has preliminary plans for approximately 410 housing units. The Blinkoff Property has no development plans at present. White Birch Estates, which contains 45 lots, was approved, but may be sold to another developer.

The study area is traversed by numerous brooks and wetland bands. Cedar Swamp, portions of which are owned by the DEP and Ducks Unlimited, receives much of the runoff from the northern sections of the study area. The dominant land use in the surrounding area is single-family residential homes with several areas of

agriculture and light industry. The study area is served by City water and sewer lines. Presently, sewer lines are in place to Cedar Lane.

The purpose of this review is to inventory and assess existing natural resources, particularly wetland and water resources, and discuss the impacts of development. This environmental report will assist the City in guiding conservation and development in the study area. Specific objectives include:

1) Assess the hydrological and geological characteristics of the watershed, including geological development limitations and opportunities;

2) Determine the suitability of existing soils to support planned development;

3) Discuss soil erosion and sedimentation concerns;

4) Assess the impact of development on water quality;

5) Assess the impact of development on wetlands and watercourses;

6) Assess the impact of development on wildlife, including alternatives for consideration;

7) Assess the impact of development on fisheries;

8) Assess planning and land use issues; and

9) Assess traffic and access issues.

THE ERT PROCESS

Through the efforts of the Torrington Inland Wetlands Commission, the developer's representatives and the King's Mark ERT, this environmental review and report was prepared for the City. This report primarily provides a description of on-site natural resources and presents planning and land use guidelines. The review process consisted of 4 phases:

1) Inventory of the site's natural resources (collection of data);

2) Assessment of these resources (analysis of data);

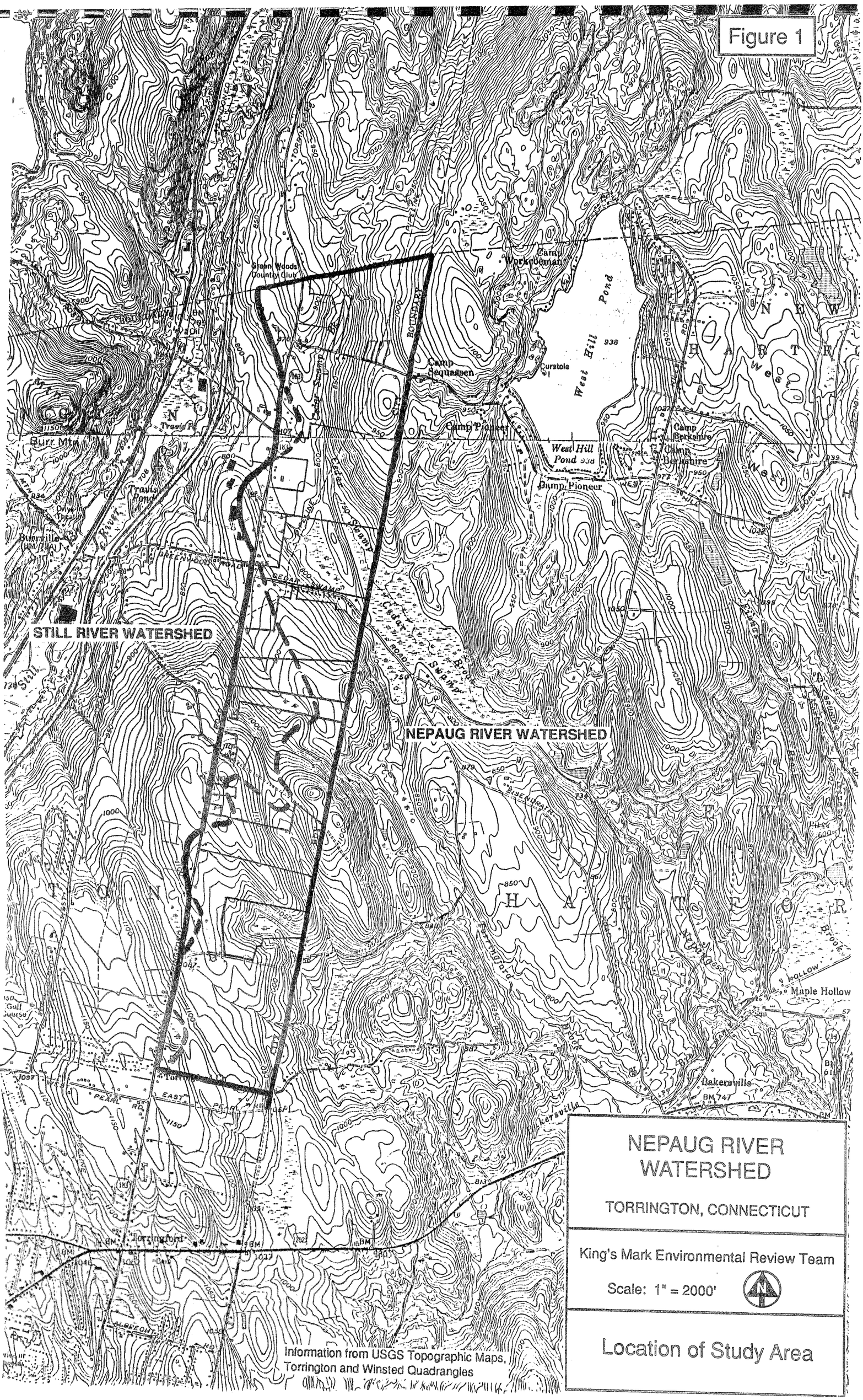
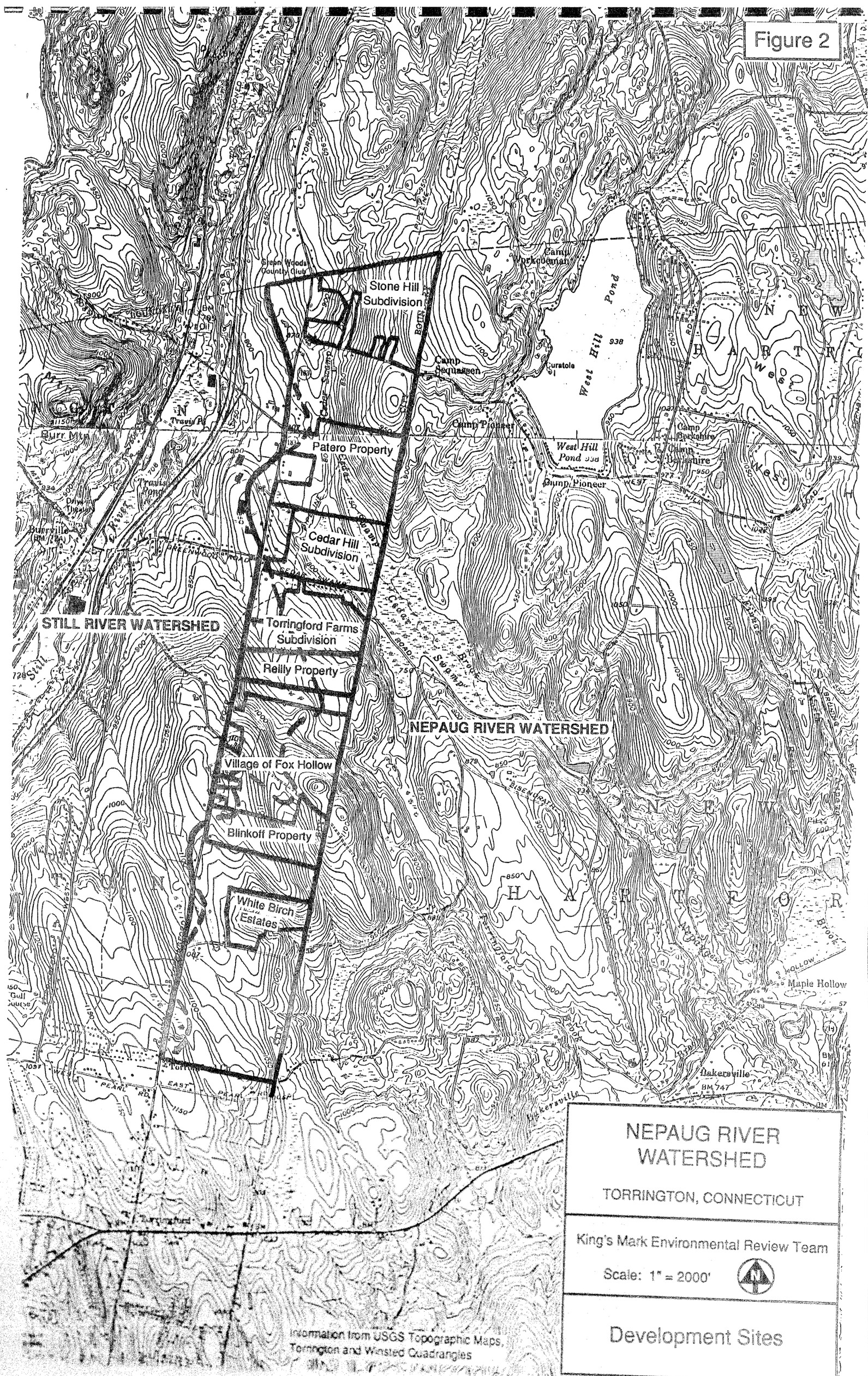


Figure 1
STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
Camp Workoman
Green Woods Country Club
West Hill Pond
Camp Sequassen
Curatolo
Camp Pioneer
Camp Berkshire
Camp Winnebago
Burr Mtn.
Travis Pond
Drive-In Theatre
Cedar Swamp
Maple Hollow
Lakeville
Torrington
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Location of Study Area
Information from USGS Topographic Maps,
Torrington and Winsted Quadrangles

Figure 2



NEPAUG RIVER WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 2000'

Development Sites

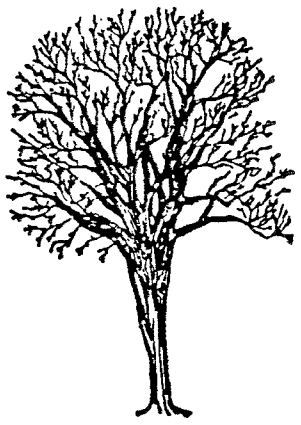
3) Identification of resource problem areas; and

4) Presentation of planning and land use guidelines.

The data collection phase involved both literature and field research. The ERT field reviews took place on November 29 and December 13, 1989. Field review and inspection of the proposed development site proved to be a most valuable component of this phase. The emphasis of the field review was on the exchange of ideas, concerns or alternatives. Mapped data or technical reports were also perused, and specific information concerning the site was collected. Being on-site also allowed Team members to check and confirm mapped information and identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. The results of this analysis enabled the Team members to arrive at an informed assessment of the site's natural resource development opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT Coordinator for compilation into the final ERT report.

PHYSICAL CHARACTERISTICS



LOCATION, LAND USE AND TOPOGRAPHY

The study area contains approximately 1,365 acres (2.1 square miles) and is located in northeastern Torrington on the border with New Hartford and Winchester. The study area is bordered on the west by Torringford Road and a segment of the western Nepaug River drainage boundary, on the north by the Winchester Town Line, on the east by the New Hartford Town Line and on the south by private, residential land which is north of East Pearl Street. Torringford Road (Route 183), which parallels the New Hartford Town Line, provides frontage for many prospective developments. East-west roads that traverse the study area include West Hill Road in the northern parts, Cedar Lane in the central parts and Spencer Road in the southern parts. The study area represents approximately 5.6% of the total drainage area for the Nepaug River which is tributary to Farmington River.

A review of air photos and a drive-through of the study area indicate that land use is characterized primarily by low to medium density residences and agriculture. Except for some open fields in the central and southern parts, the study area is mostly wooded. A gas transmission line bisects the northern half of the study area. This 50-foot wide easement appears to be managed by the gas company to prevent tree growth and to maintain access for maintenance and repair.

Based on information supplied to Team members, most of the land in the study area is presently zoned R-15, allowing single-family homes on lots of 15,000 square feet or larger. A Restricted Residential Community (RRC) zone, which allows clustering of homes, condominiums and certain commercial uses, has been permitted on the Torringford Farms residential development in the central parts. The intent of this zone is to provide flexibility in site design and encourage the preservation of open space and environmentally sensitive areas. Municipal water and sewer lines are or will be made accessible to the R-15 and RRC zones.

The proposed Stone Hill Subdivision located north of West Hill Road is in an R-40 zone, which allows single-family homes on lots 40,000 square feet or larger. Individual on-site septic systems and wells will serve this residential subdivision.

A proposed zoning change in the study area will lower the density of most of the land that is currently zoned R-15 to R-25 (single-family homes on lots 25,000 square feet or larger). The land located between Spencer Road and the southern boundary of the study area would remain R-15. In addition, the proposed Village of Fox Hollow, which is south of Torringford Farms and the Reilly Property, is proposed for a zone change to RRC. Collectively, the residential developments proposed in the study area will create 1,003 new residential units.

The drainage boundary on the west passes over, and the study area itself includes, numerous streamlined, bedrock-cored hills that are generally cigar-shaped. These hills, which are oriented in a northwest-southeast direction and which are composed primarily of a very thick glacial till (40 feet or greater), are called drumlins. They were formed by the molding action of glacier ice which overrode the till masses as it advanced southward.

In general, the topography consists of moderate slopes. However, there are areas of gentle and steep slopes. The steepest slopes, which coincide with the areas of rock outcrops and shallow to bedrock soils, occur mainly in the southcentral and northern parts of the study area. Nearly level to gentle slopes occur along the ridgetops of the drumlins.

The other major topographic feature of the study area is Cedar Swamp and the wetland to its west. Elevations in the study area range from approximately 750 feet above mean sea level to approximately 1,150 feet above mean sea level, a difference of approximately 400 feet (see Figure 3).

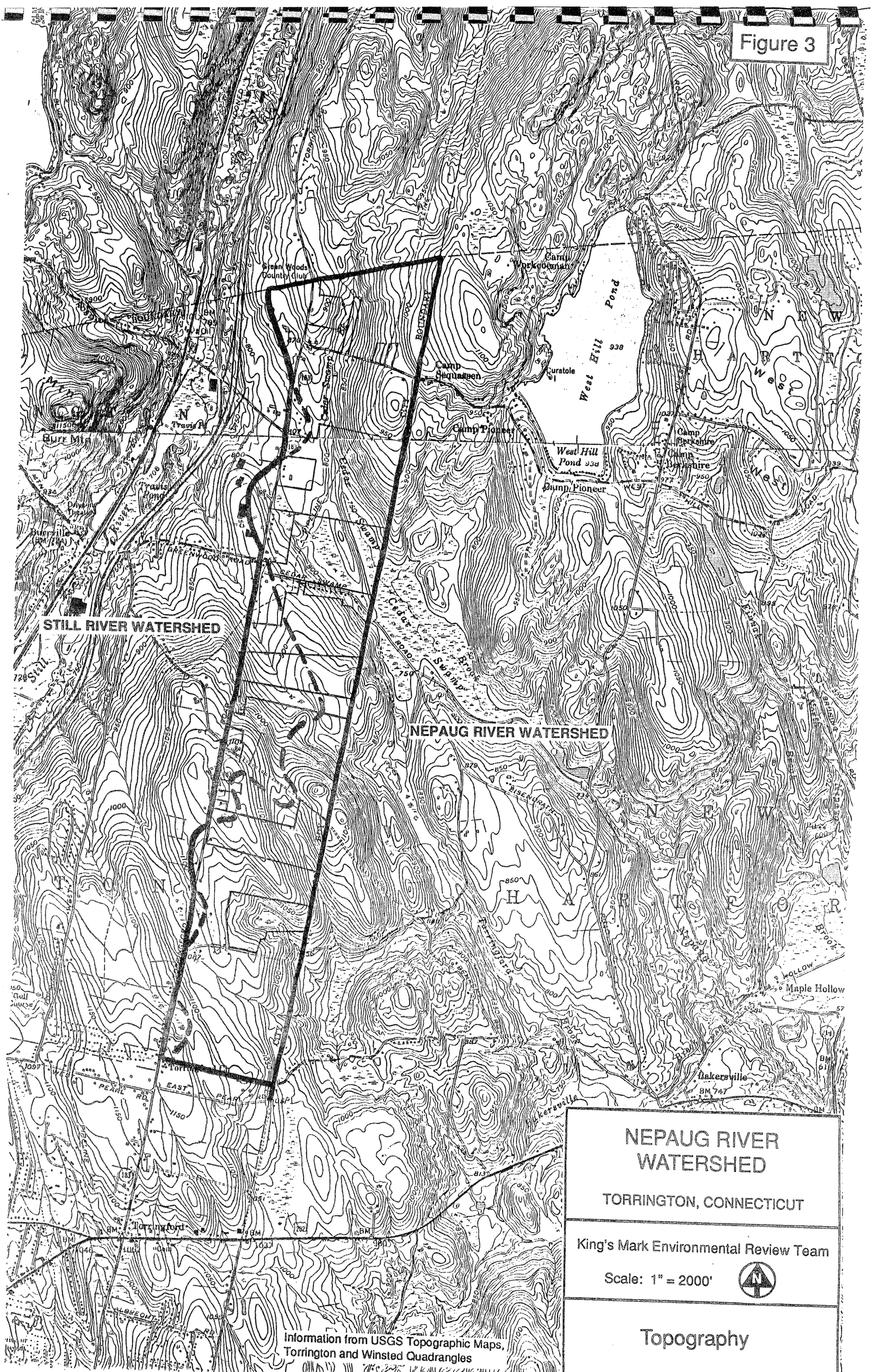


Figure 3
STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
Camp Pioneer
West Hill Pond
Camp Sequassen
Camp Pioneer
Camp Berkshire
Maple Hollow
Torrington
Torringford
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Topography

GEOLOGY

The study area is located mostly in the Torrington topographic quadrangle, with the northern parts in the Winsted topographic quadrangle. A surficial geologic map (GQ-939 by R.B. Colton) and a bedrock geologic map (QR-25 by C.W. Martin) have been published for the Torrington quadrangle. A surficial geologic map (GQ 871 by C.R. Warren) has been published for the Winsted topographic quadrangle, but only preliminary bedrock geologic information is available for review at the Department of Environmental Protection (DEP) Natural Resources Center in Hartford. The Soil Survey of Litchfield County, Connecticut and the Bedrock Geological Map of Connecticut were also referenced.

Bedrock Geology

The rock core of the study area is comprised of the Hoosac Schist and a hornblende gneiss and amphibolite. Hoosac Schist, which underlies the central and southern parts, consists of a gray, rusty weathering, fine- to medium-grained schist. The remainder of the study area (northern parts) is underlain by dark gray, fine- to medium-grained amphibolite and gneiss (see Figure 4).

Schists, gneisses and amphibolites are crystalline metamorphic rocks (geologically altered by great heat and pressure in the earth's crust). Schist, gneiss and amphibolite refer to the textural and structural aspects of the rocks. Schists tend to be slabby (part relatively easily along the mineral or foliation planes) due to the alignment of platy or flaky minerals. Gneisses tend to be banded rocks characterized by alternating layers of granular (light-colored) minerals and platy or flaky (dark-colored) minerals. Amphibolites are typically dark-colored, fine- to coarse-grained, massive to poorly layered rocks composed of amphibole and plagioclase with little or no quartz.

Depth to bedrock ranges from less that a foot in scattered outcrops to perhaps more than 40 feet beneath the crests of drumlins.

Except for Stone Hill Subdivision, the study area will be served by municipal water made available by the Torrington Water Department. Bedrock will be the principal source of water to individual wells drilled in the proposed Stone Hill Subdivision. Generally speaking, wells drilled 150-300 feet into bedrock are capable of supplying small but reliable yields of water. Approximately 90% of the bedrock wells surveyed for Connecticut Water Resources Bulletin No. 29, which encompasses the study area, yielded 3 gallons per minute or more. If pumped for 16 hours, a well producing 3 gallons per minute would yield 2,880 gallons of water per day. This should serve most residential needs adequately.

Surficial Geology

Surficial geology includes the unconsolidated materials overlying solid bedrock. According to maps GQ-939 and GQ-871, the entire study area is covered by a glacial sediment called till (see Figure 5). Till is a non-sorted mixture of rock particles ranging in size from clay to boulders. The rock materials were scraped, abraded and plucked from pre-existing bedrock and soil surfaces by glacier ice and were redeposited directly from the ice without significant redistribution by meltwater. The texture of the till in the study area is highly variable, ranging from a relatively clean sand to a silty, stony, tightly compact material locally referred to as hardpan. In many areas, 2-3 feet of relatively loose, sandy till may overlie a compact, silty, crudely layered till (hardpan). The presence of the hardpan layer often results in seasonally high watertables, soil mottling (an indicator of high groundwater tables) and moderately slow to slow percolation rates. This is a result of the slow permeabilities that characterize the hardpan layer. During periods of heavy rainfall, the more permeable soil zone above the hardpan layer often becomes saturated with groundwater resulting in a high watertable condition.

Figure 4

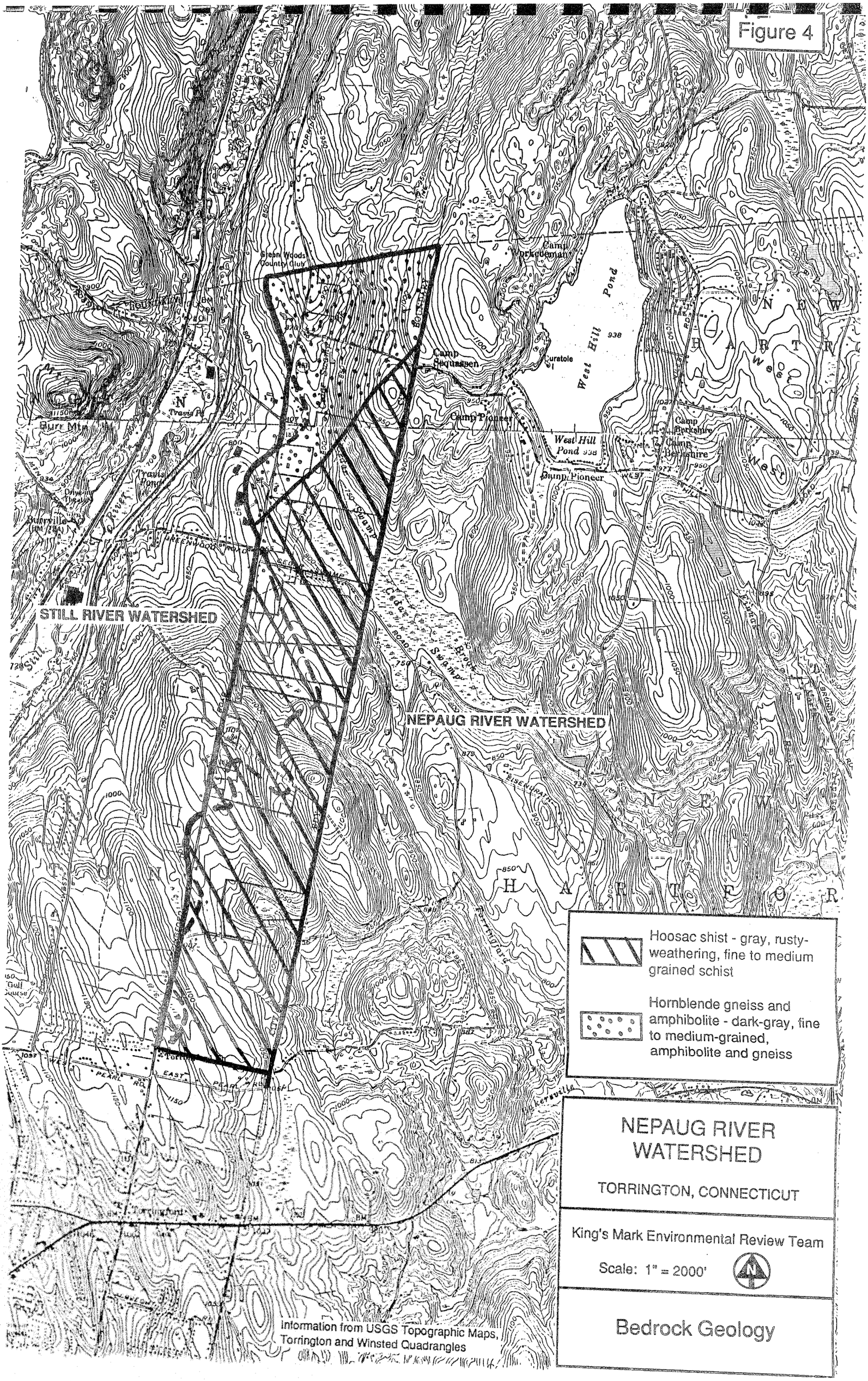
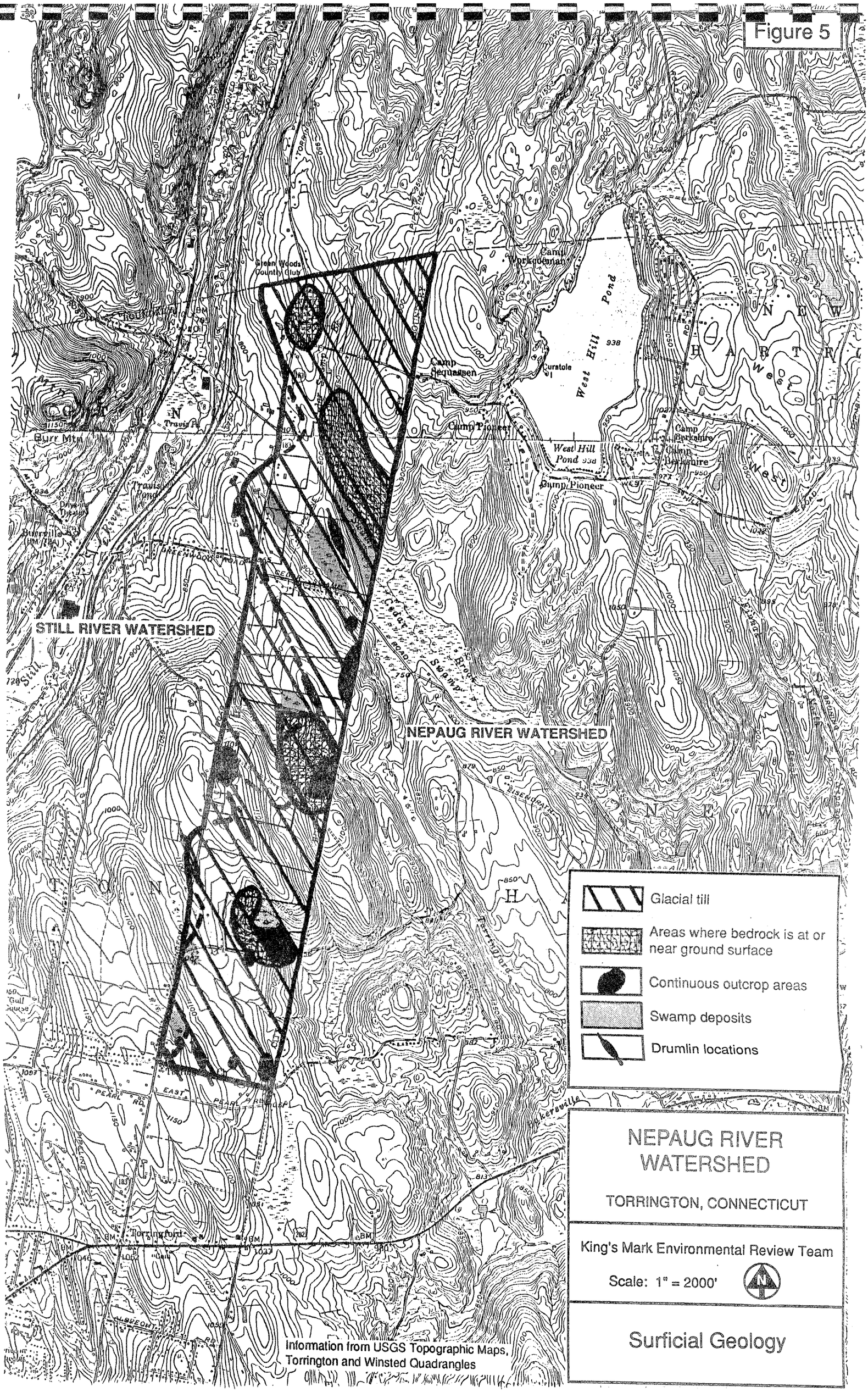

STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
West Hill Pond
Camp Pioneer
Camp Berkshire
Camp Nequasset
Camp Workcoman
Burr Mtn.
Torrington
Hoosac shist - gray, rusty-weathering, fine to medium grained schist
Hornblende gneiss and amphibolite - dark-gray, fine to medium-grained, amphibolite and gneiss
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Bedrock Geology
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles

Figure 5


STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
West Hill Pond
Camp Pioneer
Camp Berkshire
Camp Sequassen
Camp Workaman
Green Woods Country Club
Burr Mtn.
Cedar Swamp Brook
Glacial till
Areas where bedrock is at or near ground surface
Continuous outcrop areas
Swamp deposits
Drumlin locations
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Surficial Geology
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles

Without proper planning and engineering, the seasonally high watertable can be a major constraint for on-site sewage disposal and road and driveway construction, especially in cut areas. Also, the potential for wet basements exists, if homes are not properly protected by building footing drains (see Geologic Development Concerns). Because of the availability of public sewers, on-site septic systems are not anticipated for the study area, except for the proposed Stone Hill Subdivision in the northern parts.

Overlying till in several areas are pockets of swamp sediments that consist of sand, silt, clay and decayed organic matter. Notable wetlands in the study area include Cedar Swamp, a large wetland west of Cedar Swamp and the wetland on the White Birch Estates property. Additionally, according to the Soil Survey of Litchfield County, many of the seasonal and permanent streamcourses in the study area are paralleled by narrow bands of regulated wetland soils comprised mainly of the Lg (Leicester-Ridgebury-Whitman very stony fine sandy loams) soil series.

The Lg soils have been mapped as an undifferentiated unit comprising Leicester, Ridgebury and Whitman soils. These are very deep, loamy soils that formed in glacial till. The Ridgebury and Whitman soils developed in the more friable till. They range from poorly drained (Leicester and Ridgebury) to very poorly drained (Whitman). In general, the Leicester and Ridgebury soils are nearly level or gently sloping soils in drainageways and low-lying positions of till-covered uplands. The Whitman soils occur on nearly level to gently sloping depressions and drainageways on till-covered uplands.

The major concern of Lg soils from an engineering standpoint focuses on a seasonally high watertable. A high watertable condition is at or near ground surface in the Leicester and Ridgebury soils generally between November and May. In the Whitman soils, a high watertable condition, at or above ground surface, occurs September through June.

Wetlands are very important from an ecologic, biologic and hydrologic standpoint. They maintain water quality through biochemical processes and reduce stormwater runoff. For these reasons as well as others, every effort should be made to protect the regulated wetlands in the study area. The availability of municipal water and sewer lines allows for alternate types of development schemes (i.e., clustering) that would protect these environmentally sensitive areas from degradation.

GEOLOGIC DEVELOPMENT CONCERNS

The availability of municipal water and sewer lines in the study area will soften some of the principal hydrogeologic concerns that ordinarily accompany residential developments when on-site wells and septic systems are needed. Nevertheless, there are several areas of concern which warrant careful examination. These concerns, which may have adverse environmental impacts if not properly addressed, include:

1) Shallow to bedrock areas;

2) Moderate to very steep slopes, most of which are controlled by the underlying bedrock, which in some places will require substantial cuts or fills in order to accommodate roads, buildings, etc.; and

3) Till soils which are characterized by seasonally high watertables, a high percentage of fine-grained materials (i.e., sand, silt and clay) and a slowly permeable substratum.

The presence of shallow to bedrock soils in the study area suggests that blasting may be required in places for construction of foundations, utility lines, roads and driveways. Any blasting that takes place in the study area should proceed only with great care and under the strict supervision of persons experienced with modern blasting techniques. When blasting is necessary, detailed geotechnical soil, rock and foundation studies should be conducted.

The major concerns with blasting in the study area include potential for undue seismic shock and airblast to existing and new homes in the vicinity. The blasting contractor for each development should conduct a pre-blast survey of the area, including collecting background water quality data for nearby domestic wells. Also, yield tests for these wells should be conducted to ensure that post-development activities do not alter well yields. If groundwater contamination or diminished well yields occur, the municipal water line which will be extended into the study area probably could be made accessible to affected residences. When blasting is conducted without regard to potential environmental effects, there can be problems for surrounding property owners.

Certain blasting techniques can be employed to minimize impacts, depending upon the blasting requirements and geology of the site. A sufficient number of bedrock borings are needed for the blasting contractor and geotechnical consultant to study the local bedrock. Also, pre-blast surveys should be conducted for nearby buildings.

It is expected that numerous rock cuts (blasting) will be required for the proposed Village of Fox Hollow. Because of shallow to bedrock soils and rugged terrain, especially in the eastern parts, the site probably cannot be developed without a tremendous amount of earth and rock movement and blasting. In many cases, the rock cuts will be close to proposed buildings, roads and parking areas. The potential exists for rock slabs to slip along the foliation planes of the Hoosac Schist resulting in a failure or rock slide. Blasting, which will probably weaken these foliation planes, is expected to further aggravate the potential for failure. The potential for rock slide should be thoroughly investigated by a competent geotechnical engineer familiar with this type of work. Rock slides are a definite public safety concern and must be addressed in detail. There may be a need to reduce the proposed residential

densities, the amount of land disturbance and the amount of blasting to reduce the threat of rock slides.

If the blasted bedrock is used for rip-rap or fill material on- or off-site, the mineral composition of the bedrock in the study area may change the physical and chemical quality of surface or groundwater with which it comes in contact (i.e., lower the pH of the water). The potential exists for acid mine drainage to adversely affect the aquatic environments and water quality of surface and groundwaters on- or off-site, especially the local watercourses which drain to the Nepaug Reservoir. If the bedrock is found to have acid production potential, every effort should be made not to deposit the rock materials near surface waterbodies or close to the groundwater table to prevent adverse water quality changes. Experiments such as acid/base accounting and simulated weathering can be used to predict the field occurrences of acidic drainage in the bedrock underlying the study area.

The presence of moderate to steep slopes will be a problem with regard to cut embankments for the construction of roads, driveways and buildings. Because of the existing zoning and the availability of municipal utilities, the disturbance of large land areas is expected. The steep slopes, the amount of disturbance and the presence of till soils which may have a high silt, fine sand and clay content can create erosion and siltation problems, unless proper control measures are implemented and enforced. The costs for site engineering will escalate to accommodate slope retention controls, foundations and roads. Careful planning is required in these areas to minimize the potential impacts to water resources on- and off-site.

Every effort should be made to avoid placing buildings and roads on the steepest sloping portions of the study area. Roads and driveways should be constructed to cross slopes and conform to the topographic contours rather than perpendicular to the hilly parts. This will minimize the amount of cuts and fills and will limit the amount of disturbed land. Deep cuts into hardpan soils for roads and driveways are

extremely difficult to stabilize due to seepage of groundwater over the compact zone. The water creates an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to move downslope. Once this begins, the slope is extremely difficult to stabilize. The establishment of a good vegetative cover is practically impossible on these eroding slopes. Cuts into these types of soils should probably not exceed 2:1 (horizontal:vertical).

Till soils, characterized by fine-grained particles and a hardpan layer, are unfavorable for on-site sewage disposal and usually require specially designed (engineered) systems. However, since on-site septic systems are not proposed for the study area, this should not be a concern, except for the Stone Hill Subdivision. In addition, the till soils are susceptible to erosion because of their fine-grained nature, especially in steeply sloping areas and areas of large land disturbances. For these reasons, proper erosion and sediment (E&S) control measures are needed for all projects to prevent soil erosion problems.

HYDROLOGY

Most of the study area lies within the Nepaug River drainage area. The Nepaug River ultimately empties into the Farmington River. Principal watercourses in the study area include Cedar Swamp Brook in the northern parts and a few unnamed tributaries to Torringford Brook in the southern parts. The total drainage area for the Nepaug River is approximately 32 square miles or 20,480 acres. The study area is located in the northwest corner of the Nepaug River Watershed. A small portion of the study area is located in the Still River Watershed.

Groundwater in the Nepaug River drainage area is classified by the DEP as GAA (Water Quality Classification Map of Connecticut, Murphy, 1987). A GAA classification means groundwaters are tributary to a public water supply reservoir,

and the waters are presumed suitable for direct human consumption. The State's goal is to maintain this classification by banning almost all discharges to groundwater. Groundwater in the Still River Watershed is classified as GA which is suitable for human consumption.

Surface water resources in the study area have not been classified by the DEP, but are considered AA water resources in the Nepaug River Watershed by default, because they ultimately discharge to an AA water resource, the Nepaug Reservoir. The designated uses for a Class AA streamcourse include existing or proposed drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply and other purposes. Recreational uses may be restricted.

Precipitation, which takes the form of runoff, flows across the surface of the land until it reaches a brook or other surface waterbody. Precipitation may also be absorbed into the ground. Once absorbed, the water may either be returned to the atmosphere through evaporation and plant transpiration or may percolate downward to the watertable and eventually become part of the groundwater. Once the water reaches the groundwater table, it moves downslope by the force of gravity, ultimately discharging to the surface in the form of a spring, wetland area, stream, lake or directly into a river. To a large extent, groundwater flow within the study area reflects the surface flow pattern.

Residential development of the study area will increase the amount of runoff during periods of rainfall. Due to potentially high residential densities, the increase may be quite large. This increase results from soil compaction, removal of vegetation and placement of impervious surfaces (i.e., roofs, driveways, etc.) over the soil. The major concern with increased runoff is the potential for flooding and streambank erosion. Each developer must do his or her part in controlling post-development increases from their respective properties so that downstream flooding is not created or further aggravated and that local water resources are protected from erosion and

siltation. This can be accomplished satisfactorily with proper implementation of a detailed stormwater management plan. Connecticut's Guidelines for Soil Erosion and Sediment Control, as amended, should be followed closely with respect to stormwater management for each development.

The stormwater management system for each project will probably include control structures (i.e., detention basins) to maintain post-development flows at pre-development flow levels. Hydrologic calculations for each project should demonstrate that increased stormwater runoff will not cause flooding problems on- or off-site. The applicants' engineers should reference Chapter 9 of the Guidelines for Soil Erosion and Sediment Control for estimating peak flows, runoff volumes and detention basin design. A narrative and summary report, including supporting calculations, should be provided for Commission members. Topography and subsurface conditions (i.e., shallow to bedrock soils) on some of the parcels in the study area will hinder the construction of detention basins. Every effort should be made to locate basins on upland soils and not in wetland areas.

Due to the site conditions (e.g., till soils and steep slopes), the amount of land disturbance and the anticipated densities for future developments in the study area, the potential to degrade surface water on- and off-site during and following development is high. Sources of contamination include lawn fertilizers, road and driveway runoff, road salt, oils, greases and road sand.

During construction, it is imperative that E&S control measures be properly installed and maintained. The City should police E&S control measures on a regular basis. A silt-laden watercourse emanating from the Torringford Farms site was observed during the field review for the Cedar Hill Subdivision ERT on October 11, 1989. A detailed E&S control plan that is properly enforced will minimize this type of adverse impact to water resources on- and off-site. Best Management Practices (BMPs), which are consistent with the DEP Water Compliance Unit, should be

developed and implemented to minimize problems. Because the study area is located in a public water supply reservoir watershed, consideration should be given to installing catch basins equipped with hooded outlets and sumps for trapping sediments and floatables. Responsibility for maintenance of the structures should be assigned.

Appendix A contains Section 19-13-B32 - Sanitation of Watersheds, which is often overlooked from a regulatory and planning standpoint. The regulation is concerned with sewage disposal systems, agricultural wastes, fertilizer application, road salt application and termination of stormwater drainage facilities in public water supply watersheds. All developments in the study area should comply with the regulation.

Although the majority of the study area will be served by public sewer and water lines, the potential adverse impacts of stormwater, erosion, siltation, high density developments, etc., warrants careful planning to ensure that the water resources in the Nepaug River Watershed are not degraded.

SOIL RESOURCES

The dominant soils in the study area are the Charlton, Paxton and Woodbridge soil series. The different soil locations are shown in Figure 6, which is an excerpt from the Soil Survey of Litchfield County. On-site soil investigations are needed for each individual development proposal. A description of each of the soils can be found in the soil survey. Soil characteristics are summarized in Appendix B, Tables 1-3.

The Charlton and Paxton soils are both well-drained. They are generally good soils for construction, providing slopes are not too steep. The Paxton soil has a dense layer (hardpan) starting at about 24 inches in depth. This layer can hold water (a perched watertable) during wet seasons. The Woodbridge soil also has a hardpan

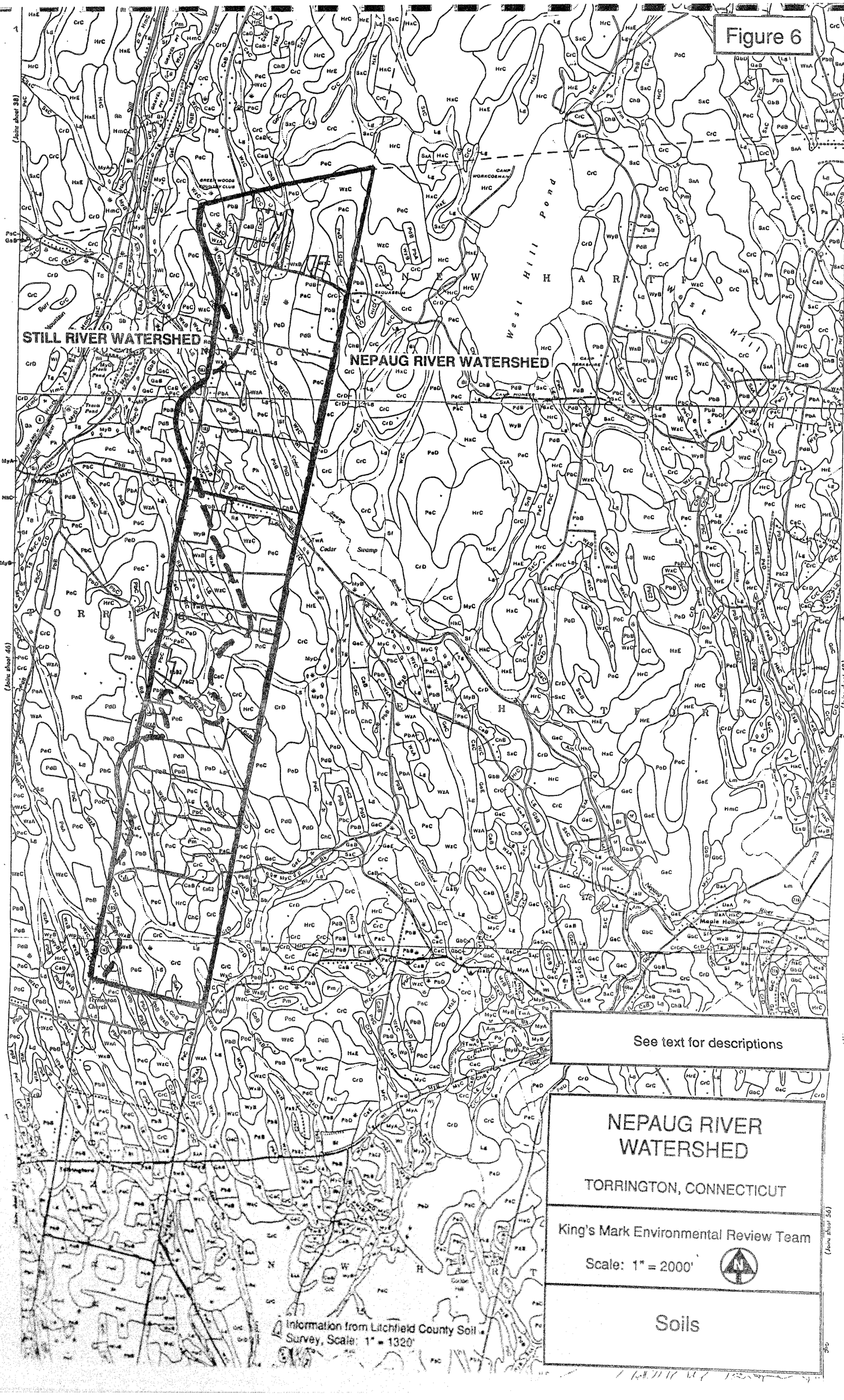


Figure 6
STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
See text for descriptions
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Soils
Information from Litchfield County Soil Survey, Scale: 1" = 1320'

layer at 18 to 24 inches in depth. Due to the seasonal high watertable in the Woodbridge soil, wetness is a limitation to development. Seepage of cut slopes in the Paxton and Woodbridge soils can cause erosion problems.

The hardpan layer of the Paxton and Woodbridge soils is a constraint to septic system design. Limitations for septic design are greater in the Woodbridge soil due to the seasonal high watertable. Most developments proposed in the study area include municipal sewer hookups, avoiding the septic system design limitations.

Most of the soils in the study area are deep to bedrock. There are 3 areas mapped as shallow to bedrock. These are found in the Hollis soil series (HrC). The first area occurs south of White Birch Estates, the second area is on the eastern edge of the Village of Fox Hollow, and the third area is west of Route 183 at the northern end of the study area. While the extent of this soil type is very limited in the study area, it poses very severe limitations to construction where it occurs due to blasting for land grading and limitations for landscaping. These problems are compounded by the steep slopes of this soil mapping unit (see Figure 7).

There are also areas of Paxton and Charlton soils on very steep (D) slopes. These slopes cause severe limitations for land grading and construction, especially with small lots. Larger lot sizes and open space areas should be considered on these soils.

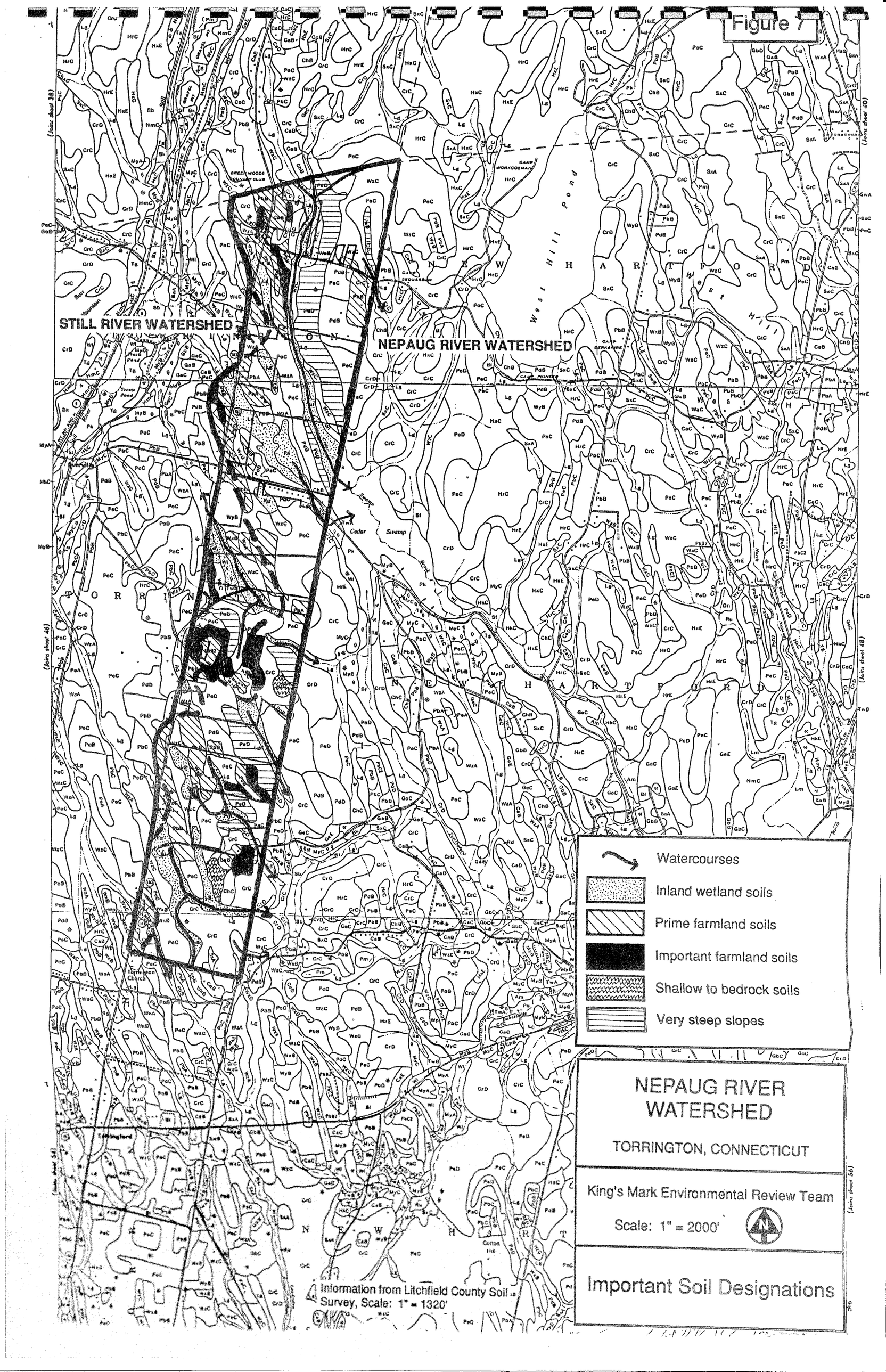
There is a high percentage of "Prime Farmland" and "Important Farmland" soil types in the study area (see Figure 7). The USDA Soil Conservation Service promotes the preservation of these soil types because of their critical role for agricultural production. Many of the developments in the study area are proposing affordable housing. Federal money for affordable or other housing may be regulated on "Prime Farmland" and "Important Farmland" soils. These soil areas make excellent community garden sites and recreation areas within a development.

