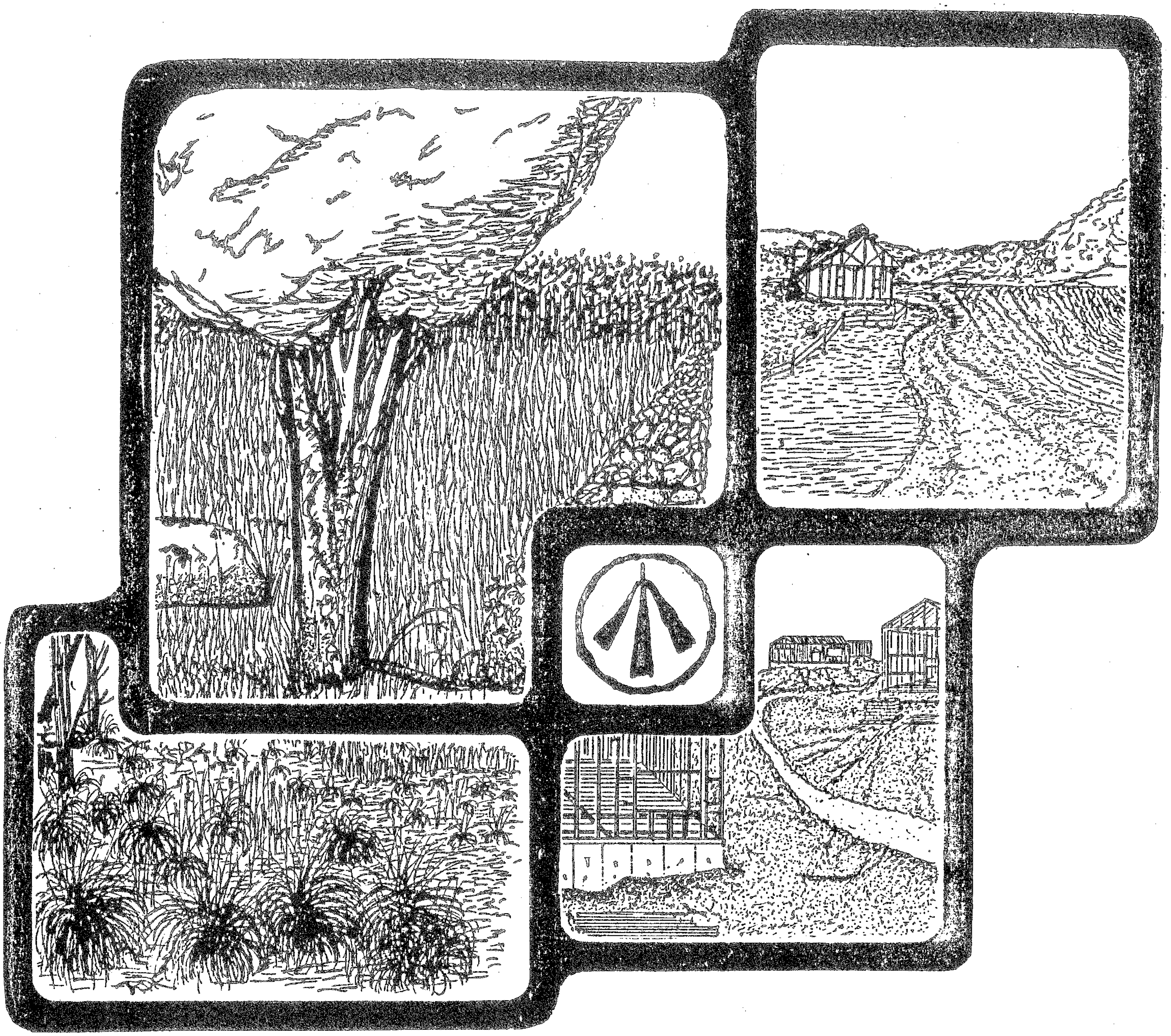
ENVIRONMENTAL REVIEW TEAM REPORT



WOODRIDGE LAKE
GOSHEN, CONNECTICUT

KING'S MARK

RESOURCE DEVELOPMENT AREA

KING'S MARK ENVIRONMENTAL REVIEW TEAM REPORT

ON

WOODRIDGE LAKE
GOSHEN, CONNECTICUT

JANUARY 1981

King's Mark Resource Conservation and Development Area

Environmental Review Team

P. O. Box 30

Warren, Connecticut 06754

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies

U.S.D.A. SOIL CONSERVATION SERVICE

State Agencies

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEPARTMENT OF HEALTH
DEPARTMENT OF TRANSPORTATION
UNIVERSITY OF CONNECTICUT COOPERATIVE EXTENSION SERVICE

Local Groups and Agencies

LITCHFIELD COUNTY SOIL AND WATER CONSERVATION DISTRICT
NEW HAVEN COUNTY SOIL AND WATER CONSERVATION DISTRICT
HARTFORD COUNTY SOIL AND WATER CONSERVATION DISTRICT
FAIRFIELD COUNTY SOIL AND WATER CONSERVATION DISTRICT
NORTHWESTERN CONNECTICUT REGIONAL PLANNING AGENCY
VALLEY REGIONAL PLANNING AGENCY
LITCHFIELD HILLS REGIONAL PLANNING AGENCY
CENTRAL NAUGATUCK VALLEY REGIONAL PLANNING AGENCY
HOUSATONIC VALLEY COUNCIL OF ELECTED OFFICIALS
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Funding Provided By

CONNECTICUT STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
Stanley J. Pac, Commissioner

Policy Determined By

KING'S MARK RESOURCE CONSERVATION AND DEVELOPMENT AREA

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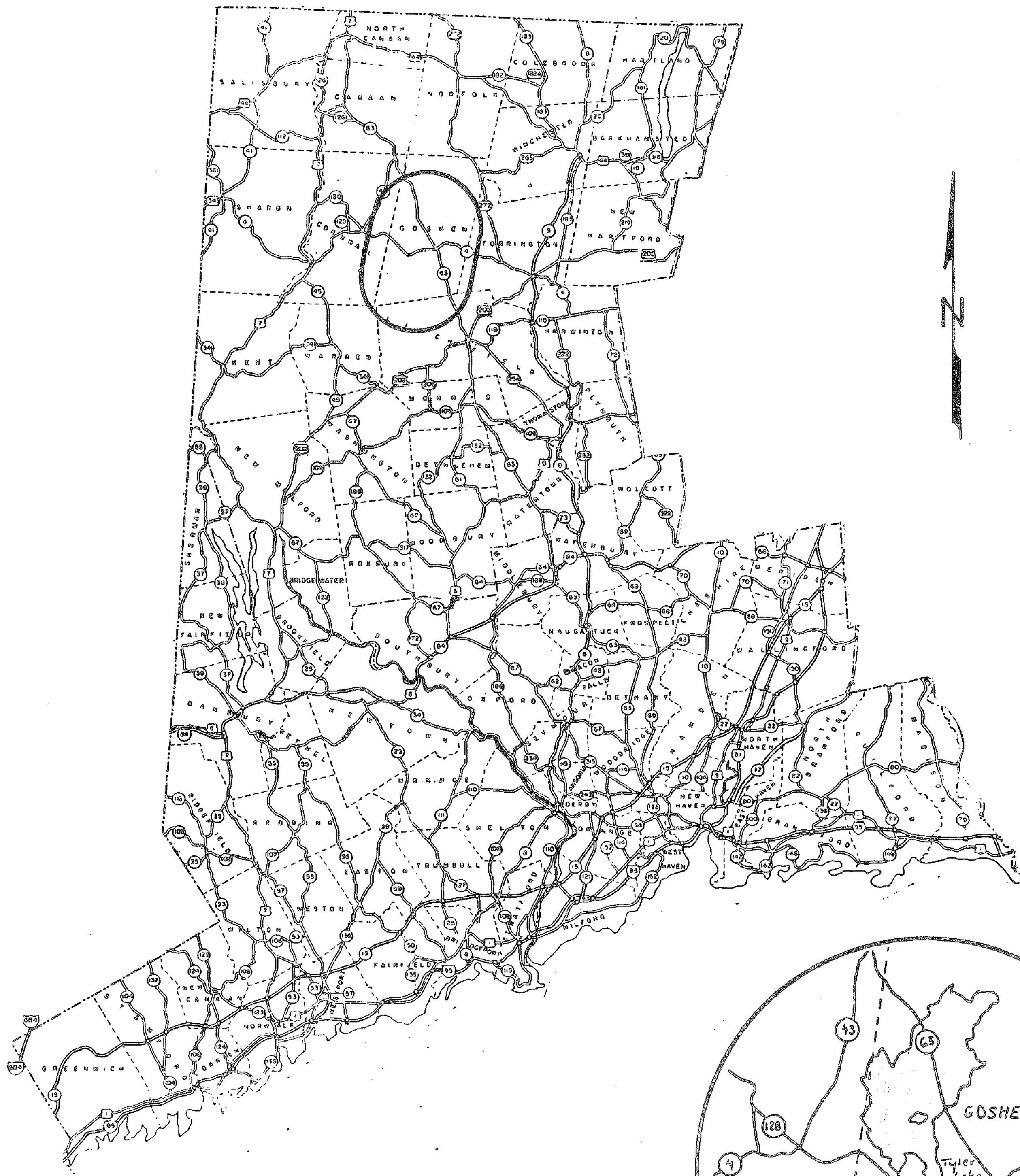
Charles A. Boster, Director
Richard Lynn, ERT Coordinator
Rebecca West, ERT Cartographer
Irene Nadig, Secretary
Brenda Lloyd, Secretary

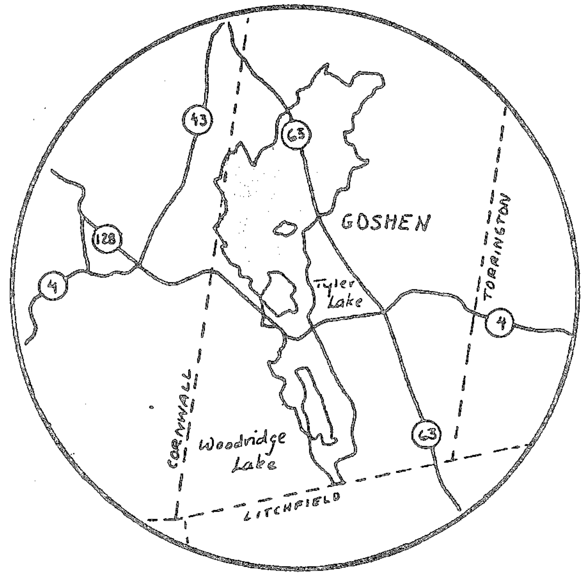
TABLE OF CONTENTS

LIST OF FIGURES

LOCATION OF STUDY SITE

WOODRIDGE LAKE
GOSHEN, CONNECTICUT





10 0 5 10

SCALE: 1" = 10 miles

ENVIRONMENTAL REVIEW TEAM REPORT
ON
WOODRIDGE LAKE
GOSHEN, CONNECTICUT

I. INTRODUCTION

In May of 1980, the King's Mark Executive Committee approved a request from the First Selectman of Goshen for an ERT study of Woodridge Lake.

Woodridge Lake is located in the southcentral portion of Goshen and is ± 400 acres in size. The drainage area of Woodridge Lake encompasses approximately 5,650 acres (8.8 square miles) and includes Tyler Lake and West Side Pond (see Figure 1). Woodridge Lake drains via the Marshepaug River to the east branch of the Shepaug River which in turn drains to the Shepaug Reservoir, a public water supply reservoir of the City of Waterbury. Woodridge Lake is therefore within a public water supply watershed.

Woodridge Lake was created in 1970 by the construction of a concrete dam across the Marshepaug River and the subsequent flooding of a large wetland. This was done as part of a large residential development project. The development project, known as "Woodridge Lake, A Private Lake Community", is now about 25% complete with ± 180 units completed of the 780 planned according to the First Selectman.

The recreational use of Woodridge Lake has recently been impaired by the nuisance growth of aquatic weeds and algae. The Woodridge Lake Property Owners Association is particularly interested in controlling the eutrophication of the Lake so as to maintain a viable body of water for recreational purposes. Towards this end, this ERT study was requested.

