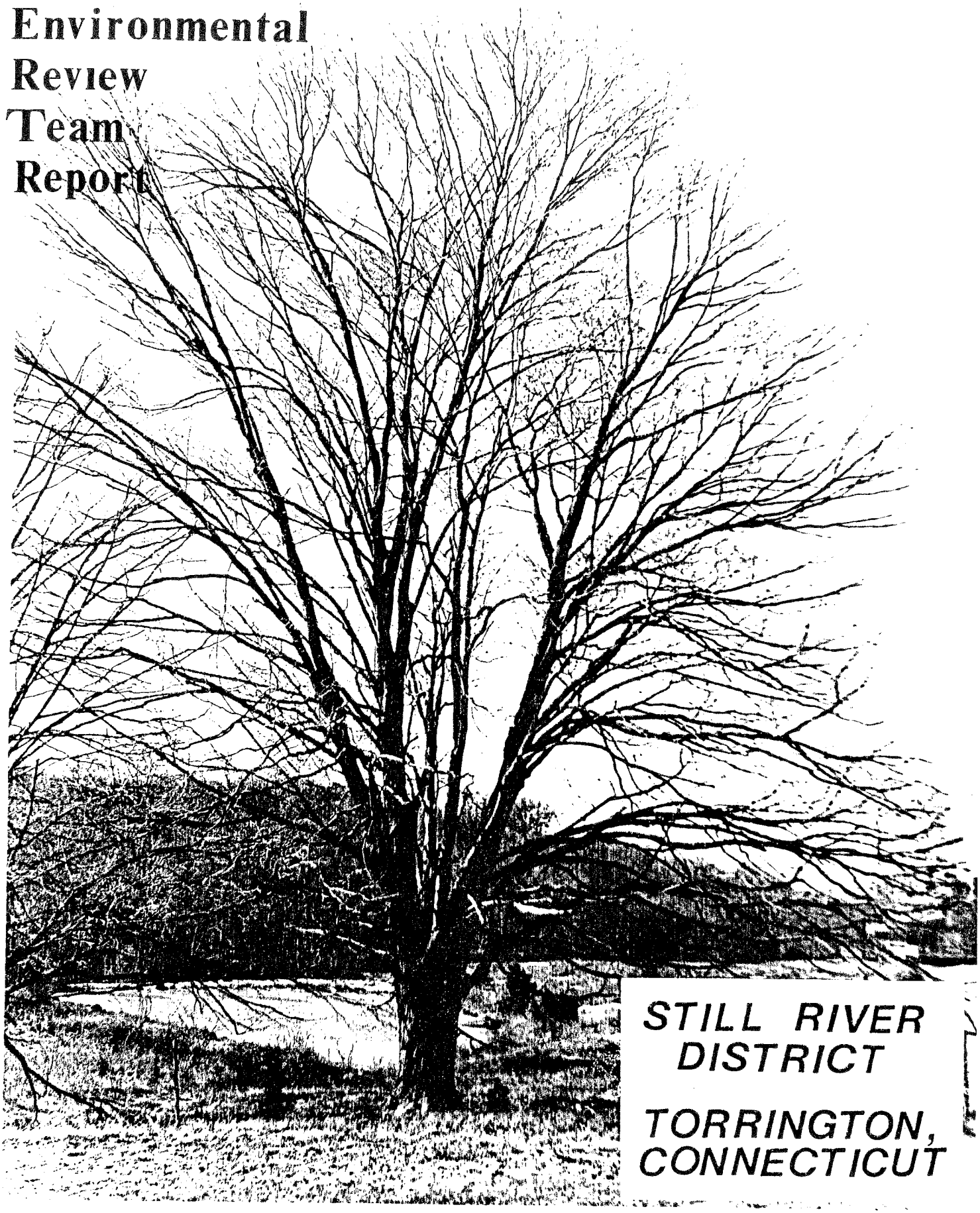
King's Mark Environmental Review Team Report



STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

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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

Mayor of Torrington

and

Torrington Planning and Zoning 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 signficance to the proposed development and also suggests considerations that should be of concern to the developer and the City of Torrington. 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.

MAY 1987

ACKNOWLEDGEMENTS

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

* Willianm Warzecha, Geologist
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* Dr. Russell Handsman, Archaeologist and Research Director
  American Indian Archaeological Institute

* Ralph Scarpino, Forester
  Department of Environmental Protection - Forestry Bureau

* Anthony Sullivan, Planner
  Office of Policy and Management

I would also like to thank Laverne Mendela, Secretary, and Janet Jerolman, Cartographer of the King's Mark Environmental Review Team for assisting in the completion of this report.

Finally, special thanks to Delia Donne, Mayor of Torrington and Jeffrey Ollendorf, City Planner for the City of Torrington for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

The Mayor of Torrington and the City Planning and Zoning Commission requested that an environmental review be conducted on the Still River District, an area encompassing the headwater region of the Still River watershed.

The District is dominated by the Still River valley and its associated wetlands. The Still River flows north into the towns of Winchester and Colebrook, confluencing with the West Branch of the Farmington River in Colebrook. Uplands rise above the valley, with the majority of new development (i.e., single-family residential, condominiums and industrial) occurring in the eastern uplands of the District. Numerous brooks and narrow wetland corridors also occur in these eastern uplands. Areas not devoted to urban or other uses are characterized by second growth woodlands.

The purpose of this review was to inventory and assess existing natural resources, particularly wetland and water resources. The environmental and planning information generated by the ERT will be utilized in the development of a new city master plan as well as assist the City in guiding conservation and development of the Still River District.

Below is a summary of the major findsing of the ERT study.

Geology

The Still River Valley appears to have resulted from the erosion of a belt of relatively weak rocks. The rocks comprising these fracture zones are more susceptible to erosional processes than surrounding rock types. Commonly, these zones form lineal topographic features which serve as discharge points for surface and groundwater.

Of the hills that flank the valley, most appear to have bedrock-controlled topography. Notable exceptions include the stream-lined hills in the eastern parts. These hills, referred to as drumlins, have shapes commonly associated with glacial activity.

The underlying bedrock is the source of water to many drilled wells in those areas not served by a public water main and depth to bedrock ranges from zero in areas where bedrock breaks the ground surface to probably as much as 55 feet below ground surface in the Still River Valley.

Surficial geologic materials consist of those unconsolidated rock particles, fragments or other debris that overlie bedrock. The surficial geology of the study area consists of four deposits including till, stratified drift, swamp sediments and alluvium.

Water Supply

The properties fronting Winsted Road, Burr Mountain Road, Kennedy Drive, Torringford and West Torrington Roads and the Industrial Park between Routes 8 and 183 are serviced by a municipal water line. For areas in the study area not served by municipal water, the crystalline metamorphic rock underlying the area appears to be the principle aquifer and source of drinking water.

The stratified drift deposits covering the Still River Valley have high potential for supplying groundwater to wells (i.e . 50 to 2,000 gallons per minute). The stratified drift deposits that have a saturated thickness of 10 feet or more and thought to be capable of yielding moderate to large amounts of groundwater. Since hydrogeologic data for most of the Still River Valley in the study area is incomplete, further testing would be required. This testing would also need to include monitoring water quality.

Because of the highly porous nature of the sand and gravel deposits, any pollutants that are disposed of directly, or otherwise make their way into the ground will have little opportunity to be renovated by the soil components. On the other hand, natural dilution by infiltrating rainfall will be increased. Also, the availability of public sewers in the Still River corridor helps to reduce the risk of groundwater contamination.

Groundwater quality is determined to a large extent by land use. Land uses which include industry, commercial, housing, road salt storage facilities, sand and gravel mining operations and agriculture, all of which are present in the District, may be potential sources of contamination to groundwater. In order to effectively protect groundwater, it is necessary to regulate land use in areas that are important for groundwater supply. Important aquifers in the City can be fully protected by adopting a groundwater protection or aquifer plan.

Groundwater within the study area is classified as "GA" except for an area in the Still River Valley, north of the intersection of Route 8 and Greenwood Road. Groundwater classified as GA may be sutiable for private or public drinking water use without treatment. A "GB" water classification means that the groundwater may not be suitable for public or private use as drinking water without treatment. The GB area had been downgraded due to the former Torrington Sewage Treatment Plant. Surface water quality of the Still River in the study area is classified as "Bc." A surface water body classified as "B" means it is suitable for bathing and other recreational purposes, agricultural uses, certain industrial processes and cooling, excellent for fish and wildlife habitat, and has good aesthetic value. The subscript "c" means the surface water can support cold water fisheries such as trout.

Watershed Boundary

The study area is located in the headwater regions of Still River. It should be pointed out that the study area represents only eight percent of the Still River watershed. The total watershed area for Still River is about 65,168 acres or 86.2 square miles. There are many drainageways tributary to Still River which are visible in the western and eastern parts of the study area. Most of the these drainageways are controlled by or lie on the underlying bedrock. The major surface water bodies in the study area are Burr Pond and Travis Pond, which total 85 and 11 acres, respectively.

In general, the watershed is moderately developed. The greatest land use in the study area is residential. Industrial and commercial land uses characterize the Still River Valley, primarily along Old Route 8. Route 8 bisects the central portions of the study area in a northwest to southwest direction. Paugnut State Forest comprises most of the land area in the western portions of the study area.

Several geologic limitations within the watershed such as steep and precipitous slopes, shallow to bedrock soils and till-based soils, which commonly have seasonally elevated water tables and slow percolation rates, will undoubtedly be the major hindrance to development in the area. The presence of public sewer and water lines in certain areas should help to minimize the hydrologeologic impacts commonly associated with residential development without those utilities. Where residential development requires on-site wells and septic systems, the presence of the aforementioned geologic limitations will undoubtedly necessitate engineered septic systems. Detailed soils testing will need to be conducted to determine if a particular parcel of land can support an on-site septic system. Without public water and sewer, it appears that the study area is best suited for low to moderate intensity development.

Runoff Concerns

As residential, commercial or industrial development takes place in the study area, the chance for substantial increases in runoff from developed areas would be expected unless some provisions are made to control runoff. Many communities in Connecticut have regulations that require off-site flows following development be maintained at present levels. This requirement is particularly important in areas which experience periodic flooding. Additional increases in runoff to these areas can further aggravate flooding problems if proper measures are taken. The most likely resolution of the peak flow requirement would be the installation of one or more detention basins.

Soil Resources

Broad sections of this watershed are suitable for housing. Woodbridge and Paxton soils necessitate the use of engineered septic systems, footing drains, and careful grading. Since these soils "buffer" increases in runoff less efficiently than soils derived from friable glacial till, stormwater detention is therefore somewhat more critical. However, due to the urban pressure on this area of Torrington, stormwater management should be considered important everywhere. Charlton soils generally pose less engineering obstacles than such soils as Paxton or Woodbridge. Charlton soils do not have perched water tables. Extensive areas of Charlton soils are situated west of Route 8. A narrower band of these soils also parallel Route 8 to the east. These soils usually do not necessitate the use of engineered septic fields. Reserve septic field areas are still needed for this soil.

The presence of dispersed areas of wetland soils and shallow to bedrock soils throughout the watershed requires careful inspection of all future subdivision plans.

Forestry Resources

The vegetation description for Torrington's portions of the watershed for the Still River can be divided into six broad vegetation types. They include: (1) wetlands; (2) field; (3) old field; (4) hardwood/softwood; (5) mixed hardwood; (6) plantation-conifers.

Left undisturbed, the character of the forest will not change dramatically but there will be a long term shift toward more shade tolerant species as the forest goes through natural processes.

Several factors have to be considered in the maintenance of a natural forest stand. Wetland soils will have a water table close to the surface of the ground. This allows for shallow root penetration of the trees. Windthrow is a potential hazard here. Large openings and clearings for development in and alongside wetland areas should be avoided if possible. Trees which are growing on ridge tops may also be subject to windthrow damage. Alterations in the wetlands which permanently raise or lower the water table and/or restrict natural drainage may have a negative impact on the vegetation in the immediate area. Raising the water table may drown root systems causing widespread mortality in the plant community. Lowering the water table may also result in plant dessication.

Active forest management is limited by several factors including: (1) landowner attitudes - many smaller parcels have many owners each with different objectives; this can make forest management more difficult; (2) terrain limitations; (3) lack of knowledge on the part of landowners as to what his/her alternatives may be; and (4) lack of good markets for low quality wood.

Overall, there is a great deal of potential of the management of the forestland in this watershed area. There are large areas of both high quality stands and potentially high quality stands.

Wetlands

The U.S. Fish and Wildlife Service's National Wetland Inventory identified 13 distinct types of wetland units in the study area. The classification of these units is based on the wetland's hydrologic location, vegetative structure, water regime, and site specific modifiers.

Because of the size of the Still River watershed, and the number and size of wetlands contained therein, the evaluation of the importance of these wetlands for the purposes of this report must be of a general nature. The primary values of the above mentioned wetlands include: (1) hydrologic; (2) water quality; (3) fish and wildlife; and (4) recreation, education, aesthetic.

Wildlife Resources

Wildlife habitat within the study area is comprised of five general habitat types: (1) mixed hardwood woodland; (2) mixed hardwood/conifer woodland; (3) conifer woodland; (4) open flood; and (5) wetland.

The study area presently contains a diversity of upland and wetland habitats. The long-term maintenance and enhancement of these habitats is heavily dependent upon the willingness of the local community to include wildlife habitat in a significant manner in its consideration of future residential and commercial development. Wetland habitats within the Route 8 and Route 183 corridor should receive immediate and special consideration in view of past intrusions and current development pressures. Land use regulation and planning activities should be directed toward enhancing habitat diversity and maintaining as many large contiguous blocks of habitat as possible.

Fishery Resources

The stretch of the Still River located within the watershed area is of marginal importance as a cold-water fishery resource and does not contain significant amounts of suitable trout habitat. The Still River in this area supports populations of such warm water fish species as white suckers, fallfish, common shiner, bluegill sunfish, grass pickerel and redfin pickerel. Public access is very limited due to the dense stream side vegetation.

The Still River is an important tributary of the Farmington River. The lower portion of the Still River (i.e., Winsted and downstream), has suitable salmonid habitat but the limiting factor for their absence is poor water quality.

Threatened and Endangered Plant and Animal Species

No known extant populations of Federally endangered or threatened species, or Connecticut "Species of Special Concern" are found in the study area or will be affected by future development in the Still River Basin.

Natural Areas Inventory Site

The study area contains a Natural Areas Inventory Site. The area is an "...esker formed by a stream flowing beneath a glacier," and "extends in an interrupted form for two miles along the Still River Valley... Preservation would entail controlling the alteration of the shape of the esker rather than complete cessation of development..."

Development and Archaeological Sites

One small collection from West Torrington indicates that prehistoric native populations used the area for settlements between 6000 and 1000 years ago. Within the Still River District, the landforms around the small wetlands west of Burr Pond as well as east of Walnut Mountain may contain occupation sites. Evidence from elsewhere in Litchfield County suggests that wetlands of varying sizes were an important focus for settlement and use during much of the prehistoric period. The density of housing complexes north and west of Burr Pond and east of Sawmill Road should be controlled in order to protect as much of this potentially sensitive land as possible.

The area between Torringford Street (Route 183) and Torringford West Street may be archaeologically sensitive. Within the past two decades, housing developments have begun to intrude into this space, probably resulting in the loss of some resources. The next decade will be critical for archaeological research and preservation in the Still River District. Initial systematic surveys should be undertaken to determine if the lands between these streets contain important sites that should be preserved for future study and interpretation.

Historical Landscapes

Torringford Street was an important focus for historic settlement during the 18th and 19th centuries. A series of later Georgian farmsteads can be seen along the road, north of Route 202. As the street continues to be developed north of Pearl Road, the now obvious sense of historic farmsteads and landscapes will be submerged beneath a new, very different pattern of intensive residential use.

A survey should be undertaken to identify those landscapes which are visually and/or historically most important to this part of the city. Zoning changes and other protective measures could then be introduced to preserve some of the sense of history that is now still present. Without such actions, it is probable that this part of Torrington's past will be lost before the 21st century.

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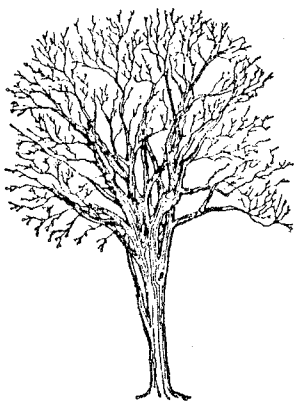


PHYSICAL CHARACTERISTICS

INTRODUCTION

The Mayor of Torrington and the City Planning and Zoning Commission requested that an environmental review be conducted on the Still River District, an approximately seven (7) square mile area in northeastern Torrington encompassing the headwater region of the Still River watershed. Though the watershed extends north into the towns of Winchester and Colebrook, the northern boundary of the study area is at the Torrington city line (Figure 1). The western portions of the study area also encompasses parts of Paugnut State Forest.

The District is dominated by the Still River valley and its associated wetlands. The Still River flows north into the towns of Winchester and Colebrook, confluencing with the West Branch of the Farmington River in Colebrook. Uplands rise above the valley, with the majority of new development (i.e., single-family residential, condominiums and industrial) occurring in the eastern uplands of the District. Numerous brooks and narrow wetland corridors also occur in these eastern uplands. Areas not devoted to urban or other uses are characterized by second growth woodlands.

The purpose of this review was to inventory and assess existing natural resources, particularly wetland and water resources. The environmental and planning information generated by the ERT will be utilized in the development of a new city master plan as well as assist the City in guiding conservation and development of the Still River District.

Below is a brief description of issues and concerns addressed by the ERT:

SOILS

The District contains several varieties of soil types including hardpan soils, wetland soils and significant glacial deposits. Much of the District is not served by municipal sewers.

GEOLOGY

Will the type of geologic formation affect the groundwater recharge of an identified area of stratified drift?

HYDROLOGY

Review the hydraulic relationship between the Still River valley and contiguous upland areas.

WATER QUALITY

Will the urban growth of the District have a pronounced impact on the water quality of the Still River.

RIVER ECOLOGY/WETLANDS

The Still River is bordered by extensive wetland systems which may contain significant animal and plant species.

LAND USE/PLANNING

Will the City's Land Use Plan and existing zoning regulations have a significant impact on the resources in the Still River valley?

FARMLAND PRESERVATION

Existing areas of farmland are currently being converted to or are threatened by urban uses. What can be done to preserve remaining farmland areas?

OPEN SPACE/RECREATION

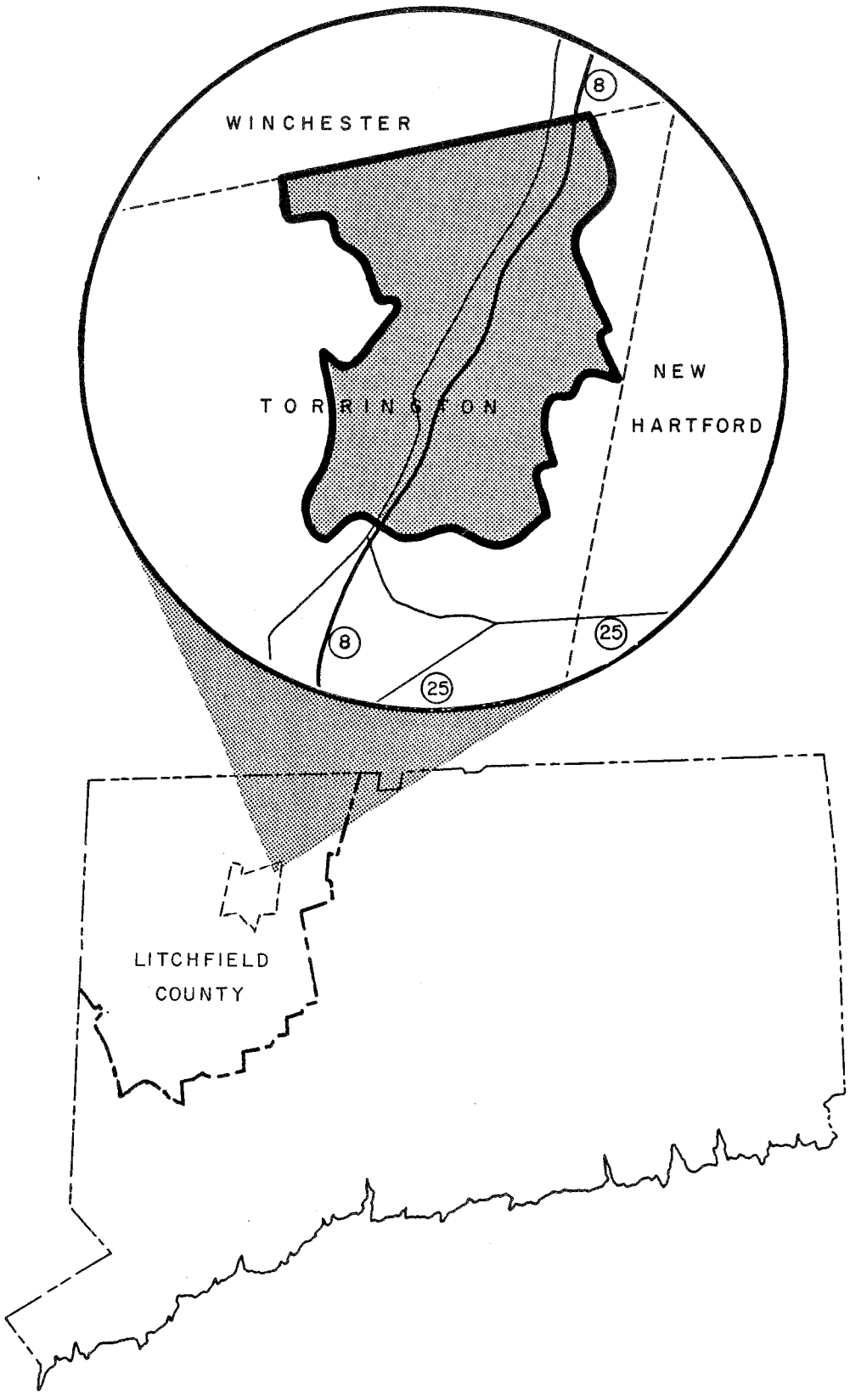
The District's development is beginning to outpace its recreational base. What steps are necessary to provide adequate recreational opportunities?

STORMWATER DRAINAGE

The City has recently received several complaints concerning increased flooding along the Still River. Identify flood mitigation measures.

Figure 1

LOCATION OF STUDY SITE



TOPOGRAPHY

The Still River District includes 4,634 acres of land in northeast Torrington that comprises the headwater regions of Still River. It consists of the Still River Valley and the bedrock-controlled upland areas that flank it to the east and west. The Still River Valley appears to have resulted from the erosion of a belt of relatively weak rocks. This zone of weakness is due to a mapped fault (i.e., fracture zone) which parallels Still River in the study area. The rocks comprising these fracture zones are more susceptible to erosional processes than surrounding rock types. Commonly, these zones form lineal topographic features which serve as discharge points for surface and groundwater.

The maximum elevation in the study are is 1,325 feet above mean sea level at the top of Walnut Mountain. The minimum elevation is the same as the existing level (usually 705 feet) of the wetland at the intersection of Still River and the Torrington city line (Figure 2).

Of the hills that flank the valley, most appear to have bedrock-controlled topography. Notable exceptions include the stream-lined hills in the eastern parts. These hills, referred to as drumlins, have shapes commonly associated with glacial activity.