Some land owners may wish to protect their "Prime Farmland" and "Important Farmland" soil resources. Preservation of farmland requires the interest of the involved landowners. Landowners can pursue participation in the State's Department of Agriculture Purchase of Development Rights program. Donation of agricultural land to private non-profit land trusts is another option. There are private consultants who specialize in programs where farms are partially subdivided for homes. The development rights to the good agricultural land are donated to a non-profit group for tax write-offs, and a viable agricultural enterprise is established. The sale of a limited amount of building lots on the remaining land is used to generate capitol for the actual investment in the farm business. The Litchfield County Soil and Water Conservation District can provide interested parties with more information on farmland preservation.

There are numerous inland wetland soil areas within the study area, including the Lg, Wl, Rg, Sf, Am, Pk and Pm soil mapping units (see Figure 7). All of these soil types are provided equal protection under the Connecticut Inland Wetland and Watercourses Act. The Lg soil mapping unit is the dominant wetland soil in the area, as it is throughout Litchfield County. Permits are required for any disturbance within the wetland areas or within Torrington's regulated inland wetland setback areas. The setback distances vary by soil type.

Because the Nepaug River Watershed is a public drinking water supply watershed, the preservation of inland wetlands in the study area is critical. Inland wetland functions of water quality improvement, sediment filtering and surface and groundwater recharge affect the public water supply. The Inland Wetlands Commission must act in a very conservative manner to protect the water resources. The use of the regulated inland wetland setback areas is critical to wetland protection and should not be compromised.

Figure 7


STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
TORRINGTON
NEW HARTFORD
West Hill Pond
Cedar Swamp
Watercourses
Inland wetland soils
Prime farmland soils
Important farmland soils
Shallow to bedrock soils
Very steep slopes
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Important Soil Designations
Information from Litchfield County Soil Survey, Scale: 1" = 1320'

The Pk and Pm soil types are inland wetlands formed in organic soils. These are unique wetland habitats, where any alteration should be avoided. These organic soil mapping units are located in the following areas:

1) Along Route 183 at the southern end of the study area;

2) On White Birch Estates; and

3) On Cedar Hill Subdivision extending just into the Patero Property.

EROSION AND SEDIMENT CONTROL

E&S control is a primary concern during land development of the study area. E&S control plans should be developed for each site, the plans should be properly installed, and the installations should be periodically monitored and maintained,.

The E&S control plans should consist of:

1) A **narrative** describing the project, the conservation measures planned, the sequence of installation and the maintenance plan;

2) A **map** which locates where the conservation measures are proposed and adequately shows the natural land features and proposed activities; and

3) **E&S details** which show how each measure is to be installed.

When reviewing an E&S control plan, the checklist from Chapter 4 of the Guidelines for Erosion and Sediment Control (revised 1989) should be followed. Chapter 4 is found in Appendix C. All planned E&S control measures should follow the planning and design techniques in the Guidelines for Soil Erosion and Sediment Control.

The Torrington Zoning Regulations give specific details concerning when an E&S control plan is required. This plan must be certified by the Planning and Zoning Commission. E&S controls can have a significant impact on inland wetland areas.

The Inland Wetland Commission should thoroughly review all E&S control plans for adequacy in protecting wetlands and watercourses.

The erodibility of the soils in the study area varies. The erodibility class is given in Appendix B, Table 2. Most of the soils fall into the moderate erodibility class. This class does not consider slope percent or slope length. The erosion potential is greatly increased on long, steep slopes.

The hazard of water pollution due to sedimentation is greatly increased in areas close to water. This makes the soils adjacent to inland wetlands and watercourses critical erosion control areas.

The most common erosion control measures which should be used include:

1) Limited land clearing with tree/vegetation protection barriers;
2) Phased construction;
3) Temporary and permanent vegetation on all disturbed land;
4) Mulching and jute net or similar material on sloping disturbed land;
5) Structural bank stabilization on steep wet slopes; and
6) Water diversions and other stabilized concentrated water areas.

Sediment controls are needed when erosion controls fail to adequately control erosion. The most common sediment control measures which should be used include:

1) Temporary silt barriers such as haybales, filter fabric, or rock berms; and
2) Sediment detention ponds.

The use of haybales rather than filter fabric supports the agricultural community, and haybales are a renewable and biodegradable resource. However, the life expectancy of haybale silt barriers is only approximately 60 days. On long-

term projects it may be more effective to use the plastic filter fence which has a life expectancy of 1 to 2 years.

If sediment basins are planned as permanent site structures, a long-term maintenance plan is needed. Responsibility for maintenance should be clarified prior to approval. Access areas in non-wetlands soils are needed to facilitate clean-out.

Stormwater Management

A runoff management system controls excess runoff caused by construction operations, changes in land use or other land disturbances. This system is used to regulate the rate and amount of runoff and sediment from development sites during and after construction operations and to minimize such undesirable effects as flooding, erosion and sedimentation. Components may include, but are not limited to, dams, excavated basins, infiltration trenches, parking lot storage, rooftop storage and underground tanks.

A runoff management system must be compatible with the floodplain management and stormwater management programs of the City and with local regulations for controlling erosion, sediment and runoff. The system, a single component or a combination of components, must properly regulate storm discharges from a site to a safe, adequate outlet. Consideration should be given to the duration of flow as well as to the peak discharge. Adequate erosion control measures and other water quality practices must be provided. The components should be planned and designed to insure minimal impact on visual quality and human enjoyment of the landscape.

If the primary purpose of the runoff management system is to minimize flooding, the peak discharge from the 2-year, 10-year and 100-year frequency, 24 hour duration, type II distribution storms should be analyzed. No increase in peak flow from these storms should be allowed unless downstream increases are compatible

with the overall floodplain management system. Some of the items to consider in determining if increased peak flows are compatible with the overall floodplain management system are:

1) The timing of peak flows from the sub-watersheds;

2) The increased duration of high flow rates which may cause streambank erosion;

3) The stability of the downstream channels; and

4) The distance downstream that the peak discharges are increased.

If the primary purpose of the runoff management system is to minimize erosion and sedimentation, the peak discharge from the 1-year, 2-year and 10-year frequency, 24 hour duration, type II distribution storms should be analyzed. Small storms (1- to 2-year frequency) are most important for streambank erosion control. Keeping the post-development 2-year frequency design storm within the streambanks is normally not sufficient to prevent downstream bank erosion, since the 2-year flood itself can be an erosive condition.

Another function of stormwater detention is to remove pollutants from runoff water to prevent a decline in water quality downstream. This is a critical issue in the Nepaug River Watershed because it is a public drinking water supply watershed.

As described by Thomas Schueler (Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs, as prepared for the Washington Metro Water Resources Planning Board, 1987), wet basins will provide better pollutant removal than dry basins. The small storms with less than 1-year frequency of reoccurrence are the most important in designing a detention basin for pollutant removal. For pollutant removal, at least 25% of the basin should be open water, greater than 2 feet deep. Urban Runoff Quality-Impact and Quality Enhancement Technology (B. Urbonas and L. Roesner, ed., American Society of Engineers, 1986)

articles "Extended Detention Basins" and "Urban Retention Basins" concur that longer detention time and areas of wet basins increase pollutant removal. Pollutant removal in basins is greater (especially for soluble pollutants such as nitrate and some forms of phosphorous), if the lower stage of a detention basin is managed as a shallow wetland to utilize the natural biological removal processes. The perimeter of wet basins should be graded to form a 10- to 20-foot wide shallow bench (0.5 to 2 feet deep) for aquatic emergent plant growth. Land Tech Consultants (Carrying Capacity of Public Water Supply Watersheds: A Literature Review of Impacts on Water Quality from Residential Development, prepared for Litchfield Hills Council of Elected Officials, 1989) agree that wetland treatment can be an effective means of pollutant removal. While construction and management of the basin for wetland plant growth is considered beneficial for pollution removal, the construction of these basins in wetlands is not. There is no net gain for water quality if a natural wetland is destroyed so that a man-made wetland can be constructed.

Cleaning and maintenance of basins should be done in a manner consistent with maintaining a healthy stand of wetland vegetation. A sediment storage area (sediment forebay) is recommended at the inlet of the basin to trap sediment and act as a clean-out point. Sediment removal and plant harvest will remove pollutants from the basins. Care should be taken in the disposal of this material.

Open water-type basins may cause temperature increases in streams. This can have a negative impact on aquatic life. In-stream basins are not recommended. Shade trees left or replanted around basins can prevent water warming. In some cases, water can be outletted from the basin bottom where water temperatures may be cooler.

To be effective over the design life, runoff management systems must be properly maintained. A plan of operation and maintenance should be prepared for use by the owner or others responsible for the system to ensure that each component

functions properly. This plan should provide requirements for inspection, operation and maintenance of individual components, including outlets. It should be prepared before the system is installed and should specify maintenance responsibility. Adequate rights-of-way must be provided for maintenance access. The minimum recommended width for an access right-of-way is 10 feet, and the maximum recommended slope is 15%. A minimum 25-foot maintenance right-of-way is recommended around the perimeter of stormwater detention basins. The maintenance access should not be in wetland soils due to the potential wetland disturbance and the difficulty of working in wet soil conditions.

Components of a runoff management system such as dams, excavated basins, infiltration trenches, parking lot storage and tanks should be owned by a unit of government that accepts responsibility for the component and can obtain the money necessary for operation and maintenance. Maintenance by individuals or homeowner associations may be limited by financial reserves and technical expertise. Components such as roof-top storage normally will be owned, operated and maintained by the owner of the property. There should be a legally binding and easily enforceable document or statement attached to the runoff management system plan requiring the owner to operate and maintain the system so that the benefits to the public are received over its intended life. This document should be signed by the owner or their authorized representative. The document should contain the following statement: "I hereby acknowledge I have read and do understand the operation and maintenance plan for _____(project name) as described above. I also agree to fulfill my responsibilities as owner/operator of the runoff management system as stated in the plan. _____(signed)"

Appropriate safety features and devices should be installed to protect humans and animals from such accidents as falling or drowning. Temporary fencing can be used until barrier plantings are established. Protective measures such as

guardrails and fences should be used on spillways and impoundments as needed. A 3:1 slope or flatter is recommended for public safety. Steeper slopes may be difficult to climb.

WATER QUALITY CONSIDERATIONS

A primary goal of the DEP Bureau of Water Management is to provide the highest level of protection for water resources used or useful for public drinking water purposes. The Bureau works toward this goal by prohibiting municipal and industrial wastewater discharges to the resources and by offering guidance to municipalities for land use decisions. Per Section 8-2 and 8-23, Connecticut General Statutes, the City has the statutory responsibility to consider the long-term protection of public water supply resources in its land use decisions. Neither the present zoning nor the proposal to amend zoning for the portion of the study area that is tributary to the Nepaug Reservoir adequately addresses this mandate.

The relevant land use policies of the State, as expressed in the State Policies Plan for the Conservation and Development of Connecticut, 1987-1992, suggest that development within a public water supply watershed should be supported by adequate on-site water supply and sewage disposal, and that public sewers should only be used to **solve existing problems**, not to support new development. Ideally, as much land as possible should be water company owned and left as open space, with low density residential development the next best land use alternative. The Bureau fully supports this policy and feels it is necessary for the long-term protection of Connecticut's finite drinking water supplies.

The Nepaug Reservoir is a significant water supply resource, having a safe yield estimated at 21.5 million gallons per day. The importance of this resource cannot be over-emphasized. The Nepaug Reservoir is capable of providing enough potable

water (assuming 100 gallons per person per day) to serve approximately 215,000 people on a sustained basis, a significant portion of the State's population! Typical of lakes in general, the Nepaug Reservoir is vulnerable to non-point source pollution such as nutrient-laden stormwater runoff from a variety of land use activities. Unlike free flowing streams, the reservoir is also a "sink" for pollutants that may result from land development.

While there is a need for affordable housing within the City of Torrington, it would be better to develop non-public water supply watershed lands. Torrington might not allow such intense development within its own water supply watershed lands located on the other side of the City.

Other concerns and recommendations include:

1) The Locational Guide Map which accompanies the State Policies Plan for the Conservation and Development of Connecticut, 1987-1992 indicates that the study area is predominantly a Conservation Area, where State land use policy is to "plan and manage for the long term public benefit the lands contributing to the state's need for...water and other resources, open space, recreation and environmental quality, and ensure that changes in use are compatible with the identified conservation values." High density development does not appear compatible with the State's policy.

2) The nature of much of the topography (i.e., steep slopes) exacerbates the for potential adverse impacts to water resources in the vicinity of the developments and the Nepaug Reservoir. White Birch Estates, for example, has proposed building lots with slopes greater than 20%. Large scale construction on difficult terrain makes adequate control of erosion and sedimentation extremely difficult, if not impossible. There is great potential to pollute downgradient water resources.

3) The study area's watercourses are fragile headwater streams. Studies of land use/water quality relationships performed in Maryland (Urbanization and Stream Quality Impairment, Richard D. Klein, 1979) determined that the percentage of impervious cover could be directly correlated to the health of the biological community in downgradient streams. This study evaluated land use and biological life in 27 small watersheds. The study's conclusions were that adverse effects on biological life were first evident when impervious cover reached 12%. At 30% impervious cover, impacts were severe. Although the impervious cover for the proposed developments has not been estimated, the amount of cover resulting from development may adversely impact these headwater resources. It will be extremely

difficult to preserve the high water quality of the headwater streams due to the large increase in the quantity of stormwater runoff and the associated road, automotive, lawn and household pollutants.

4) Some of the RRC zone development proposals have planned lots of 4,000 to 6,000 square feet. Public utilities will allow these developments to have a 15- to 20-fold increase in number of lots over what might be developed using on-site water and sewage disposal. These small-lot developments will greatly change the environmental character of the study area and adversely affect the quality of surface and groundwater supplies that feed into the Nepaug Reservoir.

5) The dredging of wetlands for use as stormwater retention systems, particularly at the scope proposed, is not a recommended use of inland wetlands and should be strongly discouraged.

6) The zoning regulations should include provisions regarding the extent of lawn area allowed in water supply watersheds. Limiting lawn area would result in less use of fertilizers and pesticides.

7) Zoning should be modified to allow no more than 1 dwelling unit per 2 acres and adoption of cluster development. Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development is available from the DEP Maps and Publications Office and is an excellent discussion of environmental and other advantages of cluster development.

8) Consultation with the soon-to-be-published Protecting Connecticut's Water Supply Watersheds: A Guide to Watershed Protection for Local Officials, (available from the DEP Maps and Publications Office) is recommended.

9) Maximizing the use of streambelt buffers, including inland wetlands contiguous to streams, particularly in areas of steep slopes where the buffer might need to exceed 100 feet, is recommended.

10) A dedication to open space of more land, perhaps 20% of the land in any of the currently proposed or future developments is recommended. Land already protected as wetland should not be included in open space calculations.

11) The impervious surfaces of each entire proposed subdivision should be 10% or less. Impervious surfaces greatly reduce the natural buffering capacities of undeveloped land and could significantly increase the potential for chemical leaks and spills to reach the reservoir.

The land development restrictions described will reduce the amount of property available for lawns, landscaping and household and road generated pollutants,

resulting in a reduction of the use of fertilizers and pesticides and the proliferation of pollutants from intensely developed residential land.

The density of development reviewed is clearly excessive for a public water supply watershed. If the development had been based on on-site water and sewage disposal, minimum lot size would probably be 2 acres or 87,120 square feet. This large lot size is supported by the Stone Hill Subdivision which proposes a density far less than allowed in the R-40 zone.

Since the development plans along Torringford Street are inconsistent with the State's Plan for conservation and development, the DEP may reduce the Clean Water Fund financing of Torrington's advanced wastewater treatment plant by a proportion related to the amount of development allowed in lands identified by the State as Conservation Areas. Furthermore, it is very questionable whether DEP can approve, per Section 22a-416, Connecticut General Statutes, the plans and specifications for the public sewer system extensions due to the concern for subsequent adverse environmental impacts. (For more information, contact Fred Banach at the DEP Bureau of Water Management.) The construction of the proposed developments appears inconsistent with the preservation of the high quality of the water in the Nepaug Reservoir, and the land use inconsistent with the State's Plan of conservation and development.

BIOLOGICAL RESOURCES

WETLAND CONSIDERATIONS

The US Fish and Wildlife Service's National Wetland Inventory identifies 10 wetland types within the study area (see Figure 8). Classification is based on the wetland's hydrologic location, vegetative cover, water regime and site specific modifiers. The specific wetland types identified under the National Wetland Inventory include:

PFO1E Palustrine, forested, broad-leaved deciduous, seasonally saturated (wooded swamp)

PFO1/4E Palustrine, forested broad-leaved deciduous and needle-leaved evergreen, seasonally saturated (wooded swamp)

PFO4E Palustrine, forested, needle-leaved evergreen, seasonally saturated (wooded swamp)

P$\frac{\text{FO4Eb}}{\text{EM}}$ Palustrine, forested, needle-leaved evergreen overstory, emergent understory, seasonally saturated, beaver modified (wooded swamp)

POWH Palustrine, permanent open water

POWHh Palustrine, permanent open water, diked/impounded

PEME Palustrine, emergent seasonally saturated (marsh)

PSS4E Palustrine, scrub/shrub, needle-leaved evergreen, seasonally saturated (shrub swamp)

PSS1E Palustrine, scrub/shrub, broad-leaved deciduous, seasonally saturated (shrub swamp)

PSS1Zb Palustrine, scrub/shrub, broad-leaved deciduous, intermittently exposed, beaver modified (shrub swamp)

The wetlands at the study area can generally be described as either wooded swamp, shrub swamp, emergent marsh or open water. These wetlands are primarily important for their wildlife habitat and water quality maintenance functions.

The Nepaug River Watershed is a public water supply watershed for the Metropolitan District Commission of Hartford's Nepaug Reservoir. Development of proposed residential subdivisions within a public water supply watershed can adversely effect the quality of the public water supply. The clearing of existing woodland habitat to accommodate the construction of houses, driveways, septic systems and roadways will lead to the fragmentation of upland and wetland habitats. The fragmentation of habitats will result in a decrease in wildlife species populations and species diversity. Wetland habitats and water quality will probably be degraded through direct filling activities and through sedimentation which invariably accompanies residential subdivision developments.

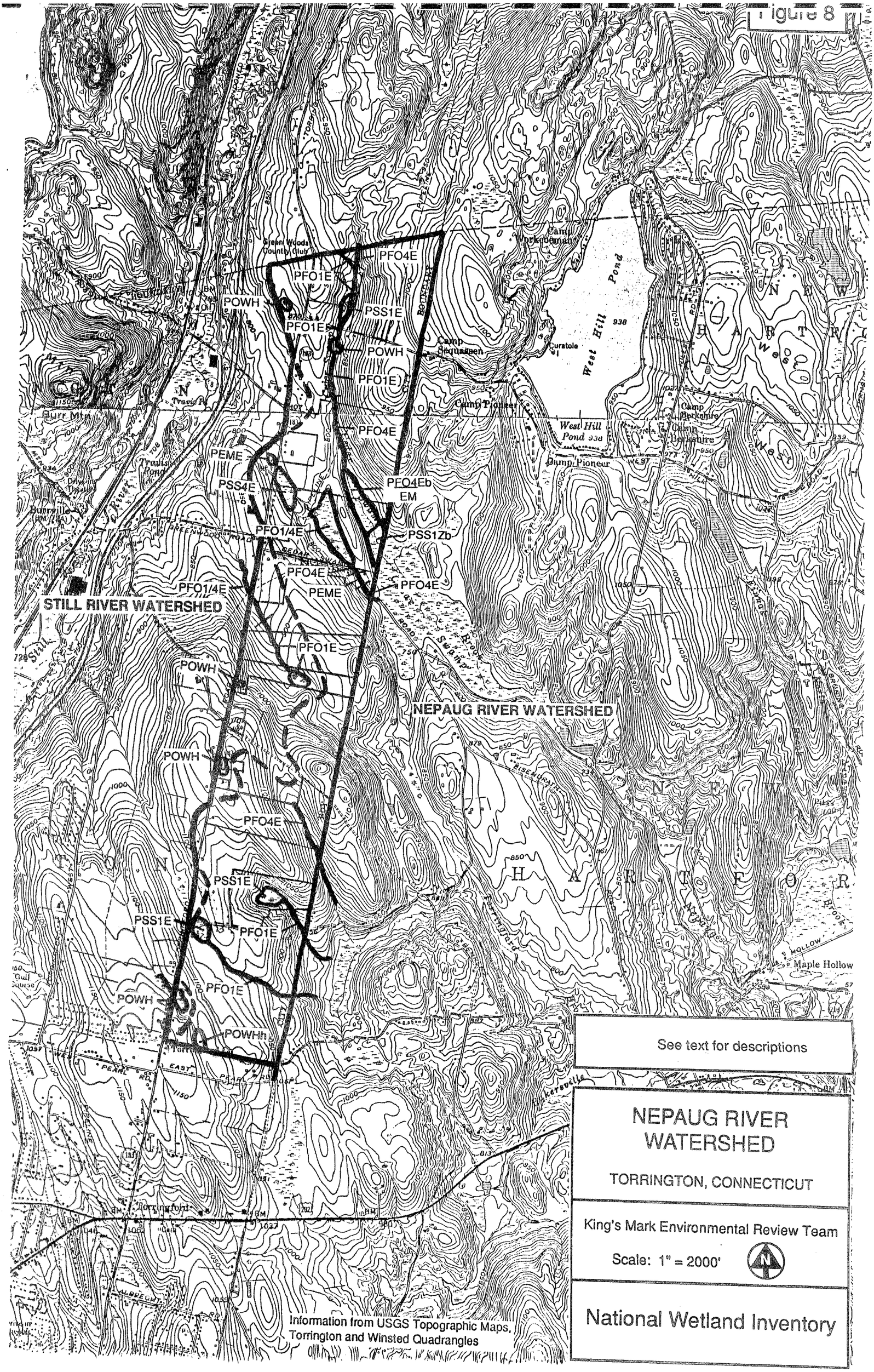
In order to limit the adverse effects on wetland habitats, water quality and wildlife resources, the following measures are strongly recommended:

1) Maintain a minimum setback of at least 100 feet, where practicable, from all wetlands and watercourses. The clearing of vegetation, construction activities and the placement of fill material should be prohibited within the setback area. This will provide an upland habitat buffer between development and wetland habitats. This type of buffer will mitigate impacts to wildlife resources and will improve the quality of stormwater runoff entering wetlands and watercourses.

2) Utilize bridges rather than culverts and roadway fill, where possible, for crossing wetlands and watercourses. The use of bridges will mitigate wetland habitat impacts by reducing the placement of fill material and by limiting the potential for changes in wetland hydrology.

3) Proposed stormwater detention basins should be constructed outside of wetland boundaries. Under no circumstances should the construction of detention basins within wetlands or watercourses include the excavation of wetland soils to allow for the operation of a permanent pool of open water (i.e., a pond).

4) Develop and implement an aggressive site specific soil E&S control plan. This plan should be implemented from the start of site preparation through the completion of site stabilization. A separate contractor should be employed to oversee the implementation of the E&S control plan and the inspection and maintenance of E&S control measures. This will reduce the potential for wetland and watercourse habitat and water quality degradation.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STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
Camp Workcoman
West Hill Pond
Camp Sequassen
Camp Pioneer
Camp Berkshire
Glenn Woods Country Club
Burr Mtn.
Burrville
Maple Hollow
See text for descriptions
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
National Wetland Inventory
Information from USGS Topographic Maps,
Torrington and Winsted Quadrangles

WILDLIFE CONSIDERATIONS

Description of Area/Habitats

The Torrington section of the Nepaug River Watershed is made up of several ownerships including several proposed developments. For the most part, the land is gently sloping, but there are some steep slopes. The study area contains a portion of the wetland known as Cedar Swamp and a variety of habitats including:

1) Deciduous woodland - hardwood forest;
2) Coniferous woodland - softwood forest pine/hemlock;
3) Mixed woodland - mixture of hardwood and softwood;
4) Woodland edge - ecotone between woodland and fields;
5) Old fields - fields once used for agriculture in varied stages of reversion to woodland;
6) Suburban areas - significant development with lots of 1 acre or less in size;
7) Riverine upper perennial wetland - stream or river and its associated riparian zone;
8) Palustrine aquatic bed - areas of submerged aquatic plants;
9) Palustrine emergent wetland - includes marshes, bogs, beaver flowages with dead trees and emergent vegetation and associated riparian zone;
10) Palustrine scrub/shrub wetland - swampland dominated by shrubs which may have occasional standing water; and
11) Palustrine forested wetland - swamp dominated by standing live trees.

Wildlife habitat is the complex of vegetative and physical characteristics that provide for all the requirements of wildlife, including shelter, resting, nesting and escape cover, water and space. The greater the habitat diversity and degree of interspersion of various habitat types, the greater the variety of wildlife there is using an area. Because of the variety of habitat types and the degree of interspersion of

these habitat types, the study area provides good to excellent wildlife habitat. The abundance and variety of wetlands increase the value of the study area for wildlife. Because the watershed has not been heavily developed, it has greater value as wildlife habitat.