The ERT was asked to: 1) provide a natural resource inventory and evaluation of the Woodridge Lake watershed, 2) identify what factors are contributing to the eutrophication of Woodridge Lake, and 3) discuss what alternatives are available for effective lake management.

The ERT met and field reviewed the site on September 24, 1980. Team members for this review consisted of the following:

Robert Orciari	Fishery Biologist	Connecticut Department of Environmental Protection
Nancy Parent	Environmental Analyst (Lakes Unit)	Connecticut Department of Environmental Protection
Gil Roberts	Sanitarian	Torrington Area Health District
Rob Rocks	Forester	Connecticut Department of Environmental Protection
Mike Schaefer	Soil Conservationist	U.S.D.A. Soil Conservation Service
Mike Zizka	Geohydrologist	Connecticut Department of Environmental Protection

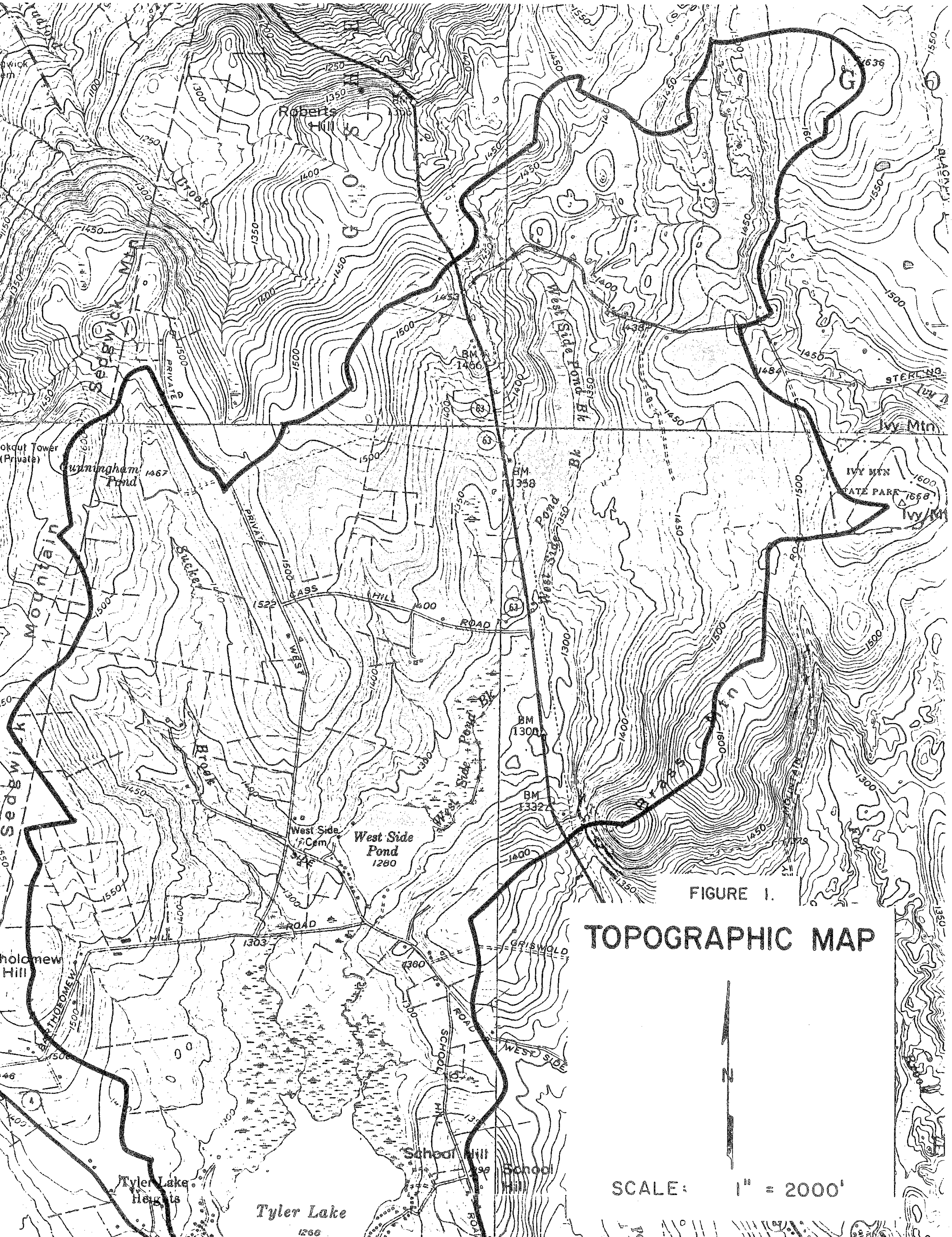
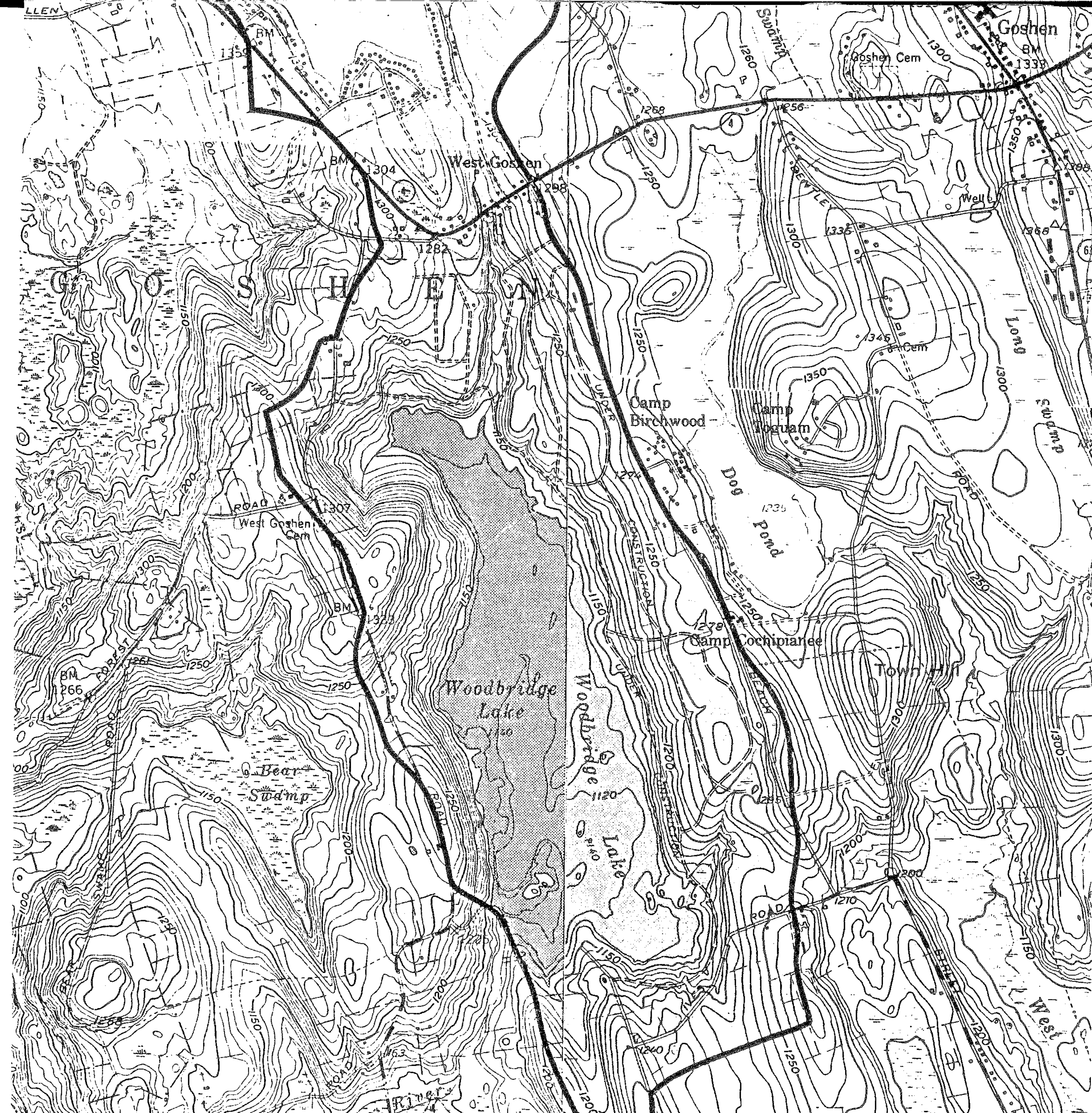


FIGURE 1.

TOPOGRAPHIC MAP

N

SCALE: 1" = 2000'


Goshen
Goshen Cem
West Goshen
G O S H E N
Camp Birchwood
Camp Toquam
Dog Pond
West Goshen Cem
Camp Cochipianee
Town Hill
Woodbridge Lake
Woodbridge Lake
Bear Swamp
Long Swamp
West
River
MOHAWK

Prior to the review day, each team member was provided with a summary of the proposed project, a checklist of concerns to address, and a soil survey map, topographic map, and land use map of the watershed. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the team's findings. The report presents the requested natural resource information and discusses alternative courses of action. All conclusions and final decisions rest with the town and the Woodridge Lake Property Owner's Association. It is hoped the information contained in this report will assist both parties in environmentally sound decision making.

If any additional information is required, please contact Richard Lynn, (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, Sackett Hill Road, Warren, Connecticut 06754.

* * * * *

II. GEOLOGY

The watershed of Woodridge Lake comprises approximately 5,650 acres (about 8.8 square miles), almost all of which is located within the Town of Goshen (a small portion is within the Town of Cornwall). Different sections of the watershed are encompassed by four U.S. Geological Survey topographic quadrangle maps; these are the Cornwall, Norfolk, South Canaan, and West Torrington quadrangles. Bedrock geologic maps of all but the Norfolk quadrangle have been published by the Connecticut Geological and Natural History Survey. Surficial geologic maps of all but the South Canaan quadrangle have been published by the U.S. Geological Survey. A preliminary surficial geologic map of the South Canaan quadrangle is open-filed at the Department of Environmental Protection's Natural Resources Center in Hartford. All of the previously mentioned publications may be purchased from the Center.

Bedrock underlying and cropping out in the watershed is classified as part of two major rock formations: the Waramaug Formation and the Tyler Lake Granite. The approximate distribution of the two formations in the watershed is shown in Figure 2. The Waramaug Formation consists largely of two interlayered and intergrading gneisses. Gneisses are rocks in which thin bands of elongate, platy, or flaky minerals alternate with bands or layers of more rounded mineral grains. The two gneisses of the Waramaug Formation may be distinguished by their different mineral compositions. One gneiss is composed primarily of quartz, plagioclase, muscovite, and biotite, and is tan or rusty-weathering. The other gneiss is composed of sillimanite, garnet, quartz, plagioclase, muscovite, and biotite, and is light rusty-weathering with a rougher, often ribbed or corrugated surface. The Tyler Lake Granite is a massive white to pink, fine to medium-grained granite composed of quartz, microcline, plagioclase, and mica.

The surficial geology of the Woodrige Lake watershed is shown in Figure 3. Surficial geologic materials consist of those unconsolidated rock particles and fragments, organic matter, or other loose debris that overlie bedrock (also known as "ledge"). The predominant surficial unit in the watershed is till. Till consists of rock debris and occasional organic materials which were accumulated by a moving sheet of glacier ice and which were later redeposited directly from the ice. Because the ice was indiscriminate in collecting and redepositing its constituent particles, till contains a nonsorted mixture of clay, silt, sand, gravel, and boulders. Two different tills have been identified in Connecticut. One type is generally thin, relatively loose, and low in fines (silt and clay); the other is tough, compact, relatively high in fines, and often thick. Where the two tills are exposed together, the compact variety underlies the looser variety. In most parts of the watershed, the till deposit is probably less than 25 feet thick. In a few places, however, very thick till (50 feet or more) has been molded by ice to form streamline hills. The clearest example of such a hill is that which is directly south of Tyler Lake. A well drilled for a home situated near the summit of the hill reportedly penetrated 134 feet of till before encountering bedrock.