GEOLOGY

Bedrock Geology

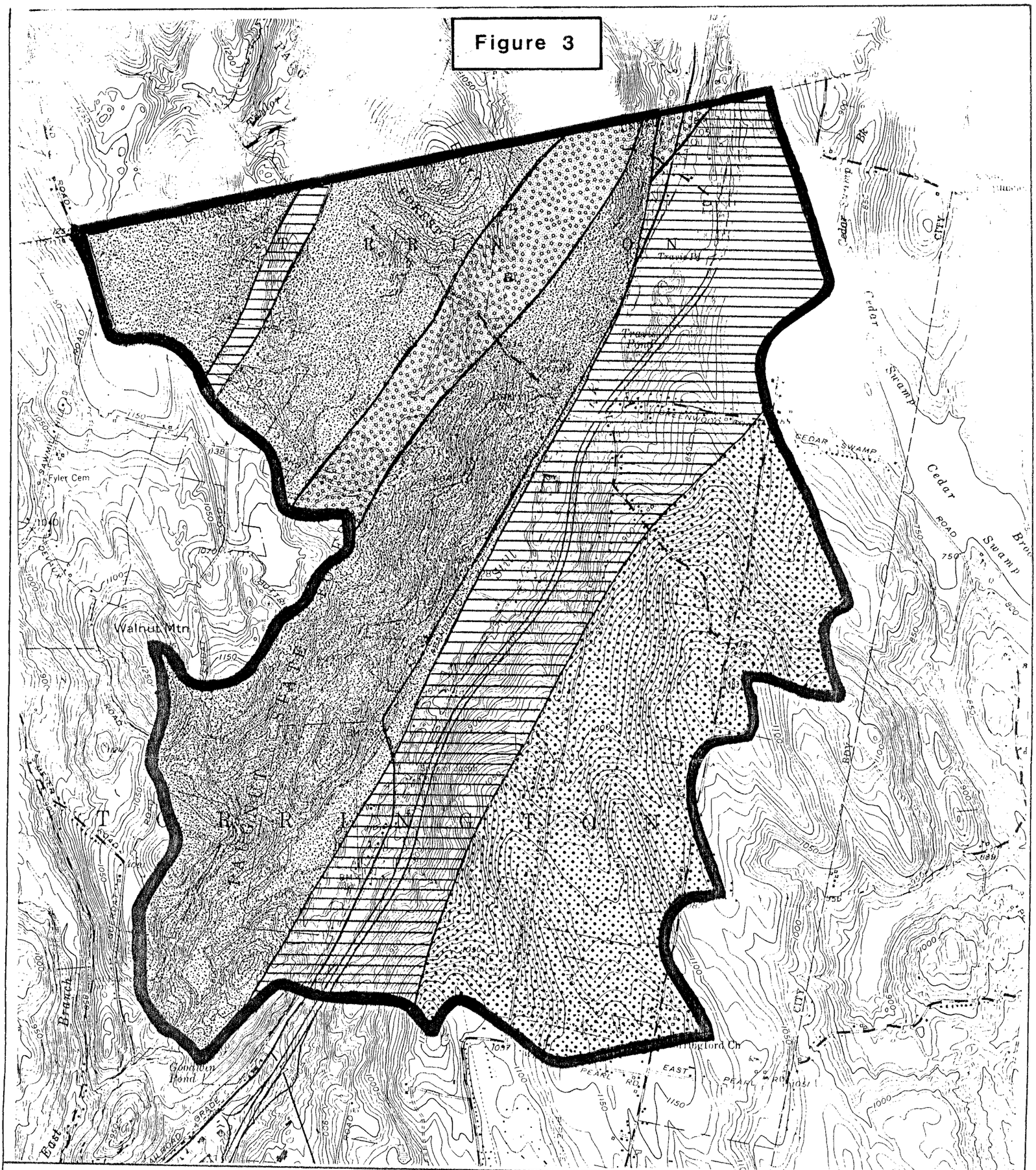
Most of the District lies within the Torrington topographic quadrangle. The northern limits lies within the Winstead topographic quadrangle.

The bedrock geology of the Torrington quadrangle was mapped by Charles W. Martin from 1965-67 and was published by the Connecticut Geological and Natural History Survey as Map QR-25. Only a preliminary bedrock geologic information is available for the Winstead topographic quadrangle. This information is available at the Department of Environmental Protection's Natural Resource Center in Hartford. Figure 3 shows the bedrock geology of the watershed, as adapted from Martin's map and preliminary bedrock geologic data on file at the Natural Resources Center.

In the following description of the mapped units in the study area, the terms "schist" and "gneiss" are frequently used. Both terms relate to the structural and textural aspects of the local rocks. All of the rocks in the watershed have undergone deformation and faulting one or more times during the period following their creation. The stresses of deformation caused the alignment of platy, flaky and elongate minerals into thin sheets or bands. Where the alignment has resulted in a slabby rock (i.e., one that parts relatively easily along surfaces of mineral alignment), the rock is termed a "schist." Where the alignment has resulted in a banded but more massive rock, the rock is termed a "gneiss." One form may grade into another and the actual term used may be based on individual preference.

The dominant rock type in the study area is named the Gneiss Complex of the Berkshire Highlands. This complex of rocks is broken up into three subunits all of which are found within the study area. The most widespread subunit is a pink and gray, fine- to-medium-grained granitic gneiss comprised of the minerals mica, feldspar and quartz. "Granitic" means the rock contains a high percentage of the light-colored minerals feldspar and quartz. The rock unit also contains layers of amphibolites (amphibole-bearing rocks), mafic (dark colored, iron- and manganese-bearing minerals) gneisses and calc-silicate rocks

Figure 3



THE GNEISS COMPLEX OF THE BERKSHIRE HIGHLANDS – RUSTY, WEATHERING FINE TO MEDIUM-GRAINED GNEISS

THE GNEISS COMPLEX OF THE BERKSHIRE HIGHLANDS – PINK AND GRAY, FINE TO MEDIUM-GRAINED GRANITIC GNEISS

THE GNEISS COMPLEX OF THE BERKSHIRE HIGHLANDS – GRAY, FINE TO MEDIUM-GRAINED LAYERED GRANITIC GNEISS

WARAMAUG FORMATION – INTERMIXED RUSTY WEATHERING GNEISS

STILL RIVER DISTRICT

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BEDROCK GEOLOGY

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(i.e., rocks rich in calcium silicate minerals). This rock unit underlies the western and central parts of the study area.

The next most abundant subunit found within the study area is a gray, fine- to medium-grained, layered granitic gneiss composed of the minerals feldspar, biotite and quartz. This subunit may also contain interlayering amphibolites, mafic gneisses, biotite gneisses and calc-silicate rocks. This subunit mainly underlies the Still River Valley, but includes an outlier to the west.

The final subunit found in the western parts just east of Burr Pond is a rusty weathering fine- to medium-grained gneiss composed of the minerals kyanite, sillimanite, quartz and plagioclase.

The southeast parts of the study area is underlain by the Waramaug Formation. These rocks are described as rusty weathering muscovite-biotite-plagioclase-quartz gneiss and a sillimanite-kyanite-muscovite-plagioclase-quartz-biotite gneiss. These two zones of rocks are intermixed and intergradational within the formation. Minor minerals in the rock include cholrite, staurolite, zircon, apatite, tourmaline, sphene and magnetite.

All of the above mentioned rocks are metamorphic; that is, they all have been subjected to great heat and pressure deep within the earth's crust.

The above mentioned rock types have been discussed for the purpose of thoroughness in the natural resources inventory. The underlying bedrock is the source of water to many drilled wells in those areas not served by a public water main. (See Water Supply section).

Depth to bedrock ranges from zero in areas where bedrock breaks the ground surface to probably as much as 55 feet[1] below ground surface in the Still River Valley.

[1] Surficial Geologic Map of the Winsted Quadrangle, Litchfield and Hartford Counties by Charles R. Warren 1970.

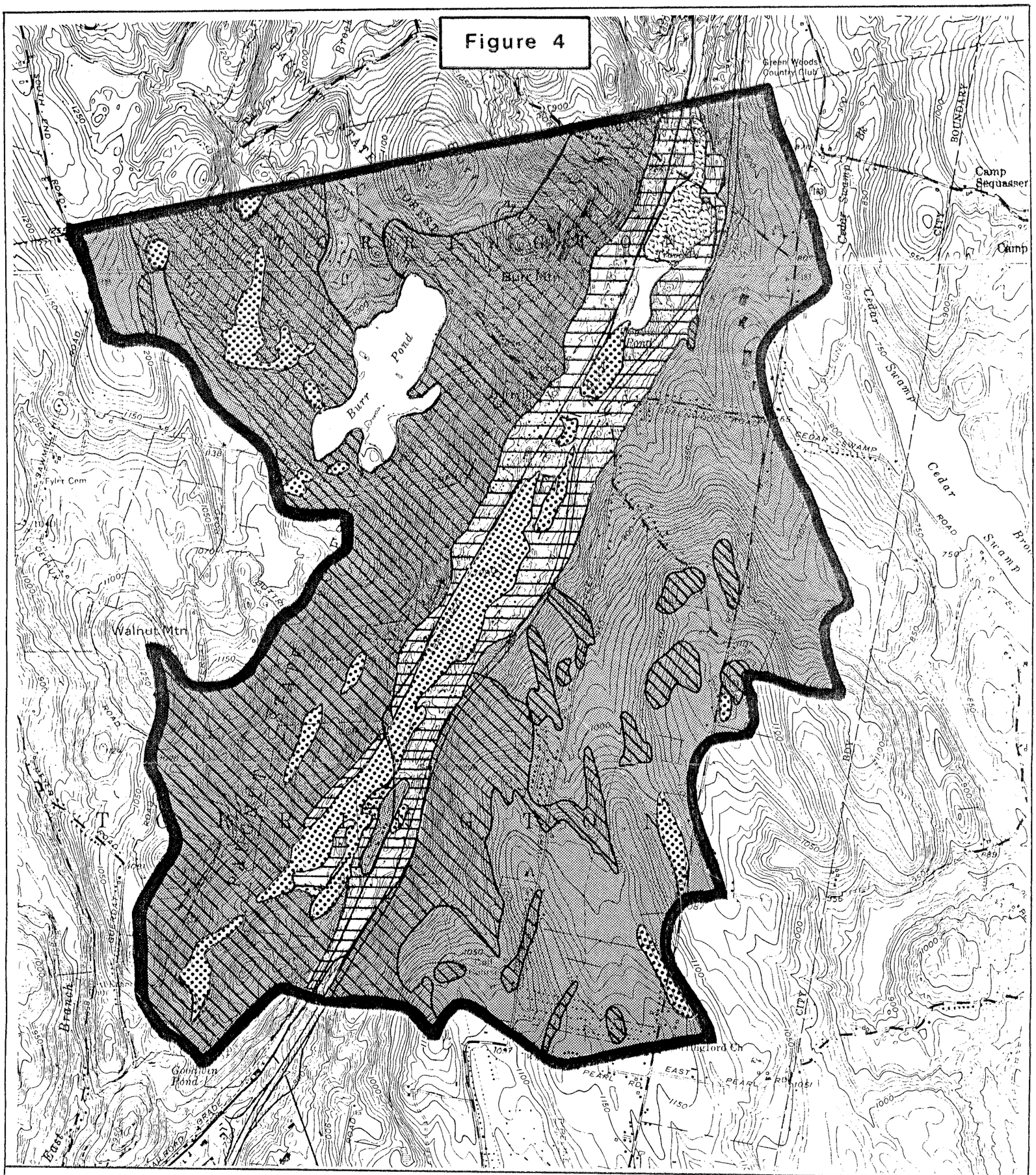
Surficial Geology

Surficial geologic materials consist of those unconsolidated rock particles, fragments or other debris that overlie bedrock. The surficial geology of the Torrington quadrangle (map GQ-939, by Roger B. Colton) and the Winstead topographic quadranges (Map GQ-871, by Charles R. Warren) have been published by the U.S. Geological Survey. The surficial geology of the study area, adapted from GQ-939 and 871, is shown in Figure 4.

The predominant surficial geologic material is till. Till consists of rock particles and fragments that were accumulated by a moving sheet of glacier ice dozer, churning up pre-existing soils and scraping, gouging and breaking bedrock surfaces. Since the ice collected rock particles of all sizes, and since these particles were not sorted by meltwater, till contains everything from clay to boulders and is locally very variable in texture. Two major till varieties have been observed in Connecticut: (1) a fairly loose, coarse-grained, olive-gray to olive-brown to light olive-brown till, and (2) compact variety of till underlying the loose till in areas where it exceeds 5 to 8 feet. The coarser till is most common in surface exposures and shallow to bedrock area. The thickest till known in the study area is located between Routes 8 and 183 in the northeast corner of the study area. The thinnest till is that which mantles the upland areas west of Still River. Also, there are several thin till areas interspersed throughout the eastern half of the study area.

The major deposits of stratified drift (i.e., sorted sediments deposited by glacial meltwater) are present throughout the Still River Valley. Sand and gravel are the major components of the stratified drift. These deposits have been and are presently being mined in the study area. The stratified drift deposits may be as much as 55 feet thick in the study area.

Figure 4



STRATIFIED DRIFT

SWAMP SEDIMENTS

THIN TILL OR AREAS WHERE BEDROCK IS AT OR NEAR GROUND SURFACE

THICK TILL, PROBABLY RANGING BETWEEN 5 FEET AND 20 FEET

ALLUVIAL LEPCSITS

STILL RIVER DISTRICT

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SURFICIAL GEOLOGY

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The other significant deposits of natural origin are post-glacial sediments called swamp sediments and alluvium. Swamp sediments consist of sand, silt, clay and a high percentage of organic material (i.e., decayed plant matter). These sediments which overlie sand and gravel deposits mainly along the Still River were deposited in areas of slow moving or stagnant water. Wetland areas in the study area have several important hydrological functions, including streamflow regulation, erosion control and surface water quality protection. It may, in addition be a valuable ecological asset. For this reason, every effort should be made to avoid wetland fillings, modification or disturbances.

Alluvial deposits are found at the northern limits of the study areas. They consist of recent stream deposits of sand and gravel in floodplain.

Man-made deposits or artificial fill are found in the Still River Valley and are associated mainly with road construction.

WATER SUPPLY

Based on a map supplied to Team members by the City Planner, the properties fronting Winsted Road, Burr Mountain Road, Kennedy Drive, Torringford and West Torrington Roads and the Industrial Park between Routes 8 and 183 are serviced by a municipal water line. For areas in the study area not served by municipal water, the crystalline metamorphic rock underlying the area appears to be the principle aquifer and source of drinking water.

Bedrock transmits water by means of an interconnected system of fractures or seams. The amount of natural quality of water withdrawn from a bedrock well depends upon the numbers of water-bearing fractures or seams it intersects and on the mineralogy of the rock formation through which the fractures pass.

The schist and gneisses underlying most of the study area are usually cabable of yielding three gallons per minute or more without penetrating much more than 300 feet of bedrock. For example, Connecticut Water Resources Bulletin #28, Hydrogeologic Data For the Farmington River Basin-Connecticut, reports that seven bedrock wells drilled in upland areas in the eastern parts of the study area (principally along Torringford West Street) had yields which ranged between 4 and 6 gallons per minute, except for one which has a yield of 20 gallons per minute. The depths of the wells ranged between 50 and 125 feet.

It is possible to estimate the probability that any given well could supply three gallons per minute (gpm) an amount considered adequate to meet most household needs. This is based on a survey of wells in the Farmington River Basin (Connecticut Water Resources Bulletin #29). This study indicates that of 331 crystalline bedrock wells examined, approximately 70 percent yielded three gpm or more; 90 percent yielded two gpm or more; and 96 percent yielded one gpm or more.

The stratified drift deposits (i.e., sand and gravel) covering the Still River Valley have high potential for supplying groundwater to wells. According to a map entitled Ground Water Yields for Selected Stratified Drift Areas in Connecticut (1986) by David L. Mazzafaro, the Still River Valley is underlain by stratified drift deposits that have a saturated thickness of 10 feet or more and thought to be capable of yielding moderate to large amounts of groundwater. Since hydrogeologic data for most of the Still River Valley in the study area is incomplete, further testing would be required. This testing would also need to include monitoring water quality (see Hydrology section).

Commonly, where stratified drift deposits are coarse-grained, generally thick and close to a major streamcourse, it may be possible to obtain

relatively large volumes of groundwater at approximately 50 to 2,000 gallons per minute.

Because of the highly porous nature of the sand and gravel deposits, any pollutants that are disposed of directly or otherwise make their way into the ground will have little opportunity to be renovated by the soil components. On the other hand, natural dilution by infiltrating rainfall will be increased. Also, the availability of public sewers in the Still River corridor helps to reduce the risk of groundwater contamination.

The City asked on the review day how to protect the potential aquifer in the District. Groundwater quality is determined to a large extent by land use. Land uses which include industry, commercial, housing, road salt storage facilities, sand and gravel mining operations and agriculture, all of which are present in the District, may be potential sources of contamination to groundwater. In order to effectively protect groundwater, it is necessary to regulate land use in areas that are important for groundwater supply. Important aquifers in the City can be fully protected by adopting a groundwater protection or aquifer plan. It is suggested that if the City is interested in adopting such as plan, they contact James Murphy, a principal environmental analyst for the DEP - Water Compliance Unit at 566-3496.

The natural quality of the water supply, except for the Still River Valley (see Hydrology section) should be good. However, there is a chance the underlying bedrock may be mineralized with iron and/or manganese. If the concentrations of these minerals are high, the well water may need to be treated with a suitable method of filtration.

HYDROLOGY

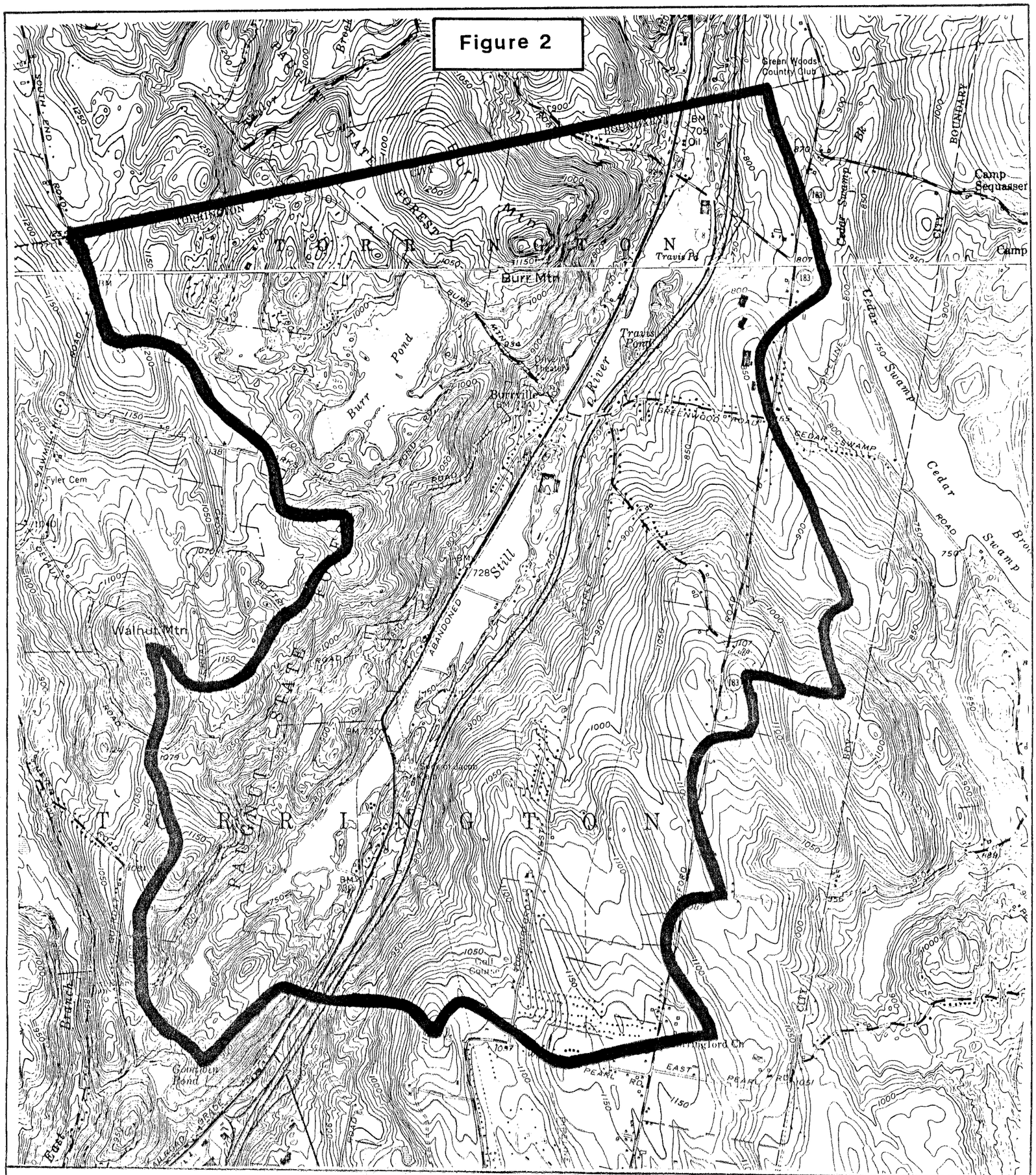
Watershed Boundary

The study area is located in the headwater regions of Still River. It should be pointed out that the study area represents only eight percent of the Still River watershed. The total watershed area for Still River is about 65,168 acres or 86.2 square miles. There are many drainageways tributary to Still River which are visible in the western and eastern parts of the study area. Most of the these drainageways are controlled by or lie on the underlying bedrock. The major surface water bodies in the study area are Burr Pond and Travis Pond, which total 85 and 11 acres, respectively (Figure 5).

Precipitation which takes the form of runoff flows across the surface of the land until it reaches a brook or other surface water bodies. 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 it may percolate downward to the water table 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 areas, stream, river or directly into a lake or pond. To a large extent, groundwater flow in the District parallels the surface flow pattern. It is controlled mainly by the underlying bedrock.

In general, the study area is moderately developed. The greatest land use in the study area is residential. Industrial and commercial land uses characterize the Still River Valley, primarily along Old Route 8. Route 8 bisects the central portions of the study area in a northwest to southwest direction. Paugnut State Forest comprises most of the land area in the western portions of the study area.

Figure 2



STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

TOPOGRAPHY

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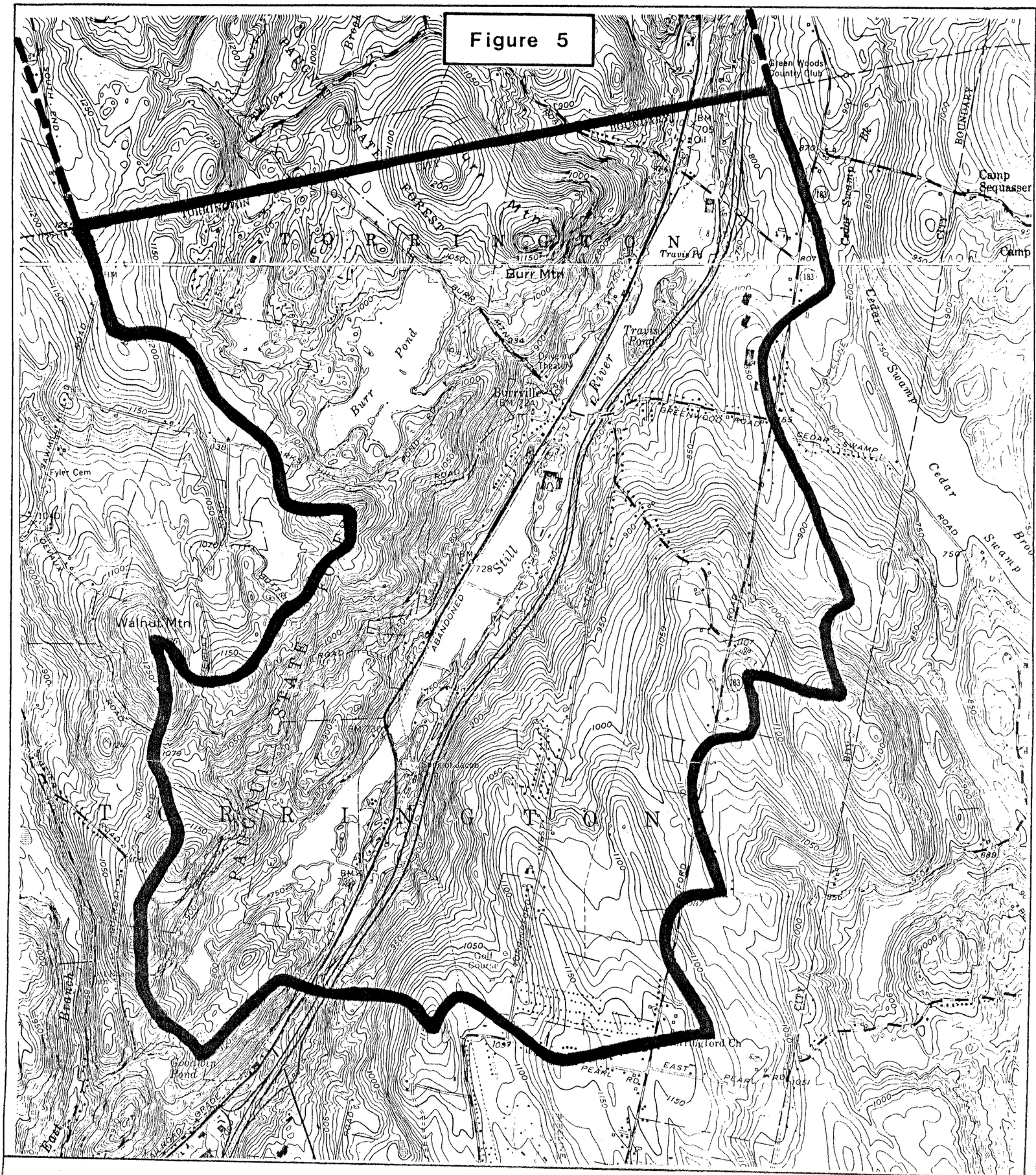
0 2000'

Figure 5



SIZE OF STUDY AREA TOTALS APPROXIMATELY 4,634 ACRES OR 7.24 SQ. MI. OF THE HEADWATER REGIONS OF STILL RIVER USING THE TORRINGTON CITY LINE AS THE NORTHERN BOUNDARY.

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

WATERSHED BOUNDARY

King's Mark Environmental Review Team

0 2000'

Several geologic limitations within the watershed such as steep and precipitous slopes, shallow to bedrock soils and till-based soils, which commonly have seasonally elevated water tables and slow percolation rates, will undoubtedly be the major hindrance to development in the area. The presence of public sewer and water lines in certain areas should help to minimize the hydrologeologic impacts commonly associated with residential development without those utilities. Where residential development requires on-site wells and septic systems, the presence of the aforementioned geologic limitations will undoubtedly necessitate engineered septic systems. Detailed soils testing will need to be conducted to determine if a particular parcel of land can support an on-site septic system. Without public water and sewer, it appears that the study area is best suited for low to moderate intensity development.