A wide variety of wildlife species are expected to utilize the study area to provide all or part of their habitat requirement needs. These species are listed in Appendix E which is an exhaustive list of all species known to inhabit Litchfield County and utilize the habitats. Appendix E includes resident breeding species, possible breeders, migrants and wintering species.

Woodland: A major portion of the Nepaug River Watershed is covered by coniferous woodland (softwood or evergreen) composed of hemlock and white pine. Deciduous (hardwood) species commonly found in the watershed are American beech, sugar and red maple, black and yellow birch, white ash, shagbark hickory and oaks. Woodlands provide cover, food, nesting places, denning sites and roosting places for wildlife.

Coniferous stands provide important year-round cover for species, including turkey, grouse and various songbirds. Stands of hemlocks are preferred nesting sites for species such as the veery, junco and red squirrel. The winged seeds produced by the hemlock are readily sought by red squirrel, pine siskin and chickadees.

Areas of thick laurel offer cover to some species of wildlife, but are less useful than most other types of evergreen cover.

Deciduous stands also provide cover, particularly when foliage is on the trees. These stands are very valuable as nesting and feeding areas. Mast producers such as oaks, hickories and beech are outstanding sources of food for many wildlife species. Quality den trees are most commonly found in hardwood species such as red and sugar maple, cherry and white ash.

Some sites within the Nepaug River Watershed have been logged in the past. Logging often creates a diversity of cover within the forest. The openings and roadways grow back in with a variety of herbaceous and woody vegetation. This growth provides cover, seeds, berries and browse for a variety of wildlife. The remaining forest contains mixed stocking, including many large diameter trees. Large trees are important for seed and mast production, food, nesting, den sites and cover.

The snag trees in the study area (standing dead trees) are a source of insects which serve as food for many species, including the downy woodpecker, white-breasted nuthatch and black-capped chickadee. Den trees (living or dead standing trees with cavities or holes) serve as a nesting or denning place for animals such as red and grey squirrels, raccoons, owls, woodpeckers and swallows.

Wetlands: Wetlands increase the habitat diversity of an area and offer a variety of food and cover to wildlife. They are important habitats to consider for protection. Acre for acre, wetlands and their associated riparian zones exceed all other land types in wildlife productivity. In addition to their value as wildlife habitat, wetlands serve other valuable functions including water recharge, sediment filtering and flood storage. For these reasons, the development of, filling in and crossing of wetlands should be avoided or limited whenever possible.

Cedar Swamp Brook flows out of a wetland area at the north end of the watershed, crosses under West Hill Road, flows into a small, private pond and continues as a small fast water stream (riverine upper perennial wetland) until it enters into Cedar Swamp. The brook reforms in New Hartford downstream of Cedar Swamp and eventually becomes a major tributary of the Nepaug River. This brook provides an important travel corridor for wildlife.

The upper portion of Cedar Swamp is within the Torrington portion of the Nepaug River Watershed. Cedar Swamp is a large diverse wetland containing

palustrine aquatic bed (submerged aquatic plants), palustrine emergent wetland (emergent aquatic plant), palustrine scrub/shrub wetland (shrubs growing in or adjacent to the wetlands) and palustrine forested wetland (wetland with standing living, dying or dead trees). The largest portion of the swamp in Torrington is located north of Cedar Lane, and a smaller portion is located south of the road. The DEP in cooperation with Duck's Unlimited recently purchased 57.53 acres of this wetland within New Hartford north of Cedar Lane. (For more information see Appendix D which contains a letter from DEP Deputy Commissioner DeCarli dated July 19, 1989 to the Torrington Inland-Wetland Commission.) Cedar Swamp offers good to excellent habitat for a number of major wildlife species, including beaver, otter, raccoon, deer, great blue heron and several species of waterfowl (see Appendix E for a more complete list of possible species).

Old Field/Agricultural Field: The old field/agricultural field habitat found along the gas pipeline, Torringford Street and an occasional isolated interior lot provides early successional stage habitat. This is an important habitat type because it contains a variety of plant communities, including grass, herbaceous plants, shrubs and young trees. The abundant growth of a variety of shrubs such as blueberry, multi-flora rose and dogwood and trees such as cherry and birch provide abundant cover and a food source for many wildlife species. Small mammals, including mice and voles, inhabit grassy areas of old field. Therefore, fields are used as hunting grounds by species such as hawks, owls, foxes and coyotes.

Fields increase the overall diversity of the study area and increase the "edge effect" or ecotone. Edge effect is the phenomenon that occurs where vegetative types meet with a high degree of interspersion, and diversity or species richness is achieved. Because of this phenomenon, the needs of a wide variety of wildlife can best be met. This habitat type often is diminished, because it is usually the first habitat type to be developed.

General Wildlife Habitat/Recommendations

As with any development, the impact on wildlife habitat will be negative. The impact on the Nepaug River Watershed will be extensive because of the proposed density of development, the addition of roads and the proximity of development to wetlands. Large portions of the forested area will be fragmented and lost during the construction of homes, roads, parking areas and walkways. Alteration of some habitat will occur where cover is cleared for lawns and landscaping. Another impact is the increased human presence, vehicular traffic and free roaming children, dogs and cats. These impacts could drive many species of wildlife from the immediate area of development and surrounding areas where no physical change has occurred (see Appendix E to compare the suburban area with all habitats listed). The value of the study area for wildlife habitat will correspondingly decrease as the amount of development increases.

Certain species which are adaptable man's activities may increase due to his presence, and associated nuisances may occur. Typical species which can become a nuisance include starlings, squirrels, raccoons and deer. Species in the study area which cannot tolerate man's presence or the changes brought about by development will either move away or perish.

Deer may be a common occurrence in the backyards of residents. New residents should understand that successfully growing gardens or ornamental shrubs may require the use of repellents, which have only limited effectiveness, or fencing, which can be unsightly. A list of vulnerable ornamentals is included in Appendix F.

A few developers have proposed clustering homes on a portion of the land and leaving other portions as open space, often including wetlands. Cluster housing will leave more land less disturbed for wildlife habitat. Clustering homes and leaving open space also provides an opportunity for wildlife management. Wildlife species can be encouraged or discouraged by providing or eliminating certain habitats.

Large open spaces free of housing provide for an opportunity to utilize the resource or control a problem through hunting or trapping.

Beaver are present in Cedar Swamp and the Nepaug River Watershed. Beaver activity will continue as long as the food supply (i.e., trees, shrubs and some emergents) lasts. Beaver will build dams, raise water levels and take down trees. Their activity increases the diversity of the wetland vegetation by creating open water, marsh areas, clearing vegetation and creating snags. Beaver can cause problems by plugging culverts, cutting trees and raising water levels into lawns, septic fields and wells. Development should be set back well away from wetlands likely to be occupied by beaver, and wetland crossings should be minimized.

Development of the upland adjacent to wetlands will negatively impact Cedar Swamp and associated wetlands due to:

1) Increased disturbance to wildlife and habitat from residents;

2) Siltation into the wetlands;

3) Increased runoff of water of questionable quality (water from roads containing salt, water from lawns containing fertilizers); and

4) Loss of upland habitat close to a valuable wetland.

Because wetlands are important to wildlife and because wetlands are limited in quantity in Connecticut and continue to dwindle on an almost daily basis, it is always preferable to chose the option or path of development that least impacts wetlands. The value of wetlands increases as the quantity of the resource diminishes. Development on land adjacent to wetlands should be designed so the wetlands receive little or no silt or runoff water of questionable quality, and the development, including lawns, should be set back a minimum of 100 feet from the wetland boundary. Wetlands require protection after development as well as before. Activities such as

filling in, clearing vegetation, using chemicals and pasturing animals in a wetland should be restricted.

Retention and detention basins control water flow into wetlands. Upland sites for basins are preferable over placing them in the wetlands. Shallow grassed-in and rip-rapped basins with no vegetation provide little wildlife habitat. Retention basins replanted with wetland vegetation is an improvement for a few species of wildlife, but typically will not duplicate the function of a naturally created wetland with its own unique hydrology and vegetation diversity. If the retention basins are not maintained and became silted, growth of planted vegetation might be stopped or limited. Because detention basins are usually designed to have water in them only after periods of heavy runoff and retain that water for only short periods, they do not provide a reliable source of water for wildlife. Detention basins are designed to control maximum water flow. They do not prevent large volumes of silt from reaching the wetland. Plans for maintained sediment traps should be incorporated into all designs.

Open Space Areas

It is important to provide open space for wildlife. Setting aside an "island of open space" surrounded by development is the least desirable for wildlife. Open space areas should be contiguous throughout the study area and with open spaces outside of the study area. This should include natural travel corridors such as streams, valleys and ridgetops for wildlife to enter and exit to other open space areas. Open space is more valuable to wildlife if not dissected by roads and other high use areas which may impede the movements of wildlife. Setting aside a combination of habitat types in conjunction with wetlands is desirable.

In a small and heavily developed State like Connecticut, where available habitat continues to decline on a daily basis, it is critical to maintain and enhance, where possible, existing wildlife habitat.

In planning and constructing a development, there are measures that should be considered to minimize the adverse impacts on wildlife. In spite of these measures, wildlife and its habitat will be adversely impacted proportional to the amount of development on a site and surrounding areas. These measures include:

1) Maintain a 100-foot (minimum) wide buffer zone of natural vegetation, where possible, around all wetland/riparian areas to filter and trap silt and sediments and to provide some habitat for wildlife.

2) Utilize natural landscaping techniques (avoiding lawns and chemical runoff) to lessen acreage of habitat lost or alteration and wetland contamination.

3) Stone walls, shrubs and trees should be maintained along field borders.

4) Early successional stage vegetation (i.e., field) is an important habitat type and should be maintained if possible.

5) During land clearing, care should be taken to maintain certain forest wildlife requirements:

    a) Encourage mast producing trees (i.e., oak, hickory, beech, etc.). A minimum of 5 oaks per acre, 14 inches dbh or greater should remain.

    b) Leave 5 to 7 snag/den trees per acre standing for birds and mammals nesting, roosting and feeding.

    c) Exceptionally tall trees, used by raptors as perching and nesting sites, should be encouraged.

    d) Brush debris from tree clearing should be piled to provide cover for small mammals, birds, amphibians and reptiles.

    e) Shrubs, trees and vines which produce fruit should be encouraged or planted as part of the landscaping. Those that produce fruit which persists through the winter are particularly valuable (especially winterberry, barberry, crabapple and rose). Appendix G contains a list of suggested shrub and tree species that can be encouraged and/or planted to benefit wildlife.

FISHERIES RESOURCES

Site Description

The proposed development in the study area in part straddles 2 watersheds: the Nepaug River Watershed and the Still River Watershed.

The **Nepaug River** and streams within its immediate watershed are presumed to be Class AA surface waters. Designated uses for this classification are existing or proposed drinking water source, fish and wildlife habitat, recreational use, agricultural and industrial supply and other purposes. Recreational use may be restricted.

The streams within this watershed form the headwaters of the Nepaug River. In general, the streams average less than 15 feet in width and 1 to 4 feet in depth. The stream channels are characterized by shallow riffle and shallow to deep moving pool over a substrate of small boulder, cobble, gravel, coarse sand and sand/silt fines. In-stream fisheries habitat is composed of random boulders, fallen and overhanging vegetation, undercut banks and depths afforded by pools. The riparian vegetation provides the stream cooling summertime shade and streambank stabilization.

The Nepaug River proper, although out of the study area, is a coldwater stream. The river averages less 20 feet in width and 2 to 4 feet in depth. The stream channels are characterized by shallow riffle and shallow to deep moving pool over a substrate of small boulder, cobble, gravel, coarse sand and sand/silt fines. In-stream fisheries habitat is composed of random boulders, fallen and overhanging vegetation, undercut banks and depths afforded by pools. Riparian vegetation is predominated by mature hardwoods with sparse urban development. The limited development has not compromised the quality of in-stream habitats.

The **Still River** and streams within its immediate watershed are classified by the DEP as Class B_C surface waters. Waters of this classification may not be meeting

water quality criteria of 1 or more designated uses of Class A surface waters and are potentially manageable for coldwater fish. Designated uses for Class A surface waters are potential drinking water source, fish and wildlife habitat, recreational use, agricultural and industrial supply and other legitimate uses.

The streams within this watershed form the headwaters of the Still River. In general, these streams average less than 10 feet in width and 1 to 4 feet in depth. The stream channels are characterized by shallow riffle and shallow to deep moving pool over a substrate of small boulder, cobble, gravel, coarse sand and sand/silt fines. In-stream fisheries habitat is composed of random boulders, fallen and overhanging vegetation, undercut banks and depths afforded by pools. The riparian vegetation provides the stream cooling summertime shade and streambank stabilization.

The Still River proper is also outside of the study area and is a wetland stream. The stream channel varies in width and depth and can be best described as a slow moving pool. The encroachment of urbanization has compromised in-stream habitat quality in many areas of the watershed.

Aquatic Resources

The streams within the **Nepaug River Watershed** are of a quality (both water and habitat) to support a native coldwater stream fish population. Anticipated fish species include brook trout, blacknose dace, longnose dace, creek chub, fallfish, tessellated darter and white sucker. The DEP Division of Inland Fisheries currently manages 3 streams within the immediate Nepaug River Watershed for recreational angling. Trout (brook, brown and rainbow) are stocked in Butternut Brook, the Nepaug River and Torringford Brook.

The streams within the **Still River Watershed** are of questionable quality (both water and habitat) to support a native coldwater stream fish population. Diversity and density of a natural coldwater stream fish population (anticipated to be naturally composed of brook trout, blacknose dace, longnose dace, creek chub, fallfish,

tessellated darter and white sucker) may have been altered. The Still River proper provides warmwater aquatic habitats. Anticipated fish species include largemouth bass, sunfish species, shiner species, yellow perch, chain pickerel, brown bullhead, white sucker and American eel. The DEP Division of Inland Fisheries currently does not manage any stream within the immediate Still River Watershed for recreational angling.

Impacts

The following potential impacts to aquatic environments are expected to occur due to development:

1) **Roadway Crossings** - The planned use of box culverts at proposed crossings will be the greatest cause of damage to stream environments. Culverts will eliminate existing open channel habitats and may result in a point of impasse for the free passage of migrating aquatic species. Sedimentation and the potential for contaminants entering the watercourse during construction can degrade of downstream habitats.

2) **Soil Erosion and Sedimentation** - Through increased surface runoff from unvegetated areas during construction, unchecked soil erosion can result in sediment deposition within watercourses which, as research has shown, is the major cause of stream degradation.

3) **Contaminant Introduction** - Surface drainage from impervious areas (i.e., rooftops, roads, driveways) may allow tars, oils, road salts and sands to enter the watercourses. This will result in water quality and stream habitat degradation and the potential for "fish kills."

4) **Nutrient Introduction** - Runoff and leaching of nutrients from lawn fertilizers, chemicals and septic tank leachate to the watercourses may stimulate excessive aquatic plant growth and result in water quality degradation and the potential for "fish kills."

5) **Stormwater Runoff** - An increase in the total area of land made impervious due to construction will ultimately increase flood flows downstream. This may in turn increase erosion along the stream corridor and contribute to increased sedimentation and habitat loss.

6) **Cumulative Impacts** - Changes in land use practices or degradation of water quality or in-stream habitats within upper reaches of either the Nepaug River or Still River Watersheds (i.e., increased sedimentation, increased stormwater flow, contaminant input, non-point nutrient inputs)

will eventually be observed in accelerated degradation of downstream areas.

Recommendations

Recommendations to mitigate habitat degradation due to development include:

1) Roadway crossing of perennial streams should be by clear span bridge. The activities associated with the placement of culverts within the channels of perennial streams will have the greatest and the longest lasting impacts to the delicate habitats of coldwater streams. Culvert placement will cause not only a loss of habitat, but also, through degrading the existing habitat quality, may completely eliminate the existing fishery. Once eliminated, this resource will never be replaced.

2) Maintain at the minimum a 100-foot open space buffer zone along the edge of all stream corridors. No construction or alteration of riparian habitat shall take place within this zone. The buffer zone should be widened in areas of steeper terrain.

3) A comprehensive E&S control plan should be submitted and installed prior to the start of any construction and maintained through all construction phases. Mitigative measures should include, but not be limited to, detention basins, catch basins, silt fences and haybales. City officials should regularly police development to ensure that all E&S controls are properly emplaced and regularly monitored.

4) Surface runoff during and following construction must not be allowed to directly enter any watercourse either as overland flow or by directing drainage systems into the stream, but rather be collected/stored within catch or detention basins. Detention basins should not be constructed within watercourse channels.

5) Stormwater runoff must be controlled (managed) not to critically increase downstream flows. Impounding streams by roadway crossings or the placement of detention basins within stream channels is not recommended.

6) Limit liming, fertilizing and the introduction of chemicals to developed lawns close to watercourses.

THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

According to the Natural Diversity Data Base, there are no known extant populations of Federally Endangered and Threatened Species or Connecticut "Species of Special Concern" occurring in the study area.

However, the area delineated in Figure 9 has been identified as a Natural Area Inventory Site. In 1972, the Connecticut Forest and Park Association, Inc. prepared a Natural Area Inventory which included 459 sites. These were nominated as significant sites for 1 or more of the following attributes: geologic, hydrologic, biologic, archaeologic, cultural, aesthetic, research/educational. Being listed as a Natural Areas Inventory site does not impart any restrictions or provide legal protection, but rather identifies areas that should receive consideration before any proposed development is approved.

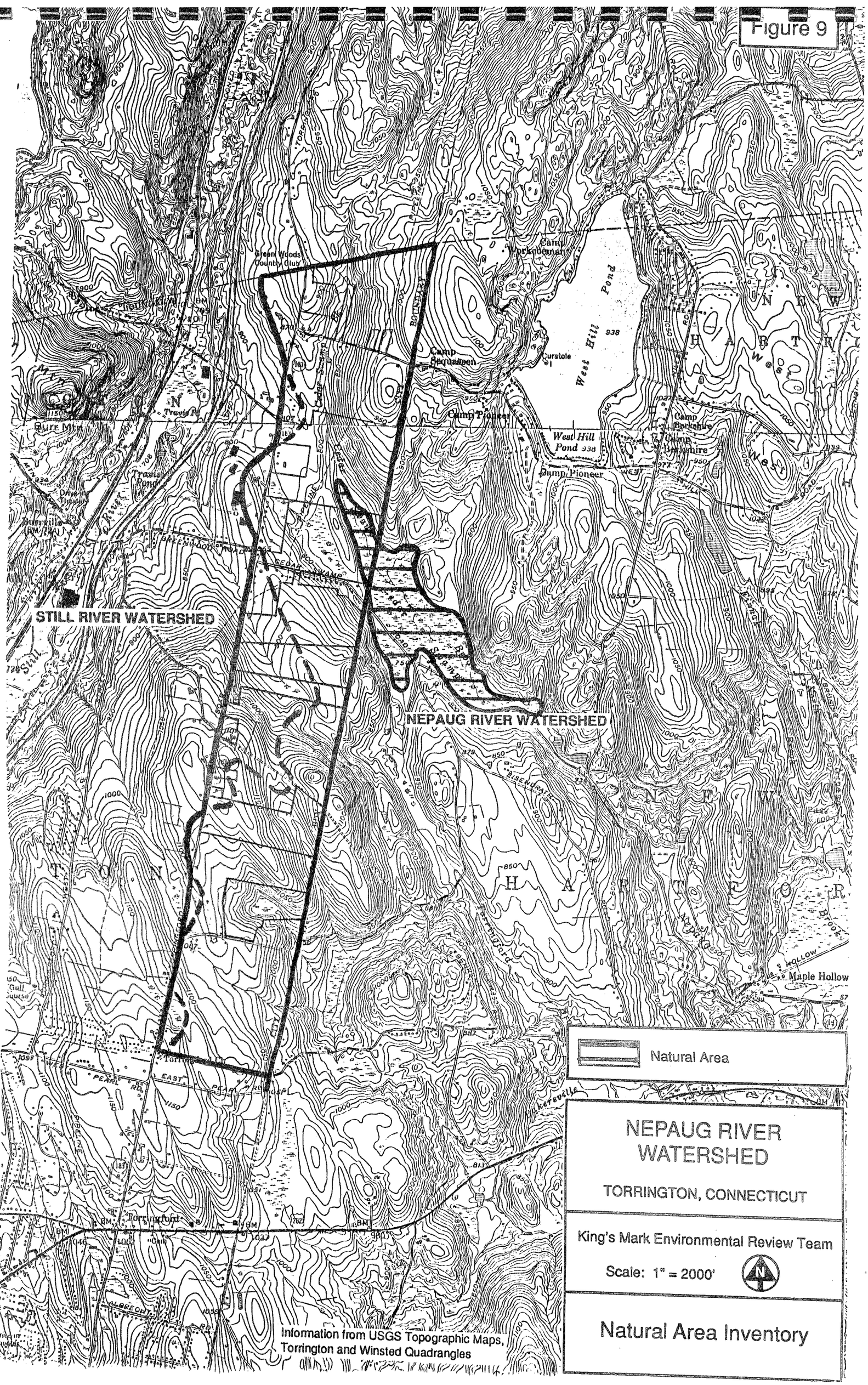
The following is excerpted from a 1981 Natural Area Inventory field survey of the area:

> "This is an extensive wet meadow type wetland. Some of the scattered red maple snags are beginning to come back which suggests that beaver are no longer active in the area. Some areas are dominated by cattail-sedge vegetation while others are shrubbier. These latter areas are predominantly alder-willow thickets, with steeple-bush, meadowsweet, Joe Pye weed, ferns, etc. The area is very large but similar throughout. There are some areas of open water."

Natural Diversity Data Base information includes all information regarding critical biologic resources available at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation 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. New information is incorporated into the Data Base as it becomes available.

Figure 9


STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
Green Woods Country Club
Camp Yorkcoman
West Hill Pond
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Camp Pemquire
Torrington
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Natural Area
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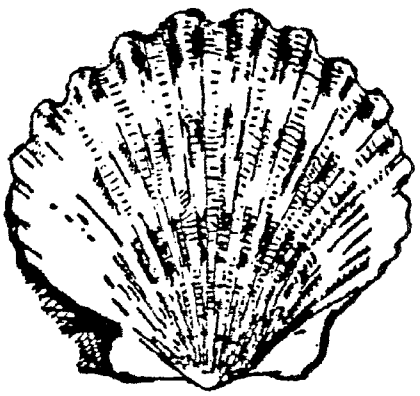
Scale: 1" = 2000'
Natural Area Inventory
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles

ARCHAEOLOGICAL RESOURCES



ARCHAEOLOGICAL RESOURCES

The study area is located within the boundaries of the proposed Torringford Street National Register Historic District (see Figure 10). In 1686, the Connecticut General Court granted western lands to Hartford and Windsor, which were formally purchased from local Indians in 1720. These lands included Torrington lots divided into 13 1/2-mile tiers. Each tier ran from east to west on the south side of the City and north to south on the northern side of the City with the highway running in between. Current streets in the study area, which run southwest to northeast and are separated by 1/2-mile intervals, are the original property boundaries. For example, the study area is between Route 183 on the west and the Torrington-New Hartford Town Line on the east. The Torrington/New Hartford boundary was the location of Shawtown Road which was the main road to Shawtown and ran north from Cedar Swamp Road. John Shaw was the founder of Shawtown and a Hessian soldier from Burgoyne's army during the American Revolution. According to legend, Shaw and 2 other soldiers deserted after Saratoga, settling in the northeast part of Torrington. Several published accounts dating to the turn of the 20th century refer to a series of cellar holes and house foundations in the area that are that are remnants of Shawtown.