Another type of glacial sediment is found in scattered areas of the watershed. Called stratified drift, the sediment was deposited by meltwater that flowed from wasting ice during a period of glacial regression. Stratified drift is typically well-sorted by grain size, and sand and gravel are commonly the predominant components. The largest body of stratified drift is found in the swampy area south of Bartholomew Hill Road and north of Tyler Lake.

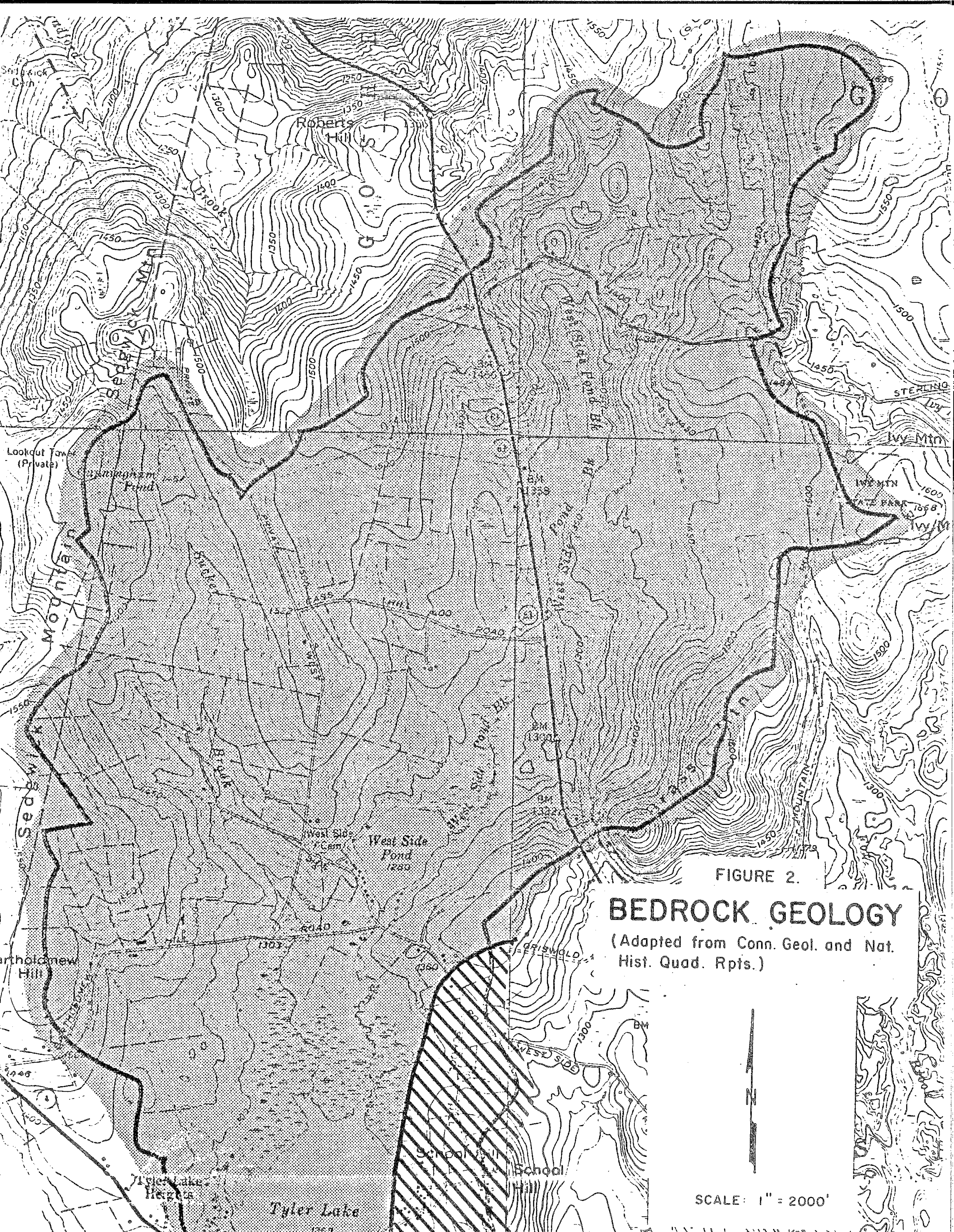


FIGURE 2.

BEDROCK GEOLOGY

(Adapted from Conn. Geol. and Nat. Hist. Quad. Rpts.)

N

SCALE: 1" = 2000'

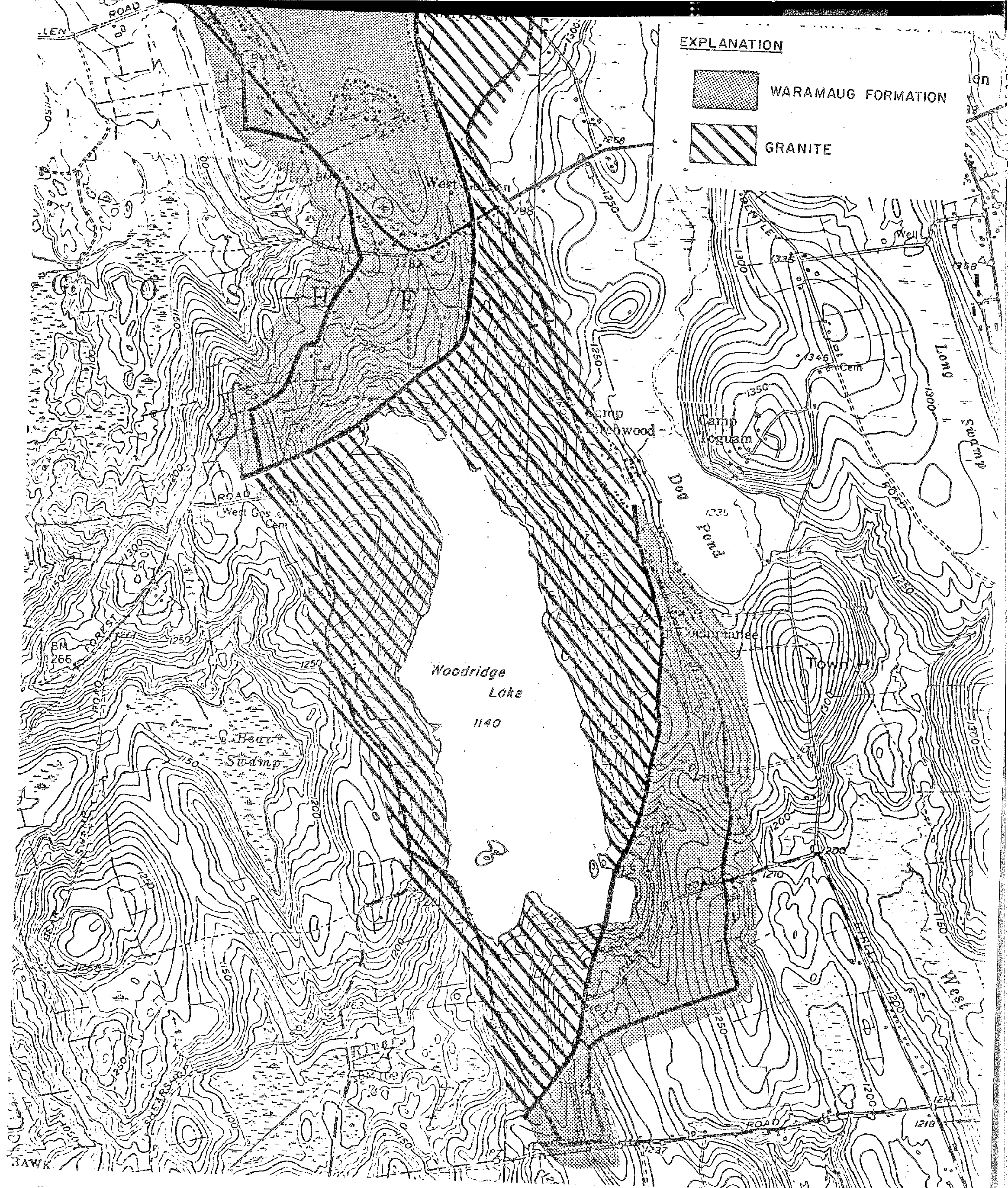
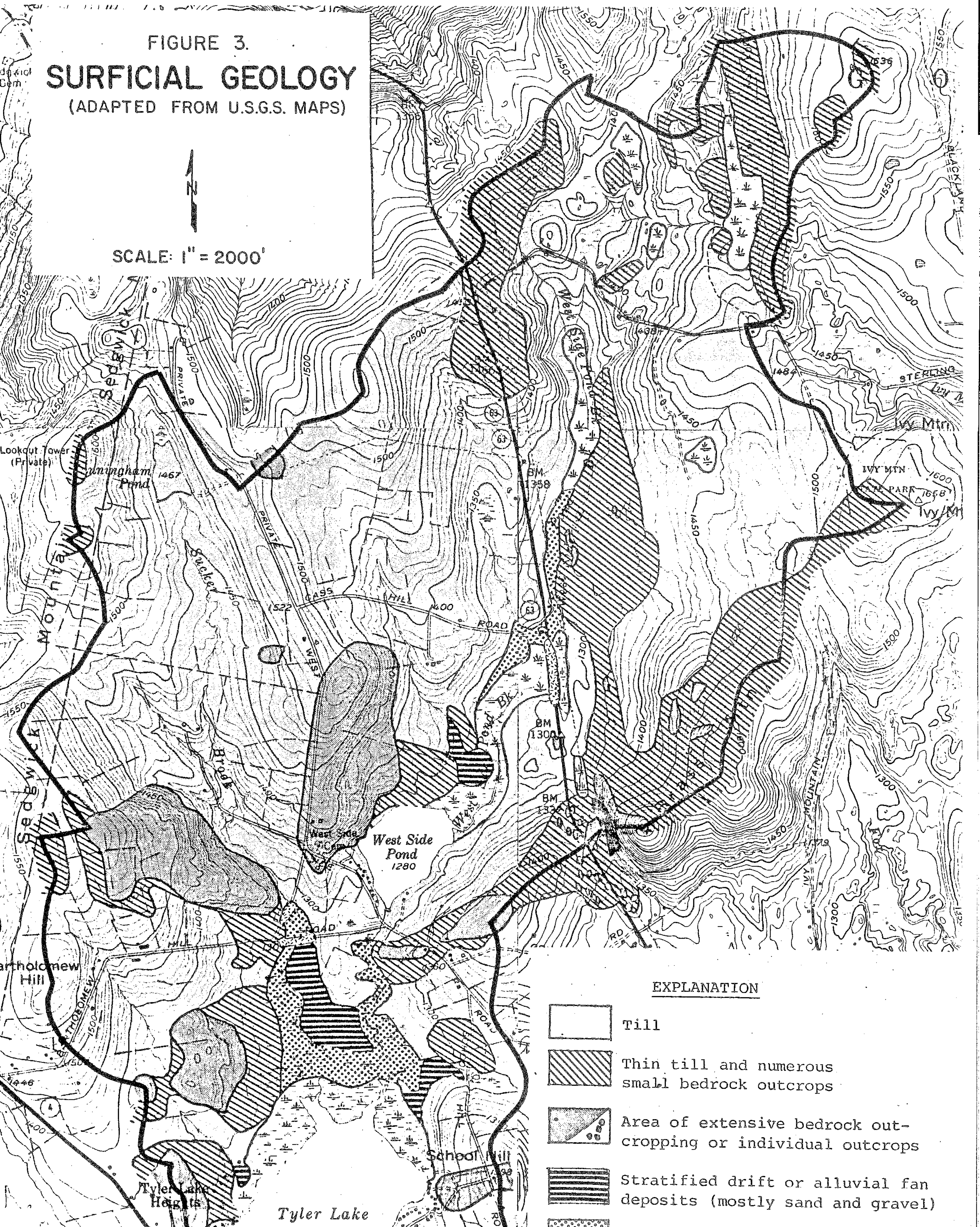