Water Quality Considerations

According to the report, Connecticut Water Quality Standards and Criteria for the Connecticut River Basin, groundwater within the study area is classified as "GA" except for an area in the Still River Valley, north of the intersection of Route 8 and Greenwood Road. Groundwater classified as GA may be suitable for private or public drinking water use without treatment. A "GB" water classification means that the groundwater may not be suitable for public or private use as drinking water without treatment. The GB area had been downgraded due to the former Torrington Sewage Treatment Plant.

Surface water quality of the Still River in the study area is classified as "Bc." A surface water body classified as "B" means it is suitable for bathing and other recreational purposes, agricultural uses, certain industrial processes and cooling, excellent for fish and wildlife habitat, and has good

aesthetic value. The subscript "c" means the surface water can support cold water fisheries such as trout.

Runoff Concerns

As residential, commercial or industrial development takes place in the study area, the chance for substantial increases in runoff from developed areas would be expected unless some provisions are made to control runoff. Many communities in Connecticut have regulations that require off-site flows following development be maintained at present levels. This requirement is particularly important in areas which experience periodic flooding. Additional increases in runoff to these areas can further aggravate flooding problems if proper measures are taken. The most likely resolution of the peak flow requirement would be the installation of one or more detention basins.

According to city officials, Torrington does not have regulations for peak flow requirement. Nevertheless, each developer should be encouraged to do his/her part to control increased runoff from their respective development. A series of developments in the study area, each producing peak flow increases, could ultimately result in a substantial change in flow characteristics of local streams and Still River, potentially aggravating existing flooding problems or causing streambank erosion. The latter would be major concern to the bedrock-controlled drainageways which characterize the eastern portions of the study area. Uncontrolled runoff arising from developed areas may cause significant streambank erosion to these drainageways. For this reason, it is suggested that a stormwater management plan include erosion and sedimentation control measures.

SOIL RESOURCES

Important Farmland

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 also an option. In the Connecticut River Valley, one company specializes in a program where farms are partially subdivided for homes, the development rights to the good agricultural land are donated to the State for tax write-offs, and a viable agricultural enterprise is estabished on the remaining farm. The sale of a limited amount of building lots is used to generate capitol for the actual investment in the farm business. See Figure 6 of important farmlands.

Residential Areas

Broad sections of this watershed are suitable for housing. To the east of Route 8 compact basal till soils such as Paxton and Woodbridge predominate. These soils necessitate the use of engineered septic systems, footing drains, and careful grading. Since these soils "buffer" increases in runoff less efficiently than soils derived from friable glacial till, stormwater detention is therefore somewhat more critical. However, due to the urban pressure on this area of Torrington, stormwater management should be considered important everywhere. Each watershed should be analyzed carefully. Charlton soils, derived from friable to compact till, generally pose less engineering obstacles than such soils as Paxton or Woodbridge. Charlton soils do not have perched water tables. Extensive areas of Charlton soils are situated west of Route 8. A narrower band of these soils also parallel Route 8 to the east. These soils

usually do not necessitate the use of engineered septic fields. Reserve septic field areas are still needed for this soil.

The presence of dispersed areas of wetland soils and shallow to bedrock soils throughout the watershed requires careful inspection of all future subdivision plans. See Figure 7 of soil limitations.

Recreation Areas

Neighborhood playgrounds can be adapted to many types of areas. A broad flat area can be used, or a hillside can be benched to accommodate recreation equipment. This also applies to parks for picnicing. Ballfields require broad flat areas, therefore potential sites are not numerous.

For local playgrounds/parks, select areas with either well-drained Charlton or Paxton soils. Areas with the moderately well drained Woodbridge soils are less favorable due to the persistence of a perched water table. Wetland soils should be avoided.

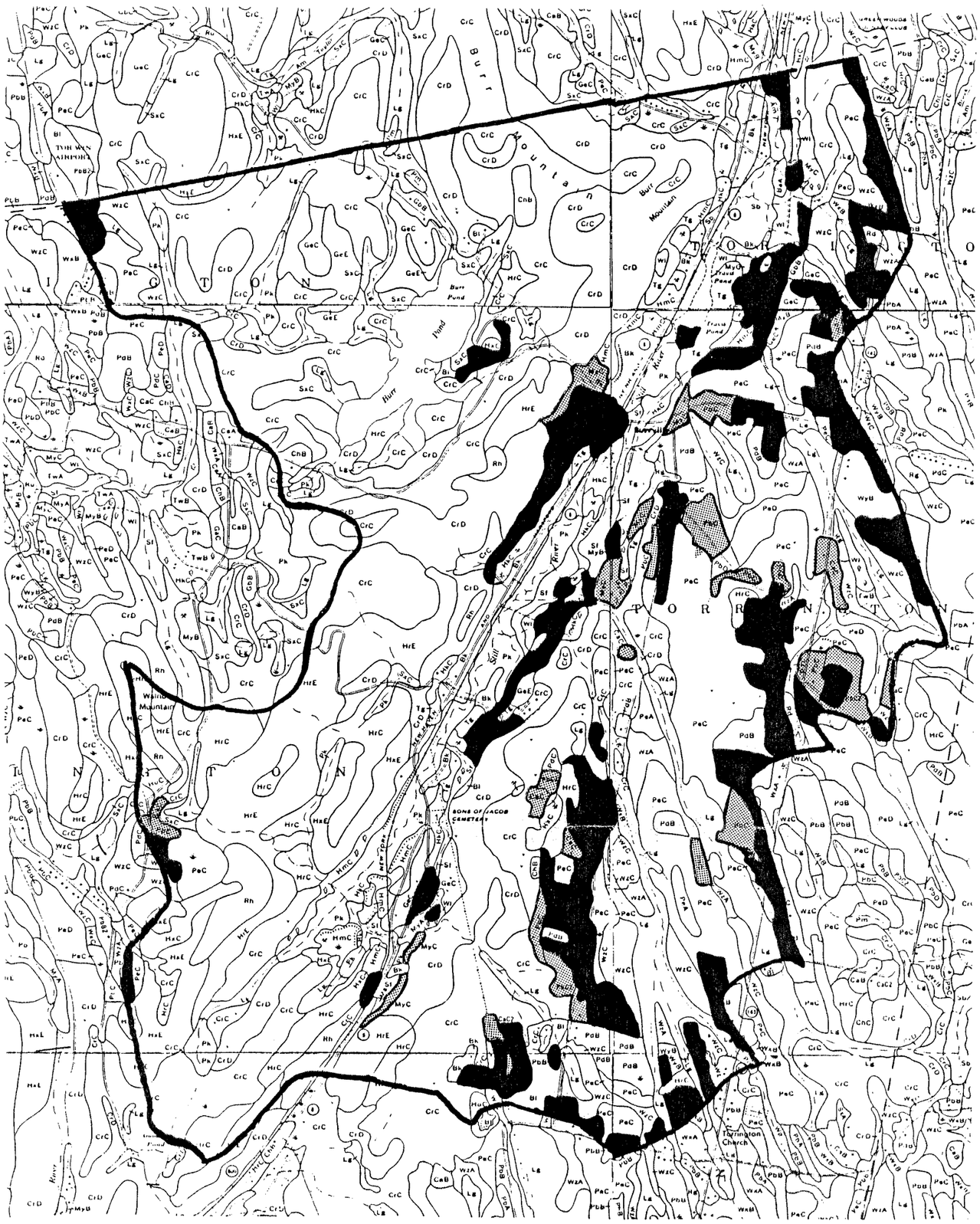
Four localities have potential for use as ballfields. All three localities are east of Route 8. The area west of Route 8 has steep topography generally, and has extensive acreage in a State forest, State park and a private community.

The potential ballfield areas are as follows (Figure 8):

(1) Off West Torringford Street, 1.5 miles north of the West Torringford Street and Pearl Road intersection. The site is east of West Torringford Street and has approximately four acres in a pie-shaped section of Paxton soils. Slopes are 0 to 3 percent. The soil is very stony.

(2) Off Greenwood Road, 0.25 miles west of the Greenwood Road and Torringford Street intersection. The site is south of Greenwood Road, situated behind a row of houses. This site has approximately a four acre section of Paxton soils. Slopes are 0 to 3 percent.

Figure 6



SOILS OF STATEWIDE IMPORTANCE

PRIME FARMLAND

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

IMPORTANT FARMLANDS

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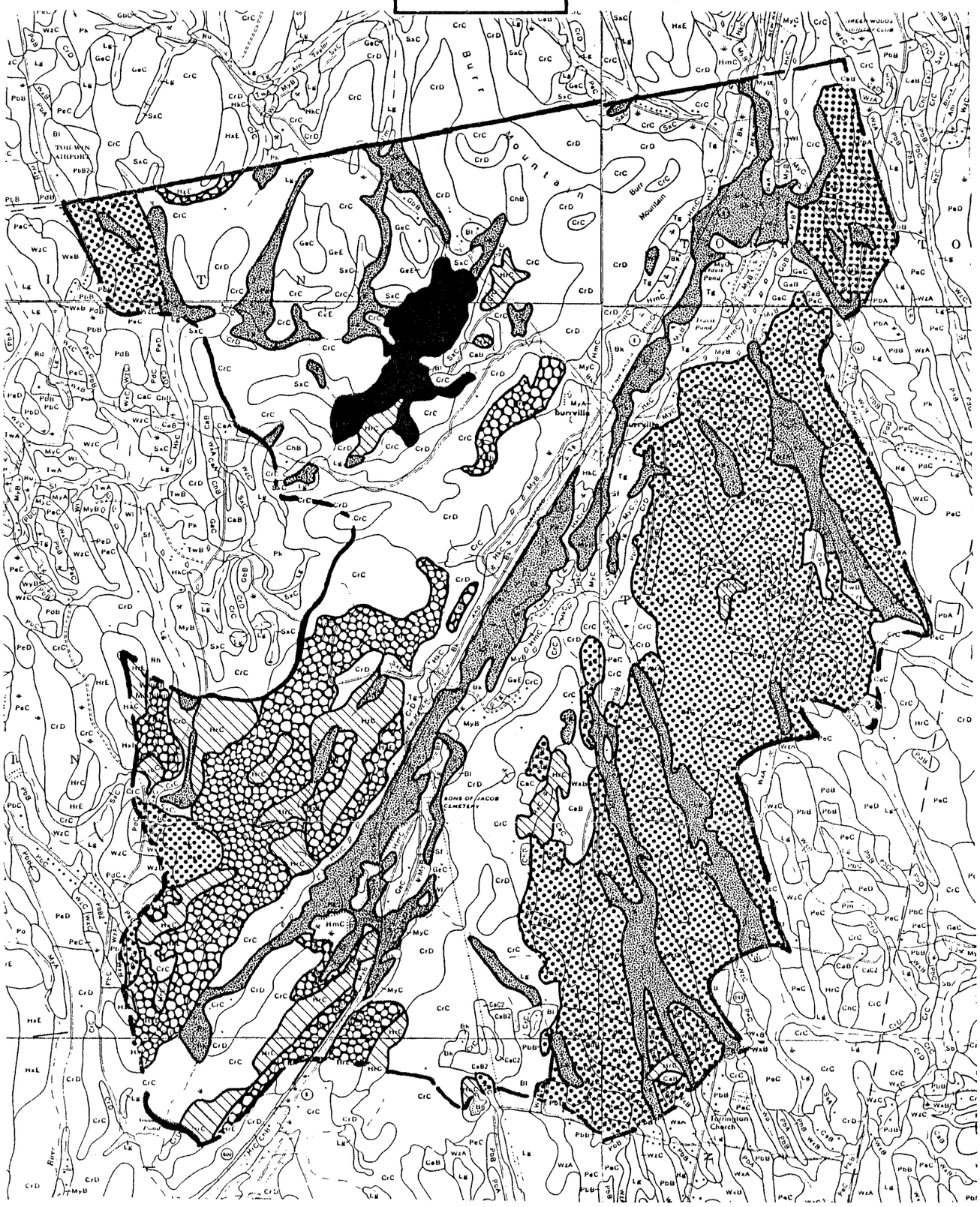
0 2000'

N

Figure 7



STILL RIVER ERT – CRITICAL SOIL AREAS

- WATER BODY
- POORLY AND VERY POORLY DRAINED
- SEASONAL PERCHED WATER TABLES
- SHALLOW TO BEDROCK
- ROCKLAND, OR SHALLOW TO BEDROCK WITH STEEP SLOPES

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

CRITICAL SOIL AREAS

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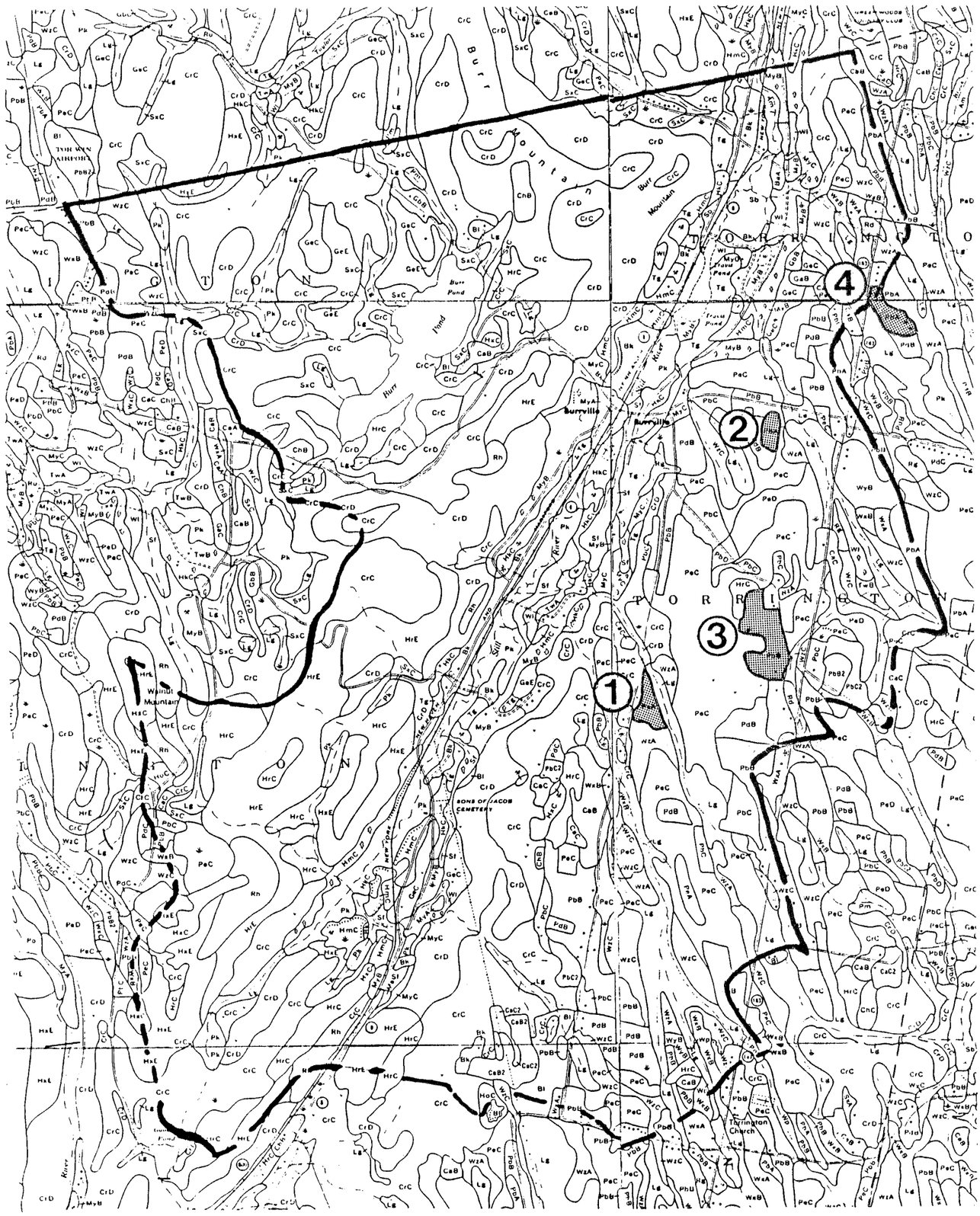
0 2000'

Figure 8



1-4 POTENTIAL BALLFIELD AREAS

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

POTENTIAL RECREATION AREAS

King's Mark Environmental Review Team

0 2000'

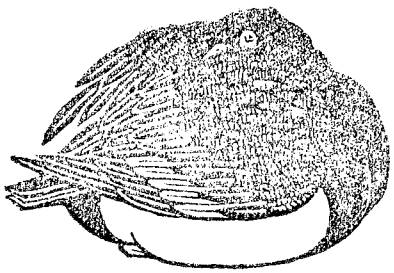
(3) Off Hayden Hill Road, 0.20 miles west of the Hayden Hill Road and Torringford Street intersection. The site encompasses land previously cleared for agriculture. This site has approximately eight acres of Paxton soils. Slopes are 3 to 8 percent.

(4) Off Torringford Street, 0.45 miles north of the Greenwood Road and Torringford Street intersection. The site is east of Torringford Street and has approximately seven acres. The soil is a Paxton with 0 to 3 percent slopes.

Areas 2, 3, and 4 are on prime agricultural soils.

All areas would require some grading. Use of subsurface drainage is advised around all buildings. On-site disposal of sewage would require careful engineering due to perched water tables in winter and spring.

BIOTA



BIOTA

FORESTRY RESOURCES

Introduction

The vegetation description for Torrington's portions of the watershed for the Still River can be divided into six broad vegetation types. These are described in more detail in the Vegetation Types Descriptions section. In general terms, most of the area is forested with tree species common in Connecticut. There are some extensive areas of water and/or wetlands as well as agricultural land, parts of two golf courses and concentrated areas of development. The heaviest development is primarily located between Routes 8 and 183, as well as in the industrial park and at Lakeridge community. The Paugnut State Forest encompasses perhaps two-thirds of the forested area west of Route 8.

In the forested areas, including the old field type, the dominance of one tree species over another is primarily dictated by available moisture usually coinciding with the depth of soil to underlying ledge or the water table.

In a commercial sense, the value of the wood is going to fluctuate greatly. Tree size, quality, and species are the underlying variables. Sawtimber size trees (i.e., sawtimber trees are greater than 12 inches in diameter measured at breast height or dbh) are more valuable than smaller stems, and as a general rule, hardwood species are more valuable than softwood species. The smaller diameter trees (i.e., 4 to 10 inches dbh) are generally thought of as the "cordwood" trees. These are of low value since the value of standing firewood is not high. Other values might be found in some of the old field type and might consist of post products from red cedar or locust.

Undoubtedly most of the individual stands within the mixed hardwood type

are even-aged; that is, most of the trees forming the upper crown canopy are approximately the same age. This cannot be said about size, however. For instance, a 12 inch dbh tree might be standing right next to an 18 inch dbh tree and they both might be 70 years old. The reason for the even-aged stands is that most of the forest developed from either abandoned farmland and clearcut, cutover forest. This clearcutting was a result of the extensive demand for charcoal up until the early 1900s.

Left undisturbed, the character of the forest will not change dramatically but there will be a long term shift toward more shade tolerant species as the forest goes through natural processes.

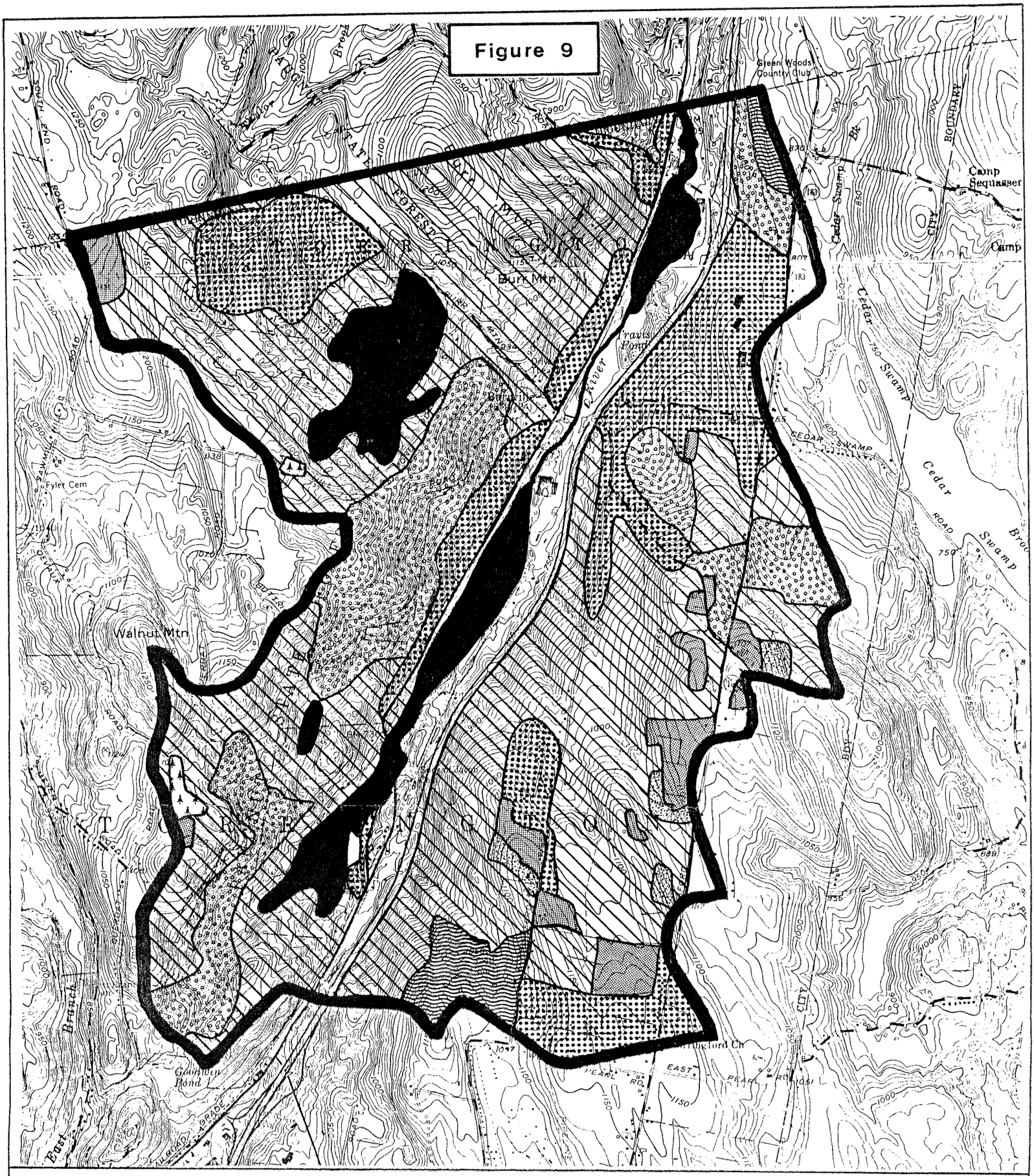
Vegetative Types Descriptions

Mixed Harwoods (MH)

Perhaps one-quarter of the forestland in the District would fall into this classification (Figure 9). This type will have at least 60 percent hardwood and in most cases, 80 percent or more. Species composition for the most part follows soil conditions. On the higher elevations, species most generally encountered will be white, red and chestnut oak, black birch, hickory and red maple. There may be extensive and dense patches of mountain laurel in the understory.

Moving downslope, species composition will be altered to include higher concentrations of red oak, sugar maple, red maple, yellow birch as well as some scattered ash and tulip poplar. Most of the highest quality and most valuable trees will be found here. In the older stands, large sawtimber trees (i.e., 20 inch dbh or more) will be common. As the slopes approach moister conditions, species composition tends toward heavier concentrations of red maple, ash and black birch.

Figure 9



DEVELOPED - RESIDENTIAL/COMMERCIAL

GOLF COURSE

WETLANDS/WATER

FIELD

OLD FIELD

HARDWOOD/SOFTWOOD

MIXED HARDWOOD

PLANTATION - CONIFERS

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

FOREST TYPES

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0 2000'

Hardwood/Softwood (H-S)

By far, this cover type is the largest and most diverse (see Figure 9). This is an area where neither the softwood species or the hardwwod component exceeds 60 percent. The hardwood species might be any of the aforementioned species and the softwood stems will be either hemlock or white pine or a combination of these. There may be small patches (i.e., up to several acres) of pure hemlock.

Plantation (PL)

There are several small areas of planted softwood trees, most of which are located in the Paugnut State Forest (see Figure 9). Species may include red pine, white pine, Norway spruce and larch.

Old Field (OF)

This cover type covers an age class from 1 to 2 years old up to 20 or 30 years old. This is dependent on how fast the trees get established on the old agricultural land (see Figure 9).

A distinct difference usually is noticeable between old pastures and old hay fields. The abandoned pasture lands usually contain species such as red cedar, juniper, bayberry or multiflora rose. Hay fields, in constrast, are usually void of such species and come back to trees faster. This difference is created by wildlife grazing back the invading trees coupled with their refusal to eat the aforementioned species.