Today, Shawtown is a "ghost town." Connecticut has many "ghost towns," where early historic settlements developed, only to have the centers of Towns shift, leaving behind the abandoned ruins and artifacts of the original occupation. Stonewalls and a roadbed for what appears to be Shawtown Road was located during a field visit. These were found on the eastern border of the Stone Hill Subdivision on the New Hartford Town Line. Shawtown itself was not located and may be further north in Barkhamsted. Also, according to 1 account, the junction of the 4 Townships of Torrington, New Hartford, Winchester and Barkhamsted was indicated by a

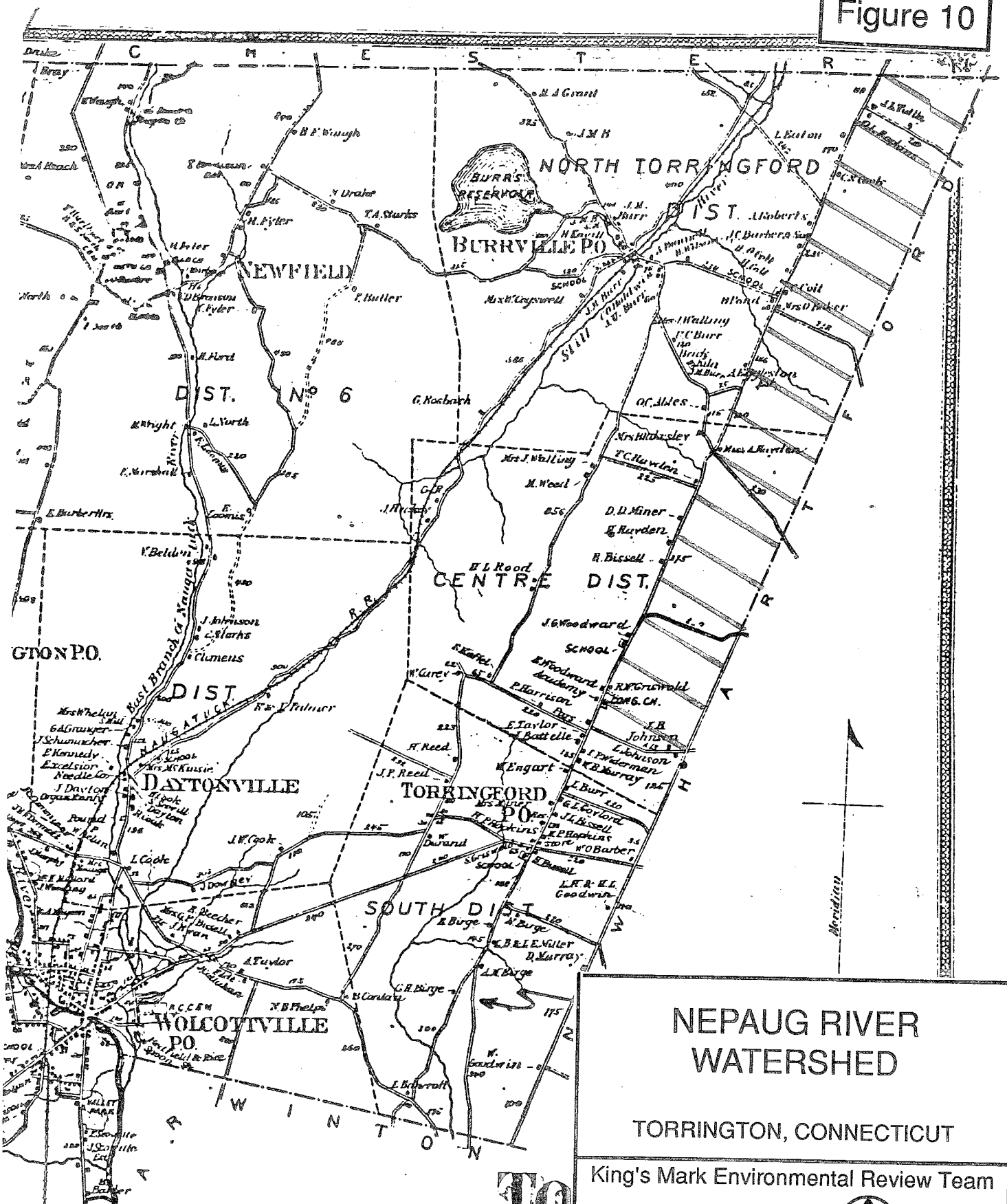
chiseled cross on a large flat rock, located close to Shawtown. This marker was not found during the field review because of snow. Every effort should be made to locate sites such as this and preserve them. A spring walk of the area could identify many of the sites. The Office of State Archaeology is willing to assist in the identification.

The study area is rich in historical features such as the Hayden Brickworks and the Hartford/Albany Turnpike. An archaeological survey of the each site can locate artifacts and determine areas which should be preserved. Commission members should consider the historical nature of the study area when reviewing each proposed development. An engineering cross section of Shawtown Road and the Hartford/Albany Turnpike could show the engineering techniques of the period. Any new development should minimize the visual impacts to the historic buildings and sites. Compatible architecture and visual buffers can be used to minimize the impact.

A review of the State of Connecticut Archaeological Site Files and Maps shows no known Indian settlements in the study area. However, based on site locations reported in Litchfield County, a number of topographic and environmental zones suggest a high probability for prehistoric archaeological sites in the Nepaug River Watershed. These studies indicate that Native American settlements and land use in the study area centered around extensive wetland systems. Long-term occupation and reoccupation of these areas provide extensive and significant archaeological deposits that should be considered with any proposed development for the area. Figure 11 highlights the areas of primary concern. The rises around the wetlands in the center of White Birch Estates appear to be an ideal area for a prehistoric campsite. These archaeological sites are shallow and fragile. A thorough archaeological survey of the study area is recommended.

The Office of State Archaeology recommends that land use proposals within these significant areas have an archaeological reconnaissance survey conducted to

Figure 10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NORTH TORRINGFORD DIST.
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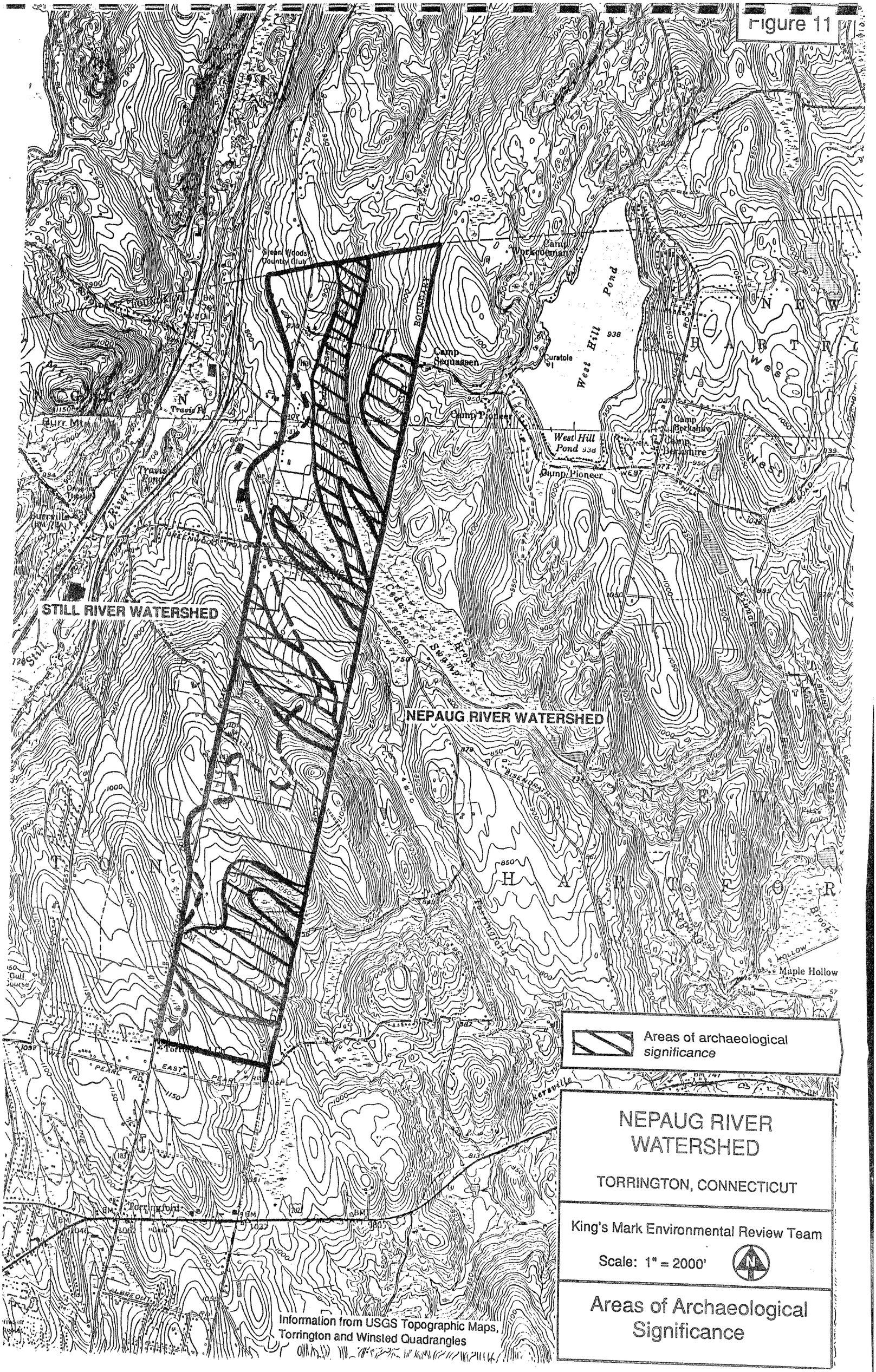
NEWFIELD DIST. No 6
CENTRE DIST.
DAYTONVILLE
TORRINGFORD PO
SOUTH DIST.
WOLCOTTVILLE PO
TORRINGTON
Meridian
Proposed Historic District
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Not To Scale
Proposed National Register District

Figure 11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Areas of Archaeological Significance
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles

identify and preserve any historic or prehistoric sites that may be adversely effected by construction. Also, historic ruins and stone walls should be maintained whenever feasible to preserve the historic integrity of the area. The Office of State Archaeology is prepared to offer the City technical assistance in evaluating the need for archaeological significance.

LAND USE AND PLANNING CONSIDERATIONS

PLANNING CONSIDERATIONS

Zoning and Surrounding Land Uses

The Nepaug River Watershed land within the City of Torrington is primarily zoned R-15, where minimum lot size is 15,000 square feet. Smaller lot sizes are possible under the City's cluster zoning provisions and RRC regulations. Under the City's cluster zoning provisions, a modified lot area requirement of 7,500 square feet is permissible. Under the RRC regulations, up to 6 dwelling units per acre are allowed. The recently adopted City Plan update calls for upzoning this portion of the City from R-15 to R-25 (which requires minimum lot size of 25,000 square feet) and considering upzoning the area to R-40 (which requires minimum lot size of 40,000 square feet). Under current regulations, an RRC zone is not permitted within a R-25 or R-40 zone, because the regulations explicitly state that this use may be located only within R-15, R-10 or R-6 zones.

Land use to the east of the study area in the Town of New Hartford consists predominantly of undeveloped woodland and wetland. This portion of New Hartford is zoned for residential use with minimum lot size of 2 acres. Cedar Swamp, a valuable natural area, is located just to the east of the study area in the Town of New Hartford. Land to the north of the study area in the Town of Winchester is zoned for residential use with a minimum lot size of 40,000 square feet and is also predominantly undeveloped. Land use directly to the south and west of the study area is predominantly zoned R-15 and is lightly developed at present. On the western side of Torringford Street between Greenwoods Road and Pinewoods Road is an industrial park. Upzoning the study area to R-25 or R-40 is more consistent with the density of development permitted in adjacent communities.

Consistency of Project with State, Regional and Local Plans

The State Policies Plan for the Conservation and Development of Connecticut 1987-1992 is a statement of the growth, resource management and public investment policies of the State. The Plan was prepared by the Office of Policy and Management (OPM) and adopted by the Connecticut General Assembly in 1987. The objective of the Plan is to give a balanced response to human, environmental and economical needs in a manner which best suits the future of Connecticut. Regional planning organizations and local governments have been encouraged by OPM to foster implementation of the Plan at the local level.

According to the Locational Guide Map that accompanies the State Plan, the wetlands portion of the Nepaug River Watershed is classified as a Preservation Area, and the remainder is classified as a Conservation Area. The State action strategy for Preservation Areas is to foster their identification and protection and to discourage structural development, except as directly consistent with preservation values. The State action strategy for Conservation Areas is to plan and manage for the long-term public benefit the lands contributing to the State's need for food, fiber, water and other resources, open space, recreation and environmental quality and insure that changes in use are compatible with the identified conservation values. The study area has been classified as a Conservation Area, in part because it is located within a public water supply watershed.

The Litchfield Hills Council of Elected Officials (LHCEO) is the official regional planning organization for the Litchfield Hills Region which includes the City of Torrington. The LHCEO has adopted a preliminary housing policy which, among other objectives, encourages housing which retains community character, preserves environmentally sensitive areas and protects water quality. The LHCEO's preliminary housing policy discourages residential development on wetlands, floodplains, steep slopes and other areas which, for environmental reasons, are

unsuitable for housing. The LHCEO's adopted policy statement also promotes the provision of meaningful open space and recreation areas with future residential development in the region.

The new Torrington City Plan specifies that "wetlands and streams need to be protected not only because of their intrinsic value but because of their importance in managing stormwater runoff and protecting public water supplies." The Plan also specifically establishes the following policies:

1) "In the Nepaug Reservoir Watershed allow only residential development or industrial development with safeguards adequate to protect the watershed;"

2) "Encourage clustering of development in order to preserve environmentally sensitive areas and open space;" and

3) "Continue to promote the use of clustering to foster affordable housing."

The City Plan also calls for consideration of upzoning the Nepaug River Watershed portion of the City to an R-25 or possibly R-40 zone.

Open Space and Recreation Considerations

A report entitled "Community Facilities and Services" was prepared by a consultant in 1987 as part of the City Plan update process. According to the report, Torrington has fewer tennis courts, softball fields and pools than suggested by generally accepted standards and is deficient in playground distribution. The report states that "those neighborhoods for which the need for playgrounds is perhaps the greatest lie in the newly-developing eastern section of the City." According to the report, there are no municipal recreation facilities in the Burrville section of the City which includes the study area. As stated in the report, larger parks can be located at a distance from the users. However, since these generally cater to older age groups, there should be a playground within 1/2 mile of every residence to adequately serve the younger age groups.

The Torrington Planning and Zoning Commission recently adopted an open space exaction in their subdivision regulations that provides for the following set-asides:

1) In subdivisions where the proposed density is less than or equal to 1 dwelling unit per 45,000 square feet, at least 7.5% of the area shall be set aside for permanent open space or recreation; and

2) In subdivisions where the proposed density is greater than 1 dwelling unit per 45,000 square feet, at least 10% of the area shall be set aside for permanent open space or recreation.

The regulations also provide that no more than 20% of the open space or recreation area shall be classified as wetland type soil, be subject to easements or utilities or other purposes unrelated to recreation or preservation of open space or have slopes greater than 15%. The Commission may also require a developer to clear and grade land that has been set aside to make it suitable for recreation.

Torrington's subdivision regulations for recreation and open space are more progressive than many communities in the State. Prudent use of the provisions will assure that future residential development in the study area will adequately provide for long-term recreational and open space needs. The judicious use of clustering can also protect meaningful areas of open space in the study area.

Upzoning the Watershed

The recently adopted City Plan calls for upzoning the study area from R-15 to R-25 with further consideration given to upzoning to R-40. The quality of water in a stream or reservoir correlates with the density of development and type of activity within the contributing drainage area. Generally, by minimizing the density of development within a public water supply watershed, the potential for water quality degradation is lessened.

As discussed in a 1988 report prepared for the LHCEO entitled Carrying Capacity of Public Water Supply Watersheds, many factors associated with

residential development may contribute to the degradation of water quality including on-site sewage disposal, erosion and sedimentation, stormwater runoff and various incidental non-point sources of pollution. Therefore, it is important that the cumulative impact of residential development on water quality be considered in establishing minimum lot sizes in public water supply watersheds. According to the Carrying Capacity report, "...it appears that maximum development density of 1 dwelling per 2 acres will provide adequate protection of water quality as long as proper watershed development control measures are utilized." This assessment was based on an extensive literature review of water quality impacts resulting from residential development. The report stresses that the 2-acre minimum lot size is only a single aspect of watershed protection and that each watershed should be evaluated individually, because natural and cultural limitations may vary. The individual assessment of a particular watershed is particularly important with regard to the study area, because the majority of the area is served by sanitary sewers. While concern over the impact of septic systems is removed by the presence of sanitary sewers, the other factors affecting water quality continue to be legitimate concerns.

An interesting study of 3 adjacent watersheds in the Town of Fairfield entitled Detection of Non-point Pollution of Small Streams in Southwest Connecticut (by S. Bongiorno et al, 1976), demonstrates the relationship of land development to water quality. The easternmost basin, the watershed of the Rooster River on the Bridgeport-Fairfield Town Line is highly urbanized with 1/4-acre lot zoning. The watershed of the adjacent Mill River is moderately urbanized and that of the Sasco River to the west of the Mill River is semi-rural. In the Rooster River basin, 90% of the homes are connected to sanitary sewer systems. The other 2 watershed areas dispose of wastes in septic tanks. The study showed that the water quality of the Rooster River in the most highly urbanized watershed was worse in almost all pollution parameters than that of the other 2 rivers, despite the fact that the Rooster

basin had sanitary sewering. The river's water quality was downgraded by street and surface runoff which had flushed into storm sewers. The runoff contained chemicals such as lawn fertilizers, organic herbicides, pesticides and metallic ions which were contributed from rooftops, paved areas, automobiles and lawns within the watershed area.

The appropriate zoning designation for the Nepaug River Watershed area of Torrington is rightfully a local decision which should be based on a variety of environmental, economic and social considerations. From an environmental standpoint, generally as the density of residential development increases, the threat to water quality intensifies. Therefore, the proposed re-zoning from R-15 to R-25 or R-40, which would serve to lower the density of development in this area, should improve the probability of preserving water quality over the long term. In effect, the larger lot zoning would provide a greater margin of safety than existing zoning with similar watershed protection controls.

In addition to the issue of upzoning, consideration should be given to amending the current provisions for cluster zoning to assure the maximum number of dwelling units allowed do not exceed the number that could reasonably be created under a conventional subdivision plan (required under Section 240.3.3 of the Zoning Regulations). This could be done by requiring the submittal of a subdivision plan prepared according to conventional lot size requirements for comparison purposes. This practice would lessen the potential for abuse of the cluster zoning provisions by allowing greater development density than would otherwise be possible.

TRAFFIC CONSIDERATIONS

The major access for the proposed developments is approximately 4 miles of Torringford Street (Route 183) between East Pearl Street and the Winchester Town

Line. Collectively, the proposed developments will add approximately 1,003 new residential units to the area, and an additional 500 housing units (for estimation only) could be constructed.

1,500 residences at 6 trips per day = 9,000 trips

1,500 residences at 8 trips per day = 12,000 trips

AVERAGE DAILY TRAFFIC (ADT) ON ROUTE 183

Location	1986-1987	1984	Percent Increase
At Spencer Street	1,200	1,000	16.7
At east Pearl Street	2,000	1,300	35.0
At Route 202	3,000	1,900	36.0

The increase in ADT exceeds the background growth of 3% to 5% per year. The additional traffic will increase the traffic volume on this section of roadway, but it should be noted that at 5% per year growth, the traffic with also increase.

Another measure of traffic is the capacity, expressed in vehicles per hour. The more significant measure is the peak hour traffic. An ideal capacity of 2,000 vehicles per hour in both directions is possible for this roadway. The background growth in traffic generated does not indicate that traffic operations will be greatly impacted.

Management of traffic operations will be critical relative to the proposed developments. Analyzing each development separately will not show much change, but all developments concerned must be reviewed together to provide safe and efficient operations. A 9,000 ADT will generate a peak-hour volume of approximately 900 vehicles per hour. During peak traffic volumes, the hourly addition of traffic will increase on Torringford Street, but not to a number exceeding the theoretical volumes. Turning movements will decrease the ease that traffic will flow on Torringford Street.

The projected growth in this section of Torrington will require the City to aggressively pursue modern transportation planning such as turning lanes and upgraded signals, to provide a safe and efficient transportation roadway system. Accident incidence can be reduced by utilizing accepted design standards, especially at those locations where turning movements are common.

Surface water discharge from roadways must be managed by both the State and City. Storm events will increase runoff as the amount of developed area increases. Materials utilized for winter maintenance must be considered in the management of surface water discharges.

DEVELOPMENT SITES

STONE HILL SUBDIVISION

Soils

The soils on-site are shown on "Index Plan of Stone Hill - Phase 2" Sheet 1 of 10, 9/20/89. The map is signed by Bruce Laskey, the soil scientist. These soils are described in Appendix B and are further described in the Soil Survey of Litchfield County.

The dominant soils in the construction areas are the Paxton and Woodbridge series. These soils have a hardpan layer at 18 to 24 inches in depth. This hardpan layer causes seepage of cut slopes which can be difficult to stabilize. Seepage is more critical in the Woodbridge soil which has a seasonally high watertable. Subsurface drainage or structural bank stabilization methods can be used to control erosion.

The location of the wetland crossings shown are practical. Any further disturbance to the wetlands should be avoided.

The non-stony phases of the Paxton and Woodbridge soils (Pb, Wx) on 0-8% slopes are classed as "Prime Farmland." On 8-15% slopes, these soils are classed as "Important Farmland."

Erosion and Sediment Control

In accordance with State law, an E&S control plan has been prepared and submitted for review (Drawing 2 - 6 of 10 9/20/89). The plan shown is adequate, if properly installed. Additional silt fence is recommended at 2 locations: on the uphill side of the wetland crossing on Lot 8 and on the north side of the driveway on Lot 10 where not currently shown. E&S design details and seeding specifications are also needed.

Stormwater Management

No stormwater detention is proposed for the site. Because the site is located in the Nepaug River Watershed, water quality protection is critical. Trapping

sediments and other pollutants from frequent storms event (less than 1-year frequency) is most important for water quality. Small basins constructed at culvert outlets could improve water quality.

Downstream erosion of streambanks was also not considered in planning the stormwater drainage system. Storm frequencies most critical for downstream erosion control are the 1- to 2-year frequencies. Additional measures could be designed to improve stormwater management for small storm frequencies on this site to control downstream erosion.

The culvert outlets for the driveways on Lots 5 and 7 are potential erosion sites. If gully erosion begins below these outlets, stabilized waterways must to be constructed to the wetland area.

The subsurface drainage system on Lot 4 should be revised to protect the driveway from additional water and ice.

Open Space

There are 2 areas slated for open space. The eastern area is a triangular piece of upland. The western area is mostly wetland. Due to the large extent of wetland soils on the site, the option of conservation easements on the remaining wetland areas should be reviewed. A conservation easement provides further protection to the inland wetland areas and makes land owners aware of the fragile nature of the land they own.