EXPLANATION
WARAMAUG FORMATION
GRANITE
Woodridge Lake
1140
Dog Pond
Camp Toquam
Town Hill
Bear Swamp
Long Swamp
West Goshen Cem
River
West

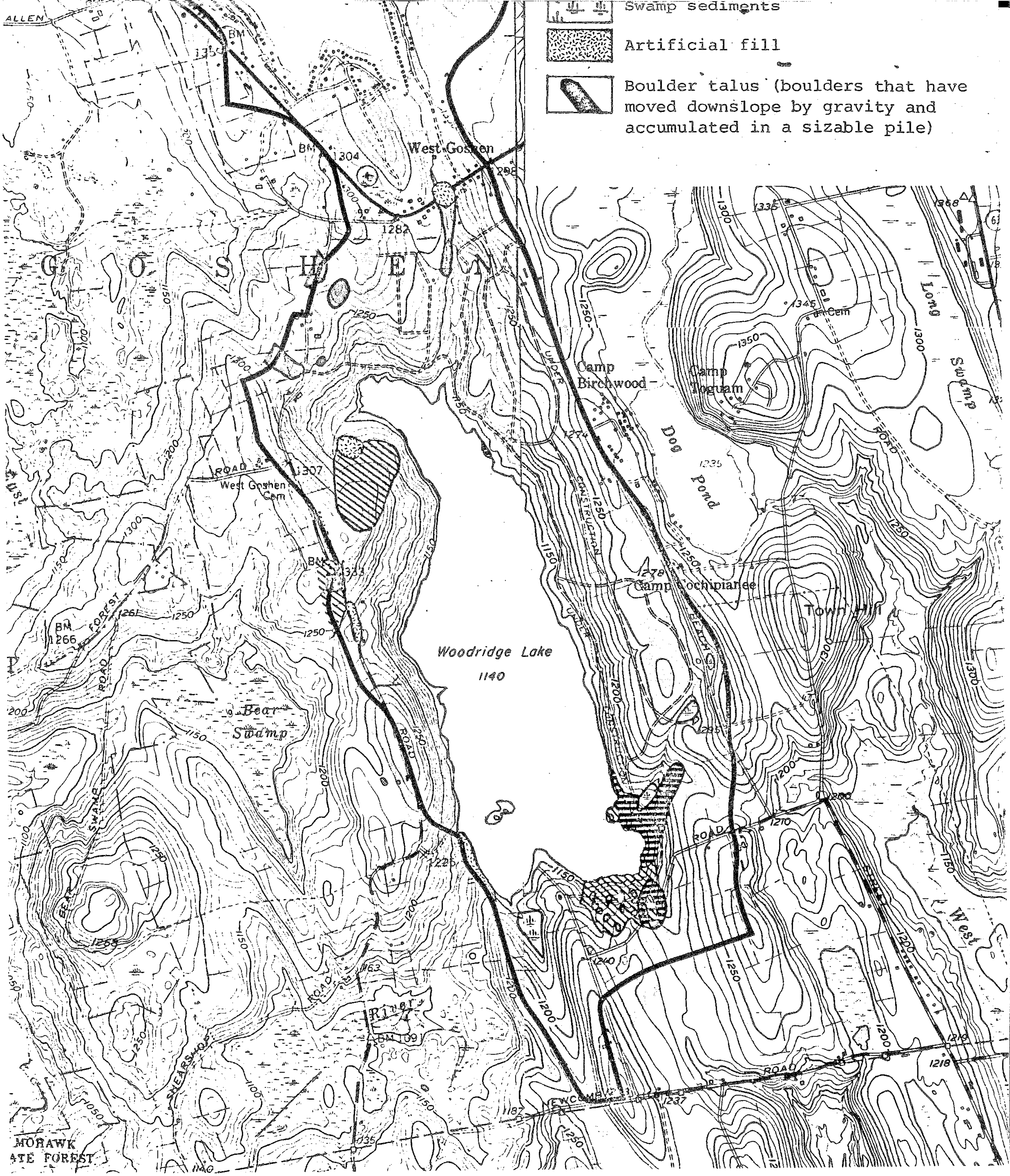
FIGURE 3.

SURFICIAL GEOLOGY

(ADAPTED FROM U.S.G.S. MAPS)

SCALE: 1" = 2000'




Swamp sediments
Artificial fill
Boulder talus (boulders that have moved downslope by gravity and accumulated in a sizable pile)
West Goshen
G O S H E N
West Goshen Cem
Camp Birchwood
Camp Toquam
Dog Pond
Long Swamp
Camp Cochipianee
Town Hill
Woodridge Lake
1140
Bear Swamp
River
MOHAWK
ATE FOREST

Several other types of surficial geologic materials are present in the watershed. The most widespread are the swamp sediments, which have been deposited in wet depressional areas. These sediments consist largely of decomposed plant material with sand, silt, and clay intermixed to various extents. Moderately well-sorted sand, silt, and gravel have been deposited in channels and on floodplains by the streams in the watershed. Such deposits are called alluvium. Where some of the streams emerge from hillslopes into flatter areas, fan-shaped deposits of gravel and sand have accumulated. Finally, man-made deposits of earth materials are located in several parts of the watershed. These last deposits are shown in Figure 3 only where they are of substantial thickness (5 feet or more) and aerial extent.

III. HYDROLOGY

By definition, the watershed of Woodridge Lake comprises all land areas from which ground or surface water may ultimately enter the lake. A raindrop falling on the watershed boundary would have a 50 percent chance of passing into or out of the watershed. As shown on the topographic map, the watershed boundary tends to follow the crests of local hills and ridges. It is to be expected that the true physical boundary may deviate to some extent from the boundary as mapped. The contours shown on the map are not completely accurate and small topographic details do not appear because of the 10 foot contour interval. Nevertheless, the boundary as mapped should be substantially correct and may be used as a reliable indicator of the general area of concern. It should be recognized, however, that any variations of true boundary from mapped boundary would be particularly important where the boundary is closest to the lake, e.g. along Milton Road. Any planning for these areas should allow for a reasonable buffer strip outside the mapped boundary to provide a safety margin.

Woodridge Lake is actually the downstream end of a drainage area that includes two other sizable water bodies: West Side Pond and Tyler Lake. West Side Pond has a surface area of approximately 42 acres and a total drainage area of about 2280 acres (3.56 square miles). Tyler Lake has a surface area of approximately 182 acres and a total drainage area (which includes the drainage area of West Side Pond) of about 4190 acres (6.55 square miles). The surface area of Woodridge Lake is approximately 400 acres and the watershed area is about 5,650 acres (8.83 square miles). All of the water bodies are moderate in depth: West Side Pond has an average depth of 15 feet and a maximum depth of 33 feet; Tyler Lake has an average depth of 12 feet and a maximum depth of 26 feet; Woodridge Lake has an average depth of 15 feet, and its maximum depth is estimated to be 22 feet. Maximum volumes of the three lakes are estimated to be 209 million gallons, 718 million gallons, and 1,866 million gallons, respectively.

Because the lakes are in a series, sources of contamination that may affect West Side Pond and Tyler Lake may also affect Woodridge Lake. As an example, the residences surrounding Woodridge Lake are sewered, with the sewage being pumped out of the watershed. Residences surrounding Tyler Lake, on the other hand, are unsewered. Septic system effluent is one of the most common pollutants of real estate lakes in Connecticut. The Team has no reason at this time to believe that Tyler Lake is presently threatened by such effluent; the point of the example is merely to show that if a pollution problem were to occur in Tyler Lake because of septic effluent, the problem could be transmitted to Woodridge Lake. Hence, sewering the Woodridge Lake residences is only a partial solution.

Of course, pollution sources further "up-drainage" in the watershed (i.e. closer to the headwater area) are less likely to damage the lake to a noticeable degree than those sources that are near the lake. First, contaminants become more diluted as they travel, due to the increasing volume of water supplied by the watershed. Contaminants produced near the lake may be concentrated in the lake around their point of entry. Second, natural processes act to eliminate pollutants on their journey. These processes include chemical reactions, soil or biological uptake, sedimentation, evaporation, and others. In this context, it is important to recognize the differing abilities of the various soil types to absorb potential contaminants. Soils that are poorly drained, shallow to bedrock, or excessively permeable may have little beneficial effect. Well-drained soils with moderate amounts of fine particles may eliminate most pollutants discharged into them, thereby protecting groundwater.

The town indicated a concern in the effect that the removal of sewage effluent from the Woodridge Lake residences to an area outside the watershed might have on groundwater recharge. Based on statistical data compiled in Connecticut Water Resources Bulletin No. 21, it may be estimated that the average recharge to groundwater in the Woodridge Lake watershed is the equivalent of 8.75 inches of precipitation. This amounts to about 3.76 million gallons per day of recharge. In the portion of the watershed of Woodridge Lake below Tyler Lake, approximately 995,000 gallons per day is recharged on the average. The average water use of a family of four is about 250 to 300 gallons per day. The ultimate number of residence units in the Woodridge Lake development was planned to be 780, but it is not now expected to go beyond 350. Assuming both 780 residences and 300 gallons of daily usage each, a total of 234,000 gallons per day would be diverted from the watershed by sewers. This represents 6 percent of the total recharge to the overall watershed and 24 percent of recharge to the Woodridge Lake subwatershed. If the residential units do not exceed 350, as the revised forecast for the community suggests, less than half of these percentages would be diverted. In either case, the loss of water from the drainage area would be expected to have two possible consequences: low flows from the lake outlet may be reduced by a small percentage, and groundwater levels in the subwatershed could be expected to drop somewhat, depending upon soil types and the total number of wells at or near specific locations. As a result of the lowering of groundwater levels, some wells, particularly if shallow, may dry up on occasion. It is difficult, however,to assess the possibility of other effects that the water-level drop may have. In addition, the potential for minor changes in groundwater storage must be balanced against the benefits that removal of sewage from the watershed has. If the number of residences around the lake does not exceed 350, it seems likely that the benefits of sewering outweigh the possible detriment; if the number reaches 780, the question would be closer.

IV. SOILS

A. The Lake Bottom

As previously mentioned, Woodridge Lake was constructed by damming the Marshepaug River. The extent of excavation that took place in constructing the Lake was minimal. Therefore, the characteristics of the lake bottom soils must be considered when addressing the problem of nutrient supplies for aquatic organisms.

The highest amounts or organic material are located on and near the surface layers of the soil profile. As this organic matter decomposes, it is transformed into chemical materials that are available to aquatic life in the form of nutrients. Shallow muck (Map symbol Pm), for example, comprises approximately 8% of the lake bottom. This soil type generally consists of well decomposed organic matter which ranges to depths of 18" - 36" from the surface. Assuming a 2' depth over a 33 acre area, this soil type alone would account for approximately 100,000 - 120,000 cubic yards or organic material. As this material decomposes, it could add substantial amounts of chemical nutrients to the water, with subsequent water quality degradation.

B. Soils vs. Future Land Development

As shown in Figure 4, much of the Woodridge Lake Watershed is underlain by soils which present severe limitations for residential development. Limiting factors include shallow to bedrock soils, soils with steep slopes, hardpan soils, inland wetland soils, and excessively drained soils. Although these limiting factors do not necessarily preclude development, they do indicate that costly and extensive measures will likely be required to overcome the soil limitations and prevent environmental harm.

Improper development on these difficult soils can affect water quality in many ways. For example, development on steep slopes without careful controls, can lead to soil erosion and siltation of streams. Septic systems installed in hardpan soils may fail if perched water tables are not adequately controlled. Septic systems installed in shallow to bedrock areas may pollute groundwater wells or may result in "breakout" of sewage effluent. Septic systems installed in excessively drained soils may result in inadequately renovated effluent reaching ground and surface waters. Development in wetland soil areas may cause many adverse impacts, including diminished water quality. Due to this potential for environmental degradation with future land development, development within the watershed should be very carefully controlled and monitored.