Besides the species previoiusly mentioned, it is common to find white pine, fire cherry, locust, aspen, black cherry and ash in the old field type.

Field (F)

This is open agricultural land presently being used to grow a variety of crops or is presently being grazed (see Figure 9).

Inland Wetlands

There are large areas of wetlands in this watershed area (see Figure 9). All of the wetlands offer a unique habitat to water-loving tree species. Red maple is the most common tree. Other associates include swamp white oak, ash as well as spicebush, highbush blueberry, buttonbush, nannyberry, pussywillow and skunk cabbage (see Wetland Resources section for further discussion on wetlands).

Limiting Conditions

Several factors have to be considered in the maintenance of a natural forest stand. Wetland soils will have a water table close to the surface of the ground. This allows for shallow root penetration of the trees. Windthrow is a potential hazard here. Large openings and clearings in and alongside wetland areas should be avoided if possible. These soils as a whole, are more sensitive to disturbance than other soil types.

Trees which are growing on ridge tops may also be subject to windthrow damage. These stems quite often grow in very thin soil (i.e., perhaps only a few inches deep) and may easily be toppled if exposed to heavy winds. As in wetland areas, trees rely on each other for stability and heavy cutting may lead to wind-related problems.

Alterations in the wetlands which permanently raise or lower the water table and/or restrict natural drainage may have a negative impact on the

vegetation in the immediate area. Raising the water table may drown root systems causing widespread mortality in the plant community. Lowering the water table may also result in plant dessication.

Several forest plantations are either pure or contain a component of red pine. This species was extensively planted in the 1930s and 1940s. These trees now have two enemies. Torrington is well within the range of both the red pine scale and the red pine adelgid. Both species have been positively identified as being present within City limits. The red pine scale, an insect, has led to the demise of virtually all the red pine to Fairfield and New Haven counties. It is spreading north and east, and it is now in lower Litchfield County with the same result. There is no control at this time. The red pine adelgid, another insect, has now been identified as causing much of the same problem with red pine and there is no control as well. Once infected, red pine stands will die. Time frame of this mortality has many variables but the outcome is always the same.

Wildfires are always a concern and threat to forest resources. Although several thousands of acres of forest burn each year in Connecticut, the chances of any one acre burning is low. Traditionally, this area has had a low incidence of fire and there is no reason to believe that this record won't continue.

Forest Management Considerations

Active forest management is limited by several factors including: (1) landowner attitudes - many smaller parcels have many owners each with different objectives; this can make forest management more difficult; (2) terrain limitations; (3) lack of knowledge on the part of landowners as to what his/her alternatives may be; and (4) lack of good markets for low quality wood.

Overall, there is a great deal of potential of the management of the forestland in this watershed area. There are large areas of both high quality stands and potentially high quality stands. Paugnut State Forest has been actively managed for years and has yielded hundreds of thousands of board feet of sawtimber and hundreds of cords of fuelwood. This forest will undergo an inventory and will have its comprehensive forest management plan revised in the next fiscal year. An active forest management program for private forest landowners would enhance the privately-owned forest resources.

Any red pine stands on private land should be evaluated for signs of insect infestations. Landowners with infected stands have two alternatives: (1) remove the infected stands or (2) let them die standing. Removal of the trees can be done commercially if enough volume in present. This would result in a net income for the landowner.

Trees which are unhealthy and not growing vigorously due to crowded conditions are most susceptible to further degradation from environmental stress brought on by development, disease, insect infestation and adverse weather conditions. Improvement thinnings which remove undesireable trees, reduces competition for sunlight, nutrients and water between the higher quality residual trees is designed, over time, to allow trees to improve in health, vigor, quality and stability. These thinnings when implemented properly, can improve the aesthetic value of an area, improve tree health and vigor, improve wildlife habitat and provide wood products.

Improvement cuttings remove trees for a variety of reasons. Individual trees could be harvested due to rot, excessive sweep or crook, unhealthy crown condition or it is an undesireable species. This type of cut allows for a hardier, more vigorous stand of trees more capable of thriving under adverse environmental conditions.

A public service forester or a private forester may be of assistance in either on the ground planning or the marketing of forest products.

WETLAND RESOURCES

Wetlands and Watercourses

The Still River is currently classified as a Class Bc water. The designated uses for the Class Bc water are recreation, fish and wildlife habitat, and agricultural and industrial water supply. Class Bc water has potential for supporting a cold water fishery.

The watercourses that are tributary to the Still River are assumed to be Class A; waters of very good quality. Water quality classification criteria are detailed in Appendix A.

The U.S. Fish and Wildlife Service's National Wetland Inventory identified 13 distinct types of wetland units in the study area. The classification of these units is based on the wetland's hydrologic location, vegetative structure, water regime, and site specific modifiers. The wetlands units are identified below and in Figure 10:

(1) Palustrine, forested (broad-leaved deciduous) with a scrub/shrub (broad-leaved deciduous) understory, seasonally saturated ($pFO1_{SS}^{E}$).

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

(3) Palustrine, forested (needle-leaved evergreen), seasonally saturated (PFO4E).

(4) Palustrine, forested (broad-leaved deciduous), seasonally saturated (PFO1E).

(5) Palustrine, forested (dead) with open water, intermittently exposed, beaver modified ($pFO5_{OW}^{2b}$).

(6) Palustrine, scrub/shrub (broad-leaved deciduous) with an emergent understory, seasonally saturated ($pSS1_{EM}^{E}$).

(7) Palustrine, scrub/shrub (broad-leaved deciduous), semi-permanently flooded.

(8) Palustrine, emergent, seasonally saturated (PEME).

(9) Palustrine, permanent open water (POWH).

(10) Palustrine, permanent open water, excavated (POWHx).

(11) Palustrine, unconsolidated bottom, intermittently exposed (PUBG).

(12) Lacustrine, limnetic open water, permanent, impounded (LIOWHh).

See Appendix B for a more detailed discussion of the U. S. Fish and Wildlife Service National Wetlands Inventory.

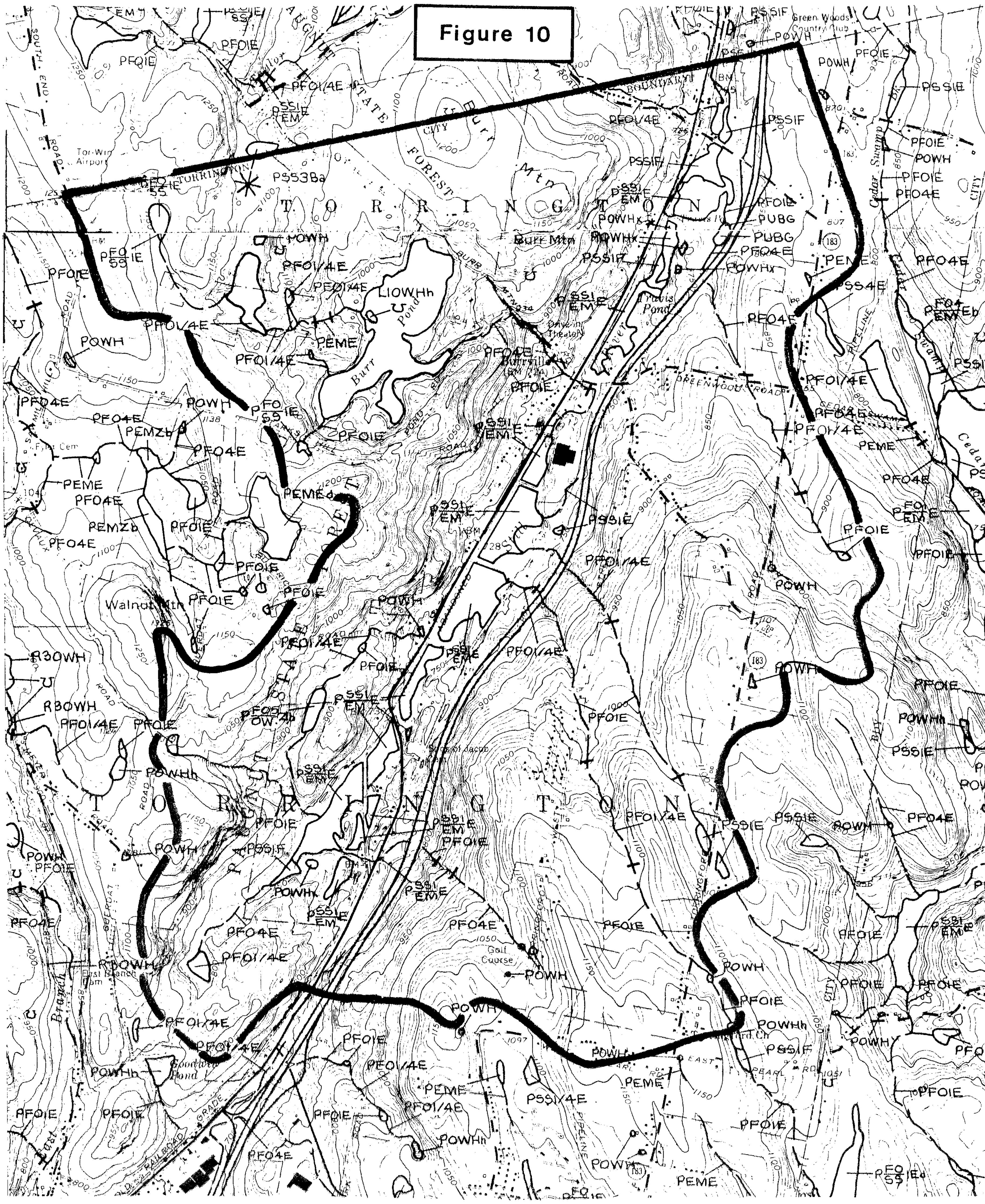
Wetland Values

Because of the size of the Still River watershed, and the number and size of wetlands contained therein, the evaluation of the importance of these wetlands for the purposes of this report must be of a general nature. The primary values of the above mentioned wetlands include: (1) hydrologic; (2) water quality; (3) fish and wildlife; and (4) recreation, education, aesthetic.

Hydrologic

The majority of the significant wetlands in the study area are closely associated with the primary brooks, streams and Still River. These wetlands perform valuable hydrologic functions. For example, by providing storage capacity for stormwater runoff, these wetlands are of significant value in modifying (i.e., reducing) the impacts of flooding within the study area as well as downstream. This function is particularly important due to the placement of many of these wetlands in the upper watershed drainage areas.

Figure 10



Palustrine, forested (broad-leaved deciduous) with a scrub/shrub (broad-leaved deciduous) understory, seasonally saturated ($p\frac{FO1}{SS}E$)

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

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

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

Palustrine, forested (dead) with open water, intermittently exposed, beaver modified ($p\frac{FO5}{OW}2b$)

Palustrine, scrub/shrub (broad-leaved deciduous) with an emergent understory, seasonally saturated ($p\frac{SS1}{EM}E$)

Palustrine, scrub/shrub (broad-leaved deciduous), semi-permanently flooded

Palustrine, emergent, seasonally saturated (PEME)

Palustrine, permanent open water (POWH)

Palustrine, permanent open water, excavated (POWHx)

Palustrine, unconsolidated bottom, intermittently exposed (PUBG)

Lacustrine, limnetic open water, permanent, impounded (LIOWHh)

STILL RIVER DISTRICT

TORRINGTON, CONNECTICUT

INLAND WETLANDS

King's Mark Environmental Review Team

0 2000'

Conversely, during dry climatic conditions, surface and groundwaters retained in these wetlands are reintroduced or released into the watercourses. Hence, water flow is sustained during dry conditions, supporting aquatic life and maintaining water quality.

Water Quality

Wetlands in the study area provide a significant benefit in maintaining surface and groundwater quality. Nutrient uptake, and the settlement and filtration of sediments are accomplished within these wetlands, thereby protecting watercourses from naturally occurring organic or mineral pollutants. Man-induced pollutants from roadways, street sanding and development activities are further ameliorated by the filtrative capabilities of wetlands. Finally, the impacts of agricultural activities on water quality are also buffered by the nutrient uptake and filtrative capabilities of these wetlands.

Fish and Wildlife

While specific fish and wildlife values are discussed elsewhere in the report, it is necessary to note a few general characteristics of factors which make these wetlands important to fish and wildlife. Many of the wetland tracts in the study area are small to medium size (i.e., 3 to 35 acres) and are hydrologically connected. Hydrologic connection of wetlands often increases wildlife use of individual wetlands by providing a passage corridor or route for wildlife from one wetland tract to another. Much of the wetland habitats within the study area are juxtaposed with large woodland habitats, thus providing extensive habitat edges. Habitat edge areas encourage wildlife species diversity by providing plant species and vegetation structural diversity.

Recreation/Education/Aesthetics

The intrinsic nature of many of the wetlands within the watershed makes them ideally suited to passive recreational pursuits, such as hiking, birdwatching, nature study and photography. Some of the larger wetland tracts have the potential to provide opportunities for hunting, fishing and trapping.

Wetlands provide ideal sites for studying natural history and ecological processes. Wetlands aid visual diversity to the surrounding landscape by virtue of their contrasting vegetative structure and plant communities, and the presence of water.

WILDLIFE RESOURCES

Wildlife Habitat

Wildlife habitat within the study area is comprised of five general habitat types: (1) mixed hardwood woodland; (2) mixed hardwood/conifer woodland; (3) conifer woodland; (4) open flood; and (5) wetland.

Mixed Hardwood Woodland

The mixed hardwood woodland wildlife habitat consists of forest stands composed of a variety of hardwood species including red oak, white oak, red maple, sugar maple, black cherry, yellow birch, black birch, ash, hickory, beech, and aspen. The understory typically contains various hardwood saplings of the aforementioned species and shrubs such as viburnum, witch hazel, blueberry, dogwood, and shadbush.

Mixed hardwood habitats are commonly utilized by deer, turkey, ruffed grouse, gray aquirrel, southern flying squirrel, gray fox, a variety of hawks

and owls, numerous small mammal species, including mice, voles, shrews, various passerine species, and certain bat species.

Coniferous Woodland

Coniferous woodland wildlife habitat within this study area typically consists of stands of hemlock and/or white pine. Understory cover is generally sparse in these habitats. Understory vegetation, where present, usually consists of coniferous seedlings and saplings. Deer, turkey, hawks and owls, various passerine species, small mammal species, including mice, voles, and shrews, utilize these habitats. Coniferous woodlands provide a variety of wildlife species with an important source of shelter from harsh climatic conditions.

Open Field

Three types of open field wildlife habitats are present within the study area: (1) agricultural cropland; (2) hayfield/pasture; and (3) abandoned agricultural field (old field). These habitats provide a rich and varied food source for many wildlife species. Many of these open field habitats within the study area are bounded by large areas of forested habitats. The habitat edge created by these adjoining habitats encourage higher wildlife populations and increased wildlife species diversity, providing a zone of overlap between two different habitats. Habitat edges contain not only wildlife common to both adjoining habitats but also wildlife that tend to colonize these transitional habitats.

Vegetation in these open fields include agricultural crops, principally hay and corn; grasses, forbs, and early successional stage trees and shrubs such as dogwood, sumac, red cedar, gray birch, aspen, white pine, raspberry and blackberry.

Wildlife utilizing open field habitat include deer, turkey, ruffed grouse, red fox, cottontail rabbit, raccoon, skunk, hawks and owls, various passerine species, and a variety of small mammals such as mice and voles.

Wetlands

Wetland wildlife habitats within the study area include five general stypes: (1) wooded swamp; (2) shrub swamp; (3) emergent marsh; (4) dead woody marsh; and (5) open water. The wetland habitats are described in the section on wetlands and watercourses and in Appendix A.

Wildlife utilizing these wetland habitats include deer, river otter, mink, muskrat, beaver, woodcock, raccoon, opossum, skunk, waterfowl, particularly wood duck, mallard and black duck, herons, a variety of passerine species, certain species of mice, voles, shrews, and bats, and a variety of amphibian and reptilian species.

Wildlife Habitat Management

The study area presently contains a diversity of upland and wetland habitats. The long-term maintenance and enhancement of these habitats is heavily dependent upon the willingness of the local community to include wildlife habitat in a significant manner in its consideration of future residential and commercial development. Wetland habitats within the Route 8 and Route 183 corridor should receive immediate and special consideration in view of past intrusions and current development pressures. Land use regulation and planning activities should be directed toward enhancing habitat diversity and maintaining as many large contiguous blocks of habitat as possible.

The following guidelines should help enhance general habitat conditions within the watershed:

(1) Promote forest cutting practices that will establish forest stands with a diversity of age class and species composition.

(2) Encourage the development of early successional stage vegetation. Abandoned fields/old fields should be cut over every 3 to 5 years to maintain early successional vegetation.

(3) Encourage the development and preservation of hedgerows within agricultural fields.

(4) Pursue the acquisition of conservation easements on forest, wetland, and agricultural properties.

(5) Leave a minimum vegetated buffer strip 100 feet wide adjacent to wetland habitats and watercourses.

(6) Strictly enforce the utilization of appropriate soil erosion and sediment controls throughout the watershed to limit sediment loading of wetlands and watercourses.

(7) Forest cutting operations should be conducted in consultation with professional foresters and wildlife biologists.

FISHERY RESOURCES

The stretch of the Still River located within the watershed area is of marginal importance as a cold-water fishery resource and does not contain significant amounts of suitable trout habitat. The Still River in this area supports populations of such warm water fish species as white suckers, fallfish, common shiner, bluegill sunfish, grass pickerel and redfin pickerel. Public access is very limited due to the dense stream side vegetation.

The river in this area consists primarily of long, sandy-bottom pools interspersed with rocks, and a small amount of short shallow riffles. The major source of cover providing habitat for fish is comprised of undercut banks and root systems and shoreline vegetation extending into the water. The existing overstory of the shrubbery provides shade during times of year when solar heating could be detrimental to stream-dwelling fishes.

In a shallow, sandy-bottom river such as this area of the Still River, very little in-stream cover and aquatic insect-producing habitat exists. Therefore, any significant cutting or removal of the overstory or ponding of the river would very likely cause warming of the water and result in the destruction and/or reduction of the existing fish habitat. It is suggested that any development plan for the area consider the fragile balance between the streambank area immediately adjacent to it.

The Still River is an important tributary of the Farmington River. The lower portion of the Still River (i.e., Winsted and downstream), has suitable salmonid habitat but the limiting factor for their absence is poor water quality. The DEP has been stocking adult brown and brook trout in Sandy Brook and Farmington River which are located immediately adjacent to the Still River. This particular section of the Still River in Torrington is the headwater of the stream and the wetlands located in the watershed are the source of its water. Any warming of the water due to a reduction of flow can result in the destruction and/or reduction of the existing trout habitat downstream. Any significant changes to the wetland areas or water table in the watershed would very likely have severe consequences downstream. Tree cutting, earth moving and associated development activities in the watershed, without proper erosion controls, could potentially impact the stream by siltation and sedimentation. Therefore, any proposed development in the watershed should consider the downstream areas and take all possible precautions to protect and safeguard the headwaters which feed those areas.

Lambour and Rosbach Brooks

Based on field observations made during the ERT field review and the observed stream flows, it would appear that these brooks might possibly have

marginal habitat requirements for a small population of wild salmonids. Most likely, this would be brook or brown trout. However, the winter of 1986-87 was abnormally wet and observed flows in the brooks might have also been abnormally high for this particular time of year. If true, then the "normal" summer low flow conditions would greatly limit the potential trout habitat in streams as small as these and negate the possibility of this fishery existing. Other species expected to be found in the brooks would be tesselated darter, common shiner, blacknose dace, longnose dace, white sucker, and fallfish.

THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

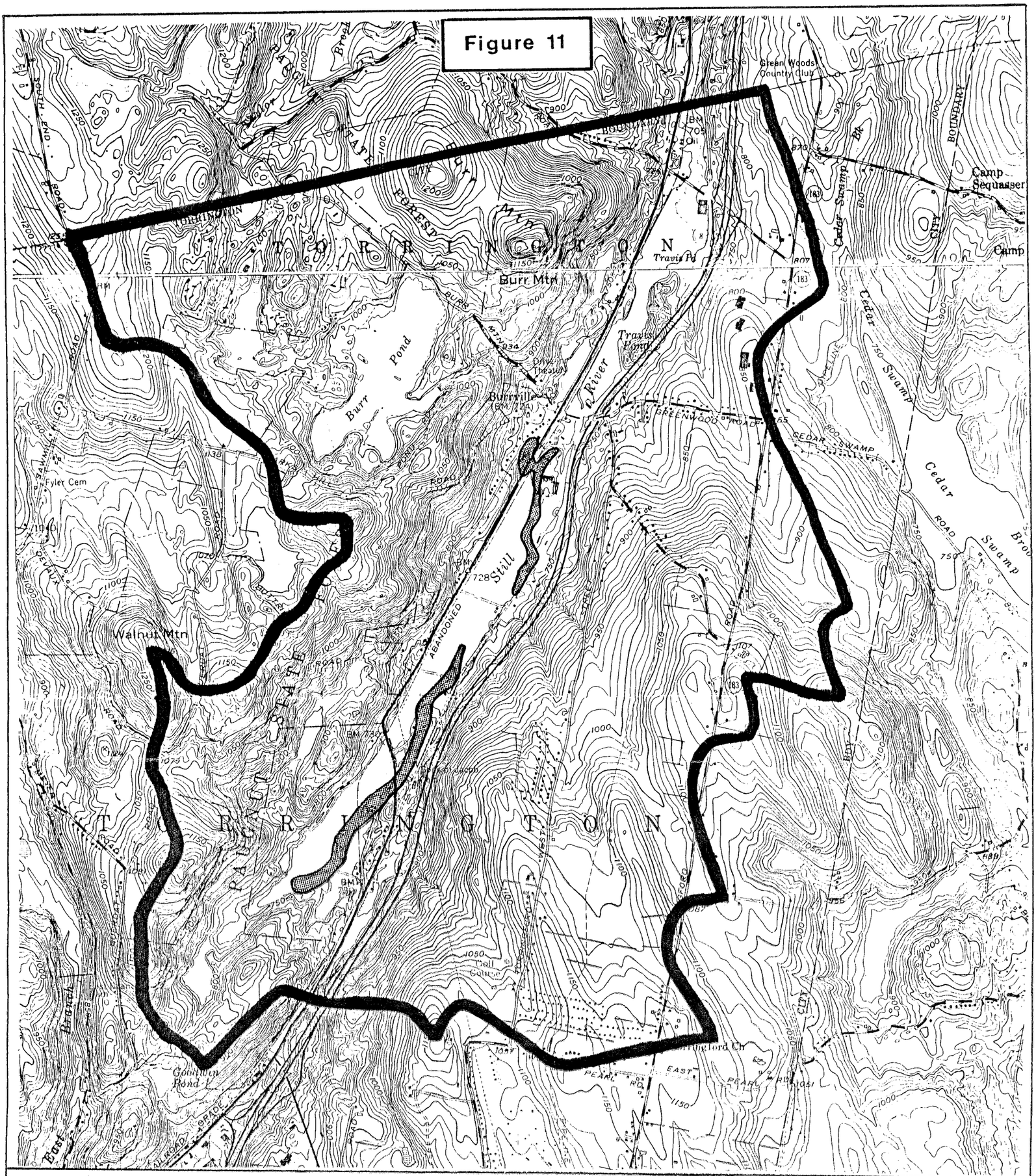
According to the DEP - Natural Diversity Data Base, no known extant populations of Federally endangered or threatened species, or Connecticut "Species of Special Concern" are found in the study area or will be affected by future development in the Still River Basin. The Natural Diversity Data Base contains the most current biologic data concerning endangered or threatened plant or animal species. On-going research continues to locate additional populations of species or locations of habitats of concern as well as updating existing data.

NATURAL AREAS INVENTORY SITE

In 1972, the Connecticut Forest and Park Association, Inc. prepared a Natural Areas Inventory totalling 459 sites. These were nominated as significant sites for one or more of the following attributes: (1) geologic; (2) hydrologic; (3) biologic; (4) archaeologic; (5) cultural; (6) aesthetic; and (7) research/educational. A site receives no legal protection by being included on the Natural Areas Inventory list.

The area indicated in Figure 11 is a Natural Areas Inventory Site. The area is an "...esker formed by a stream flowing beneath a glacier," and "extends in an interrupted form for two miles along the Still River Valley... Preservation would entail controlling the alteration of the shape of the esker rather than complete cessation of development..."

Figure 11



NATURAL - FORMING ESKER

STILL RIVER DISTRICT

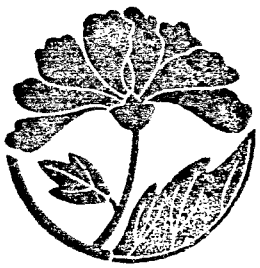
TORRINGTON, CONNECTICUT

NATURAL AREAS INVENTORY SITE

King's Mark Environmental Review Team

0 2000'

LAND USE
AND
PLANNING CONSIDERATIONS



LAND USE AND PLANNING CONSIDERATIONS

DEVELOPMENT AND ARCHAEOLOGICAL SITES

The City of Torrington is almost unknown archaeologically; there are no recorded prehistoric sites in site files of the American Indian Archaeological Institute. However, one small collection from West Torrington indicates that prehistoric native populations used the area for settlements between 6000 and 1000 years ago. The scarsity of sites is therefore not a true reflection of the city's archaeological potential; rather our lack of knowledge simply represents the lack of systematic surveys.