Wildlife Recommendations

The open space recommendations presented by the developer seem adequate for the proposed development. Several areas of wetland are included within lots. The large lot sizes should minimize the impact on the wetlands and wildlife. The

Figure 12

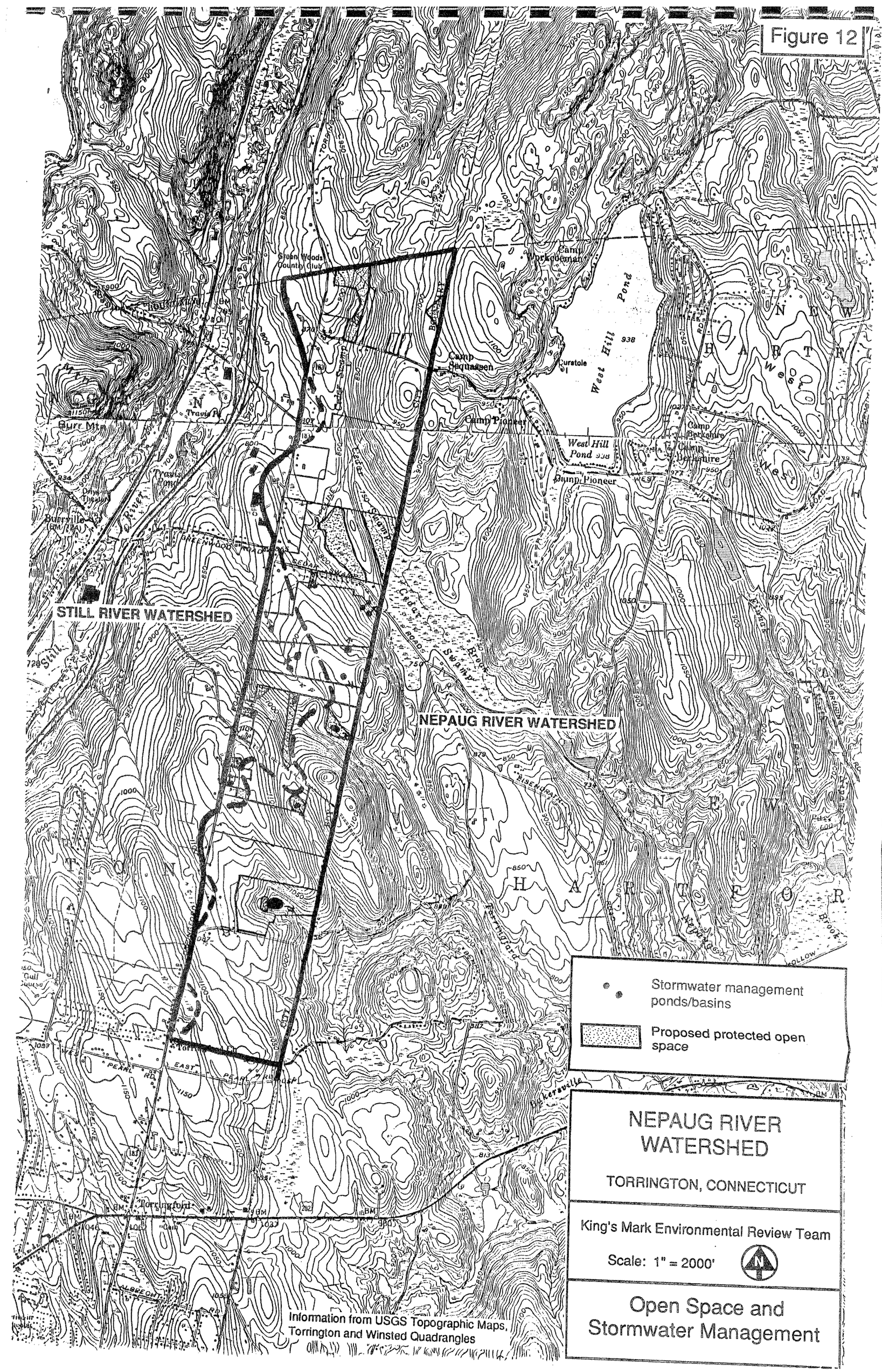
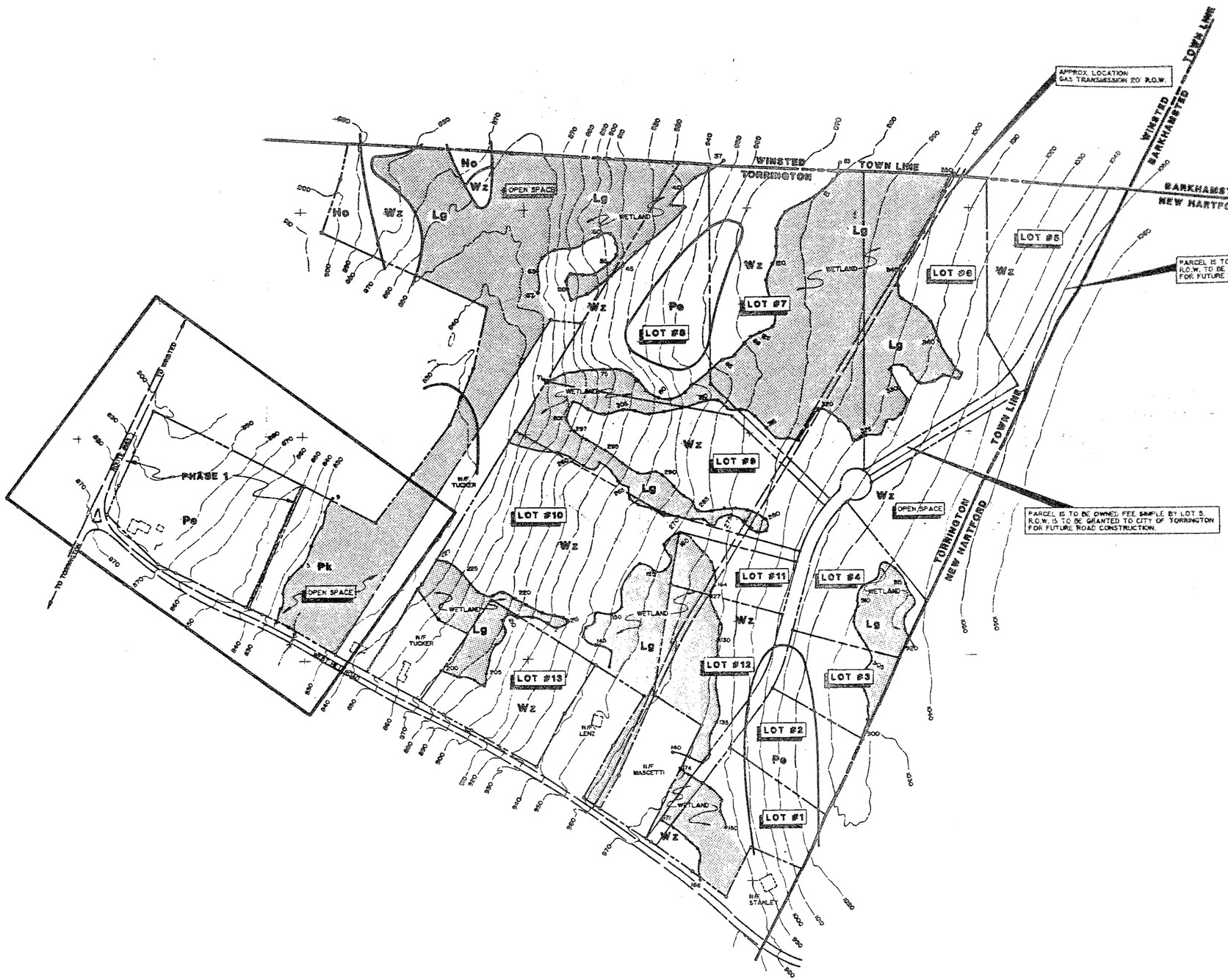

STILL RIVER WATERSHED
NEPAUG RIVER WATERSHED
Camp Workcoeman
Camp Sequassen
Camp Pioneer
Camp Berkshire
West Hill Pond
Brown Woods Country Club
Burrville
Torrington
Stormwater management ponds/basins
Proposed protected open space
NEPAUG RIVER WATERSHED
TORRINGTON, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 2000'
Open Space and Stormwater Management
Information from USGS Topographic Maps, Torrington and Winsted Quadrangles

Figure 13



Information from Stone Hill - Phase 2, Index Map by Lenard Engineering

NEPAUG RIVER WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 400'

Stone Hill Subdivision

triangular open space parcel on the eastern edge of the subdivision could be a valuable asset to the Boy Scouts of America, if donated to Camp Sequassen, adjacent owner.

PATERO PROPERTY

This site is proposed for development without specific plans at this time. Most of this parcel is wetland and steep slopes. Low density housing which avoids these sensitive areas could be accomplished on this property with minimum impact on wildlife. Any development to the east of Cedar Swamp Brook, in the brook or adjacent to it is undesirable for wildlife and the watershed. The area east of Ceder Swamp Brook and south of the gas pipeline, along with an area 100 feet west of the brook, could be designated as open space. This open space area would tie in very well with open space planned for the adjacent Cedar Hill Subdivision and would provide for a continuity of management if donated to DEP as part of the emerging wildlife management area. Crossing the wetland adjacent to Torringford Street should be avoided. Any impoundment of Cedar Swamp Brook will impact water flow to Cedar Swamp during low flow and will negatively affect the brook and its natural value for wildlife. A recreational deep water impoundment has less value to wildlife in this location than does the brook itself. Cedar Swamp Brook provides a habitat type (riverine upper perennial wetland) not found in other parts of the Torrington section of the Nepaug River Watershed. Any road up the steep slope east of the brook will be a difficult erosion control problem. Any crossing of the brook is not recommended.

TORRINGFORD FARMS

Soils

A wetland/soils map (sheets W.1 and W.2 of 3, August 18, 1989) has been submitted for the site. The consulting soil scientist should sign this map or write a letter stating that it is substantially correct. The soils are described in the Soil Survey of Litchfield County. A summary of soil characteristics is given in Appendix B.

All the soils mapped on-site have a hardpan layer at about 18 to 24 inches, causing a perched watertable. Cut slopes in these soils tend to seep, causing bank erosion. Subsurface drainage and structural bank stabilization methods can be used to control erosion.

Seasonal wetness will be a problem on lots built on the WyC soil type due to a seasonally high watertable. Subsurface drainage will be needed on these lots. The adjacent inland wetlands or storm sewer system are suitable drain outlets.

None of the mapped soils on the property are classed as "Prime Farmland" or "Important Farmland" soils. A small area of "Prime Farmland" soils is shown on the soil survey map.

The Rg soil type is a wetland soil. The City's setback distances should be followed, and the site layout revised to provide protection to inland wetlands. In numerous other areas, direct impact on the wetlands is proposed. Alternative designs should be evaluated for these areas which include, but are not limited to:

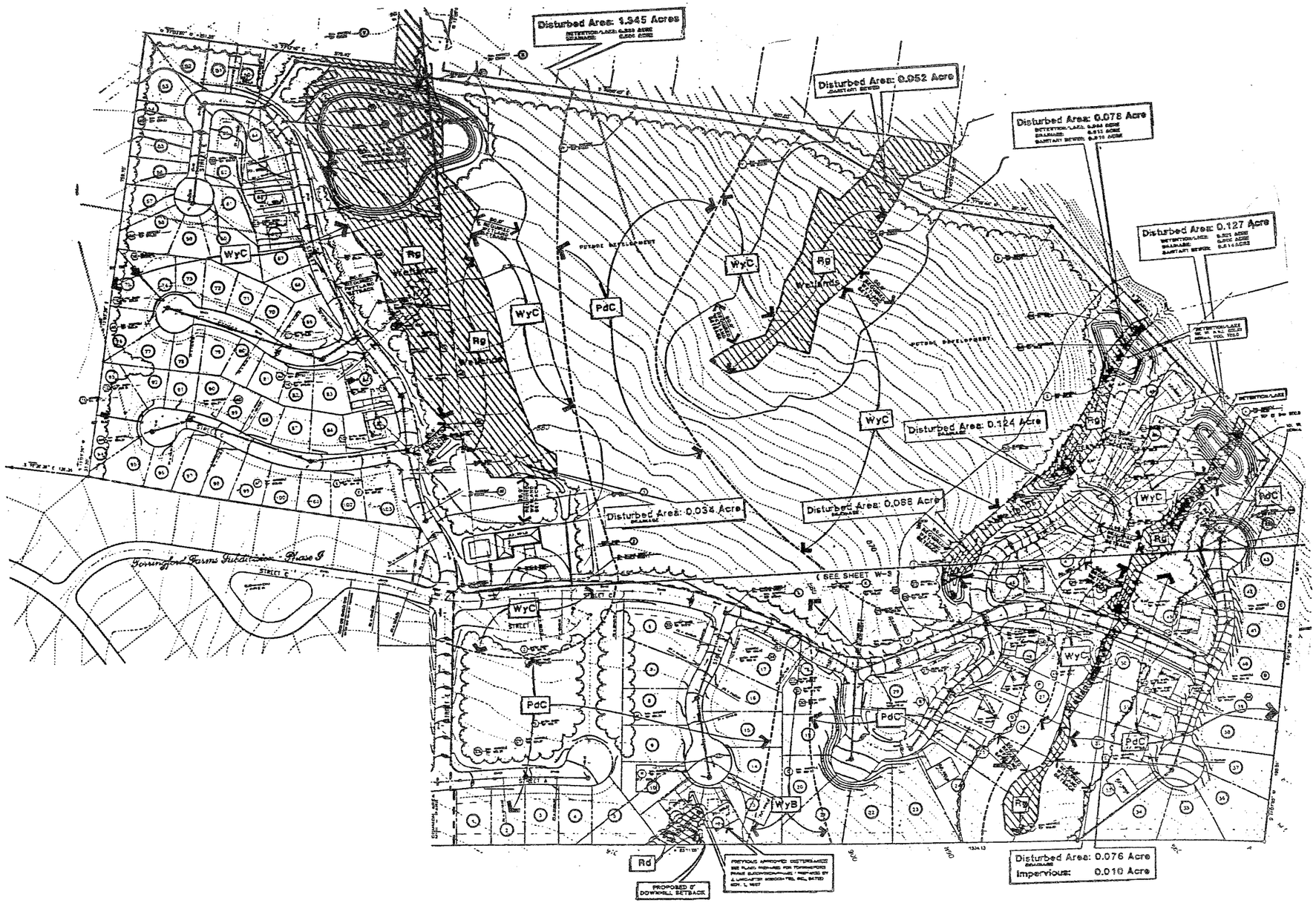
1) Street L should be moved away from the wetland.

2) Detention basins should be moved out of the wetland.

3) The northeastern detention basin should not pipe the water through the wetland.

4) Street E should be moved away from the wetland near Lots 64, 84 and 85.

Figure 14



Information from Torringford Farms - Phase II,
Wetland Analysis by J. Lancaster Assoc.

NEPAUG RIVER WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 200'

Torringford Farms

5) Decreasing the length of pipe for the culvert outlet across from Lot 84 to outlet water in non-wetland soils should be investigated.

Erosion and Sediment Control

An E&S control plan has been prepared for the road construction (sheet C.25 and 25 of 25, August 18, 1989). An E&S plan is still needed for house construction. Many of the houses are proposed very close to the wetlands and property lines, making this additional E&S plan critical. This plan should include sediment barriers along both sides of the easternmost wetland and the wetland on Lots 11 and 12.

The construction on-site should be phased to prevent disturbing the entire site at once. A minimum of 3 phases is recommended.

Grading plans should be shown for the driveways on roads K, M and L (unless omitted). The steep natural topography and road grading make these driveways high potential erosion areas. The road banks and other disturbed soil areas in the vicinity of roads K, M and L (unless omitted) should be mulched after grading. Jute netting or a similar product may also be necessary.

The silt fence should continue along the entire length of sewer line installation (along the northern property edge). It should be on both sides of installation through inland wetland areas.

Stormwater Management

If stormwater detention basins are allowed in wetland soils, they should be designed so that the wetlands are not drained or the basins completely filled with water. Both conditions will destroy the wetland habitat. The basins should be managed for wetland vegetation. The outlets of the basins and culverts on Lots 15 and 93 should be carefully reviewed to determine the effect on downstream properties. The detention basins should be designed to detain water from small frequency storms (less than 1-year frequency) to provide water quality protection.

The basins should be designed to detain water from the 1- to 2-year frequency storms to prevent streambank erosion. The detention basins of upstream property owners should be evaluated in designing the detention basins at this site.

Open Space

Preserved open space areas with conservation easements are strongly recommended for this site.

Wildlife Recommendations

This development maximizes the number of housing units, leaving virtually nothing for wildlife. This development represents a nearly urban environment. With virtually all of the land stripped of vegetation, siltation into Cedar Swamp is a real concern. Additional runoff of reduced quality into the swamp is a certainty. Detention basins should be designed to retain silt to their 100-year flood design. Areas of open space should be left on the steeper slopes on the east end of the development to serve as a barrier to the movement of silt. Housing at this density negatively impacts wildlife, its habitat and the watershed.

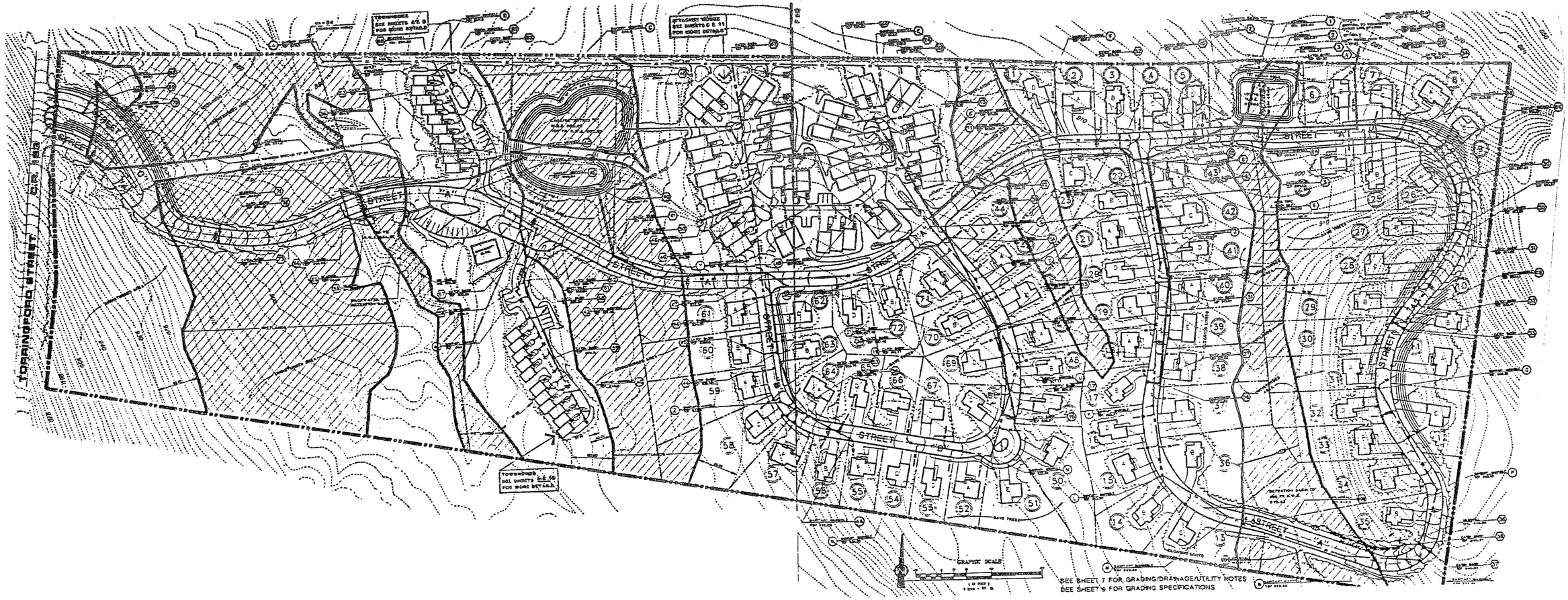
REILLY PROPERTY

Soils

The soils on-site are shown on the "Topographical and Soils Map" prepared for John P. Reilly, 5/15/89. The wetland flagging and soil sketch was prepared by Roy Shook. The soil map should be signed by Roy Shook, or a letter from him should state that the map is substantially correct as drawn. The soil types are described in the Soil Survey of Litchfield County. A summary of soil characteristics is shown in Appendix B.

The Rg soil areas are inland wetlands. The wetland areas are described in a report by George Malia. Under State law, all inland wetland areas are provided

Figure 15



Information from Grading/Drainage/Sanitary
for J. Reilly by J. Lancaster Assoc.

NEPAUG RIVER
WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 200'

Reilly Property

equal protection. The City's setback requirements should not be changed due to the wetland descriptions submitted in the Malia report.

Several wetland disturbances are proposed for the site. Alternative plans should be reviewed which reduce wetland impacts, including:

1) The wetland crossing on Street A between Lots 35 and 36 might be avoided or reduced by moving the road.

2) The site entrance might be moved or redesigned to reduce inland wetland impacts.

3) Street A might be moved between Lots 23 and 44 to reduce the amount of inland wetland filling.

4) Stormwater detention basins should be moved out of the wetlands to reduce impact.

Slope is a potential problem along the eastern edge of the site on the CxC, HrD and PdD soil types. Proposed driveway grading should be shown for Lots 10-12 and 26-29 because the road grading and steep slopes can cause severe constraints.

The HrD soil type typically is shallow to bedrock. Blasting may be required for road or lot grading in this area. Lots 9, 25 and 26 will probably be affected by shallow soil conditions.

Erosion and Sediment Control

An E&S control plan has been prepared. This plan is appropriate for controlling erosion and sedimentation on-site, if properly installed. More details are needed on sheet 29, especially for haybales, filter fence, permanent seeding, stockpile stabilization, tree barrier and rip-rap installation details. Without these details on the plans, the E&S controls might be installed improperly.

Stormwater Management System

There are 4 stormwater detention basins proposed for the site.

Detention Basin	Type	In Nepaug Watershed	Flows Into	Dam	Soil	Wetlands
A	dry	no	Torringford Farms	yes (road)	Rg	yes
B	wet	no	Torringford Farms	yes	Rg	yes
C	dry	yes	Torringford Farms	yes	Rg	yes
D	dry	yes	Village of Fox Hollow	yes (road)	Rg	yes

If Basin C is excavated down into the wetland and allowed to drain out the outlet pipe, it is effectively draining this portion of the wetland. If the basin is to remain in the wetland as designed, wetland maintenance and management techniques should be incorporated such as a shallow pool, a wetland shelf, a wetland planting plan, etc. The low flow rip-rap lined channel in Basin C is an appropriate erosion control measure. However, it is not appropriate to drain this wetland via the channel.

The periodic flooding of Basins A and D may cause vegetation/habitat changes to the wetlands. If these basins are allowed in the wetland areas, the depth and duration of flooding and potential impacts on the habitat should be reviewed. While longer flood durations improve pollutant removal into the basins, the longer durations also cause the most change in vegetation types. Likewise, the more frequent use of the basins (small storm frequency control) improves pollutant removal into the basins, the more frequent flooding of the basins will cause the most change in vegetation types.

Planning the basins for water quality improvement is critical in the Nepaug River Watershed (Basins C and D). Environmental tradeoffs may be more acceptable for water quality improvement in this area.

The design of Basins A, B and C should be reviewed by an engineer for compounded effects on adjacent subdivisions. Basins A, B and C flow into the Torringford Farms subdivision and will have a significant impact on the function of the Torringford Farms stormwater management system. The design of these basins should be reviewed by an engineer for design adequacy. Dam safety permits may be required by the DEP Dam Safety Unit.

Wildlife Recommendations

This development also maximizes the number of housing units and leaves virtually nothing for wildlife. Siltation into Cedar Swamp is a real concern with virtually all of the land stripped of vegetation. Additional runoff of reduced quality into the swamp is a certainty. A previously established roadway across the wetlands was accomplished by adding fill at some point. Using the same routes for new construction would show a higher regard for this wetland habitat. Much of the "undisturbed area" is shown west of the Nepaug River Watershed boundary. If these areas are designed for open space in perpetuity, all wildlife habitat is not lost. Housing at the density proposed for this development negatively impacts wildlife, its habitat and the watershed.

VILLAGE OF FOX HOLLOW

Soils

A soil map and legend for the site are shown on "Topographic Plan L1 - 1/19/87 for Citizen's Land Corp." This soil map should be signed by the soil scientist, or a letter from him should state that the map is substantially correct. The soils are described in Appendix B and are further described in the Soil Survey of Litchfield County.

Many soils on-site have a very dense hardpan layer starting at 18 to 24 inches (i.e., Paxton, Woodbridge and Ridgebury soil series). These soils tend to seep water out at this hardpan layer when slopes are cut through the soil. This can cause severe erosion on cut slopes, which can be controlled by drainage or structural bank erosion control measures. Topsoiling of regraded areas will be critical for revegetation of the site due to this dense subsoil material. A minimum recommended depth of topsoil for the site is 6 inches to allow for some rooting depth.

Shallow to bedrock soils (Hollis series) on the knoll in the southeastern portion of the site have severe land grading limitations. Blasting will probably be required. Landscaping these areas after grading will be very difficult, and steep slopes make grading problems even more difficult. Alternative lot layouts with larger lots and reduced land grading should be considered for shallow to bedrock areas.

The Pb and Wx soils on-site with 0-8% slopes are classed as "Prime Farmland." These soils with 8-15% slopes and the Rd soils are classed as "Important Farmland." Federal funding for construction on these soils may be regulated.

Erosion and Sediment Control

By State law an E&S control plan is required for this site. However, no plan was submitted for review. Once a plan has been developed for the site, it can be submitted to the City and to the Litchfield County Soil and Water Conservation District for review, if required.

The site has steep to very steep slopes. The most critical steepness is the eastern edge of the property, adjacent to the New Hartford Town Line. Erosion controls are especially important in this area.

The road layout and grading plan (Sheet C-2, 12-3-89) shows that the majority of the site will be regraded for the road construction. This is a massive land disturbance which greatly increases the erosion potential of site construction. Phased construction is critical for erosion control.

Figure 16

Information from Village of Fox Hollow,
Conceptual Site Plan by FGA Services

NEPAUG RIVER
WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 400'

Village of Fox Hollow

It is recommended that Phases 1, 2 and 3 be cut in half:

1) E&S controls and utility construction should correspond to phase construction.

2) Land disturbance due to utility construction is significant. Phased construction of the utilities is critical to erosion control.

3) Where buried utilities cross inland wetlands, an E&S plan should be developed and followed.

There is a 60% slope shown between proposed elevations 1060 and 1090 east of the Giordano property. There is a 71% slope shown in the northeast corner of the property. These slopes are probably too steep to be stabilized with vegetation alone. This steeply graded slope will be difficult to stabilize and maintain. Specific details for stabilization should be shown on the E&S plan.

The slopes in the section along the New Hartford Town Line are shown as 3:1 to 4:1. While this slope can be stabilized with vegetation, it will be very difficult for maintenance by land owners and construction of homes and driveways. Driveway and lot grading plans should be reviewed prior to approval.

Stormwater Management System

There are 5 stormwater control basins proposed for this development as shown on the "Watersheds and Surface Water Drainage Map - Sheet C-4 (12-3-89)."

The following information is a summary of the basins as shown:

Basin	Type	Flows Into	In Nepaug Watershed	Pipe Size	Dam	Soil	Wetland
Detention Basin 1	wet	New Hartford	yes	21" RCP	yes	RdA	yes
Detention Basin 3	wet	Berti Property	no	18" RCP	?	WyB	no
Detention Basin 4	wet	Barto Property	no	24" RCP	?	UdB	no
Retention Basin 1	dry	Blinkoff Property	yes	24" RCP plus weir	yes	Wp/RdA	yes
Retention Basin 2	dry	Barto Property	no	48"	yes	RdA	yes

The detention basins will provide better pollutant removal than the retention basins. Designing and managing the basin areas as inland wetlands should also improve them as pollutant removal systems. Small storm events (less than 1-year frequency) are most critical for pollution removal. Approximately 60-70% of urban sediments are expected to settle out within the first 6 hours of detention. Detention times of at least 24 hours are probably necessary to achieve removal of most pollutants. Water quality improvements in the stormwater management system are most critical in Detention Basin 1 and Retention Basin 1, because they are in the Nepaug River Watershed. It is critical to design the detention/retention basins to prevent the post-development 1- to 2-year storm frequencies from increasing in peak flow and to minimize streambank erosion.