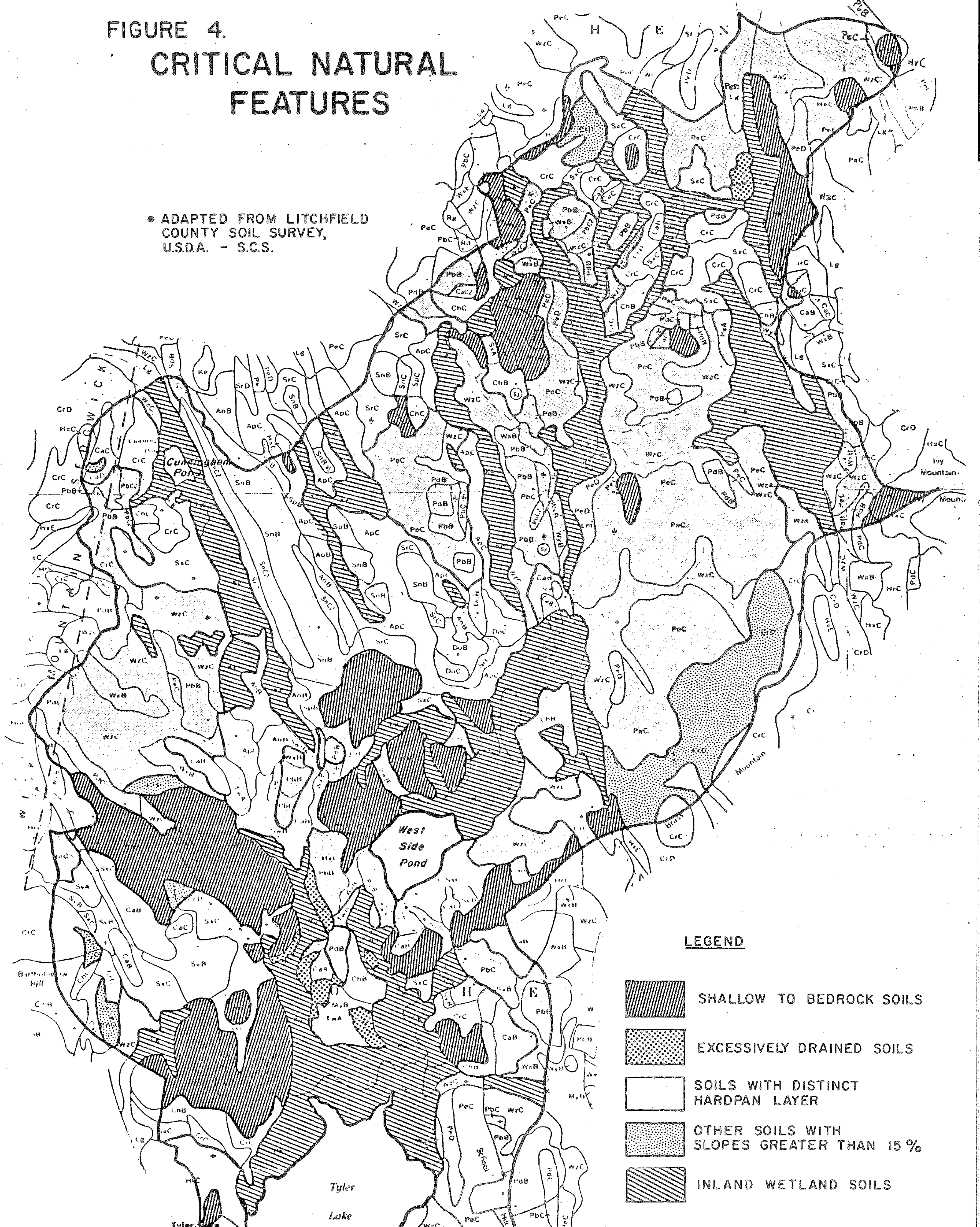
C. Agricultural Land in the Watershed

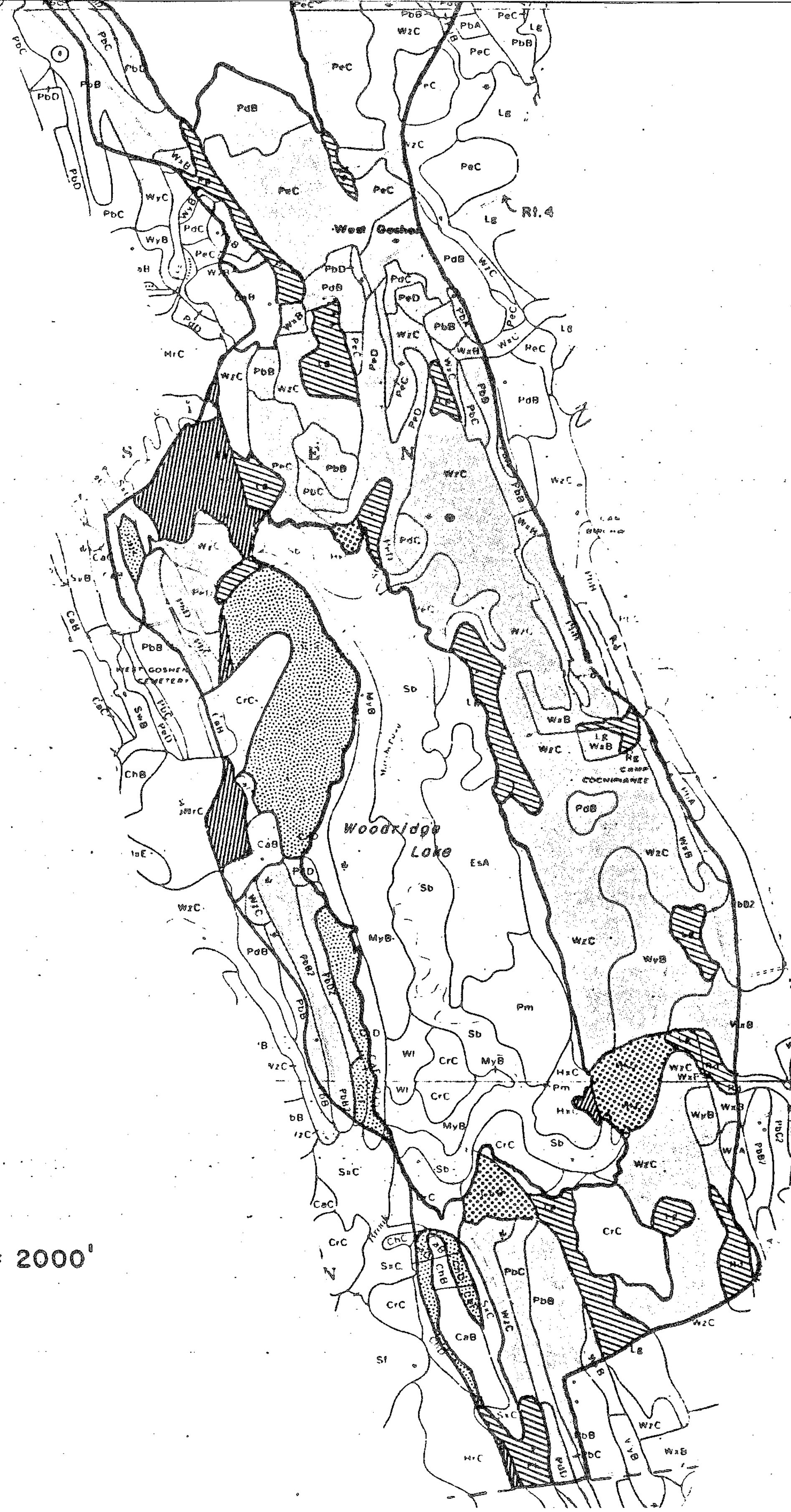
There are approximately 563 acres of agricultural land (pasture And backyard Land) and 78 acres of cropland within the watershed. The heaviest concentration of agricultual and/or cropland is located within the Sucker Brook subwatershed (agricultural land - 299 acres, cropland - 55 acres). Approximately 3100 linear feet of Sucker Brook runs through agricultural land and ± 500 feet of the stream runs adjacent to cropland. The parcel of cropland adjacent to the stream is ± 10 acres in size.

In the other three subwatersheds involved, agricultural and/or cropland comprises only a small percentage of the total land area. The situation of these agricultural parcels in relation to streams or watercourses indicates that the amount of nutrients entering the streams from these lands should be minimal.

FIGURE 4.
CRITICAL NATURAL FEATURES

* ADAPTED FROM LITCHFIELD COUNTY SOIL SURVEY, U.S.D.A. - S.C.S.





SCALE: 1" = 2000'

Fertilizers and Application

It will be assumed that the ± 10 acre parcel of cropland along Sucker Brook is fertilized with a combination of spread manure and commercial fertilizers. Generally, manure should be applied to cornland only in the spring and fall, when the ground is not frozen.

Typical fertilizer requirements for cornland are: 160 lbs/acre N (Nitrogen), 80 lbs/acre P_2O_5 (source of phosphorous) and 120 lbs/acre K_2O (source of potassium). These are general figures and may vary depending on soil and other conditions. The total fertilizer application for the 10 acre parcel is expected, however, to approach 1600 lbs. N, 800 lbs P_2O_5 and 1200 lbs K_2O.

Most nitrogen applied as fertilizer is either removed by plant growth, denitrification, volitilization, and to some extent, leaching. Some nitrogen may contaminate water bodies if excessive leaching occurs, but this is the exception and not the rule.

Phosphorous is "fixed" in the soil and is not very mobile within the soil. Phosphorous is released in solution at very low levels of concentration. Therefore, available phosphorous within the soil at any one time would be found in small amounts. Phosphorous tends to be removed from the soil by erosion and/or plant uptake.

The 10 acre parcel along Sucker Brook is gently sloping, indicating that erosion problems within the field are minor and most phosphorous applied would stay on the site until removed by plant uptake.

D. Erosion and Sedimentation:

Erosion and resultant sedimentation of streams may come from various sources within the watershed. These include: denuded roadbanks, dirt roads, storm drains and homesites. Sources should be inventoried and corrective measures should be taken to avoid unnecessary sedimentation. Examples of these erosion and sedimentation sites were observed during the ERT's field review.

To minimize adverse water quality impact, new construction within the watershed should ideally be governed by stringent zoning and subdivision regulations. These regulations, if enforced, would ensure that future land use is compatable with the area's natural resources. Special provisions under the regulations could take into account erosion and sediment control, streambelts, soils and slopes and management of storm water runoff.

Large amounts of road sand were noticed upon field investigation of the Woodridge Lake Subdivision. This sand should be cleaned up regularly and catch basins in the area should be maintained so as to have a minimum 1'-2' depth of sump space.

The installation of a sediment basin at the north end of the lake just south of where the Marshepaug River crosses Hyerdale Drive would be desirable to collect any sediment that comes from the Marshepaug. This basin would require maintenance, by removing sediment when necessary.

V. SEPTIC SYSTEMS AND WATER QUALITY

Since the main feeder tributary to Woodridge is downstream of Tyler Lake and Westside Pond, any water quality evaluation must consider activities in these areas as well. It is fortunate that the Woodridge Lake Watershed is part of the larger Shepaug Reservoir Watershed of the city of Waterbury. As such, there may be available a history of both bacteriological and chemical samples of upstream tributaries which might be useful in predicting patterns of water quality. In addition, the Public Health Code mandates that Water Utilities conduct sanitary surveys of supply reservoir watersheds on an annual basis. This entails a house-to-house inspection program in search of possible pollution sources such as overflowing septic systems, poor manure storage practices, etc. Violations discovered are referred to health departments for correction. Within the Woodridge Lake watershed, approximately ½ dozen septic malfunctions are reported to the Torrington Area Health District (TAHD) annually.

At present, the majority of the homes on both Tyler Lake and West Side Pond are of a seasonal nature so that septic system use is at its maximum when soil acceptance rates are at their best (i.e. July and August). Existing state and health district regulations present strict limitations on the further development and/or conversion of seasonal homes where conditions for subsurface sewage disposal are marginal. This includes specifically (a) a regulation which prohibits the installation of a water supply well on a property or for a home (not presently supplied), which is not able to meet current minimum code requirements for subsurface sewage disposal; (b) A TAHD regulation which prohibits conversion or change of use of a building unless the property is able to meet all the current requirements of the Public Health Code. In this regard, it would be beneficial to categorize existing buildings on both Tyler Lake and West Side Pond as either seasonal or permanent in order to provide a solid base from which future evaluations might be made ; (c) The TAHD has increased the minimum separating distance from a septic system to a watercourse (Public Health Code requires 25 ft.) to 75 ft. minimum. This should provide a more than adequate buffer zone for protection of water quality.