Within the Still River District, the landforms around the small wetlands west of Burr Pond as well as east of Walnut Mountain may contain occupation sites. Evidence from elsewhere in Litchfield County suggests that wetlands of varying sizes were an important focus for settlement and use during much of the prehistoric period. If similar sites exist in these places in the Still River District, their research potential will be lost if these landforms are disturbed by housing developments and other activities. In particular, the density of housing complexes north and west of Burr Pond and east of Sawmill Road should be controlled in order to protect as much of this potentially sensitive land as possible.

During some periods in the past, the valley floor of the Still River was probably a series of shallow wetlands and interconnected ponds. Such a complex may also have been an important focus for prehistoric settlement, suggesting that adjacent landforms may contain unknown sites. The area between Torringford Street (Route 183) and Torringford West Street may thus be archaeologically sensitive. Within the past two decades, housing developments

have begun to intrude into this space, probably resulting in the loss of some resources. The next decade will be critical for archaeological research and preservation in the Still River District. Initial systematic surveys should be undertaken to determine if the lands between these streets contain important sites that should be preserved for future study and interpretation.

PLANNING TO PROTECT HISTORIC LANDSCAPES

Evidence from an initial examination of standing architecture also indicates that Torringford Street was an important focus for historic settlement during the 18th and 19th centuries. A series of later Georgian farmsteads can be seen along the road, north of Route 202. As the street continues to be developed north of Pearl Road, the now obvious sense of historic farmsteads and landscapes will be submerged beneath a new, very different pattern of intensive residential use. A survey should be undertaken to identify those landscapes which are visually and/or historically most important to this part of the city. Zoning changes and other protective measures could then be introduced to preserve some of the sense of history that is now still present. Without such actions, it is probable that this part of Torrington's past will be lost before the 21st century.

PLANNING CONSIDERATIONS

Introduction

The City of Torrington is very fortunate to have on its staff a City Planner who is being assisted with the task of rewriting the Plan of Development by the Consulting firm Lord-Wood and Associates. Any Town or City

will be well served by this caliber of professional planning and the City of Torrington can expect high quality products once the planning process is in motion. Given this set of circumstances, it was difficult for the ERT Planner to provide detailed planning advice on the future of the Still River District.

Land Use

It appeared to the ERT Planner that the families presently living within the Still River District study area have presented their views regarding how they envision their neighborhoods. Numerous subdivisions in the study area, which appear to be acceptable, are presently being developed. Applications for industrial park development and condominium projects are also pending. Both single-family subdivisions and condominium proposals often attract neighborhood opposition. This suggests that future sites for industry or multi-family housing in the Still River District should be carefully researched and evaluated. The need for such development in the District should be balanced with existing sites within the City which are already zoned for multi-family and industrial uses.

Recreational Facilities

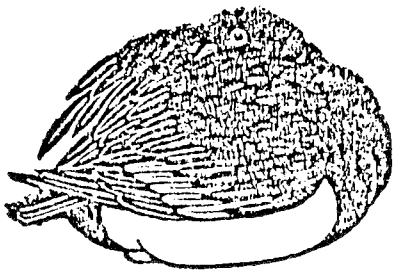
The City identified that there is a need in the District for recreational facilities. Residential growth in the District is outpacing the development of recreational facilities, particularly ballfields and playgrounds for children. If the uplands and farms in the District are developed for single-family homes, there will be an accompanying increase in the need for recreational areas as well as schools. Both of these pressures will require the City to acquire property in the District to accomodate recreational and educational uses.

Reaction to recent flooding of certain areas of the Still River may prompt the City to take action to correct these problems. If correcting these problems identifies any property that the City should own, it could be possible to coordinate these corrective actions with the acquisition of land for use as ballfields. Recreational uses of land within watersheds are complimentary to keeping property open to accomodate periodic flooding.

Potential for Farmland Preservation

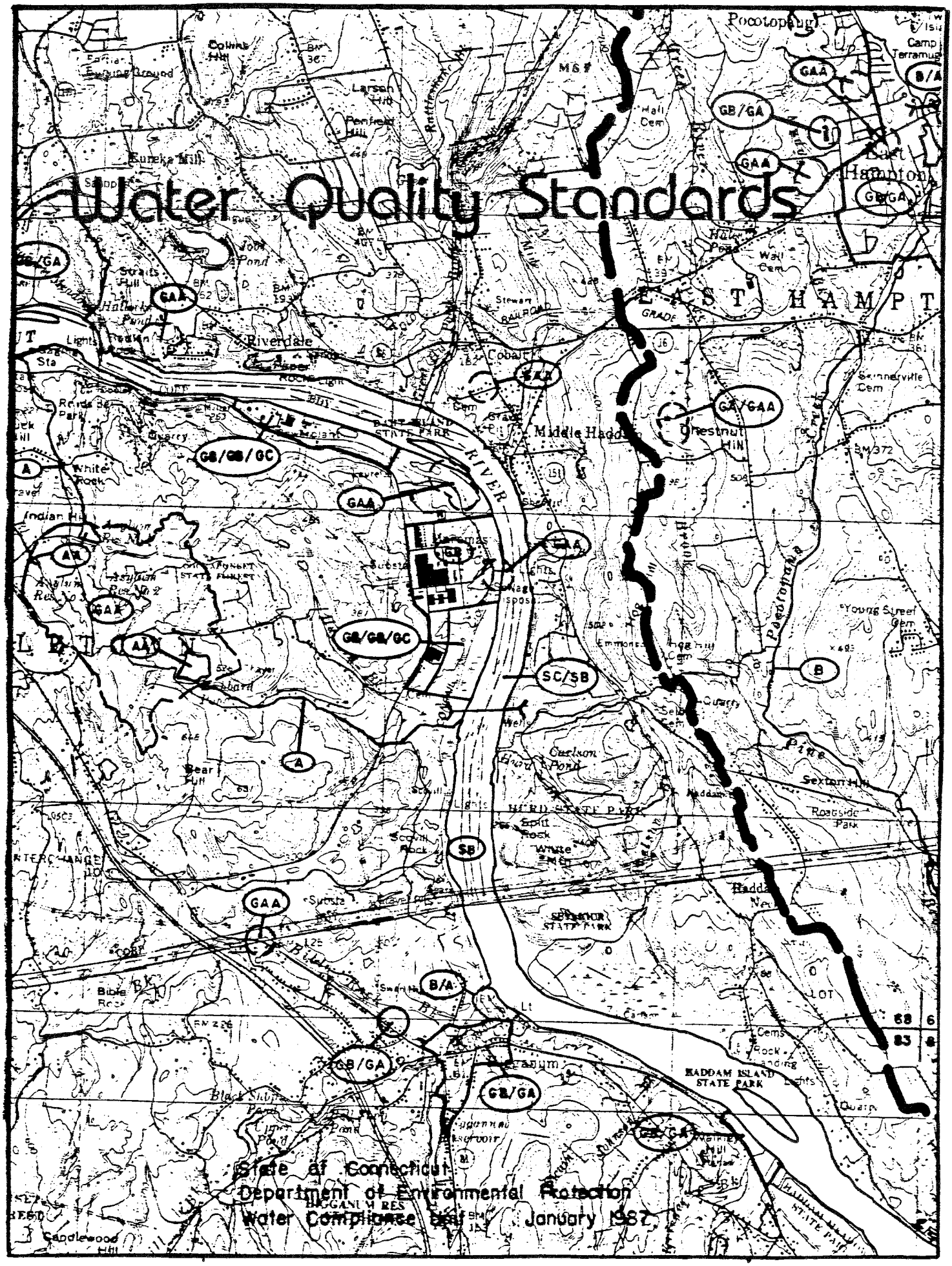
The farmland preservation program which the State of Connecticut has conducted in the last decade has recently had some success in acquiring large tracts of importnat and productive farmland in several communities. If appropriate sites can be identified, it is encouraged that the City work closely with the State Department of Agriculture in acquiring these lands for farmland protection.

APPENDICES



APPENDIX A

WATER QUALITY STANDARDS


Water Quality Standards
State of Connecticut
Department of Environmental Protection
Water Compliance Unit
January 1982

WATER QUALITY STANDARDS

WATER QUALITY STANDARDS

I. INTRODUCTION

Section 22a-426 of the Connecticut General Statutes requires the Commissioner of Environmental Protection to adopt standards of water quality for all the State's waters. The purpose of these standards is to provide clear and objective statements for existing and projected water quality and the general program to improve Connecticut's water resources. They also serve to qualify the state and its municipalities for available federal grants for water pollution control.

State statute mandates that these standards shall:

(1) Apply to interstate waters or portions thereof within the State.
(2) Apply to such other waters within the state as the Commissioner may determine is necessary.
(3) Protect the public health and welfare and promote the economic development of the State.
(4) Preserve and enhance the quality of State waters for present and prospective future use for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes and agricultural, industrial and other legitimate uses.
(5) Be consistent with the health standards as established by the Department of Health Services.

Water Quality Classifications, based on the adopted Water Quality Standards (WQS), establish designated uses for surface and ground waters and identify the criteria necessary to support those uses. The designated use and criteria goals serve to focus the department's water quality management activities, including establishment of water quality based treatment controls and strategies required by Sections 301 and 306 of the Federal Clean Water Act.

Section 303 of the Federal Clean Water Act requires state adoption of surface water quality standards and their review and modification at least every three years. Federal law defines water quality standards as the identification of water quality goals of a waterbody through the assignment of designated uses to be made of the water and by setting criteria necessary to protect the uses.

Federal regulations state water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish and wildlife, recreation in and on the water and agricultural, industrial and other purposes including navigation.

Though federal law requires adoption of water quality standards for surface waters, ground waters are not subject to federal review and approval. Connecticut's water quality standards however, recognize the inter-relationship between surface and ground waters and the competing use of ground waters for drinking and for wastewater assimilation. These standards specifically identify ground water quality goals, designated uses and those measures necessary for protection of public and private drinking water supplies; the principal use of Connecticut's ground waters.

II. SURFACE WATERS STANDARDS

1. It is the State's goal to restore or maintain surface waters to a quality consistent with their designated use and supportive quality criteria goals.

2. Surface waters with a classification goal of B or SB and with existing quality better than established standards for that Class will be maintained at their existing high quality. The Commissioner may require of discharges permit applicants a minimum level of treatment exceeding the applicable standards of performance for new sources promulgated pursuant to the federal Clean Water Act as well as Sections 22a-430 and 22a-436 of the Connecticut General Statutes or other special treatment requirements deemed necessary to prevent pollution and which will maintain existing uses made of, or presently possible in such waters.

3. All surface waters receiving treated wastewater discharges under permit will be restored and maintained to a condition consistent with Class B or Class SB designated uses and quality criteria except where irreperably altered to the extent certain designated uses have been permanently lost. The determination of where these exceptions exist shall follow federal EPA "Use Attainability" guidance and shall be subject to approval of the Commissioner and of the federal Environmental Protection Agency (EPA).

4. Surface waters will not be lowered in a designated use goal as established by its classification unless, and until it has been demonstrated to the Commissioner that such change is justifiable due to overriding economic or social needs and will not interfere with or become injurious to any existing uses made of, or presently possible in, such waters. Any applicant requesting a change in a water quality classification will be required to demonstrate to the Commissioner the proposed new Class designation is consistent with all such uses.

5. Discharges to surface waters shall be limited as follows:
   (A) Class AA surface waters: discharges may be permitted by the Commissioner from public or private drinking water treatment systems, minor cooling and other clean water discharges, subject to the approval of the Commissioner of Health Services. Backwash discharges must be treated to a level which in the judgement of the Commissioner of Environmental Protection protects aquatic life and drinking water supplies.
   (B) Class A and SA surface waters: discharges may be permitted by the Commissioner of treated backwash waters from public or private drinking water treatment systems, minor cooling and other clean water discharges.
   (C) Class B and SB surface waters: discharges may be permitted for all those allowed in Class AA, A and SA waters, for major cooling water discharges and major and minor discharges from municipal and industrial wastewater treatment systems.
   (D) The designation of surface waters as Classes C/B, D/B, SC/SB or SD/SB, shall not be a reason for authorizing a new discharge that would not allow the receiving surface waters to attain Class B or Class SB designated uses and quality criteria.

(E) The designation of surface waters as Classes B/AA, B/A, C/A, SB/SA, or SC/SA shall not be a reason for authorizing a new discharge that would be inconsistent with Class AA, A or SA discharge limits.

6. The Commissioner may establish zones of influence when permitting discharges to surface waters. The spatial dimensions and/or volume of receiving water allocated to zones of influence will be established on a case-by-case basis, taking into account the unique hydraulic, physical/chemical, and biological characteristics of the receiving waterbody. The intent is to allow the Commissioner to allocate a portion of the receiving water resource for mixing and assimilation of a discharge effluent provided this zone of influence will not preclude any designated uses of the receiving waterbody. The Commissioner, pursuant to statutory authority, may require surface water dischargers to provide information on receiving water characteristics including the spatial dimensions of the discharge zone of influence and the volume of flow required for mixing and assimilation of waste. Considerations to be used in establishing zones of influence include:

(a) The volume, strength, and persistence of any toxic substances in the discharge effluent, as well as potential bioaccumulation of toxic substances in aquatic organisms.

(b) Allowance for a continuous zone of passage for free swimming and drifting organisms.

(c) Impingement upon spawning grounds and nursery areas for sensitive aquatic organisms or areas utilized by aquatic organisms for shelter and living space to the extent that the environmental value of the receiving waterbody is significantly reduced.

(d) The location of other discharges to the receiving waterbody to insure that the cumulative effect of adjacent zones of influence will not significantly reduce the environmental value of the receiving waterbody.

Assessment of environmental value will be based on a number of receiving water characteristics, including but not limited to: type of waterbody, velocity, depth, number and type of aquatic habitats, migration patterns, nature of the food chain, level of productivity, water temperature, ability of tributaries to provide recruitment, presence of endangered species, and value to human uses (aesthetic, commercial and sport fishing, and recreational uses).

As a guideline, zones of influence on larger rivers shall be limited to no more than 25% of the cross-sectional area or volume of flow.

7. When considering discharge impacts, the minimum average daily flow for seven consecutive days that can be expected to occur once in ten years under natural conditions (7Q10) is the minimum flow to which the standard for surface waters apply, except when a stream has been historically regulated to result in low flows below that level, in which case the standards apply to that low flow determined by the Department of Environmental Protection's Minimum Flow Regulations as amended; the Department's Diversion Permit Program; or the Federal Energy Regulatory Commission's hydropower licensing process. Maintaining a long-term flow of 7Q10 or less may result in significant stress on the physical and biological quality of surface waters. Higher flows may be desirable to maintain or achieve designated uses. In those surface waters having regulated flows, at or near the naturally occurring 7Q10 flow, more

stringent water quality criteria may be required to achieve and maintain designated uses. The Commissioner may approve discharge limitations based on minimum average daily flow in excess of 7Q10 conditions, provided the Commissioner is satisfied that special measures will be implemented by the discharger during low flow conditions which provide protection to the environment which would be at least as effective as that protection which would pertain if discharge limitations were based on 7Q10 conditions alone.

8. The Commissioner, pursuant to statutory authority, will regulate discharges to the waters of the State to assure that such discharges do not cause pollution due to acute or chronic toxicity to aquatic and marine life. The strategy to identify and regulate potentially toxic discharges is described in the Department of Environmental Protection's Water Quality Management Plan. The Department's Guidelines for Preparation of Discharge Toxicity Evaluations provides technical guidance to assist dischargers in obtaining the information necessary for assessment of toxic impact.

9. Surface waters and sediments shall be free from chemical constituents which accumulate in tissues of fish, shellfish and other aquatic organisms to levels which will impair the health of aquatic organisms or result in unacceptable tastes, odors or health risks to human consumers of aquatic life.

10. Water quality criteria for benthic invertebrates shall be utilized where appropriate, in evaluation of surface water quality. These criteria describe the fauna of erosional or riffle habitats in flowing waters which are not subject to tidal influences. They are intended to provide guidance for assessment of the biological integrity of surface waters with respect to established water quality goals. These criteria are based on the rationale that biological data, in combination with physical/chemical data, better reflect the attainment of these goals than do physical/chemical data alone.
The benthic community is widely used for the environmental assessment of flowing waters. The structure of this community is a function of environmental conditions during the life span of the organisms. Consequently, community structure can be altered by the effects of pollution, including intermittent events which could easily be missed by conventional chemical/physical indicators. The well-being of the benthic community is frequently reflected in the well-being of higher forms of aquatic life, such as fish.

11. The discharge of radioactive materials in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. In no case shall the Alpha emitters in a surface water exceed a concentration of 1,000 picocuries per liter.

12. Reasonable controls or Best Management Practices for control of non-point source pollutants, may be defined by the Commissioner on a case-by-case basis or the Commissioner may require that it be demonstrated by any person or municipality that all reasonable controls will be or are being used.

13. The Commissioner shall establish nutrient effluent limits for wastewater discharges which are determined by DEP to cause cultural (man made) eutrophication that impairs aesthetics, recreation, and/or habitat for fish and aquatic life. No numerical water quality criteria can be established as each watercourse has unique flow characteristics and nutrient inputs from natural and cultural (man made) sources. The intent is to achieve meaningful improvements in the trophic condition of Class B or SB waters through implementation of reasonable point source nutrient controls and control of non-point sources by Best Management Practices.

14. In lakes, ponds and impoundments designated as Class AA or A, water quality management efforts shall be directed towards implementation of reasonable methods of control of non-point sources of nutrients and sediments in order to abate, prevent or minimize eutrophic conditions. Use of these controls is considered preferable to use of biocides for remedial correction of eutrophic conditions.

15. Water quality criteria do not apply to conditions brought about by natural causes. Conditions which exist in the water, in part due to man's normal uses of the land, shall be considered natural. The meaning of the word 'natural' is not limited to only those conditions which would exist in water draining from pristine land. In the case of land lying within a water supply watershed, man's normal use of the land means certain agricultural practices, low density residential development and the improvement and maintenance of secondary roads, provided Best Management Practices are used.

16. There shall be no point source discharge into any natural lake or pond or tributary surface waters which will raise the phosphorus concentration of the receiving surface waters, including phosphorus contained in suspended matter, to an amount in excess of 0.03 mg/l. The Class B impoundments listed below shall be considered natural lakes or ponds.

Town	Lake or Pond
Bozrah	Fitchville Pond
Griswold	Ashland Pond
Killingly	Fivemile Pond
Stafford	Glenville Pond
Stafford	Riverside Pond
Stafford	Warren Pond

17. Potential drinking water supplies identified in the Long Range Plan for Management of Water Resources prepared and adopted pursuant to Section 22a-352 of the Connecticut General Statutes shall be designated as Class AA surface waters.

18. Section 22a-417 of the Connecticut General Statutes imposes an absolute restriction on the discharge of sewage to Class AA reservoirs and their tributaries. The coliform bacteria standard of "none of human origin", if violated by a discharge source outside the State where similar requirements are not imposed, shall not be a valid reason for either relaxing the restriction in Connecticut or changing the Class AA designation. It is a State policy to pursue the adoption of compatible Water Quality Standards in neighboring states to assure the protection of Connecticut drinking water supplies.

19. Disinfection shall be required for all treated sewage discharges to surface waters. The period of disinfection shall vary depending on the nature of the receiving waterbody as described below:
    1. Continuous disinfection shall be required at all sewage treatment plants located south of Interstate Highway 95 to protect the sanitary quality of shellfish resources. Continuous disinfection may be required at other locations as determined by the Commissioner.
    2. Disinfection shall be required only during the period from May 1 to October 1 at all sewage treatment plants located north of I-95. Seasonal disinfection is intended to protect the sanitary quality of bathing waters and minimize adverse impacts to aquatic life associated with disinfection. It is recognized that criteria for coliform bacteria may not be met on the above streams during the period when disinfection of sewage treatment plant effluent is not required. The degree of treatment and disinfection shall be as required by the Commissioner and shall be consistent with the health standards established by the Commissioner of Health Services.

20. The discharge of sewage, sink and galley wastes from boats, whether or not treated by any marine sanitation device, is prohibited in all inland freshwaters not capable of interstate navigation. The Department will pursue delegation of authority from EPA for designation of no discharge zones at marinas, near bathing areas and over shellfish areas marked in accordance with Section 19-13-B71 of the Public Health Code.

21. The use of subscript b, as in Class B_b, or SB_b, is intended to designate the zone of influence in the immediate vicinity of treated sewage outfalls where bathing is not advisable due to elevated concentrations of fecal coliform bacteria.

22. Criteria for fecal coliform organisms are as determined by the membrane filter (MF) method for freshwaters, and the multiple tube fermentation (MPN) method for marine waters. Criteria for coliform bacteria are intended to provide a basis for evaluation of data related to sewage contamination. Due to the inherent uncertainty involved in sampling and analytical determination of coliform levels, excursions from established criteria should be investigated by means of a field survey of sanitary conditions or other appropriate means to determine coliform source and to confirm the sanitary quality of the waterbody in question. (See also Appendix B).

23. The use of subscript c, such as Class B_c, C_c/B_c, SB_c is to identify areas suitable for cold water fisheries, including spawning, growth and passage. More stringent water quality criteria may apply and will be developed on a case by case basis for these waters.

24. Physical obstructions such as dams, which prevent cold water fish from reaching an area suitable for spawning and growth, shall not be considered a valid reason for not meeting the designated use and quality criteria for fish unless a DEP approved use attainability analysis has been performed.

25. In the estuarine segments (Class SB) of the Housatonic, Connecticut and Thames Rivers the allowable temperature increase from discharges shall be consistent with the criteria for the non-tidal segments (Class B).

26. Except within designated dredged material disposal areas, surface waters shall be substantially free of pollutants that: a) unduly affect the composition of bottom fauna; b) unduly affect the physical or chemical nature of the bottom; or c) interfere with the propagation and habitats of shellfish, finfish, and wildlife. Dredged materials dumped at approved disposal areas shall not pollute the waters of the state and shall not result in; a) floating residues of any sort; b) release of any substance which may result in long-term or permanent degradation of water quality in waters overlying or adjacent to the dumping grounds; c) dispersal of sediments outside a zone of influence enclosing the designated dump points; or d) biological mobilization and subsequent transport of toxic substances to food chains.

27. Sample containers , preservation, handling and analysis should conform to EPA methods promulgated in 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," Friday, October 26, 1984 and subsequent amendments. Other different but equivalent methods may be utilized if they have received the Commissioner's prior approval.

28. As part of the Commissioner's continuing efforts to further define water quality standards, other criteria will be considered. The Commissioner reserves the right to amend or extend the criteria for each Class of waters as new information, or improved or more stringent criteria relative to water quality impacts, are developed and justified subject to the legal and procedural requirements of state and federal laws or regulations.

29. Waters which are not otherwise designated shall be considered as Class A or Class SA.

30. Tidal wetlands and tidal creeks shall be considered as Class A or Class SA watercourses unless otherwise designated.

31. Watercourses which are fully enclosed in drainage conduits or pipes and not assigned a specific Class may be considered, on a case-by-case basis, to be the Class of the stream segment to which they discharge.

32. Where existing water quality does not meet the designated use and quality criteria goals, the existing quality will be identified, followed by the use goal (e.g. C/B).

III. SURFACE WATER CLASSIFICATIONS

INLAND SURFACE WATERS

CLASS AA

Designated Use - Existing or proposed drinking water supply; fish and wildlife habitat; recreational use; agricultural, industrial supply and other purposes, (recreational uses may be restricted).

CRITERIA

Parameter		Standard
1.	Aesthetics	Uniformly excellent
2.	Dissolved oxygen	Not less than 5 mg/l at any time.
3.	Sludge deposits-solid refuse-floating solids-oils and grease-scum-color	None other than of natural origin.
4.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls or Best Management Practices are used.
5.	Turbidity	Shall not exceed 10 JTU (or NTU equivalent) over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter. All reasonable controls or Best Management Practices are to be used.
6.	Coliform bacteria	Fecal coliform shall not exceed an arithmetic mean of 20 organisms/100 ml in any group of samples nor shall 10% of the samples exceed 100 organisms/100 ml. Refer to Standard number 22 and Appendix B.
7.	Taste and odor	None other than of natural origin.
8.	pH	As naturally occurs.

9.	Allowable temperature increase	None other than of natural origin except when it can be demonstrated that cold water fish spawning and growth will not be impaired, in which case Class B standards and criteria apply.
10.	Chemical constituents	None in concentrations or combinations which would be harmful to the most sensitive designated water use. Refer to Standards numbers 6, 7, 8 and 9.
	(a) Phosphorus	None other than of natural origin
	(b) Sodium	Not to exceed 20 mg/l
11.	Benthic Invertebrates which inhabit lotic waters	A wide variety of macroinvertebrate taxa should normally be present and all functional groups should normally be well represented. Presence and productivity of aquatic species is not limited except by natural conditions, permitted flow regulation or irreversible cultural impacts. Water quality shall be sufficient to sustain a diverse macroinvertebrate community of indigenous species. Taxa within the Orders Plecoptera (stoneflies), Ephemeroptera (may-flies), Coleoptera (beetles) and Trichoptera (caddisflies) should be well represented.