Alternative basin sites which are not in wetland soils should be investigated for Detention Basin 1 and Retention Basins 1 and 2. The wetlands themselves have significant hydrologic and environmental benefits for the site which can be destroyed by basins. Managing the basins as inland wetlands decreases this negative impact. Constructing at least a 10- to 20-foot wide aquatic plant shelf in the wet basins is very beneficial.

Retention Basin 1 should be relocated off-stream so that the impact on the stream corridor is reduced. The maintenance access to Retention Basins 1 and 2 should be clarified. Maintenance access through an inland wetland may not be appropriate. A 25-foot buffer area is also recommended around wet basins for maintenance. This is not shown for Retention Basin 2. Maintenance of this basin could effect adjacent property owners.

Open Space Planning

The inland wetland setbacks (which include backyards), recreation facilities, parking lot and stormwater detention basins should not be included in measuring the open space proposed for the site (calculation shown on Sheet L3, 10-2-89). These areas are being used. They are not open space. Walking trails should not be constructed around the wetland areas. These areas have already been disturbed due to construction and further disturbance is not recommended. The open space areas will provide some privacy between homes and reduce noise, if left in wooded vegetation.

Wildlife Recommendations

Approximately 50% of this development does not occur within the Nepaug River Watershed. Some commendable efforts are being made by the developers to reduce the impact on the environment, including:

1) Approximately 18.8 acres of proposed open space;

2) A 50-foot buffer of undeveloped area placed around the perimeter of the property;

3) A 300-foot set back from the road; and

4) An effort to locate wetland crossings at previously disturbed and filled sites.

From a wildlife perspective there are disturbing factors to consider on this property, including:

1) RRC zoning would allow 435 housing units on the property as opposed to 278 units at R-15. The proposed R-25 zone would allow approximately 166 units. The value of cluster developments is to significantly reduce the disturbance to the environment by keeping the number of housing units the same as before zone change, but on fewer acres. This allows the remainder of the site to stay as open space. The RRC zone as currently planned and administered does not protect wildlife habitat.

2) Detention basins are located within wetlands and are not designed to retain silt.

3) Significant acreage of quality upland wildlife habitat will be lost. This site has a good distribution of open fields, old fields and quality woodland. Using Appendix E, compare these habitats to that on suburban areas.

4) Small open space areas such as those proposed in this development are of greater value to wildlife, if they are contiguous within the development and with other open space parcels on surrounding properties. Open space areas are of greatest value when a substantial acreage (>100 acres) is tied together and managed as 1 unit by 1 organization.

5) The developer intends to place housing units on steep slopes and shallow to bedrock areas at a very high density. Runoff from these areas will carry quantities of silt and perhaps larger particles into the Nepaug River Watershed and Cedar Swamp. These areas should be included in the open space, or the housing density should be reduced.

BLINKOFF PROPERTY

No development is currently proposed for this property. Most of the site is within the Nepaug River Watershed. Any future development should be planned at densities far below RRC, unless total units do not exceed zoning and substantial open space is left undisturbed. The stream, adjacent riparian zone and steep slopes should remain undisturbed as open space. The open fields found on this property are valuable to wildlife because they are isolated from roads and heavy public use.

WHITE BIRCH ESTATES

Soils

A soils map and report was prepared by Soil Science Services of Cheshire, CT. This soils report gives an adequate description of the soils on-site. Further information on these soils is found in the Soil Survey of Litchfield County. Appendix B contains a summary of soil characteristics.

The steep slopes are the dominant soil limitation to building homes on this site. Slope is most limiting on the northeastern leg of the property. Site specific land grading plans must be reviewed carefully to determine lot and E&S control feasibility in steep areas.

The Paxton and Woodbridge soils have a very dense hardpan layer at about 18 to 24 inches in depth. Cut slopes will seep along this layer, making slopes difficult to stabilize. Subsurface drainage or structural bank stabilization methods can be used to control erosion.

Numerous inland wetland crossings are proposed in the Lg soil. Alternative development proposals which have less impact on the inland wetlands should be reviewed.

The open space for recreation is mapped as being approximately 1/2 Wx and 1/2 Lg soils. No recreation facilities should be proposed on the Lg soil, leaving the inland wetlands undisturbed. The bridge proposed across the stream into the wetland should be omitted. The proposed swing sets and picnic tables are appropriate on the Wx soil type. However, because of seasonal wetness, recreational use is limited.

The Pm soil type is a unique inland wetland because of its organic soil. This inland wetland should be left in its natural state with no lake constructed. Lake construction will change the wetland type and destroy many of the significant features of this wetland. The proposed plan is to dredge all organic soil from the lake

site. If any organic soil remains, floating organic deposits and brown discolored water are likely.

Any areas of Pb or Wx soil on 0-8% slopes are classed as "Prime Farmland." On 8-15% slopes these soils are classed as "Important Farmland."

Erosion and Sediment Control

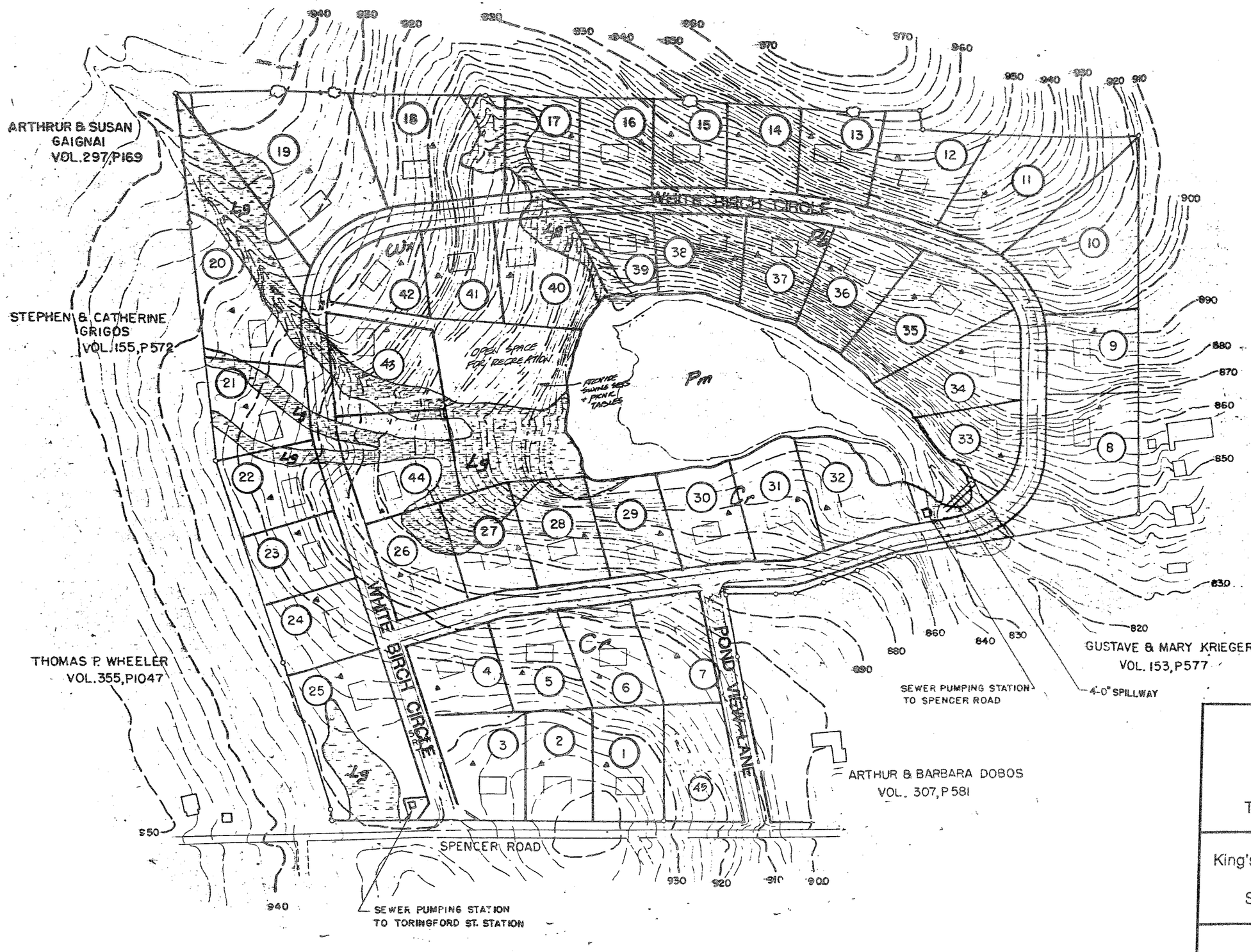
An E&S control plan has been prepared for this site. This E&S control plan is generally not adequate for the site. The E&S narrative states phased construction might be done at the discretion of the developers. Phased construction of the site is strongly recommended as a required part of the E&S control plan. The steep slopes and proximity to wetlands make phased construction essential to E&S controls.

There are numerous areas where regraded slopes proposed are steeper than 2:1 slopes. No bank stabilization methods are proposed for these areas. Grass cannot hold slopes greater than 2:1. On slopes 1 1/2 or 2:1, rock rip-rap or other structural measures should be used to stabilize slopes. On slopes steeper than 1 1/2:1, rip-rap cannot be used because rock will not be stable. At the junction of Pond View Lane and White Birch Circle, the 1:1 rip-rapped slope proposed is not recommended. A structural retaining wall may be needed in this area.

Mulch should be applied to all disturbed slopes of 2:1 or greater. Mulching fabric (such as jute netting) should be applied to all disturbed slopes greater than 30 feet in length, unless stabilized with rock or other structural measures. Additional sediment barriers are needed at numerous locations to protect the wetlands and adjacent property owners.

No grading setback is provided from the wetland/proposed lake and Lot 39. A natural vegetation buffer area is strongly recommended around this area, and City setback regulations from wetlands should be followed for buffer distances.

Figure 17



Information from White Birch Estates, Wetlands and Soils Data by Bernard Bisson, PE.

NEPAUG RIVER WATERSHED

TORRINGTON, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 200'

White Birch Estates

No details were supplied with the E&S control plan for review. E&S details are required in the plan. These details should include design details for the diversion swales located on Sheet 7 of 21 (6/18/87). If not designed and installed correctly, these swales are high potential gully erosion sites. The diversion swale along Lots 18 and 19 will bring additional water into the streamcourse on Lots 17 and 18. This may cause the streamcourse to erode and should be investigated further.

Once a revised E&S control plan has been prepared, the City can have the Litchfield County Soil and Water Conservation District review the plan, if needed.

Stormwater Management

The proposed lake is also a proposed stormwater detention system. No information was provided for pre- and post-development runoff flows from the site, the desired storm frequencies or how the lake (only 2 feet difference between top of riser and top of spillway) will detain water. This information should be clarified.

Alternative upland sites are recommended for stormwater detention. For water quality purposes, the small frequency storms (less than 1-year frequency) should be detained. To prevent downstream bank erosion, the 1- to 2-year storm frequency peak runoff should not increase after the site is developed.

The engineering adequacy of the dam design was not reviewed.

Wildlife Recommendations

This development is likely to have significant negative impact on wildlife habitat on-site and downstream. Substantial acreage is in either steep slopes or wetlands. The open space is being developed for recreation. A natural wetland altered into a retention basin is of little value to wildlife when surrounded by houses. Siltation will be a significant problem during construction, especially on steep slopes. The negative impacts could be reduced by:

1) Reducing the number of units;

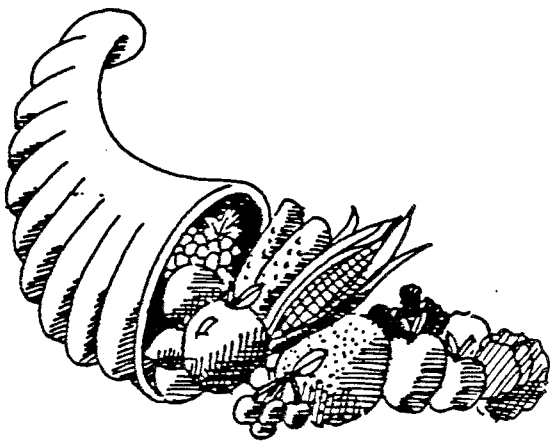
2) Increasing the lot size to at least 1/2 acre;

3) Eliminating all disturbance on steep slopes;

4) Leaving the major wetland, a 100-foot undisturbed buffer around it and the outflow stream and slopes north of that wetland as open space; and

5) Reducing runoff and silt on upland sites.

APPENDICIES



Appendix A: Sanitation of Watersheds

SANITATION OF WATERSHEDS

Sec. 19-13-B32. Sanitation of Watersheds. Unless specifically limited, the following regulations apply to land and watercourses tributary to a public water supply including both surface and ground water sources.

(a) As used in this section, "sewage" shall have the meaning found in section 19-13-B20(a) of the public health code: "Toxic metals" shall be arsenic, barium, cadmium, chromium, lead, mercury and silver and the salts thereof; "high water mark" shall be the upper limit of any land area which water may cover, either standing or flowing, at any time during the year and "watershed" shall mean land which drains by natural or man-made causes to a public drinking water supply intake.

(b) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located within one hundred feet of the high water mark of any reservoir or within fifty feet of the high water mark of any stream, brook, or watercourse, flowing into any reservoir for drinking purposes.

(c) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located on any watershed, unless such facility is so constructed that no portion of the contents can escape or be washed into the stream or reservoir.

(d) No sewage shall be discharged on the surface of the ground on any watershed.

(e) No stable, pigpen, chicken house or other structure where the excrement of animals or fowls is allowed to accumulate shall be located within one hundred feet of the high water mark of a reservoir or within fifty feet of the high water mark of any watercourse as above mentioned, and no such structure shall be located on any watershed unless provision is made in a manner acceptable to the commissioner of health services for preventing manure or other polluting materials from flowing or being washed into such waters.

(f) No toxic metals, gasoline, oil or any pesticide shall be disposed of as a waste into any watercourse tributary to a public drinking water supply or to any ground water identified as supplying a public water supply well.

(g) Where fertilizer is identified as a significant contributing factor to nitrate nitrogen occurring in excess of 8mg/l in a public water supply, fertilizer application shall be made only under current guidelines established by the commissioner of health in cooperation with the state commissioner of

agriculture, the college of agriculture of the University of Connecticut and the Connecticut agricultural experiment station in order to prevent exceeding the maximum allowable limit in public drinking water of 10.0 mg/l for nitrite plus nitrate nitrogen.

(h) Where sodium occurs in excess of 15 mg/l in a public drinking water supply, no sodium chloride shall be used for maintenance of roads, driveways or parking areas draining to that water supply except under application rates approved by the commissioner of health, designed to prevent the sodium content of the public drinking water from exceeding 20 mg/l.

(i) The design of storm water drainage facilities shall be such as to minimize soil erosion and maximize absorption of pollutants by the soil. Storm water drain pipes, except for crossing culverts, shall terminate at least one hundred feet from the edge of an established watercourse unless such termination is impractical, the discharge arrangement is so constructed as to dissipate the flow energy in a way that will minimize the possibility of soil erosion, and the commissioner of.health finds that a discharge at a lesser distance is advantageous to stream quality. Special precautions shall be taken to protect stream quality during construction.

Appendix B: Soil Limitations Chart

TABLE 1: SOIL SYMBOLS AND MAPPING UNIT NAMES

Soil Symbol	Soil Mapping Unit Name
Am	Alluvial land
CaA	Charlton fine sandy loam, 0-3% slopes
CaB	Charlton fine sandy loam, 3-8% slopes
CaB2	Charlton fine sandy loam, 3-8% slopes, eroded
CaC	Charlton fine sandy loam, 8-15% slopes
CaC2	Charlton fine sandy loam, 8-15% slopes, eroded
CaD	Charlton fine sandy loam, 15-25% slopes
CaE	Charlton fine sandy loam, 25-35% slopes
ChB	Charlton stony fine sandy loam, 3-8% slopes
ChC	Charlton stony fine sandy loam, 8-15% slopes
ChD	Charlton stony fine sandy loam, 15-25% slopes
CrC	Charlton very stony fine sandy loam, 3-15% slopes
CrD	Charlton very stony fine sandy loam, 15-35% slopes
HoC	Hollis rocky fine sandy loam, 3-15% slopes
HrC	Hollis very rocky fine sandy loam, 3-15% slopes
HrE	Hollis very rocky fine sandy loam, 15-35% slopes
Lg	Leicester, Ridgebury and Whitman very stony fine sandy loam
PbA	Paxton fine sandy loam, 0-3% slopes
PbB	Paxton fine sandy loam, 3-8% slopes
PbB2	Paxton fine sandy loam, 3-8% slopes, eroded
PbC	Paxton fine sandy loam, 8-15% slopes
PbC2	Paxton fine sandy loam, 8-15% slopes, eroded
PbD	Paxton fine sandy loam, 15-25% slopes
PbD2	Paxton fine sandy loam, 15-25% slopes, eroded
PbE	Paxton fine sandy loam, 25-35% slopes
PdB	Paxton stony fine sandy loam, 3-8% slopes
PdC	Paxton stony fine sandy loam, 8-15% slopes
PdD	Paxton stony fine sandy loam, 15-25% slopes
PeA	Paxton very stony fine sandy loam, 0-3% slopes
PeC	Paxton very stony fine sandy loam, 3-15% slopes

Soil Symbol	Soil Mapping Unit Name
PeD	Paxton very stony fine sandy loam, 15-35% slopes
Pk	Peat and Muck
Pm	Muck, shallow
Rd	Ridgebury fine sandy loam
Rg	Ridgebury stony fine sandy loam
Sf	Scarboro loamy fine sand
SpB	Stockbridge stony loam, 3-8% slopes
SrD	Stockbridge very stony loam. 15-35% slopes
SxA	Sutton very stony fine sandy loam, 0-3% slopes
Wl	Walepole and Raynhnam soils
Wp	Whitman stony fine sandy loam
WxA	Woodbridge fine sandy loam, 0-3% slopes
WxB	Woodbridge fine sandy loam, 3-8% slopes
WxC	Woodbridge fine sandy loam, 8-15% slopes
WyA	Woodbridge stony fine sandy loam, 0-3% slopes
WyB	Woodbridge stony fine sandy loam, 3-8% slopes
WyC	Woodbridge stony fine sandy loam, 8-15% slopes
WzA	Woodbridge very stony fine sandy loam, 0-3% slopes
WzC	Woodbridge very stony fine sandy loam, 8-15% slopes

TABLE 2: SOIL CHARACTERISTICS IMPORTANT TO DEVELOPMENT

Soil Symbol	Permeability (in/hr)	K	Corrosivity to Steel	Corrosivity to Concrete	Flooding	Water Table Depth (ft)	Water Table Kind	High Water Months	Depth to Rock (in)	Frost Action
Am	0.6-6.0	0.20	high	high	frequent	0-1.5	apparent	Sep-Jun	>60	high
CaA	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaB	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaB2	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaC	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaC2	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaD	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
CaE	0.6-6.0	0.24	low	high	none	>6.0	---	---	>60	low
ChB	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
ChC	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
ChD	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
CrC	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
CrD	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
HoC	0.6-6.0	0.17	low	high	none	>6.0	---	---	10-2	mod
HrC	0.6-6.0	0.17	low	high	none	>6.0	---	---	10-20	mod
HrE	0.6-6.0	0.17	low	high	none	>6.0	---	---	10-2	mod
Lg	0.6-6.0	0.20	low	high	none	0-1.5	apparent	Nov-May	>60	high
PbA	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbB	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbB2	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbC	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbC2	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbD	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbD2	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbE	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PdB	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PdC	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PdD	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod

Soil Symbol	Permeability (in/hr)	K	Corrosivity to Steel	Corrosivity to Concrete	Flooding	Water Table Depth (ft)	Water Table Kind	High Water Months	Depth to Rock (in)	Frost Action
PeA	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PeC	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PeD	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
Pk	0.2-6.0	-0-	high	low	none	+0.5-1.0	apparent	Sep-Jun	>60	high
Pm	0.2-6.0	-0-	high	mod	none	+1.0-1.0	apparent	Nov-May	>60	high
Rd	0.6-6.0	0.24	high	high	none	0-1.5	perched	Nov-May	>60	high
Rg	0.6-6.0	0.20	high	high	none	0-1.5	perched	Nov-May	>60	high
Sf	6.0-20	0.17	high	high	none	+1.0-1.0	apparent	Jan-Dec	>60	high
SpB	0.6-2.0	0.24	mod	low	none	>6.0	---	---	>60	mod
SrD	0.6-2.0	0.24	mod	low	none	>6.0	---	---	>60	mod
SxA	0.6-6.0	0.20	low	high	none	1.5-2.5	apparent	Nov-Apr	>60	high
Wl	2.0-6.0	0.20	low	mod	none	0-1.0	apparent	Nov-May	>60	high
Wp	0.6-6.0	0.28	high	high	none	+1.0-0.5	perched	Sep-Jun	>60	high
WxA	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WxB	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WxC	0.6-2.0	0.24	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WyA	0.6-2.0	0.20	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WyB	0.6-2.0	0.20	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WyC	0.6-2.0	0.20	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WzA	0.6-2.0	0.20	low	mod	none	1.5-2.5	perched	Nov-May	>60	high
WzC	0.6-2.0	0.20	low	mod	none	1.5-2.5	perched	Nov-May	>60	high

--- no data available

K - Erodibility Factor
- .10-.24 - Low Erodibility
- .28-.37 - Medium Erodibility
- .43-.64 - High Erodibility

Flooding Classes
- None
- Occasional
- Common
- Frequent

TABLE 3: MAJOR SOIL LIMITATIONS FOR DEVELOPMENT

Soil Symbol	Septic System	Excavations	Dwellings	Basements	Commercial	Roads	Lawns	Fill	Ponds
Am	C-7,2,3	C-5,2	C-7,2	C-7,2	C-7,2	C-2,7,8	C-2,7	C-2	C-5
CaA	A	A	A	A	A	A	A	A	C-11
CaB	A	A	A	A	B-9	A	A	A	C-11
CaB2	A	A	A	A	B-9	A	A	A	C-11
CaC	B-9	B-9	B-9	B-9	B-9	B-9	B-9	A	C-11
CaC2	B-9	B-9	B-9	B-9	B-9	B-9	B-9	A	C-11
CaD	C-9	C-9	C-9	C-9	C-9	C-9	C-9	B-9	C-11
CaE	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
ChB	A	A	A	A	B-9	A	B-16	A	C-11
ChC	B-9	B-9	B-9	B-9	C-9	B-9	B-16,9	A	C-11
ChD	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
CrC	B-9	B-9	B-9	B-9	C-9	B-9	B-16,9	A	C-11
CrD	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
HoC	C-15	C-15	C-15	C-15	C-15	C-15	C-15	C-23,15	C-11
HrC	C-15	C-15	C-15	C-15	C-15,9	C-15	C-15	C-23,15	C-11
HrE	C-15,9	C-15,9	C-9,15	C-15,9	C-9,15	C-15,9	C-9,15	C-23,15,9	C-11
Lg	C-2	C-2	C-2	C-2	C-2	C-2,8	C-2	C-2	B-18
PbA	C-6	B-13,2	B-2	B-2	B-2	B-2	A	A	C-11
PbB	C-6	B-13,2	B-2	B-2	B-2,9	B-2,8	A	A	C-11
PbB2	C-6	B-13,2	B-2	B-2	B-2,9	B-2,8	A	A	C-11
PbC	C-6	B-13,2	B-2,9	B-2,9	C-9	B-2,9,8	B-9	A	C-11
PbC2	C-6	B-13,2	B-2,9	B-2,9	C-9	B-2,9,8	B-9	A	C-11
PbD	C-6,9	C-9	C-9	C-9	C-9	C-9	C-9	B-9	C-11
PbD2	C-6,9	C-9	C-9	C-9	C-9	C-9	C-9	B-9	C-11
PbE	C-6,9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
PdB	C-6	C-13,2	B-2	B-2	B-2,9	B-2,8	B-16	A	C-11
PdC	C-6	C-13,2,9	B-2,9	B-2,9	C-9	B-2,9,8	B-16,9	A	C-11
PdD	C-6,9	C-9	C-9	C-9	C-9	C-9	C-96	B-9	C-11
PeA	C-6	C-13,2	B-2	B-2	B-2	B-2,8	B-16	A	C-11

Soil Symbol	Septic System	Excavations	Dwellings	Basements	Commercial	Roads	Lawns	Fill	Ponds
PeC	C-6	B-13,2,9	B-2,9	B-2,9	C-9	B-2,9,8	B-16,9	A	C-11
PeD	C-6,9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
Pk	C-12,4,6	C-14,4	C-12,4,10	C-12,4,10	C-12,4,10	C-12,4,8	C-4,14	C-2	C-18
Pm	C-12,4	C-14,12	C-12,4,10	C-12,4,10	C-12,4,10	C-4,8,12	C-4,14	C-2	C-18
Rd	C-6,2	C-2	C-2	C-2	C-2	C-2,8	C-2	C-2	C-11
Rg	C-6,2	C-2	C-2	C-2	C-2	C-2,8	C-2	C-2	C-11
Sf	C-4,3	C-5,14,4	C-4	C-4	C-4	C-4,8	C-4	C-2	C-5
SpB	C-6	A	A	A	B-9	B-10,8	B-16	B-10	C-11
SrD	C-9,6	C-9	C-9	C-9	C-9	C-9	C-9	B-9,10	C-11
SxA	C-2	C-2	B-2	C-2	B-2	C-8	B-16,2	B-2	B-18
Wl	C-2,3	C-5,2	C-2	C-2	C-2	C-2,8	C-2	C-2	C-5
Wp	C-6,4	C-4	C-4	C-4	C-4	C-4,8	C-4	C-2	C-11
WxA	C-2,6	C-2	B-2	C-2	B-2	C-8	B-2	B-2	C-2
WxB	C-2,6	C-2	B-2	C-2	B-2,9	C-8	B-2	B-2	C-2
WxC	C-2,6	C-2	B-2,9	C-2	C-9	C-8	B-2,9	B-2	C-2
WyA	C-2,6	C-2	B-2	C-2	B-2	C-8	B-16,2	B-2	C-11
WyB	C-2,6	C-2	B-2	C-2	B-2,9	C-8	B-16,2	B-2	C-11
WyC	C-2,6	C-2	B-2,9	C-2	C-9	C-8	B-16,2,9	B-2	C-11
WzA	C-2,6	C-2	B-2	C-2	B-2	C-8	B-16,2	B-2	C-11
WzC	C-2,6	C-2	B-2,9	C-2	C-9	C-8	B-16,2,9	B-2	C-11

--- no data available

Degree of Limitations

A - Soil properties and site features are generally favorable for indicated use, and limitations are easily overcome.