For a number of years, the TAHD has collected water samples from Tyler Lake, West Side Pond and Woodridge Lake as part of its bathing water program. With few exceptions these samples have been very good (less than 100 coliform content/100 ml; limit is 1000/100 ml for bathing water) from a bacteriological standpoint. Samples for chemical analysis are not undertaken on a regular basis since no bathing water standards exist and the state lab is therefore reluctant to run such tests. There have, however, been a large number of ground water samples analyzed for both bacteria and chemical constituents from new drilled wells in the Woodridge Lake Community. With the exception of iron and manganese, the results of chemical analysis of the supplies have been satisfactory.

One of the problems at Woodridge Lake which was brought out at the ERT meeting is the susceptibility of the lake to algae blooms. The chemical treatment method utilized (copper sulfate) has normally been conducted after the bloom takes place. It would be beneficial to be able to predict a bloom before it occurs so that treatment measures could be instituted prior to the elaborate growth period. Public water utilities share similar problems with their surface water supplies, particularly with respect to taste and odor producing algae. It is the common practice for such utilities to collect samples of reservoirs as frequently as 1/wk, which are submitted to private labs for microscopic analysis. This technique enables the utility to predict an algae bloom and provide treatment without interruption in the water quality. A program of this nature might be beneficial if the same principals could be applied at Woodridge Lake. Certainly, it would be advisable to investigate the subject further if chemical treatment to control weed growth is to be employed.

VI. FOREST MANAGEMENT

A substantial portion of the Woodridge Lake watershed is presently wooded. The ForestryUnit of the Department of Environmental Protection encourages all woodland owners to manage their forest lands. When properly prescribed and executed, forest management practices will increase the production of forest products, improve wildlife habitat and enhance the overall condition of the woodland with minimum negative environmental impact. A public service forester from the Department of Environmental Protection may be contacted (tel. 379-0771) to provide basic advice and technical assistance in woodland management. Services of a more intensive nature are available from private consulting foresters. A list of the private foresters in Connecticut is available from the State Forestry Unit.

Healthy woodlands provide a protective influence on water quality: they stabilize soils, reduce the impact of precipitation and runoff, and moderate the effects of adverse weather conditions. By so doing, woodlands help to reduce erosion, sedimentation, siltation and flooding. Research has shown that soil protected by the cover of litter and humus associated with woodland areas contributes little or no sediment to streams.

Silvicultural practices, the cultivation and harvesting of timber for commercial purposes, may be capable of lowering water quality in at least five different ways: 1) erosion, siltation and sedimentation caused by improperly located and improperly constructed access roads, skid trails, yarding areas and stream crossings. 2) Siltation and sedimentation caused by logging debris left in streams, interfering with natural flows. 3) Thermal pollution resulting from complete or partial harvesting of stream bank vegetation, eliminating shade. 4) Chemical pollution caused by improper application of herbicides and insecticides. 5) Influx of nutrients caused by the application of fertilizer, soil conditioners and wetting agents (used in forest fire control).

Research has determined that nutrient loss from normal silvicultural practices does not, for the most part, result in significant deterioration of water quality.

In Connecticut the widespread use of chemicals in forest management is not prevalent and therefore does not constitute a great threat to water quality at this time.

The harvesting of trees is, however, a major tool used in forest land management. The actual cutting of trees causes no erosion or sedimentation and therefore no degradation of water quality. The soil disturbances associated with the transportation of the felled trees (e.g. access roads, skid trails, yarding areas and stream crossings) does, however, have the potential to degrade water quality by stimulating erosion and sedimentation. These impacts can be lessened by proper planning, placement, construction and maintenance of access roads, skid trails, yarding areas and stream crossings.

A series of Best Management Practices (BMP's), which are recommendations designed to minimize the negative impact of silvicultural activities on water quality, has been compiled by the State Forester. A pamphlet entitled "Logging and Water Quality in Connecticut: A Practical Guide for Harvesting Forest Products and Protecting Water Quality" will be published and made available through the Department of Environmental Protection's Forestry Unit around the end of 1980. The implementation of these BMP's will most likely be of a voluntary nature, through an accelerated education program and perhaps an incentive program.

A "BMP", as defined in the above mentioned pamphlet, is "a practical, economical and effective management or control practice which will reduce or prevent the generation of pollution."

Examples of recommended BMP's for preventing or reducing degradation of water quality resulting from silvicultural activities include:

Phase I. <u>Planning the Job</u>.

a. Locate all streams, wetlands and poorly drained soils (sensitive areas) on USGS topographic maps and/or county soils maps.

b. Plan preliminary locations of access roads, skid roads and yarding areas to avoid the sensitive areas. Locate potential stream crossings.

c. Plan for the best time of year to implement individual silvicultural activities. Sensitive areas that cannot be avoided should be planned for winter when the ground is frozen and more stable.

d. Plan Stream Management Zones which are aimed at protecting stream beds and stream banks.

Phase II. <u>Implementing the Job</u>.

a. Locate logging roads and skid trails so that slopes which exceed 10% are avoided except for short distances.

b. Locate yarding areas on well drained soils with a slight slope, avoiding drainage discharge directly into access roads or streams.

c. Locate Stream Management Zones and avoid equipment operation in these areas to the greatest extent possible.

d. Provide undisturbed buffer strips between streams and roads or yarding areas. The width of these buffer strips is generally between 30 and 100 feet but should depend on slope, soil erodability and the magnitude of road or yarding area drainage discharge.

e. Avoid, when possible, equipment operation on poorly drained soils, in swales and around or in stream channels.

f. Avoid complete clearing of vegetation in the Stream Management Zone.

g. Avoid disturbing understory vegetation within 30 feet of a stream channel.

h. Avoid reducing overstory crown cover below 50% within 30 feet of stream channel.

i. Avoid felling trees in streams; if this occurs, remove debris as soon as possible.

j. Avoid stream crossings if possible; if not, consider building temporary bridges. Crossings should be made at right angles to the stream over stable rock or gravel bottoms, and should avoid steep or unstable banks.

Phase III. Completing the Job.

a. Install erosion control measures on access roads and primary skid trails, including properly placed waterbars and reconditioned cross drains, located at intervals which take into account road length, slope and common sense.

b. Remove all temporary bridges and culverts from streams.

c. Lime and seed specific critical areas, such as steeply sloped roads or problem areas.

d. Close roads to prevent continuing access.

Following these BMP's along with the use of common sense will help to avoid water quality degradation resulting from silvicultural operations.

Further guidelines to maintain water quality on managed woodlands may be found in the pamphlet "Timber Harvesting Guidelines" by the Wood Producer's Association of Connecticut. The principles set forth in this publication are aimed at protecting the forest ecosystem from thoughtless timber harvesting practices that may lower environmental quality in both the long and short run. Copies of this pamphlet are available from the Department of Environmental Protection's Forestry Unit and members of the Wood Producers' Association of Connecticut.

VII. FISHERIES

Woodridge Lake is shallow in relation to its surface area, and would therefore be considered a warm-water fisheries resource. The Lake should be capable of supporting good populations of warm-water species of fish, such as largemouth bass, chain piclerel, yellow perch, brown bullhead, golden shiner, and bluegill, common, and redbreasted sunfish.

Submerged tree stumps, which are commonly found throughout the bottom of Woodridge Lake, are beneficial from a fisheries standpoint, as they provide holding, hiding, and spawning sites for largemouth bass. Rooted aquatic vegetation may also be beneficial in providing hiding places for small individuals of all species of fish. Additionally, these plants would be utilized by perch, pickerel, and shiners for egg deposition. However, if the plants are over-abundant, they may provide too much protection for prey species and reduce predation by bass. Without being adequately controlled by largemouth bass, sunfish and perch may become over-populated and stunted. Therefore, limited removal of some rooted vegetation may actually improve the fisheries of Woodridge Lake. Some areas of vegetation should, however, remain undisturbed throughout the lake.

Woodridge Lake is a fairly new impoundment. In newly created reservoirs or impoundments, the nutrients released from flooded soils and vegetation produce an abundance of plankton, which forms the base of the food chain for fish. In such reservoirs, growth and population structures of all fish species, particularly largemouth bass, tend to be at their peaks. Therefore, Woodridge Lake should presently provide good fishing for both bass and panfish. Because of its large size and potential for good fishing, the lake is a very important fisheries resource. However, by having no public access, the resource is highly underutilized.

Woodridge Lake is probably already in an eutrophic state. Further inputs of nutrients from non-point sources of pollution may increase algae production and subsequently, the production of fish. However, this increase in fish production could be distributed among more, but smaller sized individuals. Since Woodridge Lake is probably already eutrophic, moderate increases in nutrient inputs should not significantly affect the fisheries of the lake.

The major tributary to Woodridge Lake flows from Tyler and West Side Ponds. During the summer, water flowing through this tributary will become warmed by these lakes. Thus, trout would not likely be capable of surviving throughout the year. However, Tyler and West Side Ponds are stocked with trout and some of these fish may drop down into the tributary, where they could survive from the fall to spring. Typical pond species of fish, such as bass, perch, and sunfish, may also be carried into the brook from Tyler Pond. Stream species of fish, including white sucker, fallfish, blacknose dace, and creek chub may permanently reside in the stream. The tributary between Tyler Pond and Woodridge Lake would have some potential for providing a put-and-take trout fishery,if it were stocked by the Woodridge Lake Association in the early spring. There are several smaller tributaries to Woodridge Lake, but they are much too small to have significant fisheries values.

VIII. LAKE FEATURES AND MANAGEMENT ALTERNATIVES

As previously mentioned, Woodridge Lake is a relatively shallow, artificial impoundment, created in 1970 by the contruction of a concrete dam across the Marshepaug River and the subsequent flooding of a large wetland. The morphological characteristics of the Lake according to the Woodridge Lake Property Owners Association are:

Surface Area = 400. acres (162 hectares)
Maximum Depth = 22. feet (6.7 meters)
Mean Depth = 10. feet (3.05 meters)
Volume = $4,937,340m^3$
Watershed Area = 5,027. acres (7.92 sq. miles) *
Retention Time = 128 days

The drainage area of Woodridge Lake encompasses four lakes: West Side Pond, Cunningham Pond, Tyler Lake and Woodridge Lake itself. Because of the hydrologic relationships between these lakes, a brief discussion of each follows:

West Side Pond is a small, 42.4 acre lake. The Pond has been classified by the Connecticut Agricultural Experiment Station (CAES) as oligo-mestrophic. West Side Pond Brook, which drains from a wetland is the only feeder stream to the Pond. The outflow of West Side Pond flows south to Tyler lake.

Tyler Lake is natural in origin and possesses a surface area of 182 acres. The Lake has three tributaries: Sucker Brook which drains from Cunningham Pond and two streams that enter from the north (one of which originates at West Side Pond). All of these tributaries pass through a large wetland before entering the Lake. The CAES has classified Tyler Lake as mesotrophic. Upstream lakes, as nutrient sinks , assist in protecting Woodridge from rapid eutrophication.

The Marshepaug River drains from Tyler Lake, and flows south to Woodridge Lake. The Marshepaug exits Woodridge Lake on its southwest shore and joins the East Branch of the Shepaug River. The Shepaug River then drains into the Shepaug Reservoir, a public water supply for the City of Waterbury.

A. Direct Lake Use

Research sponsored by the Environmental Protection Agency (E.P.A.) has demonstrated that motor exhausts do not cause a lasting deterioration of water quality; however, the exhausts can cause temporary localized conditions which are incompatible with swimming or other lake uses.

Aquatic plants have many natural mechanisms for spreading and colonizing new habitats and motor boats do not promote growth or spreading that would not occur naturally.