CLASSIFICATIONS

- AA	Known or presumed to meet water quality criteria which support the designated uses.
-B/AA	May not be meeting Class AA water quality criteria or designated uses. The goal is Class AA.

INLAND SURFACE WATERS

CLASS A

Designated Uses - Potential drinking water supply; fish and wildlife habitat; recreational use; agricultural, industrial supply and other legitimate uses, including navigation.

CRITERIA

Parameter		Standard
1.	Aesthetics	Uniformly excellent
2.	Dissolved oxygen	Not less than 5 mg/l at any time.
3.	Sludge deposits - solid refuse-floating solids - oils and grease - scum-color.	None other than of natural origin.
4.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls or Best Management Practices are used.
5.	Turbidity	Shall not exceed 10 JTU (or NTU equivalent) over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter. All reasonable controls or Best Management Practices to be used.
6.	Coliform bacteria	Fecal coliform shall not exceed an arithmetic mean of 20 organisms/100 ml in any group of samples nor shall 10% of the samples exceed 100 organisms/100ml. Refer to Standard number 22 and Appendix B.
7.	Taste and odor	None other than of natural origin.
8.	pH	As naturally occurs.
9.	Allowable temperature increase	None other than of natural origin except when it can be demonstrated that cold water fish spawning and growth will not be impaired, in which case Class B standards and criteria apply.

10. Chemical constituents	None in concentrations or comnbinations which would be harmful to the most sensitive designated water use. Refer to Standards numbers 6, 7, 8 and 9.
(a) Phosphorus	None other than of natural origin.
11. Benthic Invertebrates which inhabit lotic waters	A wide variety of macroinvertebrate taxa should normally be present and all functional groups should normally be well represented. Presence and productivity of aquatic species is not limited except by natural conditions, permitted flow regulation or irreversible cultural impacts. Water quality shall be sufficient to sustain a diverse macroinvertebrate community of indigenous species. Taxa within the Orders Plecoptera (stoneflies), Ephemeroptera (may-flies), Coleoptera (beetles) and Trichoptera (caddisflies) should be well represented.

CLASSIFICATIONS

- A	Known or presumed to meet water quality criteria which support designated uses.
-B/A or C/A	May not be meeting water quality criteria or one or more designated uses. The goal is Class A.

INLAND SURFACE WATERS

CLASS B

Designated Use - Recreational use; fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.

CRITERIA

Parameter	Standard
1. Aesthetics	Good to excellent
2. Dissolved oxygen	Not less than 5 mg/l at any time.
3. Sludge deposits - solid refuse - floating solids - oil and grease - scum - color	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
4. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls or Best Management Practices are used.
5. Turbidity	Shall not exceed 25 JTU (or NTU equivalent); Class B_c not to exceed 10 JTU (or NTU equivalent) over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter. Criteria may be exceeded in Class B_b waters. All reasonable controls and Best Management Practices to be used.
6. Coliform bacteria	Fecal coliform shall not exceed a log mean of 200 organisms/100 ml in any group of samples nor shall 10% of the samples exceed 400 organisms/100 ml. Refer to Standard number 22 and Appendix B.
7. Taste and odor	None that would impair any usages specifically assigned to this Class.
8. pH	6.5 - 8.0

9. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85°F, or in any case raise the normal temperature of the receiving water more than 4°F.
10. Chemical constituents	None in concentrations or combinations which would be harmful to the most sensitive designated water use. Refer to Standards numbers 6, 7, 8 and 9. Reasonable controls on point and non-point sources of phosphorous which are considered significant contributors to eutrophication of lakes, ponds and impoundments may be required. Refer to Standard number 13.
11. Benthic Invertebrates which inhabit lotic waters	Water quality shall be sufficient to sustain a diverse macroinvertebrate community of indigenous species. All functional groups and a wide variety of macroinvertebrate taxa shall be present, however one or more may be disproportionate in abundance. Waters which currently support a high quality aquatic community shall be maintained at that high quality. Presence and productivity of taxa within the Orders Plecoptera (stone-(flies), Ephemeroptera (mayflies); and pollution intolerant Coleoptera (beetles) and Trichoptera (caddis-flies) may be limited due to cultural activities. Macroinvertebrate communities in waters impaired by cultural activities shall be restored to the extent practical through implementation of the department's procedures for control of toxic pollutant discharges to surface waters and through Best Management Practices for non-point sources of pollution.

CLASSIFICATIONS

- B	Known or presumed to meet water quality criteria which support designated uses.
- C/B or D/B	Presently does not meet the water quality criteria or one or more designated uses. The goal is Class B.

INLAND SURFACE WATERS

CLASS C

Existing Use - Certain fish and wildlife habitat, certain recreational activities, agricultural, industrial and other legitimate uses, including navigation; swimming may be precluded; one or more Class B criteria or designated uses may be impaired; goal is Class B unless a DEP and EPA approved use attainability analysis determines certain uses are non-attainable. Refer to Standard number 3.

CRITERIA

Parameter		Quality
1.	Aesthetic	May be poor to excellent.
2.	Dissolved oxygen	May be less than 5 mg/l under some conditions.
3.	Sludge deposits-solid refuse-floating solids-oils and grease-scum-color	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
4.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls or Best Management Practices are used.
5.	Turbidity	May exceed 25 JTU (or NTU equivalent). All reasonable controls or Best Management Practices to be used.
6.	Coliform bacteria	May exceed Class B criteria.
7.	Taste and odor	None that would impair any usages specifically assigned to Class B waters.
8.	pH	6.0 - 8.5

9. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85°F or in any case raise the normal temperature of the receiving water more than 4°F.
10. Chemical constituents	May occasionally be present in concentrations or combinations which limit the distribution or abundance of aquatic life. Refer to Standards numbers 6, 7, 8 and 9.
11. Benthic Invertebrates which inhabit lotic waters	Some functional groups may be absent or disproportionate in abundance. Class C criteria are presented for descriptive purpose only to identify impaired stream segments. The macroinvertebrate community may reflect a significant degree of water quality impairment. Pollution sensitive taxa within the Orders Plecoptera(stoneflies), Ephemeroptera (mayflies), Coleoptera (beetles) and Trichoptera(caddisflies) are absent. If a permanent macroinvertebrate community exists, facultative or pollution tolerant taxa may be represented by pollution tolerant Trichoptera (caddisflies), Odonata (dragonflies), Diptera (trueflies), Isopoda (sow bugs), Amphipoda (scud), Hirudinia (leeches), Tubificia (tubificid worms) and/or Mollusca (snails, clams).

CLASSIFICATIONS

- C/B, C/A or C/AA	Presently not meeting water quality criteria or one or more designated uses due to pollution. The goal for such waters may be Class AA, A or Class B depending upon the specific uses designated for a water course. In those cases where an approved use attainability analysis has been conducted, certain designated uses may not be sought.

INLAND SURFACE WATERS

CLASS D

Present conditions severely inhibit or preclude one or more designated uses for extended time periods or totally preclude attainment of one or more designated uses. May be suitable for bathing or other recreational purposes, certain fish and wildlife habitat, industrial and other legitimate uses, including navigation, may have good aesthetic value.

Examples of conditions which warrant Class D designation include, severe sediment contamination which limits utilization of a water by aquatic organisms; presence of chemical contaminants in fish and/or shellfish which represent an unacceptable health risk to human consumers; consistently high concentrations of indicator bacteria or eutrophication effects (nuisance conditions) which preclude use of a water body for swimming during the summer months, or frequent occurrence of anoxic conditions (dissolved oxygen less than 1 ppm).

The goal is Class B unless a DEP and EPA approved use attainability analysis determines certain uses are non-attainable. Refer to Standard number 3.

CLASSIFICATIONS

D/B, D/A - Presently not meeting water quality criteria or one or more designated uses due to severe pollution. The goal for such waters may be Class A or Class B depending upon the specific uses designated for a watercourse. In those cases where an approved use attainability analysis has been conducted, certain designated uses may not be sought.

LAKE TROPHIC CLASSIFICATIONS

OLIGOTROPHIC

May be Class AA, Class A, or Class B water; Low in plant nutrients; Low biological productivity characterized by the absence of nuisance macrophyte beds. Excellent opportunities for water contact recreation.

CRITERIA

Parameters	Standard
1. Total Phosphorus	0-10 ug/l spring and summer
2. Total Nitrogen	0-200 ug/l spring and summer
3. Chlorophyll-a	0-2 ug/l mid-summer
4. Secchi Disk Transparency	6 + meters mid-summer

MESOTROPHIC

May be Class AA, Class A, or Class B water. Moderately enriched with plant nutrients. Moderate biological productivity characterized by occasional nuisance blooms of algae and/or small areas of nuisance macrophyte beds. Good opportunities for water contact recreation.

CRITERIA

Parameters	Standard
1. Total Phosphorus	10-30 ug/l spring and summer
2. Total Nitrogen	200-600 ug/l spring and summer
3. Chlorophyll-a	2-15 ug/l mid-summer
4. Secchi Disk Transparency	2-6 meters mid-summer

EUTROPHIC

May be Class AA, Class A, or Class B water. Highly enriched with plant nutrients. High biological productivity characterized by frequent nuisance blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation opportunities may be limited.

CRITERIA

Parameters	Standard
1. Total Phosphorus	30-50 ug/l spring and summer
2. Total Nitrogen	600-1000 ug/l spring and summer
3. Chlorophyll-a	15-30- ug/l mid-summer
4. Secchi Disk Transparency	1-2 meters mid-summer

HIGHLY EUTROPHIC

May be Class AA, Class A, or Class B water. Excessive enrichment with plant nutrients. High biological productivity, characterized by severe nuisance blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation may be extremely limited.

CRITERIA

Parameters		Standard
1.	Total Phosphorus	50 + ug/l spring and summer
2.	Total Nitrogen	1000 + ug/l spring and summer
3.	Chlorophyll-a	30 + ug/l mid-summer
4.	Secchi Disk Transparency	0-1 meters mid-summer

OLIGOTROPHIC

Lake	Town
Alexander	Killingly
Beach	Voluntown
Highland	Winchester
Mashapaug	Union
West Hill	New Hartford

MESOTROPHIC

Black	Meriden/Middlefield
Bolton (Middle)	Vernon
Bolton (Lower)	Bolton/Vernon
Candlewood	New Fairfield/Sherman/New Milford Danbury/Brookfield
Cedar	Chester
Cream Hill	Cornwall
Crystal	Ellington/Stafford
Dodge	East Lyme
East Twin	Salisbury
Gardner	Salem/Montville/Bozrah
Gorton	East Lyme
Hayward	East Haddam
Hitchcock	Wolcott
Long	Ledyard/North Stonington
Mamanasco	Ridgefield
Mt. Tom	Litchfield/Morris/Washington
Mudge	Sharon
Pachaug	Griswold
Pataganset	East Lyme
Pocotopaug	East Hampton
Quassapaug	Middlebury
Rogers	Lyme/Old Lyme
Shenipsit	Vernon/Ellington/Tolland
Taunton	Newtown
Terramuggus	Marlborough
Tyler	Goshen
West Side	Goshen
Wyassup	North Stonington

EUTROPHIC

Lake	Town
Bantam	Litchfield/Morris
Batterson Park	Farmington/New Britain
Beseck	Middlefield
Roseland	Woodstock
Waramaug	Warren/Kent/Washington
Wononscopomuc	Salisbury

HIGHLY EUTROPHIC

Cedar	North Branford
Lilliononah	Southbury/Bridgewater/Brookfield/ Newtown
Linsley	North Branford
North Farms	Wallingford
Silver	Berlin/Meriden
Zoar	Newtown/Monroe/Oxford/Southbury
1860 Reservoir	Wethersfield

COASTAL AND MARINE SURFACE WATERS

CLASS SA

Designated Use - Marine fish, shellfish and wildlife habitat, shellfish harvesting for direct human consumption, recreation, and all other legitimate uses including navigation.

CRITERIA

Parameters		Standard
1.	Aesthetics	Uniformly excellent
2.	Dissolved oxygen	Not less than 6.0 mg/l at any time.
3.	Sludge deposits-solid refuse-floating solids-oils and grease-scum-color	None other than of natural origin
4.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls and Best Management Practices are used.
5.	Turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls and Best Management Practices are used. A secchi disc shall be visible at a minimum depth of 1 meter.
6.	Coliform bacteria	Total coliform shall not exceed a median of 70 colonies/100 ml nor shall 10% of the samples exceed 230 organisms/100ml. Shellfish harvesting for direct human consumption is the most restrictive use of this Class with respect to sanitary quality of water, consequently this standard is adopted to maintain consistence with section 19-13-B65(c) of the Connecticut Public Health Code. Refer to standard number 22 and Appendix B.

7.	Taste and odor	As naturally occurs.
8.	pH	6.8 - 8.5
9.	Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
10.	Chemical constituents	None in concentrations or combinations which would be harmful to the most sensitive designated water use. Refer to Standards numbers 6, 7, 8 and 9.

CLASSIFICATIONS

- SA	Know or presumed to meet water quality criteria which support designated uses.
- SB/SA or SC/SA	Presently not meeting water quality criteria or one or more designated uses. The goal is Class SA.

COASTAL AND MARINE SURFACE WATERS

CLASS SB

Designated Uses - Marine fish, shellfish and wildlife habitat, recreation, industrial and other legitimate uses including navigation.

CRITERIA

Parameter		Standard
1.	Aesthetic	Good to excellent
2.	Dissolved oxygen	Not less than 5.0 mg/l at any time.
3.	Sludge deposits-solid refuse-floating solids-oils and grease-scum-color	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
4.	Sand or silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls and Best Management Practices are used.
5.	Turbidity	A secchi disc shall be visible at a minimum depth of 1 meter. Criteria may be exceeded in Class SB[b] waters. All reasonable controls and Best Management Practices to be used.
6.	Coliform bacteria	Fecal coliform shall not exceed a log mean of 200 organisms/100ml nor shall 10% of the samples exceed 400 organisms/100 ml. Refer to Standard number 22 and Appendix B.
7.	Taste and odor	As naturally occurs. None that would impair any usages specifically assigned to this Class.
8.	pH	6.8 - 8.5

9.	Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
10.	Chemical constituents	None in concentrations or combinations which would be harmful to the most sensitive designated water use. Refer to Standards numbers 6, 7, 8, and 9.

CLASSIFICATIONS

- SB	Known or presumed to meet water quality criteria which support designated uses.
- SC/SB or SD/SB	Presently not meeting water quality criteria or one or more designated uses. The goal is Class SB.

COASTAL AND MARINE SURFACE WATERS

CLASS SC

Existing Uses - Certain marine fish, shellfish and wildlife habitat; recreational boating, industrial and other legitimate uses, including navigation and swimming; one or more Class SB criteria or designated uses impaired; goal is Class SB unless a DEP and EPA approved use attainability analysis determines certain uses are non-attainable. Refer to Standard number 3.

CRITERIA

Parameter		Quality
1.	Aesthetics	Good
2.	Dissolved oxygen	May be less than 5 mg/l at any time.
3.	Sludge deposits-solid refuse-floating solids - oils and grease-scum-color	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
4.	Sand and silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls and Best Management Practices are used.
5.	Turbidity	None that would impair any usages specifically assigned to Class SB.
6.	Coliform bacteria	May exceed Class SB standard.
7.	Taste and odor	As naturally occurs. None that would impair any usages specifically assigned to Class SB waters.
8.	pH	6.5 - 8.5

9. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
10. Chemical constituents	May occasionally be present in concentrations or combinations which limit the distribution or abundance of aquatic life. Refer to Standards numbers 6, 7, 8, and 9.

CLASSIFICATIONS

- SC/SB or SC/SA	Presently not meeting water quality criteria or one or more designated uses due to pollution. The goal for such waters may be Class SA or Class SB depending upon the specific uses designated for a watercourse. In those cases where an approved use attainability analysis has been conducted, certain designated uses may not be sought.

COASTAL WATERS

CLASS SD

Present conditions severely inhibit one or more designated uses for extended time periods or totally preclude attainment of one or more designated uses. May be suitable for bathing or other recreational purposes; certain fish, shellfish and wildlife habitat; industrial and other legitimate uses, including navigation; may have good aesthetic value.

Examples of conditions which warrant Class SD designations include, severe sediment contamination which limits utilization of a water body by aquatic organisms; presence of chemical contaminants in fish and/or shellfish which represent an unacceptable health risk to human consumers; consistently high concentrations of indicator bacteria or eutrophication effects (nuisance conditions) which preclude use of a water body for swimming during the summer months, or frequent occurrence of anoxic conditions (dissolved oxygen less than 1 ppm).

The goal is Class SB unless a DEP and EPA approved use attainability analysis determines certain uses are non-attainable. Refer to standard number 3.

CLASSIFICATIONS

- SD/SB, SD/SA — Presently not meeting water quality criteria or one or more designated uses due to severe pollution. The goal for such waters may be Class SA of Class SB depending upon the specific uses designated for a water course. In those cases where an approved use attainability analysis has been conducted, certain designated uses may not be sought.

IV. GROUND WATERS STANDARDS

33. The goal of the Commissioner is, wherever feasible, to restore or maintain all ground waters to a quality consistent with its use for drinking without treatment. In keeping with this goal, all degraded ground waters shall be restored to the extent possible to a quality consistent with Class GAA or GA. However, attainment of Class GAA or GA quality may not be sought when:
   A) The ground water is in a zone of influence of a permitted discharge in a Class GAA or GA area.;
   B) The ground water goal is designated as Class GB; unless there is a demonstrated need to restore ground waters to Class GA or where it can be demonstrated to the Commissioner that restoration to Class GA cannot be reasonably achieved;
   C) The ground water goal is designated as Class GC.

34. Ground waters with existing quality better than established standards for that Class will be maintained at their existing high quality. Any applicant for a new discharge to such waters may be required to demonstrate to the Commissioner that the discharge is justifiable due to overriding economic or social needs. The Commissioner may require a level of treatment which will result in water quality exceeding Federal and State Potable Water Supply Criteria. Other special treatment requirements deemed necessary to prevent pollution and which will maintain existing uses made of, or presently possible for such waters, may also be required.

35. Ground waters shall not be lowered in Class designation unless and until it has been affirmatively demonstrated to the Commissioner such change is justifiable due to overriding economic or social needs and will not interfere with or become injurious to any existing use made of or presently possible in such waters or that of adjacent surface waters. Any applicant requesting a change in a water quality classification will be required to demonstrate to the Commissioner the proposed new Class designation is consistent with all such uses.

36. Discharges to ground water shall be limited in conformance with the following:
   (A) Class GAA Ground Waters: permits may be granted for discharges of domestic sewage as defined in Section 22a-430-1 of the regulations of state agencies or wastes from acceptable agricultural practices or backwash from public drinking water treatment systems or other minor cooling or clean water discharges.
   (B) Class GA Ground Waters: permits may be granted for those discharges permitted in Class GAA areas and septage disposal or disposal of other wastes of predominantly human or animal origin. These ground waters may receive effluents containing substances of natural origin or materials which easily biodegrade in the soil system and pose no threat to untreated drinking water supplies drawn from the ground water outside any zone of influence.
   (C) Class GB Ground Waters: permits may be granted for discharges permitted in Class GAA and Class GA ground waters. In addition, permits may be granted for treated industrial process waters

amenable to further treatment by soils and for the siting of land disposal facilities specifically designed such that resultant discharges shall not cause ground water degradation that could preclude its future use as a drinking water source or prevent maintenance or attainment of adjacent surface water designated uses.

(D) Class GC Ground Waters: There is a present and continuing need to allow discharges to the ground which are currently best treated by making use of the restoration or attenuation characteristics of the soil and subsurface hydrogeologic conditions. The best places to meet this need in Connecticut exist in limited areas of the State where specific geologic, ground and surface water conditions exist that may be most favorable to the acceptance of such discharges. In many Class GC areas, the historic waste disposal practices may have, for all practical purposes, permanently rendered the ground water unsuitable for drinking water without treatment, and/or the development of large yield and high quality water supply from the aquifer conditions is unlikely. Permits may be granted for all discharges allowed in areas designated as Class GAA, Class GA, and Class GB. Class GC areas may also be suitable for other discharges with the following requirements:

(1) The discharge must operate under a 22a-430 discharge permit.
(2) The discharge must not prevent attainment or maintenance of any adjacent surface water designated use.
(3) The ground water within the extent of the zone of influence resulting from the discharge must be owned or controlled by the discharger and must be adequately monitored.
(4) There must be no conflict between the discharge and the need for public or private water supply.

37. Zones of influence created by a permitted discharge shall not affect existing or potential designated uses. The Commissioner may require of applicants that information which will enable him to establish zones of influence in permitting discharges to ground water.

(1) Zones of influence may be allowed and the determination of boundaries of a zone shall be required when natural soil materials are used to treat a discharge or to allow the dilution of substances by ground water to acceptable concentrations for discharge to the surface waters in an effluent/ground water mix which will not prevent attainment or maintenance of adjacent surface water designated uses.
(2) The zone of influence for subsurface sewage disposal systems which are permitted under the authority delegated to the Commissioner of Health Services by Section 22a-430, shall be defined as the area required by the separating distances established as minimum requirements in the Public Health Code.
(3) The zone of influence for all other discharges to the ground water shall be the area in which the ground water could be in violation of any pertinent federal and state drinking water standards or otherwise be polluted by the discharge.

(4) Property rights to ground water and permission to degrade ground water are not automatically granted by assignment of a Class. The Commissioner may require applicants for Section 22a-430 permits a demonstration they have acquired rights to any ground water which may be degraded by their discharge. The Commissioner may also require such applicants to record the effect and extent of any discharge, and duration of same following its cessation, on relevant land records.

38. Ground waters assigned to a specific Class are not protected by such designation when the subsequent withdrawal of ground waters induces infiltration from an adjacent surface water or induces flow from an authorized zone of influence or flow from an adjacent ground water area of a different classification. For new ground water withdrawals, the impacts attributable to induced flow of lower Class ground waters would be a consideration in issuance of permits through the state's Water Diversion Program (Section 22a-365 through 378 of the CGS).

39. Ground waters shall be free of chemical constituents in concentrations or combinations which would be harmful to the assigned Class.

40. The discharge of radioactive materials in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. In no case shall the Alpha emitters in surface waters to which ground waters flow exceed a concentration of 1,000 picocuries per liter.

41. Reasonable controls or Best Management Practices may be defined by the Commissioner on a case-by-case basis or the Commissioner may require that it be demonstrated by any person or municipality that all reasonable controls will be or are being used.

42. Potential drinking water supplies identified in the Long Range Plan for Management of Water Resources prepared and adopted pursuant to Section 22a-352 of the Connecticut General Statutes shall be designated as Class GAA ground waters.

43. Sample containers, preservation, handling and analysis should conform to EPA methods promulgated in 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," as amended. Other different but equivalent methods may be utilized if they have received the Commissioner's prior approval.

44. As part of the Commissioner's continuing efforts to further define water quality standards, other criteria will be considered. The Commissioner reserves the right to amend or extend the criteria for each Class of waters as new information, or improved or more stringent criteria relative to water quality impacts, are developed and justified subject to the legal and procedural requirements of state and federal laws or regulations.

45. Where existing water quality does not meet the designated use and quality criteria goal, the existing quality will be identified, followed by the use goal (e.g. GB/GA).

46. Ground waters which are not otherwise designated shall be considered as Class GA.

V. GROUND WATER CLASSIFICATIONS

GROUND WATERS

CLASS GAA

Designated Use - Existing or potential public drinking water supply.

CRITERIA

Parameter		Standard
1.	Dissolved oxygen	As naturally occurs.
2.	Oils and grease	None other than of natural origin.
3.	Color and turbidity	None other than of natural origin.
4.	Coliform bacteria	Not to exceed a monthly arithmetic mean of 1 or, more than 4 in any individual sample collected.
5.	Taste and odor	None other than of natural origin.
6.	pH	As naturally occurs or as may result from normal agricultural, horticultural, lawn maintenance or construction activity provided all reasonable controls are used.
7.	Chemical constituents	Subject to standards of Section 19-13-B102 of the Connecticut Public Health Code, advisories of the Department of Health Services and primary and secondary standards of the Federal Safe Drinking Water Act.

CLASSIFICATIONS

- GAA

Ground waters tributary to public water supply watersheds or within the area of influence of community and non-community water supply wells. Presumed suitable for direct human consumption without need for treatment. The State's goal is to maintain drinking water quality.

- GB/GAA

Ground waters tributary to public water supply watersheds or within the area of influence of community and non-community water supply wells. May not be suitable for direct human consumption without treatment due to contamination from waste discharges, spills or leaks of chemicals or land use impacts. The State's goal is to restore the ground water to drinking water quality.

GROUND WATERS

CLASS GA

Designated Use: Existing private and potential public water supply.