B - Soil properties are not favorable for indicated use, and special planning, design or maintenance is needed.

C - Soil properties or site features are so unfavorable to overcome that special design, increases in cost and possibly increased maintenance are required.

Types of Limitations

1 Seepage	2 Wetness	3 Poor Filter	4 Ponding	5 Banks Cave	6 Slow Perc
7 Flooding	8 Frost Action	9 Slope	10 Low Strength	11 No Water	12 Subsides
13 Dense Layer	14 Humus	15 Shallow Depth	16 Large Stone	17 Small Stone	18 Slow Refill
19 Piping	20 Dam Seepage	21 Erosion	22 Droughty	23 Area Reclaim	

Appendix C: Chapter 4 - Guidelines for Soil Erosion and Sediment Control

Chapter 4

REQUIREMENTS FOR SOIL EROSION AND SEDIMENT CONTROL PLANS

Chapter 4 - REQUIREMENTS FOR SOIL EROSION AND SEDIMENT CONTROL PLANS

A. DEFINITION OF PLAN

An erosion and sediment control plan is a document which explains and illustrates the measures which will be taken to control erosion and sediment problems on construction sites. The plan has a written portion known as a narrative and an illustrative portion known as a map or site plan.

A plan is defined in PA 83-388 of 1983 as follows:

> Sec. 3 (5) "Soil erosion and sediment control plan" means a scheme that minimizes soil erosion and sedimentation and includes but is not limited to a map and narrative. The map shall show topography, cleared and graded areas, proposed area alterations and the location of and detailed information concerning erosion and sediment measures and facilities. The narrative shall describe the project, the schedule of major activities on the land, the application of conservation practices, design criteria, construction details and the maintenance program for any erosion and sediment control facilities that are installed;"

B. PLAN FORMAT

The soil erosion and sediment control plan should be an integral part of the overall site plan. However, it needs to be consolidated, so it can be separated from the site plan for review and certification.

To facilitate plan review, certification and implementation, and the construction inspection process, the following format is suggested:

1. The information needed for construction should be on the construction drawings and not in the design calculations or background information.

2. The construction drawings should all be the same size sheets.

3. The soil erosion and sediment control measure construction drawings should be a part of the overall construction drawings for the project.

4. The construction details for measures should be shown on a separate sheet from the plan view sheets.

5. The stages of development, sequence of major operations on the land, and maintenance program during construction are in the narrative portion of the plan but also should be on the construction drawings.

6. General information about the project and design calculations should be in the narrative portion with the exception of a small, simple plan.

7. The design calculations should be in the narrative separate from the construction drawings. Design calculations are normally not needed for inspection, but design calculations need to be available in case revisions are necessary during construction.

8. The background information should be in the narrative separate from the construction drawings.

C. PLAN OUTLINE

The plan must include the items required by the law as given above. The items following include those required by the law and other items that should be considered when developing the plan and included in the plan if appropriate.

This plan outline should not be used as a basis for plan approval. It is intended to be of assistance in preparing and approving erosion and sediment control plans, and to be a reminder of major items that usually need to be considered when developing a plan.

1. VICINITY MAP

a. Project location
b. Roads, streets
c. North arrow
d. Scale
e. Major drainageways
f. Major land uses of surrounding areas

2. PROJECT FEATURES

a. Property lines
b. Limit and acreage of development application
c. Limit and acreage of disturbed area
d. North arrow
e. Scale
f. Legend
g. Planned and existing roads and buildings with their location and elevations
h. Land use of surrounding areas
i. Access roads; temporary and permanent

3. NATURAL FEATURES

a. Soils
b. Rock outcrops
c. Seeps, springs
d. Inland and coastal wetlands
e. Floodplains
f. Streams, lakes, ponds, drainageways, dams
g. Existing vegetation
h. Natural features of adjacent areas

4. TOPOGRAPHIC FEATURES

a. Contours; present and planned (normally 2 foot intervals)
b. Areas of cut or fill
c. Planned grades and slope steepness

5. DRAINAGE SYSTEM

a. Existing and planned drainage pattern
b. Existing and planned drainage area map (include off-site areas that drain through project)
c. Size of drainage areas
d. Size and location of culverts and storm sewers
e. Design calculations and construction details for culverts, storm sewers, etc.
f. Size and locations of existing and planned channels or waterways with design calculations and construction details to control erosion of the channel or waterway
g. Existing peak flows with calculations
h. Planned peak flows with calculations
i. Changes in peak flows
j. Off-site effects of increased peak flows or volumes
k. Measures with design calculations and construction details to control off-site erosion caused by the project
l. Survey and soil information below culverts and storm sewer outlets
m. Measures with design calculations and construction details to control erosion below culverts and storm sewer outlets
n. Measures with design calculations and construction details to control groundwater, i.e. seeps, high water table, etc.

6. UTILITY SYSTEM

a. Location of existing and planned septic systems
b. Location and size of existing and planned sanitary sewers
c. Location of other existing and planned utilities, telephone, electric, gas, etc.

7. CLEARING, GRADING, VEGETATIVE STABILIZATION

a. Areas to be cleared, staging and sequence of clearing
b. Disposal of cleared material
c. Areas to be graded, staging and sequence of grading
d. Areas and acreage to be vegetatively stabilized
e. Planned vegetation with details of plants, seed, mulch, fertilizer, planting dates, etc.
f. Temporary erosion protection of disturbed areas
g. Temporary erosion protection when time of year or weather prohibit establishment of permanent vegetative cover

8. EROSION CONTROL MEASURES

a. Construction drawings and details for temporary and permanent measures
b. Design calculations
c. Maintenance requirements of measures during construction of project
d. Person responsible for maintenance during construction of project
e. Maintenance requirements of permanent measures when project is complete
f. Organization or person responsible for maintenance of permanent measures when project is complete

9. NARRATIVE

a. Nature, purpose and description of project
b. Potentially serious erosion or sediment problems
c. The stages of development if more than one stage is planned
d. The sequence of major operations on the land, such as installation of erosion control measures, clearing, grading, temporary stabilization, road base, road paving, building construction, permanent stabilization, removal of temporary erosion control measures
e. The time required for the major operations identified in the sequence
f. The planned dates for the project. These are often subject to change depending on markets, financing and permit approvals, therefore the sequence of all major operations and time required for major operations is more important in minimizing erosion and sediment problems.

Appendix D: DEP Correspondence

FILE 7/21/89

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WILDLIFE BUREAU
ROOM 254

July 19, 1989

Mr. Raymond Hubert
Torrington Inland-Wetland Commission
City Hall
140 Main Street
Torrington, CT 06790

Re: Subdivision Plan for Cedar Hill

Dear Chairman Hubert:

The Wildlife Bureau of the Department of Environmental Protection has taken substantial interest in the wetlands known as Cedar Swamp located in Torrington and New Hartford, along Cedar Swamp Road.

In 1985, the DEP formed an agreement with Ducks Unlimited, a private, nonprofit organization dedicated to conserving wetland habitat for waterfowl and other wildlife, in order to participate in D.U.'s M.A.R.S.H. program. M.A.R.S.H. is an acronym for "Matching Aid to Restore States Habitat" and the program provides money for wetland acquisition and/or enhancement to state fish and wildlife agencies based on DU's income within that state.

After a statewide search, the Cedar Swamp Area in New Hartford was identified and approved by DEP and DU as a M.A.R.S.H. project site. The particular area was chosen for many values including the extent of wetland wildlife habitat and diversity of wildlife species, potential for further enhancing wildlife by implementing various wildlife management techniques, its value as it forms the headwaters of the Nepaug River, potential for wildlife based recreational use, and its scenic and aesthetic amenities. The State of Connecticut and Ducks Unlimited have recently purchased a 57.53 acre tract in Cedar Swamp formerly owned by Amelia M. Marsh. This is the first DU M.A.R.S.H. project to be dedicated in the State of Connecticut. The property has been designated as a Wildlife Management Area and will be managed to enhance its value to wildlife and wildlife users.

The DEP has hopes of protecting this Wildlife Area from encroachment by development through additional acquisitions and/or management agreements with landowners in the immediate area. This wetland is virtually undisturbed except for Cedar Swamp Road and the immediate limited number of roadside houses.

Phone: 566-4683

As other developments are being built within this watershed, additional run-off into Cedar Swamp is certain to occur as a result. The cumulative effect of additional developments will have a negative impact on the wetlands of Cedar Swamp. Enforcement of best management practices for sediment and erosion control on several developments in the north end of Torrington have not prevented erosion or sedimentation of the Still River. For this reason, we have concerns with the current plan for the Cedar Hill subdivision.

The Cedar Hill plan as proposed, admirably, is prepared to donate 43.9 acres as open space. The extreme density of R-6 zoning is also offset somewhat by sewer and water supplied by the Torrington sewer and water system. However, storm run-off for housing at this density will add additional flows to Cedar Swamp. Calculations and plans submitted by the developer should be carefully reviewed. Planning for the 25-year flood conditions is inadequate for high-density development. The cumulative downstream effect of many high-density developments in the area is of great concern. Not only will this proposed development negatively impact the wildlife and wildlife habitat, but it will once again urbanize another remote and "wild" portion of our state. This plan will also impact the State of Connecticut's ability to expand on its wildlife Management Area in order to protect and ensure its availability for wildlife and future generations to enjoy.

Our recommendations relative to this proposal include (1) Planning storm drainage for at least the 50-year flood. (2) A 50 ft. buffer zone between property lines and wetlands. (3) Eliminate from the proposal the units located on the high ground surrounded by wetlands (Lots 64-78). (4) Donate the open space to the State of Connecticut as an addition to the state-owned Cedar Swamp Wildlife Management Area. This will insure uniform planning and habitat management practices for the benefit of the natural resources of Cedar Swamp. (5) Implementation and enforcement of "Best Management Practices" for erosion and sedimentation control that will prevent damage to Cedar Swamp.

Thank you for the opportunity to offer comments on the Cedar Hill subdivision proposal.

Sincerely,

Dennis P. DeCarli
Deputy Commissioner

DPD:POB/mg

Appendix E: Species List by Habitat for Litchfield County

CONNECTICUT SPECIES DATABASE
WILDLIFE BUREAU
WESTERN DISTRICT HEADQUARTERS

SPECIES LIST BY HABITAT FOR LITCHFIELD COUNTY

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Marbled Salamander	X										
Jefferson Salamander	X		X						X		X
Blue-spotted Salamander							X				X
Spotted Salamander	X		X				X				X
Red-spotted Newt	X							X	X		
Northern Dusty Salamander							X				X
Redback Salamander		X	X								
Four-toed Salamander											X
Northern Spring Salamander	X	X	X				X				X
Northern Two-lined Salamander	X	X	X								X
Eastern Spadefoot	X	X	X		X						
American Toad	X	X	X	X	X	X					
Fowler's Toad	X	X	X			X					X
Northern Spring Peeper	X	X	X				X		X	X	X
Greater and Lesser Gray Treefrog			X	X	X						
Green Frog								X	X	X	
Wood Frog	X	X	X								X
Northern Leopard Frog					X		X	X	X	X	X
Pickerel Frog							X	X	X		
Bull Frog								X	X	X	
Common Snapping Turtle									X		
Stinkpot								X	X		
Spotted Turtle							X	X	X		
Wood Turtle	X			X	X				X	X	X
Eastern Box Turtle	X	X		X	X					X	X
Eastern Painted Turtle								X	X		
Northern Water Snake							X				
Northern Brown Snake	X	X	X	X	X	X	X			X	X
Northern Redbelly Snake	X	X	X								X
Eastern Garter Snake	X	X	X	X	X	X	X			X	X
Eastern Ribbon Snake	X	X	X	X			X			X	X
Eastern Hognose Snake	X	X	X	X	X						X
Northern Ringneck Snake	X	X	X								
Eastern Worm Snake	X	X	X		X		X				X
Northern Black Racer	X	X	X	X	X				X	X	X
Eastern Smooth Green Snake	X				X				X	X	X

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Black Rat Snake	X		X	X	X						X
Eastern Milksnake	X	X	X	X	X					X	X
Northern Copperhead	X										X
Timber Rattlesnake	X	X	X								X
American Bittern									X		
Great Blue Heron							X		X		
Green-backed Heron (Green)							X		X	X	X
Black-crowned Night Heron							X		X	X	X
Canada Goose					X				X		
Wood Duck							X				X
American Black Duck							X		X	X	X
Mallard							X		X		X
Common Merganser							X				
Hooded Merganser											X
Turkey Vulture	X		X	X	X	X	X		X	X	X
Northern Harrier (Marsh Hawk)							X			X	X
Sharp-shinned Hawk	X	X	X	X	X						
Cooper's Hawk	X		X	X	X					X	X
Goshawk	X	X	X								
Red-shouldered Hawk	X		X	X							X
Broad-winged Hawk	X	X	X								
Red-tailed Hawk	X	X	X	X	X					X	X
American Kestrel				X	X	X					
Ring-necked Pheasant					X						
Ruffed Grouse	X		X		X						
Eastern Wild Turkey			X		X						
King Rail									X		
Virginia Rail									X		
Common Moorhen (Common Gallinule)							X		X		
Killdeer					X	X					
American Woodcock				X	X				X	X	
Rock Dove					X	X					
Mourning Dove	X	X	X	X	X	X					
Black-billed Cuckoo	X	X	X	X	X						
Yellow-billed Cuckoo	X	X	X	X	X					X	X
Screech Owl	X	X	X	X	X	X					
Great Horned Owl	X	X	X	X							X
Barred Owl	X	X	X								X
Long-eared Owl	X	X			X						X
Northern Saw-whet Owl	X	X	X								X
Whip-poor-will	X		X								
Chimney Swift						X					
Ruby-throated Hummingbird			X			X					X

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Belted Kingfisher									X	X	X
Red-bellied Woodpecker			X			X					
Yellow-bellied Sapsucker			X								
Downy Woodpecker			X	X		X					X
Hairy Woodpecker	X	X	X								X
Northern Flicker	X	X	X	X	X	X					
Pileated Woodpecker	X	X	X								X
Wood Pewee	X		X			X					
Willow Flycatcher				X	X						
Least Flycatcher	X			X	X						
Eastern Phoebe	X	X	X	X		X					
Great Crested Flycatcher	X		X	X							X
Eastern Kingbird				X	X					X	
Horned Lark					X						
Purple Martin						X					
Tree Swallow										X	X
Bank Swallow						X				X	
Barn Swallow						X					
Blue Jay	X	X	X			X					
Common Crow	X	X	X	X							
Common Raven							X				
Black-capped Chickadee	X	X				X					X
Tufted Titmouse	X		X			X					X
Red-breasted Nuthatch		X	X								
White-breasted Nuthatch	X		X			X					
Brown Creeper	X	X	X								X
Carolina Wren				X	X	X				X	
House Wren				X	X	X					X
Marsh Wren									X		
Winter Wren		X									X
Blue-gray Gnatcatcher	X		X				X			X	X
Eastern Bluebird				X	X					X	
Swainson's Thrush	X	X									
Hermit Thrush		X	X	X						X	X
Wood Thrush	X		X			X					X
American Robin	X			X	X	X					
Golden-crowned Kinglet		X		X							
Gray Catbird				X						X	
Northern Mockingbird				X	X	X					
Brown Thrasher				X	X						
European Starling					X	X					
White-eyed Vireo				X	X					X	
Solitary Vireo		X	X								

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Yellow-throated Vireo	X				X		X			X	X
Warbling Vireo	X		X								
Red-eyed Vireo	X					X					
Blue-winged Warbler				X	X						
Yellow Warbler					X		X			X	
Chestnut-sided Warbler			X	X	X						
Magnolia Warbler		X		X	X						
Black-throated Blue Warbler	X		X	X							
Yellow-rumped Warbler (Myrtle)		X		X				X			
Black-throated Green Warbler		X									
Blackburnian Warbler	X	X									X
Pine Warbler		X									
Cerulean Warbler	X						X				
Black-and-white Warbler	X		X								
American Redstart	X		X	X		X	X			X	
Worm-eating Warbler	X										
Ovenbird	X	X	X								
Northern Watertrush											X
Louisiana Waterthrush							X				X
Common Yellowthroat				X	X		X		X	X	
Hooded Warbler										X	
Canada Warbler	X	X	X				X			X	X
Yellow-breasted Chat					X					X	
Scarlet Tanager	X		X	X							X
Northern Cardinal				X	X	X					
Rose-breasted Grosbeak				X	X	X	X			X	
Indigo Bunting				X	X		X				
Rufous Sided Towhee				X	X						
Chipping Sparrow			X	X		X					
Field Sparrow				X	X						
Vesper Sparrow					X						
Savanna Sparrow					X						
Grasshopper Sparrow					X						
Henslow's Sparrow					X					X	
Song Sparrow					X	X			X	X	
Swamp Sparrow									X	X	
White-throated Sparrow				X	X	X					
Northern Junco		X	X	X	X		X				
Bobolink					X						
Red-winged Blackbird					X				X	X	
Eastern Meadowlark					X						
Common Grackle				X	X				X	X	
Brown-headed Cowbird	X	X		X		X					

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Orchard Oriole				X	X	X					
Northern Oriole (Baltimore)				X	X	X	X				
Purple Finch		X	X	X		X					
House Finch					X	X					
American Goldfinch				X	X					X	
Pine Siskin		X		X						X	
Evening Grosbeak		X									
House Sparrow						X					
Virginia Opossum	X		X			X	X				X
Masked Shrew	X	X									X
Water shrew							X		X	X	X
Smoky Shrew	X		X				X				
Long-tailed Shrew	X	X	X								
Short-tailed Shrew	X	X	X		X		X		X	X	
Least Shrew				X	X						
Hairy-tailed Mole	X		X	X	X						
Eastern Mole			X		X	X					
Star-nosed Mole			X		X		X		X	X	
Snowshoe Hare	X	X	X								
European Hare					X						
Eastern Chipmunk			X	X							
Woodchuck				X	X						
Little Brown Myotis			X			X	X				X
Silver-haired Bat	X	X	X								X
Eastern Pipistrelle	X	X	X				X				X
Red Bat	X	X	X	X							
Hoary Bat	X	X	X			X					
Eastern Cottontail	X	X	X	X	X	X				X	X
New England Cottontail	X	X	X	X	X					X	X
Grey Squirrel	X		X								
Red Squirrel	X	X	X								
Southern Flying Squirrel	X		X								
Northern Flying Squirrel			X								
Beaver							X		X		
Deer Mouse		X	X	X	X						
White-footed Mouse	X	X	X	X	X	X	X		X	X	
Boreal Red-backed Mouse	X	X	X	X							
Meadow Vole					X		X		X	X	X
Woodland Vole	X				X						
Muskrat									X		
Southern Bob Lemming	X		X		X				X		
Norway Rat						X					
House Mouse				X	X	X					

SPECIES	DW	CW	MXW	WE	OF	SA	RUP	PAB	PEM	PSS	PFO
Meadow Jumping Mouse				X	X				X	X	
Woodland Jumping Mouse	X	X					X		X		
Coyote				X	X						
Red Fox			X	X	X						
Gray Fox	X		X								X
Black Bear	X	X	X								X
Raccoon			X	X	X	X	X			X	
Short-tailed Weasel			X		X					X	
Long-tailed Weasel			X	X	X		X			X	
Mink							X			X	X
Fisher	X	X	X							X	X
Striped Skunk				X	X	X					
River Otter							X			X	X
Bobcat	X	X	X	X	X					X	X
White-tailed Deer	X	X	X	X	X					X	X

Habitat selections for Litchfield County

DW	Deciduous Woodland
CW	Coniferous Woodland
MXW	Mixed Woodland
WE	Woodland Edge
OF	Old Fields
SA	Suburban Areas
RUP	Riverine Upper Perennial Wetland
PAB	Palustrine Aquatic Bed
PEM	Palustrine Emergent Wetland
PSS	Palustrine Scrub/shrub Wetland
PFO	Palustrine Forested Wetland

Appendix F: Preference List of Deer Foods

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WILDLIFE BUREAU
INFORMATIONAL SERIES

PREFERENCE LIST OF DEER FOODS

Preferred Winter Foods	Readily Eaten
Cedar, white or arbor vitae	Greenbrier
Yew	Ash, white or black
Apple	Maple, sugar
Sassafras	Arrowwood, maple leaved
Maple, mountain	Oaks*
Wintergreen	Grape, wild
Maple, striped	Birch, yellow and black
Dogwood, alternate leaved	Chestnut
Dogwood, flowering	Hickory
Sumac, staghorn	Cherry, choke
Maple, red	Cherry, black
Witch Hobble	Witch hazel
Basswood	Spice bush
Elderberry	Elm
Elder, red berried	Chokeberry, black
Ash, mountain	Honeysuckle, bush
Cucumber tree	Walnut, black
Cranberry, highbush	Butternut
Nannyberry	Hazelnut
Arbutus	Juneberry or shadbush
Honeysuckle, Japanese	Blueberry, low sweet
Honeysuckle	Blueberry, sourtop or low bush
Hemlock	Leatherwood
Wild raisin	
Blueberry, highbush	
Dogwood, silky	
Dogwood, red-osier	
Dogwood, round-leaved	
Willow*	

Other Choices

Lespedeza
Snowberry
Black gum
Snakeweed
Bearberry
Wild rose
Crabapple
Coralberry
Honey locust
Lady's tobacco
Plantain
Strawberry
Speedwell
Poison-ivy
Mints
Goldenrod
Pussytoes
Aster
Teaberry
Acorn

Preferred Spring Foods

May hawthorn
Clover
Alfalfa
Cinquefoil
Dandelion
Corn
Trefoils
Sunflower
Pokeweed
Jewelweed
New Jersey tea
Bitterbush
Serviceberry
Big and little bluestem
Curly Mesquite
Tall dropseed
Magnolia
Big leaf gallberry

Preferred Summer Foods

Blackberry
Ferns
Mushrooms
Bluegrass
Wheatgrass
Black-eyed Susan
Soybean
Wild hydrangea
Cabbage palm

Preferred Autumn Foods

Acorns
Oxalis
Plains lovegrass
Whorled nodviolet
Mat euphorbia
Arrowleaf sida
Creeping blueberry
Palmetto berry
Wild grape
Bittersweet
Red Raspberry

*There is considerable difference in palatability or preference of the different species of this genus. They vary from this point to very low.

Appendix G: Suitable Planting Materials for Wildlife Food and Cover

SUITABLE PLANTING MATERIALS FOR WILDLIFE FOOD AND COVER

Herbaceous/Vines	Shrubs	Small Trees
Panicgrass	Sumac	Hawthorn
Timothy	Dogwood	Cherry
Trumpet creeper	Elderberry	Serviceberry
Grape	Winterberry	Cedar
Birdsfoot trefoil	Autumn olive	Crabapple
Virginia creeper	Blackberry	
Switchgrass	Raspberry	
Lespedeza	Honeysuckle	
Bittersweet	Cranberrybush	
Boston ivy		

NOTES

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, 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 and/or developers 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 and/or developers in the review of sites proposed for major land use activities. 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 recreational/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 land owner/ developer allowing the Team to enter the property for purposes of review and a statement identifying the specific areas of concern the Team should investigate. When this request is approved by the local Soil and Water Conservation District and King's Mark RC&D Executive Committee, the Team will undertake the review. At present, the ERT can undertake approximately two (2) reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil and Water Conservation District or Nancy Ferlow, ERT Coordinator, King's Mark Environmental Review Team, King's Mark RC&D Area, 322 North Main Street, Wallingford, Connecticut 06492. King's Mark ERT phone number is 265-6695.