A model prepared to estimate the potential nutrient enrichment of Lake Wononscopomuc by wild geese (Norvell, 1975), can also be applied to Woodridge Lake. The model estimated that each goose excretes 50 grams of Phosphorus and 100 grams of nitrogen on a monthly basis. If one-thousand wild geese spend approximately three months on the lake, the potential nutrient contributions are:

1. .03 mg Phosphorus/liter and .06 mg Nitrogen/liter on a volume basis.

2. .09 grams Phosphorus/m^2 and .19 grams Nitrogen/m^2 on an areal basis.

These nutrient contributions are substantial; geese may therefore be contributing significantly to the nutrient enrichment of Woodridge Lake.

* NOTE: Calculations by the ERT show the watershed of Woodridge Lake to be ± 5650 acres, or about 8.8 square miles.

B. Eutrophication and Lake Management Alternatives

Eutrophication is a natural aging process through which a waterbody gradually increases in fertility and biological productivity, and fills in with accumulations of organic deposits. As eutrophication proceeds, algae blooms increase in both intensity and duration, and aquatic plant growth becomes more prolific. The lake becomes shallower and the deep, cold waters are lost. During the latter stages of this process, the waterbody becomes a boggy or marshy wetland.

The lake characteristics directly associated with eutrophication are nuisance algae blooms, extensive beds of aquatic weeds, reduced depth and the loss of cold water. These characteristics may interfere with a lake's desired recreational uses.

Under natural conditions the eutrophication process usually advances very slowly over thousands of years. The process can be accelerated by activities of man which increase nutrient and sediment inputs to a waterbody.

In general there are three accepted stages of eutrophication which are defined as follows:

1. Oligotrophic = early stages of the process, very infertile, low biological productivity, high transparency, usually highly oxygenated and relatively deep with little accumulation of organic sediments on the bottom.

2. Mesotrophic = a mid-range between the two extremes of oligotrophic and eutrophic.

3. Eutrophic = late stages of the process, very fertile (high in plant nutrients such as nitrogen and phosphorous), high in biological productivity, low in transparency, bottom waters usually show reduced levels of dissolved oxygen and usually shallow with an abundance of organic matter on the bottom.

Analysis of lakes throughout the State has shown that the majority of shallow, artificial impoundments are eutrophic. It is generally accepted that residential development within a lake watershed accelerates the eutrophication process, leading to a further deterioration in water quality.

Phosphorous has been identified as the growth limiting nutrient in the majority of Connecticut lakes. The term "limiting nutrient" refers to the nutrient which is in the shortest supply relative to growth requirements. In general, algae and macrophytes will grow until the supply of some basic nutrient is depleted. Then any increase in that nutrient will result in a corresponding increase in biological productivity. Similarly, a reduction in that nutrient will reduce potential biological productivity. Enrichment of a lake with plant nutrients is the fundamental cause of eutrophication.

In many cases, a significant source of phosphorous enrichment is failing septic systems. It would not be expected that any phosphorous from the Woodridge Lake development would reach the Lake, because the treatment facility, a land-application system, is located within the Bantam River Watershed and does not "drain" toward Woodridge Lake. However, failing septic systems upstream of Woodridge Lake could be negatively impacting lake water quality.

The transport of eroded soil to a lake contributes to eutrophication in two ways. First, phosphorous and other plant nutrients are introduced into the lake by erosion and secondly, sediment particles are deposited in the lake, reducing the depth and thereby creating an environment more conducive to aquatic macrophyte growth.

As previously discussed, the sediments underlying Woodridge Lake are composed mainly of soils which are high in organic content. When evaluating eutrophication it is important to consider the cycling of nutrients between lake sediments and lake water. It is possible that nutrient recycle from the Lake bottom is a significant source of phosphorous to the surface water. Nutrients within the sediments probably also serve to support rooted aquatic plant growth.

There are disadvantages to any weed control method. A few of the problems which may be encountered are:

1) Those macrophytes which are resistant to the control method employed, may multiply due to a reduction in competitive pressures from other species.

2) If the weeds are removed, the loss of habitat, spawning areas and a food source for fish and other aquatic organisms may be incurred.

3) After the weeds are removed, nutrients could be made available to algae and subsequently, "blooms" may occur.

The most common means of aquatic weed control are: winter drawdown, weed harvesting, chemical treatments, drawdown and excavation, and hydraulic dredging. Each of these control methods is discussed below.

1) Winter drawdown

If the spillway has the capacity to effectively lower the water level, the lake may be drawndown in the fall to expose the sediments. Over the winter, the bottom freezes and destroys roots, vegetative parts and susceptible seeds. Winter drawdown will not kill algae. Winter drawdown should be coordinated with fisheries experts to prevent impacts on fish populations.

Winter drawdown of four to five feet has been employed at Woodridge Lake in the past and was deemed unsuccessful when the weeds returned the following season.

Possible reasons for the lack of success are:

(1) The water level was not drawn down sufficiently to expose enough of the bottom sediments.

(2) The type of macrophytes inhabiting the Lake cannot be effectively controlled by drawdown.

(3) The Lake was reinvaded by another species when competition was reduced.

(4) More than one drawdown may be necessary to effectively check the weeds.

2) Weed harvesting

Weed harvesting entails the mechanical cutting of the weeds. Although the method provides immediate relief, it may have to be repeated at periodic intervals.

The Woodridge Lake Property Owners Association has purchased a weed harvester and has found this method to be successful.

3) Chemical Treatment

The use of any algicide or herbicide within the waters of the State is governed by statute (Sec. 430 of Public Act 872) and permits are required from the Pesticide Compliance Unit of D.E.P.

The Woodridge Lake outfall, Marshepaug River, flows into the East Branch of the Shepaug River, which drains into the Shepaug Reservoir, a public water supply for the City of Waterbury. Proposed applications which involve a public water supply must be approved by the State Health Department.

Chemical treatments are generally only "cosmetic" and repeated applications may be necessary.

4) Drawdown and Excavation

Drawdown and excavation is sometimes employed to remove the substrate utilized by the plants for growth. The process increases water depth to levels where plants growing on the bottom will not receive enough light to survive. The effects of this method are generally long-termed.

The sediments underlying Woodridge Lake, formerly a large wetland, are probably a significant source of nutrients to the lake.

The drawdown and excavation process requires the use of heavy equipment and it must be determined whether the Lake bottom could support this weight.

This method has a relatively high capital outlay; however, the restorative effects are long termed.

If this method is given further consideration, a feasibility study should be conducted to "map" lake sediments according to depth, composition, and underlying substances. Final disposal of excavated sediments should also be explored during the feasibility study. Hydraulic dredging (see discussion below) accomplishes the same goal as drawdown and excavation, but is more costly due to increased specialization and complexity.

5) Hydraulic dredging

Under this method, specialized sediment dredges are employed to remove underwater sediments by suction as a slurry. The slurry must be dewatered prior to final disposal, and the decant water usually must be treated to remove solids and nutrients prior to disposal. The development of dewatering containment basins of suitable size and location is a major and expensive undertaking. However, where environmentally and financially feasible, this method can provide improvement if other methods are unsatisfactory.

C. Future Directions

The following should be considered to protect the water quality of Woodridge Lake.

1) Future development of any of the undeveloped lots within the watershed should proceed with caution and the knowledge that it has been demonstrated, in most cases, that residential development in a lake watershed accelerates the eutrophication process, leading to further deterioration of existing water quality.

2) Existing sources of erosion, sedimentation and runoff at home construction sites and along the road surrounding the Lake should be corrected.

3) Cuttings from the weed harvesting operation should be disposed of away from the lake or any watercourses.

4) The maintenance of a vegetated buffer strip around the lakeshore should be continued.

5) The Wildlife Unit of the Department of Environmental Protection should be contacted to discuss the overwintering of large numbers of geese on the lake.

6) An on-going water quality testing program should be implemented to monitor water quality trends or changes over time. The following schedule is a suggested program to assess changes in trophic character. Technical assistance can be gained from the Connecticut Department of Environmental Protection.

Water Quality Parameters	Details
a) Secchi disk -	Take reading once/month to measure water clarity (exclude winter months).
b) Dissolved Oxygen & Temperature -	Plot dissolved Oxygen and temperature profiles once/month (exclude winter months).
c) Total phosphorus, total nitrogen, and ammonia nitrogen.	Take one water sample for each parameter during both spring and fall overturn. During the late summer months it is also desirable to sample for the parameters in the hypolimnion.
d) Phytoplankton	Take composite surface samples for species identification and enumeration at intervals during summer stratification and into fall overturn. Significant blooms should also be sampled and notation made of bloom duration.
e) Aquatic macrophytes	Mapping of vegetation species identification and density description.

The State Legislature has appropriated the sum of $40,000 for reimbursement to towns and lake authorities for algae and weed control in accordance with the provisions of Section 25-3c of the Connecticut General Statutes. Reimbursement is limited solely to towns or lake authorities established in accordance with Section 7-151a of the Connecticut General Statutes.

The Environmental Protection Agency has established policies and procedures governing the granting of Federal financial assistance to the State for the protection and restoration of publicly owned freshwater lakes as authorized by Section 314 of the Clean Water Act. A publicly owned freshwater lake is defined by the E.P.A. as one which offers public access through publicly owned contiguous lands, so that any menber of the public may have equivalent opportunity to enjoy the privileges and benefits of the lake as any other member of the public. Woodridge Lake is presently ineligible for federal financial assistance because access is limited to Woodridge Lake property owners.

For additional information on lakes management, the following publication is recommended:

<u>Lake Restoration: Proceedings of a National Conference</u>, August 22-24,1978, Minneapolis, Minnesota. U.S. Environmental Protection Agency, Office of Water Planning and Standards, Washington, D.C., March 1979.