CRITERIA

Parameter		Standard
1.	Dissolved oxygen	As naturally occurs.
2.	Oils and grease	None other than of natural origin.
3.	Color and turbidity	None other than of natural origin.
4.	Coliform bacteria	Not to exceed a monthly arithmetic mean of 1 or more than 4 in any individual sample collected.
5.	Taste and odor	None other than of natural origin.
6.	pH	As naturally occurs or as may result from normal agricultural, horticultural, lawn maintenance or construction activity provided all reasonable controls are used.
7.	Chemical constituents	Subject to standards of Section 19-13-B102 of the Connecticut Public Health Code, advisories of the Department of Health Services and primary and secondary standards of the Federal Safe Drinking Water Act.

CLASSIFICATIONS

- GA — Ground waters within the area of influence of private and potential public wells. Presumed suitable for direct human consumption without need for treatment. The state's goal is to maintain the drinking water quality.

- GB/GA

Ground waters which may not be suitable for direct human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts. The State's goal is to restore the ground water to drinking water quality.

GROUND WATERS

CLASS GB

Designated Use: Industrial process water and cooling waters; presumed not suitable for direct human consumption without treatment.

CRITERIA

Parameter — Standard

No qualitative criteria can be specified as ground waters of this Class are known or may reasonably be presumed to be degraded due to a variety of pollution sources.

CLASSIFICATIONS

- GB — Ground waters within highly urbanized areas or areas of intense industrial activity and where public water supply service is available. May not be suitable for direct human consumption due to waste discharges, spills or leaks of chemicals or land use impacts. The State's goal is to prevent further degradation by preventing any additional discharges which would cause irreversible contamination.

GROUND WATERS

CLASS GC

Designated Use: Assimilation of discharges permitted by the Commissioner pursuant to Section 22a-430 of the Connecticut General Statutes. Refer to Standard number 35.

CRITERIA

Parameter	Standard

No qualitative criteria are specifically determined until such time permit applications are prepared. The most sensitive governing considerations for use of ground waters in this Class is the impact of any permitted wastewater flows on adjacent surface waters.

CLASSIFICATIONS

- GA/GA/GC — areas not presently used for waste disposal and where existing water quality is presumed to be suitable for direct human consumption. The Department's immediate goal is to maintain existing water quality. The potential use of the groundwaters for purposes other than drinking water, based on a preliminary evaluation of hydrogeologic conditions, is indicated by the Class GC designation. A municipality or person may submit permit applications for certain wastewater discharges and a request to change to Class GC. Issuance of the discharge permit and the concurrent change to a GC classification may be made upon the Commissioner's findings that the discharge will not cause pollution of the waters of the state. Applications must include an assessment of discharge impacts on surface waters, acceptable hydrogeologic studies and compliance with other applicable requirements set forth in the Standards.

- GB/GB/GC

Areas which have been used for waste disposal or where contaminants have been introduced into the ground water. Water quality is known or presumed unsuitable for direct human consumption. The Department's immediate goal is prevent irreversible contamination of the ground waters. The potential use of these ground waters for purposes other than drinking water is indicated by the Class GC designation. A municipality or person may submit permit applications for certain wastewater discharges and a request to change to Class GC. Issuance of the discharge permit and the concurrent change to a GC classification may be made upon the Commissioner's findings that the discharge will not cause pollution of the waters of the state. Applications must include an assessment of discharge impacts on surface waters, acceptable hydrogeologic studies and compliance with other applicable requirements set forth in the Standards.

- GC:

Areas where the Commissioner has issued a permit for a ground water discharge consistent with these criteria and Section 22a-430 of the Connecticut General Statutes. Use of the soil and ground waters for treatment and assimilation of certain wastewaters has been sanctioned by the department through permit. The owner and operator of the waste treatment and disposal facility has performed all necessary hydrogeologic studies, secured rights to all affected ground waters, and has complied with all other requirements of Connecticut's Water Quality Standards. Ground waters not suitable for development of drinking water supplies.

APPENDIX A

DEFINITIONS

ACUTE TOXICITY - Adverse effect such as mortality or debilitation caused by a brief exposure to a relatively high concentration of a toxic substance.

AMBIENT - Normally occurring conditions in a waterbody.

ANTIDEGRADATION - A statement of practice required by federal law which prohibits a state from lowering surface water quality classifications or standards in order to accommodate new or increased wastewater discharges or land use practices which impact a particular water course. The state must attain, and maintain the most sensitive existing and potential use for a respective waterbody.

BENTHIC - Refers to organisms or material associated with the bottom of watercourses.

BENTHIC MACROINVERTEBRATES - Animals large enough to be seen by the unaided eye and can be retained by a U. S. standard No. 30 sieve (28 meshes per inch, 0.595 mm openings). They must live at least part of their life cycle within or upon submerged substrates in a body of water. These animals usually consist of the aquatic life stages of various insects and arthropods, molluscs, leeches and worms.

BEST MANAGEMENT PRACTICES - Those practices which reduce waste discharges into waters of the state and which have been determined by the Commissioner to be acceptable based on, but not limited to, technical, economic and institutional feasibility.

CHRONIC TOXICITY - Adverse effect, such as reduced reproductive success or growth, poor survival of sensitive life stages which occurs as a result of exposure to relatively low concentrations of a toxic substance.

CLASSIFICATIONS - Designation of the proposed uses of surface and ground waters with alphabetic character. Where classifications appear in two sections separated by a diagonal line, the first classification indicates existing use or general quality and the second classification indicates the water use goal.

CLEAN WATER - Water, which in the judgement of the Commissioner, is of a quality substantially similar to that occurring naturally in the receiving stream under consideration; e.g. minor cooling waters, dredging and dredged material dewatering waters.

COMMISSIONER - Commissioner of Environmental Protection.

COASTAL AND MARINE WATERS - Those waters generally subject to the rise and fall of the tide and as defined by Section 22a-93 of the Connecticut General Statutes as amended.

CRITERIA - Elements of Connecticut's Water Quality Standards, expressed in parameters and their constituent concentrations, levels, or by narrative statements, representing a quality of water that supports a particular designated use.

DEPARTMENT - The Connecticut Department of Environmental Protection.

DEPURATION - Controlled shellfish purification process where a controlled environment is used to reduce the level of bacteria and viruses in shellfish. The process usually includes a fixed structure having a specified water circulation and disinfection system, together with designed tanks and racks.

DESIGNATED USE - Those uses specified in Connecticut's Water Quality Standards for each surface watercourse or ground water area, whether or not they are being attained.

DISCHARGE - Defined in Sec. 22a-423 as ".... the emission of any water, substance or material into the waters of the state, whether or not such substance causes pollution."

DISCHARGE TOXICITY EVALUATION - A structured scientific analysis of the toxic strength and discharge rate of a treated wastewater effluent relative to available dilution in the receiving water. Prepared as described in the Department's guidance document, Guidelines for Preparation of Discharge Toxicity Evaluations. An analysis typically contains data and supporting information on receiving waterbody characteristics and recommendations regarding possible approaches to reduce effluent toxicity and in-stream toxic impacts resulting from the discharge.

DREDGING - The excavation, removal or dispersal of sediments.

EFFLUENT - Treated waste process waters or cooling waters discharged from a waste treatment or manufacturing facility.

EUTROPHICATION - The process of enrichment of surface waters with plant nutrients which may cause nuisance algae blooms and excessive growth of aquatic weeds.

FUNCTIONAL GROUP - General category of benthic macroinvertebrates based on feeding mechanisms.

GROUND WATERS - Waters flowing through earth materials, beneath the ground surface.

HIGH QUALITY WATERS - Waters of a quality which exceed established standards for the respective Class. May sustain a sensitive use which is designated for a higher Class. Refer to Standard number 2.

INDIGENOUS - Animal or plant life which are naturally occurring inhabitants of a certain geographic region.

INVERTEBRATES - Animals lacking a backbone.

LENTIC - Standing water environments, such as lakes and ponds.

LOTIC - Refers to flowing water habitats, as in streams or rivers.

MOST SENSITIVE USE - The water use (drinking, swimming, boating, fish and aquatic life propagation, irrigation etc.) which is most susceptible to degradation by a specific pollutant.

(e.g. Bacterial contamination can preclude swimming but not fish production; copper concentrations as low as 20 parts per billion (ppb) may adversely affect sensitive species of fish and aquatic life while drinking water quality is not affected until copper concentrations approach the secondary drinking water Maximum Concentration Level (MCL) of 1,000 parts per billion).

MSD - Marine Sanitation Device. Devices installed or used on watercraft for the collection, treatment and disposal of human wastes.

NON-POINT SOURCE - Wastewaters, leachate or runoff which originate from diffuse sources or widespread areas. For example; soil erosion from construction sites.

POINT SOURCES - Treated or untreated wastewater discharges from manufacturing or sewage treatment works which are conveyed to their discharge point within discrete, readily identifiable pipes or conduits or are emitted through some other similar single point. For example, an outfall pipe from a sewage treatment plant.

SEDIMENTS - Any natural or artificial materials which constitute all or part of the banks, bed or bottom of an intermittent or perennial watercourse.

SEWAGE - Defined in Sec. 22a-423 as, "human and animal excretions and all domestic and such manufacturing wastes as may tend to be detrimental to the public health".

SURFACE WATERS - Waters which flow over the earth's surface, whether or not confined in natural watercourses.

TAXON (pl. Taxa) - Refers to a biological classification category, usually the finest division attainable in current taxonomy. Most benthic organisms are identified to genus or species.

TECHNOLOGY BASED TREATMENT - Waste treatment defined under the provisions of Sections 301(b) and 304(b) of the Federal Water Pollution Control (Clean Water) Act. The level and type of treatment required is based on the manufacturing process used and type of waste generated.

TIDAL WETLANDS AND CREEKS - Defined in Section 22a-29 of the Connecticut General Statutes as those areas which border on or lie beneath tidal waters.

TOXIC SUBSTANCE - Any substance which can adversely affect the survival, growth or reproduction of fish, other forms of aquatic life or humans exposed to the substance either by direct contact or through consumption of aquatic organisms.

TRANSPLANTATION - Harvesting shellfish from designated closed areas, transporting and placing the shellfish onto other designated areas for propagation, growth, purification or transfer to an approved depuration plant.

TROPHIC CONDITIONS - The state of enrichment of a waterbody with plant nutrients.

USE ATTAINABILITY ANALYSIS - A structured scientific assessment of the factors affecting the attainment of a watercourse designated use which may include physical, chemical, biological and economic factors. The analysis process is defined in: the Revised Water Quality Standards Regulations published in the Federal Register (48 FR 5 1400, November 8, 1983). Additional guidance regarding preparation of Use Attainability Analyses is contained in Chapter 3 of the Water Quality Standards Handbook (EPA - 1983) and Technical Support Manual: Water Body Surveys and Assessments for Conducting Use Attainability Analyses (EPA Office of Water, November 1983).

WATERS OF THE STATE - Defined in Sec. 22a-423 as, "...all tidal waters, harbors, estuaries, rivers, brooks, watercourses, waterways. wells, springs, lakes, ponds, marshes, drainage systems, and all other surface or underground streams, bodies or accumulations of water, natural or artificial, public or private, which are contained within, flow through or border upon this state or any portion thereof".

WATER QUALITY - A statement of the physical, chemical and biological characteristics of surface or ground waters.

WATER QUALITY BASED TREATMENT - Additional waste treatment defined under the provisions of Section 302 of the Clean Water Act when technology based treatment is not sufficient to protect water quality.

WATER QUALITY LIMITED SEGMENT - Any segment of a watercourse where it is known that water quality does not meet applicable standards and/or is not expected to meet applicable water quality standards even after the application of technology based effluent limitations.

WATER QUALITY STANDARDS - Provisions of state and federal law which consist of designated use or uses for the state's waters and water quality criteria which will support those uses.

ZONE OF INFLUENCE - Spatial area or volume of receiving water flow within which some degradation of water quality or use impairment is anticipated to occur as a result of a pollutant discharge. May be used to describe an area impacted by thermal, conventional, or toxic pollutants.

ZONE OF PASSAGE - Spatial area or volume of flow within which the concentration of toxic chemicals and/or temperature elevations are below levels which would impede or prohibit the passage of free swimming and drifting aquatic organisms.

7Q10 - (Seven-day, Ten-year low flow) - lowest 7 consecutive day mean stream discharge with a recurrence interval of ten (10) years.

[This statistically derived flow rate is exceeded approximately 99% of the time in Connecticut streams. The probability of a 7 day flow of less than the 7Q10 in any given year is approximately 1%. Low stream flows are sustained by ground water inflow as opposed to surface water runoff].

APPENDIX B

GUIDELINES FOR USE OF COLIFORM BACTERIA CRITERIA

Bacteria of the coliform group reside in the intestines of warm blooded animals including man. The approximate contribution of coliform group bacteria as determined in a metropolitan sewage system, is 160 billion per capita per day. High levels of coliform in water may indicate the presence of human wastes and consequent potential health hazards.

Total coliform bacteria have traditionally been widely used as surrogates to indicate the possible presence of pathogenic organisms normally associated with sewage. Total coliform bacteria are also found in tissues of plants, soils, and the intestines of other warm blooded animals, including common domestic animals. Therefore, the presence of large numbers of coliform organisms is cause for concern but not proof that waters are contaminated with sewage and accompanying pathogenic bacteria.

Fecal coliform bacteria comprise a portion of the total coliform group and are more specific to bacteria found in the intestinal tract of warm blooded animals but not in plants, soils, and other sources which have no sanitary significance.

A major change was incorporated into the last revision of the Water Quality Standards in that fecal coliform was used as the primary criteria for sanitary quality of surface waters. Fecal coliform criteria presented in USEPA Quality Criteria for Water (1976) were used as guidance.

In May of 1984 the U. S. Environmental Protection Agency released a Draft Bacteriological Ambient Water Quality Criteria document (F. R. 1984). When this document is published in final form, it is intended to update and revise the existing EPA criteria document cited above (USEPA 1976). The proposed criteria are based on recent research which examined the relationship between observed incidence of swimming associated illness, and measured ambient densities of various indicator bacteria. As a result of this research, the EPA concluded that the currently recommended indicator organism group, fecal coliforms, should be replaced by two indicators which show a better correlation to swimming related illness.

The recently proposed criteria document recommends that for water contact recreation, Escherichia coli and/or Enterococcus be used as indicators for freshwater, and Enterococcus be used as the indicator organism for marine waters.

Connecticut's Department of Environmental Protection and the Department of Health Services are currently evaluating the proposed criteria in terms of their applicability to Connecticut waters. Consideration will be given to incorporation of the proposed criteria into the next revision of Connecticut's Water Quality Standards.

USFDA BACTERIOLOGICAL CRITERIA FOR DIRECT HARVESTING OF SHELLFISH

For shellfish harvesting areas, the U. S. Food and Drug Administration (FDA) has established the following criteria:

Class SA, Shellfish harvesting - Fecal coliform shall not exceed a median of 14 organisms/100 ml nor shall 10% of samples exceed 43 organisms/100 ml, or:
total coliform not to exceed a median of 70 organisms/100 ml nor shall 10% of samples exceed 230 organisms/100 ml.

At the present time, the State Department of Health Services uses the FDA criteria for Total Coliform. Analysis is performed using the MPN 5-tube decimal dilution procedure. In order to insure an acceptable confidence level, a minimum of 15 samples is required.

PERMITTED UTILIZATION OF SHELLFISH FROM MARINE WATERS
by Water Quality Classification

The following restrictions are imposed by the Connecticut Department of Health Services for the Utilization of shellfish from marine waters.

CLASS	ACCEPTABLE UTILIZATION
SA	Direct marketing
SB	Depuration and relay (transplant) operations. The U. S. Food & Drug Administration (FDA) would refer to this area as a "Restricted Area Classification", under the National Shellfish Sanitation Program. The FDA interpretation of the bacteriological water quality for a restricted area is: when that area is exposed to fecal contamination during worst pollution conditions, the total coliform median or geometric mean most probable number (MPN) of the water does not exceed 700 per 100ml and not more than 10 percent of the samples exceed an MPN of 2,300 per 100ml for a 5-tube decimal dilution test.
SC	Long term relay operations (minimum of one year on Class SA water). This classification would represent waters where pollution loading of shellfish would require considerable renovation.

APPENDIX B

NATIONAL WETLANDS INVENTORY

National Wetlands Inventory
U.S. Fish & Wildlife Service
1:100,000 Map Narrative Report
- Hartford NW -

Introduction

In 1974, the U.S. Fish & Wildlife Service directed its Office of Biological Sciences to conduct an inventory of the Nation's wetlands. As part of this overall objective, an effort began in October 1980 to delineate and classify wetlands within the boundaries of the State of Connecticut. The classification system used was based upon "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979).

Wetland maps (1:100,000) and wetland overlay maps (1:24,000) are produced at National Wetlands Inventory Headquarters in St. Petersburg, Florida. Final maps of Connecticut's wetlands are available at the Natural Resources Center, Department of Environmental Protection, 165 Capitol Avenue, Hartford, Connecticut, 06115. An integral part of the wetlands inventory is a narrative report for each 1:100,000 map. The following report provides both basic and specific data to aid the user in understanding the general nature of the Hartford NW quadrangle and provides representative details of its wetland habitats.

Map Preparation

Contractor for this project was the Natural Resources Center, Department of Environmental Protection, Hartford, Connecticut. Aerial photographic interpretation and preparation of this report were by Nels E. Barrett and Kenneth J. Metzler. Coordinators for this project were John Organ and Ralph Tiner Jr., National Wetlands Inventory, U.S. Fish & Wildlife Service, One Gateway Center, Suite 700, Newton Corner, MA 02158.

Wetland delineation and classification for Hartford NW was done with black and white panchromatic diapositive transparencies. The photography used was U.S.G.S. high altitude aerial photography flown on April 3, 1980 and April 7, 1981 at the scale of 1:80,000. Field checking of representative sites was conducted during the Fall of 1980, the Spring and Summer of 1981, and the Spring of 1982.

User Caution

Map users are cautioned that mapping with aerial photographs has limitations. Through stereoscopic examination of the photographs, wetlands are identified and classified on the basis of color, tone, texture, pattern, size, local ecology, and cultural patterns. Aerial photographs reflect conditions during the year and season in which they were taken. In addition, resolution limitations inherent in high altitude imagery can cause problems in accurately recognizing ground conditions. For these reasons, wetlands smaller than three acres were not consistently mapped and many areas with non-persistent emergent or aquatic vegetation were classified as open water.

Furthermore, some Federal agencies and the State of Connecticut define and describe wetlands in a different manner than that used in this inventory. This is no attempt, in either design or manner, to establish or replace any regulatory program of or for a governmental agency. Persons intending to engage in activities involving modifications within or adjacent to any wetland or watercourse should seek advice of appropriate Federal, State, or local agencies concerning specific regulations and jurisdictions that may affect such activities.

Any noted discrepancies regarding wetland omissions, inclusions, or errors should be given to the National Wetlands Inventory Regional Coordinator or the Natural Resources Center, whose addresses are given above.

Area Description

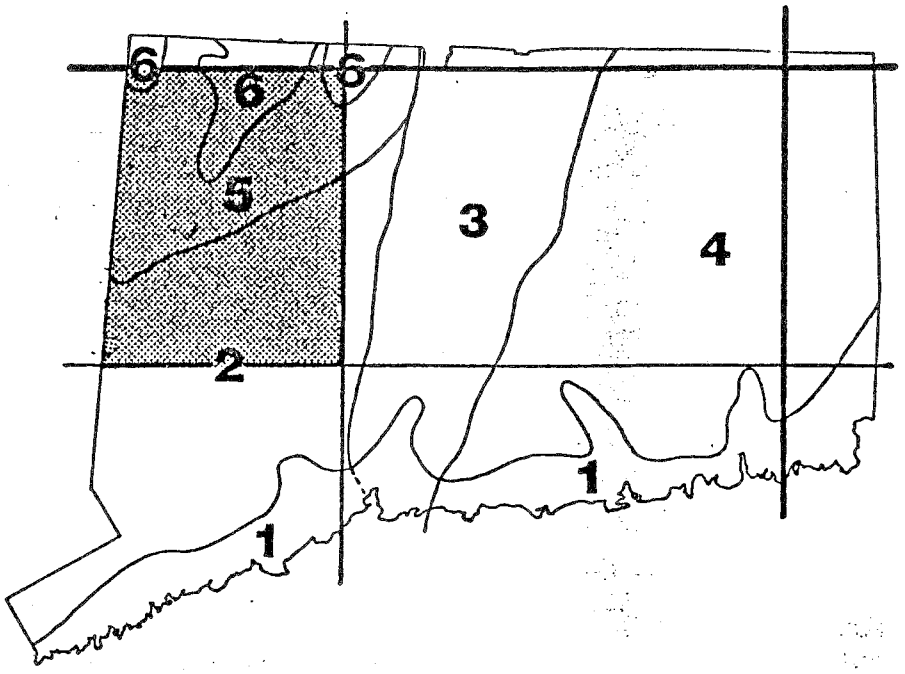
Bailey's Ecoregions

Ecoregions are a hierarchical land classification system designed to group areas on the basis of similar bioclimatic, geologic, and geomorphic criteria. Hartford NW is entirely in the Appalachian Oak Forest section of the Eastern Deciduous Forest (Bailey 1978). This section is characterized by tall, broadleafed trees, primarily oaks, beech, birch, maple, and hickory, that provide a continuous and dense canopy in the summer but shed their leaves completely in the winter. The climate of this section is characterized by a strong annual temperature cycle, precipitation distributed fairly evenly throughout the year, and a small water deficit during the summer months. The Appalachian Oak Forest section extends from the Appalachian Mountains northeastward to the southern tip of Maine.

Hammond Land-Surface Forms

A variety of Hammond Land-Surface Forms are found in Hartford NW. Land-Surface Forms systematically characterize United States topography. Most of Hartford NW is in the Adirondack-New England physical subdivision (Hammond 1965). The southern section is characterized as Open High Hills with 20-50% of the area gently sloping, local relief 500-1,000 feet, and more than 75% of the gentle slope in lowland. This area will be referred to in future sections as part of the Western Hills (Fig. 1). Much of the northern section of Hartford NW is characterized as Open Low Mountains, with 20-50% of the area gently sloping, local relief greater than 1,000 feet, and 50-75% of the gentle slope is on upland. This area will be referred to in future sections as the Western Uplands. The northwest corner of Connecticut is in the Appalachian Highland physical subdivision and is characterized as Tablelands with considerable relief. This portion of Hartford NW has 50-80% of the area gently sloping, local relief 500-1,000 feet, and 50-75% of the gentle slope on uplands. This physical subdivision and a small section of Low Open Mountains in the north-central section of Hartford NW will be referred to as the Western Highlands.

Figure 1. Major physiographic regions of Connecticut (Modified from Dowhan and Craig, 1976). The shaded area indicates the location of Hartford NW. An index map to the 7.5' quadrangles in Connecticut is in Appendix A.

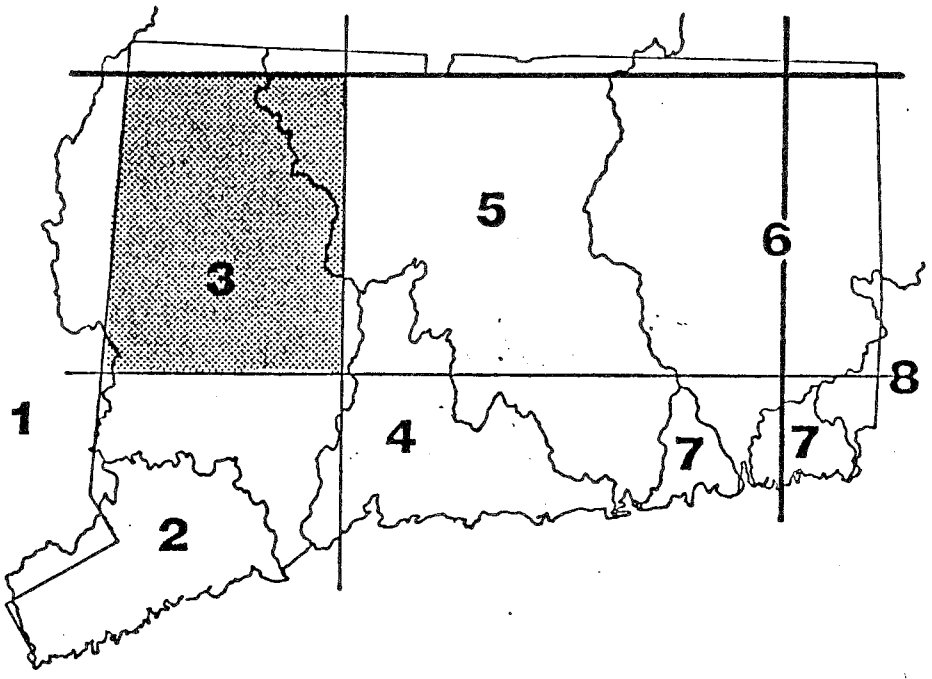


1. Coastal Region
2. Western Hills
3. Central Valley
4. Eastern Hills
5. Western Uplands
6. Western Highlands

Hydrologic Mapping Units

Hydrologic mapping units are part of an effort by the U.S. Geological Survey to provide a series of uniform, nationally consistent maps which accurately delineate hydrographic boundaries to Federal and State water agencies. Units are designated by an eight digit number which is tied to a computer file (Catalogue of Information on Water Data) which contains information on water data activities (U.S.G.S. 1979). Most hydrologic mapping units in Hartford NW are in the New England Region. Nearly all of Hartford NW is drained by unit 01100005 or the Housatonic Major Basin (McElroy 1981). The northeast corner of Hartford NW is drained by unit 01080207 which is part of the Connecticut Major Basin. Near the western boundary of Connecticut, a small section is drained by unit 02030107 or the Hudson Major Basin.

Figure 2. Major drainage basins of Connecticut (McElroy, 1981). The hatched and heavy ruled areas refer to Appendix A.



1. Hudson
2. Southwest Coast
3. Housatonic
4. South Central Coast
5. Connecticut
6. Thames
7. Southeast Coast
8. Pawcatuck

Geology & Topography

The geology and topography of Hartford NW (Flint 1930) shows considerable variability throughout its area. Forces of many kind have contributed to its present structure. During the Pleistocene Epoch, the Wisconsin glacier covered all of Hartford NW. When the glacier melted, part of the debris was left in place to form the glacial till soils on the uplands and part was carried by glacial meltwater and deposited in stratified beds in the valleys and lowlands. Although changes in the topography of the upland areas were relatively small, the vast amounts of materials deposited by the meltwaters made the valleys much flatter than they were before. In general, the depth of unconsolidated materials in the uplands is much less than 10 feet, whereas the depth of terrace deposits may exceed 100 feet.

Hartford NW can be divided into three general physiographic provinces. Each province has a distinct bedrock geology with the resulting topography affecting not only the nature and development of soils, but the types and distribution of wetlands, their vegetation, and their current land use.

The bedrock of the Western Hills is primarily metamorphic with Paleozoic gneisses and schists complexly folded into north-trending belts. Included in this region are two north trending marble belts chiefly along the Housatonic and East Aspetuck River valleys. The topography of the Western Hills is generally between 250 feet to 1,000 feet; the maximum elevation is around 1,250 feet. The greatest topographic relief, 400-500 feet is adjacent to the marble valleys. Included in the Western Hills is a small portion of the Pomeraug Valley, a Triassic outlier underlain by reddish sandstones and basalts similar to those in the Connecticut Valley. Wetlands in the Western Hills occur primarily on glacial till and in depressions filled with peats and mucks. Wetlands on terrace soils and on floodplains are less common.

The bedrock of the Western Uplands and Western Highlands are similar to the Western Hills. However, the topography of the Western Uplands and Highlands is generally more rugged with elevations ranging from 1,000 feet to greater than 1,500 feet, respectively. The greatest topograpic relief in Hartford NW occurs along the Marble Valleys. Wetlands distribution in the Western Uplands and Western Highlands are similar to wetlands described in the Western Hills.

Soils

The wetland soils of Connecticut have formed in a humid, temperate climate on a variety of parent materials. Soils are of the Wisconsin Age or more recent and can be organized into four natural groups; soils formed on glacial till, soils formed on terraces, soils formed on flood plains, and organic soils in basins and depressions.

Wetland soils derived from glacial till occur on lower slopes and in valleys on bedrock controlled hills or on the slopes and bases of streamlined hills with compact basal till. Soils are generally rocky, have little organic matter accumulation in the upper layers, and are saturated or have surface water for part of the growing season. In most cases, these soils have formed under a

hardwood forest composed primarily of Red Maple, American Elm, Yellow Birch, and a variety of Oaks. Often, the water table varies considerably during the summer months. In most of Hartford NW, these soils are derived primarily from crystalline rocks (gneiss and schists) where as in the Pomeraug Valley, the till soils are derived from red sandstones, shales, and basalts. In the marble valleys, the tills are derived from the underlying limestone, with a pH often higher than any other soils in the State.

Terrace soils occur primarily in the lower portions of large river and stream valleys where they are underlain by stratified sands and gravels deposited during glacial times. In most places, a few inches to three feet of loamy or fine sandy material covers the older coarser water deposits. Terrace wetland soils generally have little or no organic matter development and can have a highly fluctuating water table. Terrace wetland soils have formed primarily under a hardwood forest, but since these soils are often quite acid, they can support various concentrations of White Pine and Hemlock.

Floodplain soils occur in nearly level river valleys. They are formed in loamy deposits several inches to a few feet thick overlying layers of sand and gravel. These soils are subject to seasonal inundation with the lower, more poorly drained soils flooded most frequently. In some areas surface ponding can occur extending well into the vegetative season. Poorly drained floodplain soils have developed under a hardwood forest consisting primarily of Ash, Maple, and Elm in most areas or under marsh vegetation in depressions that hold surface water throughout most of the summer months. Floodplain wetlands have a variety moisture regimes that reflect differences in topographic position and drainage. Most floodplain soils were considered as upland in this classification.

Organic soils occur in depressions and basins where surface organic deposits are usually five or more feet deep. These soils are saturated most of the time and often have surface water throughout the winter and spring. Inland organic soils have developed primarily under a forest cover of mixed deciduous and evergreen trees. Windthrows commonly occur and result in the irregular microtopography (hummocks and depressions) found in these wetlands. All organic soils are wetlands in Hartford NW.

Climate

The climate of Hartford NW is best characterized by its changeableness. Located in the belt of the prevailing westerly winds, the climate of Hartford NW is influenced by air from the interior of the North American continent. Precipitation however, comes from warm, moist maritime air swept up from the Caribbean Sea, with Hartford NW always close to the tracks of storms set off by the interplay of these two air systems. The resulting "weather" is highly unpredictable with great variations from day to day, season to season, and year to year.

In general, the climate of Hartford NW (Brumback 1965) has large ranges in both diurnal and annual temperature, ample precipitation usually uniformly distributed throughout the year, great variation between the same season in different years, and considerable diversity from place to place. Climatic hazards infrequently do occur, and include hurricanes, excessive precipitation as rain or snow, droughts of one or more years duration, severe ice storms, and tornadoes.

As in other physical features, the climate of Hartford NW has regional variation and is summarized below (Dowhan & Craig 1976):

	(North) Western Hills	(North) Western Uplands	(North) Western Highlands
Mean average temperature	48°F	47.5°F	46°F
Average winter temperature	27°F	26°F	24°F
Monthly mean minimum	17.5°F	14°F	12°F
Mean annual minimum	-10°F	-15°F	-20°F
Snowfall (inches)	50"	60"	90"
Length of frost free season	155 days	150 days	140 days
Average summer temperature	71°F	68°F	66°F
Monthly mean maximum	84°F	81°F	80°F
Average precipitation (inches)	45"	-	50"

Descriptions of the Wetlands

Hartford NW exhibits a variety of wetland types reflective of the irregular topography of the glaciated northeast. Forested swamps are by far the predominant wetland type with areas of shrub-scrub and emergent vegetation most commonly occurring in transitional situation such as pond borders or as the result of natural or man-made impoundments. Beaver activity is relatively common in Hartford NW and most bodies of open water have been either impounded or excavated and have been mapped as such.

In defining our mapping units, we have tried to be as consistant as possible within the limits of the imagery used. However, for all areas mapped, we referred to 1980 B&W aerial photographs (1:12,000) to confirm vegetation cover and determine some wetland bounderies. In addition, considerable field time, both within the framework of this project and that of previous studies, were used in the final wetland determinations. In this respect, we feel that the plant communities and ecological relationships represented by each mapping unit are as accurate as possible without detailed field surveys. All plant taxonomy used in this section follows Fernald (1950).

The Palustrine System

The majority of wetlands in Hartford NW are in the Palustrine System. The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistant emergents, and all such wetlands that occur in tidal areas where salinity is less than $0.5^{o}/oo$. It also includes all bodies of open water less than 20 acres. Each unit is described below:

PF01A

A forested wetland on river floodplains characterized by brief flooding during the spring but with the water table well below the soil surface during most of the growing season. Along major rivers such as the Housatonic, the forest is dominated by Silver Maple (Acer saccharinum), Cottonwood (Populus deltoides), Green Ash (Fraxinus pensylvanica) and American Elm (Ulmus americana). On smaller rivers, Red Maple (Acer rubrum) or Sycamore (Platanus occidentalis) are often dominant. The shrub layer in these forests is often well developed with Box Elder (Acer negundo), Silky Dogwood (Cornus amomum), Elderberry (Sambucus canadensis), and many small trees predominating. The ground cover is often lush with Sensitive Fern (Onoclea sensibilis), Ostrich Fern (Pteretis pensylvanica), Wood Nettle (Laportea canadensis), Jewelweed (Impatiens capensis), and many other herbaceous species found.

PF01C

A forested wetland on river floodplains characterized by extended periods of flooding early in the vegetative season with surface water absent by the end of the season in most years. As in the previously described wetland, floristic variation occurs. Along major rivers the forests are dominated by Silver Maple and Green Ash, with an often poorly developed shrub layer, and a lush ground cover of False Nettle (Boehmaria cylindrica), Sensitive Fern, Cut-grass (Leersia virginica) and Richweed (Pilea pumila). On smaller rivers, Red Maple can predominate with Pin Oak (Quercus bicolor), American Elm, and Green Ash common. The shrub layer is often well-developed and the ground cover is diverse with Ostrich Fern, Sensitive Fern, False Hellebore (Veratrum viride), White Avens (Geum canadense), Jack-in-the-Pulpit (Arisaema atrorubens), and many others.

PF01E

This common wetland type is characterized by a forest canopy often dominated by Red Maple with the soil saturated or with standing water during part of the growing season. This mapping unit can be separated into three general community types not distinguished or separated on the accompanying maps.

The Red Maple - ericaceous shrub forest is characterized by an often dense shrub cover of species such as Highbush Blueberry, Swamp Azalia (Rhododendron viscosum), Sweet Pepperbush (Clethra alnifolia), Winterberry (Ilex verticillata), Arrowwood (Viburnum recognitum), and Spicebush (Lindera benzoin). The microtopography is hummocky due to sporadic windthrows, with numerous herbs on the hummocks and an abundance of bryophytes in the depressions. This community is found on both organic and wet mineral soils.

The Red Maple - Spicebush forest differs with a dominant shrub cover of Spicebush. This Red Maple forest type occurs primarily along brooks and in swamps that receive adequate seepage water. Often, Pin Oak, Swamp White Oak (Quercus bicolor) and American Elm are common associates. This wetland occurs primarily along brooks and in swamps that receive telluric water from the adjoining upland.

The Red Maple - Tussock Sedge forest is distinguished by a relatively open tree layer of Red Maple and a dominant ground cover of Tussock Sedge (Carex stricta). This wetland type typically occurs on the edges of ponds or lakes with fluctuating water levels, on spring fed slopes with spring flooding, or in areas where the water level has changed through impoundments. In calcareous areas, Carex lacustris is often the dominant sedge.

PF01Et

A wetland forest often dominated by Red Maple with various admixtures of Black Ash (Fraxinus nigra). This wetland type is restricted to the marble valleys of western Connecticut where the soil pH is often close to neutral (pH 6-7). This wetland differs from other deciduous forested swamps in Hartford NW by the abundance of characteristic species such as Sensitive Fern, Northern Buttercup (Ranunculus septentrionalis) and Miterwort (Mitella diphylla).

PFO1/2E

A forested wetland often dominated by Red Maple with at least a 30% mixture of Tamarack (Larix laricina). In all other respects this wetland is quite similar to the variety described in PFO1E above.

PFO4E

Coniferous forested wetlands are sporadically distributed in Hartford NW. These forests are distinguished primarily by a dense forest canopy of evergreen trees, a variable shrub layer, a sparse ground cover of few herbaceous species, and often a carpet of numerous bryophytes. As in other seasonally saturated wetlands, standing water can be present during part of the year, although the water table is generally below the soil surface during the summer months. In Hartford NW, two coniferous forested wetlands are found.

Hemlock swamps are distinguished by a dense forest cover of Hemlock (Tsuga canadensis) with mixtures of White Pine (Pinus strobus), Red Maple, and Yellow Birch. Hemlock swamps generally have an open ground cover with characteristic species such as Goldthread (Coptis groenlandica) and numerous mosses.

Northern White Cedar swamps (PFO4Et) have a very limited distribution in Hartford NW. Restricted to the northern marble valley, this wetland type is distinguished by a dominance of Northern White Cedar (Thuja occidentalis) with various amounts of Red Maple and White Pine. The shrub layer is variable, consisting of American Hornbeam (Carpinus caroliniana), Black Ash, and Mountain Laurel (Kalmia latifolia). Herbaceous vegetation is generally sparse, with Goldthread, Northern Buttercup, Miterwort (Mitella diphylla), and Foamflower (Tiarella cordifolia) characteristic.

PFO4Ba

A forested bog dominated by Black Spruce (Picea mariana) with a surface layer carpeted by Sphagnum mosses. The substrate is saturated throughout the growing season and rises and falls with changes in the water table. This wetland type is uncommon in Hartford NW where it occurs in undrained bedrock depressions.

PFO1/4E

A wetland forest with at least a 30% mixture of evergreen and/or deciduous trees. This mixed wetland forest includes Red Maple and Yellow Birch mixed with White Pine or Hemlock. As in other seasonally saturated wetlands, the soil is either saturated or has standing water for part of the growing season.

PFO1/5Zb

A beaver modified forested wetland with at least a 30% mixture of dead trees. This wetland type is characterized by an unstable water table with flooding and drawdowns dependent on the activity of the beaver. The vegetation can be quite variable but is generally similar to the forested wetlands described above. Beaver modified wetlands were mapped only when either an active dam or lodge was visable on the imagery or after field investigation.

PFO1/SS1E

An open forested wetland with at least 30% canopy coverage of shrubs. This mapping unit was used primarily for shrub thickets with an open tree layer of Red Maple. These areas often have a dominant shrub cover of Swamp Azalea, Highbush Blueberry, etc., although Alders (Alnus spp.) and Willows (Salix spp.) can occur in some areas. The soil surface in these wetlands is generally very hummocky with standing water present in the depressions during the early portion of the growing season.

PFO4/SS1E

A wetland similar to the one previously described but with an open forest canopy of coniferous species such as White Pine or Hemlock.

PFO5/SS1E

A seasonally saturated deciduous shrub wetland with a canopy of dead trees. In general, the presence of dead trees indicates a recent change in the water level.

PFO5/SS1F

A semi-permanently flooded shrub wetland dominated by Buttonbush (Cephalanthus occidentalis) with a canopy of dead trees. This wetland type is characterized by standing water well into the growing season, with the soil surface exposed only for short periods during drought.

PFO1/EME

A seasonally saturated wetland with at least a 30% mixture of deciduous trees and emergent vegetation. Primarily this wetland is distinguished by scattered Red Maple, Ash, or Elm with a ground cover of numerous grasses, sedges, and other herbaceous plants. Tussock Sedge (Carex sticta), Reed Canary Grass (Phalaris arundinacea), and Bluejoint Grass (Calamogrostis canadensis) are common associates, with Carex lacustris often abundant in the calcareous valleys.

PFO5/EME

A seasonally saturated emergent wetland with a canopy of dead trees. This wetland type occurs primarily in wetlands that have previously been impounded. The vegetation is often very variable with numberous grasses, sedges, forbs, and scattered shrubs.

PFO5/EMF

A semi-permanently flooded emergent wetland with a canopy of dead trees. The vegetation can be variable, dominated by sedges (Carex stricta, C. spp.), Bur-reeds (Sparganium spp.), Cattail (Typha latifolia), Grasses (Calamagistis canadensis), or with a mosaic of several dominant species. Associated plants in this habitat include Marsh fern (Dryopteris thelypteris), Arrowhead (Sagittaria latifolia), Rattlesnake Grass (Glyceria candensis), Wool-Grass (Scirpus cyperinus), Marsh Rush (Juncus canadensis) and many others. In this wetland type, surface water persists for most of the growing season.

PSS1/EME

A seasonally saturated wetland with at least a 30% mixture of shrubs and/or emergent plants. This wetland is characterized by surface water present during the spring and a variable vegetative cover. Common vegetation types include Red Maple-ericaceous shrubs mixed with sedges, grasses, and/or numerous herbaceous plants. Associated species include Marsh Fern (Dryopteris thelypteris), Sensitive Fern, Jewelweed, Smartweeds (Polygonum spp.) and many others. Red Osier Dogwood (Cornus stolonifera) is often common in the calcareous valleys.

PSS1/EMF

A semi-permanently flooded wetland with at least a 30% mixture of shrubs and/or emergent plants. This wetland is characterized by the presence of standing water well into the vegetative season with the soil surface exposed only during periods of drought. Dominent plants include Buttonbush, Water Willow, Three-way Sedge (Dulichium arundinaceum), Wool grass, sedges, Arrow-Arum (Peltandra virginica), Bullhead Lily (Nuphar varigatum), Pickeral Weed (Pontederia cordata), and others.

PSS1/EMZb

A beaver modified wetland with at least a 30% mixture of shrubs and/or emergent plants. Primarily this wetland type is dominated by a variety of herbaceous plants with a open shrub cover of shrubs such as Dogwoods, Alders, Arrowwood, Highbush Blueberry, etc. As for other beaver modified wetlands, this signature was not used unless beaver activity was apparent on the imagery or after field investigation.

PEMA

An emergent wetland found on floodplains as well as on the temporarily flooded soils. This wetland type is distinguished by brief surface flooding during the spring with the water table well below the soil surface for the rest of the growing season. These wetlands have a variable vegetation with grasses, sedges and herbaceous species such as Joe Pye Weed (Eupatorium spp.) most prevalent.

PEMBt

A saturated emergent wetland restricted to the northern marble valley. Common species include sedges (Carex diandra, Cladium mariscoides, C. lasiocarpa), grasses (Calamogrostis canadensis), numerous herbs, and scattered shrubs (Betula pumila, Acer rubrum, Salix spp.).

PEMC

An emergent wetland found on river floodplains characterized by grasses such as Reed Canary Grass, sedges (Carex crinita, Carex spp.), Sensitive Fern, and many others.

PEME

A seasonally saturated emergent wetland with a variable ground cover. This wetland type includes pastures as well as wet grasslands. Common emergents include Tussock sedges, other sedges, grasses, and rushes.

PEMF

A semi-permanently flooded emergent wetland with a variety of herbaceous species. Primarily, this wetland is characterized by the presence of standing water for the marjority of the growing season. Dominant herbaceous species include Tussock Sedge, Sweet Flag (Acorus calamus), Arrowroot, Arrow Arum (Peltandra virginica), Three-way Sedge, Rice Cut Grass (Leersia oryzoides), Bur-reeds (Sparganium spp.), and Smartweeds (Polygonum hydropiperoides, P. punctatum). Wetlands dominated by Water Willow were also assigned this signature.

PEMZb

A beaver modified emergent wetland with a variable herbaceous cover. This wetland is distinguished primarily by active beaver modification and an unstable moisture regime.

PEM/ABF

A semi-permanently flooded emergent wetland with at least a 30% mixture of pools with standing water. The vegetation of this wetland is similar to that described as PEMF with floating aquatics such as Water Lily (Nymphaea odorata), Bullhead Lily (Nuphar variegatum), Water-shield (Brasenia schreberi), and numerous submerged aquatics (Ceratophyllum demersum, Potamogeton spp. Elodea spp.) in the pools. Aquatic beds were not visible on the imagery and mapped only after field checking.

PABH

A shallow pond with floating or submerged aquatic vegetation as described above.

PAB/OWH

A shallow pond with at least a 30% mixture of floating aquatic vegetation and open water.

POWH

A permanent pond that is less than 20 acres in areal extent.

POWHh

An impounded pond less than 20 acres in areal extent.

POWHr

Artificial waste water treatment plant basins.

POWHx

An excavated pond less than 20 acres in areal extent. This unit was mapped only when berms were readily visible on the imagery or in gravel pits.

POWKHr

Artificial basins that receive water through active pumping.

The Lacustrine System

Wetlands in the Lacustrine System include all bodies of water greater than 20 acres in areal extent. Most lacustrine wetlands in Hartford NW have been impounded.

L1OWH

A permanent lake with no visible evidence of impoundment.

L1OWHh

An impounded lake or reservoir.

L2ABH

A shallow portion of a lake with floating emergent vegetation as described in PABH.

The Riverine System

The Riverine System includes all wetlands and deepwater habitats included within a channel that lacks persistant vegetation and has a salinity less than $0.5^{o}/oo$. This system includes all rivers and major streams in Hartford NW.

R4RB1J

A portion of a bedrock channel in the Housatonic River, below an impoundment, that is flooded intermittently.

R3OWH

Upper perennial rivers and streams that contain permanent fast flowing water.

R2OWH

Lower perennial rivers that contain permanent slow flowing water, a low gradient, and often a well-developed floodplain.

Special Modifiers

d - Wetlands that have been artificially ditched or drained.

r - Deep water habitats with an artificial manmade substrate.

t - Wetlands with a circumneutral pH formed in soils derived from marble or limestone.

x - Wetlands that have been excavated.

Linear wetlands

Linear wetlands have been delineated in this inventory with a dashed line. In general, these wetlands were smaller on the imagery than the width of a pen line (approximately 20-60 feet on the ground). Linear wetlands by convention have been classified by their surrounding vegetation.

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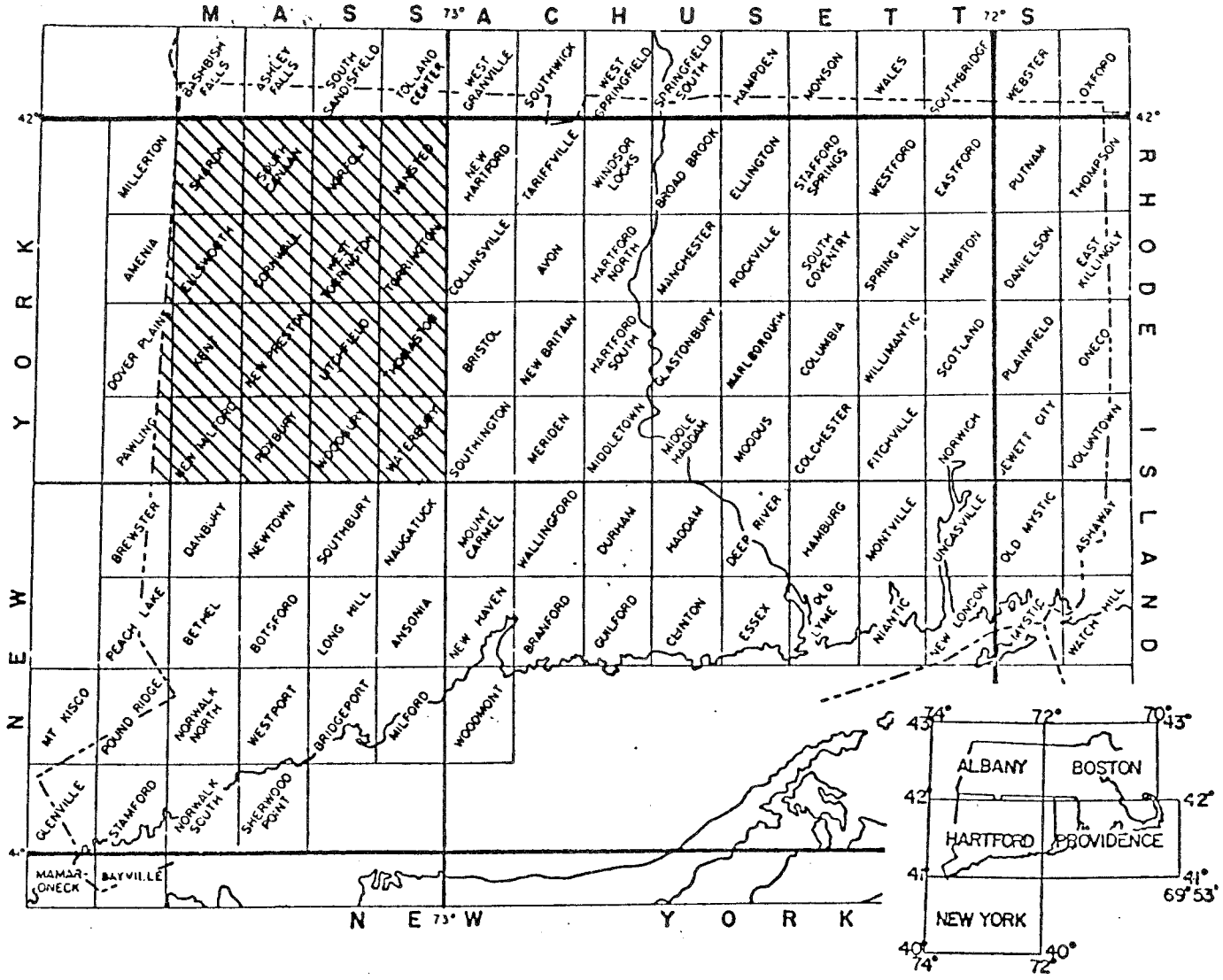
APPENDIX A

Connecticut quadrangle index map (1:24,000 series). The heavy ruled lines indicate the boundaries of the Hartford 1:250,000 National Topographic map (insert) with the hatched quadrangle indicating the area of this report.



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 - a 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 the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for 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 two (2) reviews per month.

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