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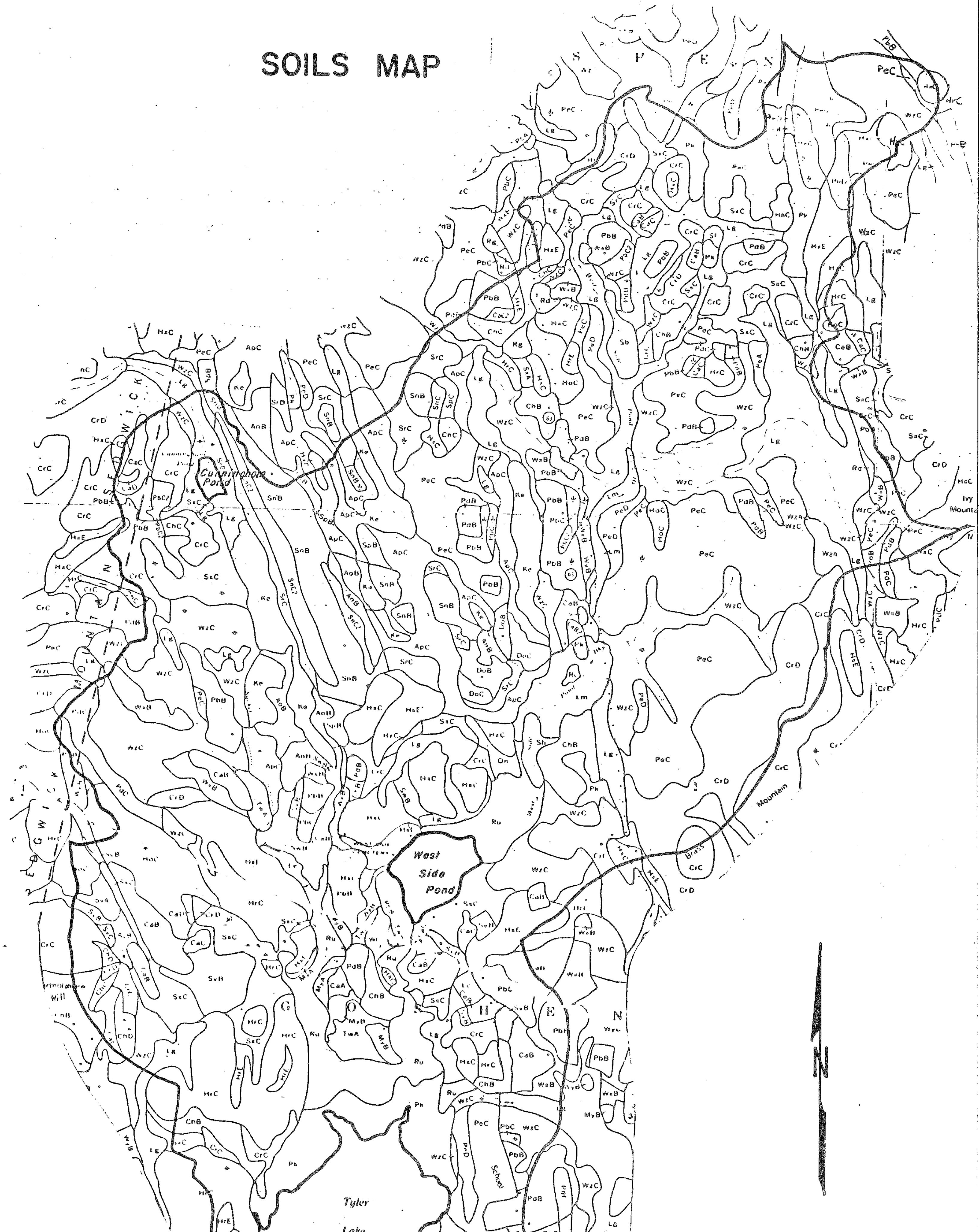
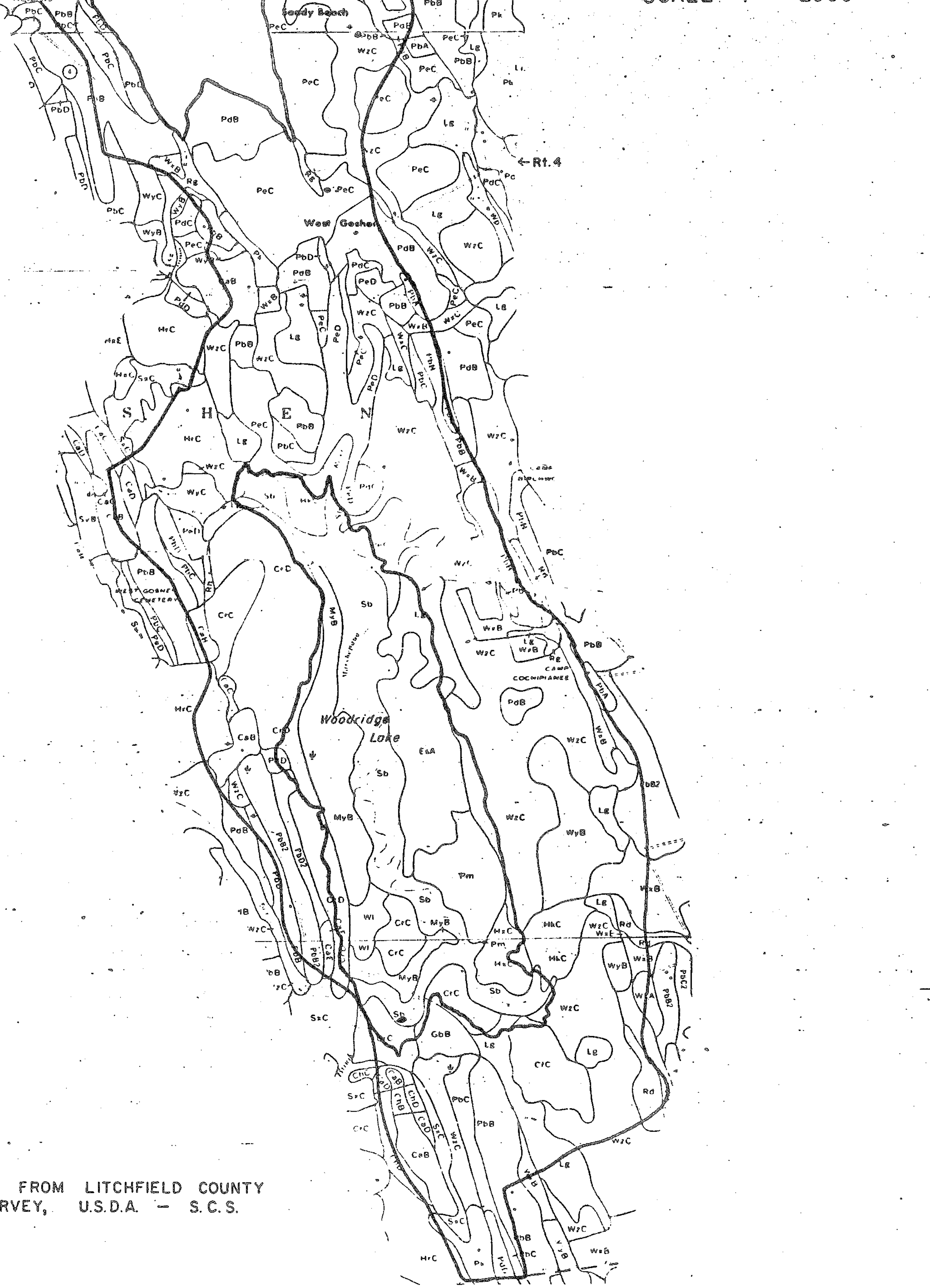
APPENDIX

SOILS MAP



Cunningham Pond
West Side Pond
Tyler Lake
Ivy Mountain
Mountain
Brass
School



ADAPTED FROM LITCHFIELD COUNTY
SOIL SURVEY, U.S.D.A. – S.C.S.

SOILS LIMITATION CHART - WOODRIDGE LAKE

NAT. SOIL GROUPS	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB-TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
A-1b	HkC	Hinckley gravelly sandy loam, 3-15% slopes	Severe; Poor filter	Slight	Slight	Moderate; Sandy
A-1d	MyA MyB	Merrimac sandy loam,0-3% slopes, 3-8% slopes	Severe; Poor filter	Slight	Slight	Slight; Sandy
A-2	TwA TwB	Tisbury & Sudbury soils, 0-3% slopes 3-8% slopes	Severe; Wetness, Poor filter	Severe; Wetness	Severe; Frost Action	Slight
A-3b	*SF	Scarboro fine sandy loam	Severe; Ponding, Poor filter	Severe; Ponding	Severe; Ponding, Frost action	Severe; Ponding, Excess humus
B-1a	CaB	Charlton fine sandy loam, 3-8% slopes	Slight	Slight	Slight	Slight
	ChB	Charlton stony fine loam, 3-8% slopes	Slight	Slight	Slight	Moderate; Large stones
	DoB	Dover fine sandy loam, 3-8% slopes	Slight	Slight	Slight	Slight
	GbB	Gloucester stony sandy loam, 3-8% slopes	Severe; Poor filter	Moderate; Large stones	Moderate; Large stones	Moderate; Small stones, Droughty
B-1b	DoC	Dover fine sandy loam, 8-15% slopes	Moderate; Slope	Moderate; Slope	Moderate; Slope	Moderate; Slope
	ChC	Charlton stony fine sandy loam, 8-15% slopes	Moderate; Slope	Moderate; Slope	Moderate; Slope	Moderate; Slope, Large stones

NAT. SOIL GROUP	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB-TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
B-1b	CaC	Charlton fine sandy loam, 8-15% slopes	Moderate; Slope	Moderate; Slope	Moderate; Slope	Moderate; Slope
B-1c	CrC	Charlton very stony fine sandy loam, 3-15% slopes	Moderate; Slope	Moderate; Slope	Moderate; Slope	Moderate; Slope; Large stones
B-1d	CaD CaE	Charlton fine sandy loam, 15-25% slopes 25-35% slopes	Severe; Slope	Severe; Slope	Severe; Slope	Severe; Slope
B-1e	CrD	Charlton very stony fine sandy loam, 15-35% slopes	Severe; Slope	Severe; Slope	Severe; Slope	Severe; Slope
B-2a	SvB	Sutton fine sandy loam, 3-8% slopes	Severe; Wetness	Severe; Wetness	Moderate; Frost action	Slight
	SwB	Sutton stony fine sandy loam, 3-8% slopes	Severe; Wetness	Severe; Wetness	Moderate; Frost action	Moderate; Large stones
B-2b	SxA	Sutton very stony fine, sandy loam, 0-3% slopes	Severe; Wetness, Large stones	Severe; Large stones, Wetness	Moderate; Frost action, Large stones	Moderate; Large stones
	SxC	Sutton very stony fine sandy loam, 3-15% slopes	Severe; Wetness, Large stones	Severe; Wetness, Large stones	Moderate; Slope, Frost action	Severe; Large stones
B-3a	*Lc	Leicester, fine sandy loam, 0-3% slopes	Severe; Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
	*Le	Leicester stony fine sandy loam, 0-3% slopes	Severe; Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
B-3b	*Lg	Leicester, Ridgebury, Whitman very stony fine sandy loam, 0-3% slopes	Severe; Large stones, Wetness	Severe; Large stones, Wetness	Severe; Wetness, Frost action, Large stones	Severe; Large stones, Wetness

NAT. SOIL GROUP	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB-TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
C-1a	PbB	Paxton fine sandy loam, 3-8% slopes	Severe; Percs slowly	Moderate; Wetness	Moderate; Frost action, Wetness	Slight
	PdB	Paxton stony fine sandy loam, 3-8% slopes	Severe; Percs slowly	Moderate; Wetness	Moderate; Frost action Wetness	Moderate; Large stones
	SnB	Stockbridge loam, 3-8% slopes	Severe; Percs slowly	Moderate Wetness	Slight	Slight
	SpB	Stockbridge stony loam, 3-8% slopes	Severe; Percs slowly	Moderate; Large stones, Wetness	Slight	Moderate; Large stones
C-1b	PbC	Paxton fine sandy loam, 8-15% slopes	Severe; Percs slowly	Moderate; Slope, Wetness	Moderate; Slope, Wetness, Frost action	Moderate; Slope
	SnC	Stockbridge loam, 8-15% slopes	Severe; Percs slowly	Moderate; Slope, Wetness	Moderate; Slope	Moderate; Slope
	SpC	Stockbridge stony loam, 8-15% slopes	Severe; Percs slowly	Moderate; Large stones, Slope	Moderate; Slope	Moderate; Slope, Large stones
C-1c	PeC	Paxton very stony fine sandy loam, 3-15% slopes	Severe; Percs slowly	Moderate; Slope, Wetness	Moderate; Slope, Wetness Frost action	Moderate; Slope
	SrC	Stockbridge very stony loam, 3-15% slopes	Severe; Large stones, Percs slowly	Severe; Large stones	Moderate; Slope, Large stones	Severe; Large stones
C-1d	PbD	Paxton fine sandy loam, 15-25% slopes	Severe; Slope, Percs slowly	Severe; Slope	Severe; Slope	Severe; Slope

NAT. SOIL GROUP	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB-TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
C-1e	PeD	Paxton very stony fine sandy loam, 15-35% slopes	Severe; Percs slowly, Slope	Severe; Slope	Severe; Slope	Severe; Slope
C-2a	WxB	Woodbridge fine sandy loam, 3-8% slopes	Severe; Percs slowly	Severe; Wetness	Severe; Frost action	Moderate; Wetness
	WyB	Woodbridge stony fine sandy loam, 3-8% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Large stones, Wetness
	AnB	Amenia silt loam, 3-8% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Slight
	AoB	Amenia stony silt loam, 3-8% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Large stones
	WyC	Woodbridge stony fine sandy loam, 8-15% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Slope, wetness Large stones
C-2b	ApC	Amenia very stony silt loam, 3-15% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Slope, Wetness Large stones
	WzA	Woodbridge very stony fine sandy loam, 0-3% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Large stones, Wetness
	WzC	Woodbridge very stony fine sandy loam, 3-15% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action	Moderate; Slope, Wetness Large stones
C-3a	*Ka	Kendaia silt loam, 0-3% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
	*Rg	Ridgebury stony fine sandy loam, 0-3% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness

NAT. SOIL GROUP	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB-TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
	*Rd	Ridgebury fine sandy loam	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
C-3b	*Ke	Kendaia-Lyons very stony silt loams, 0-3% slopes	Severe; Wetness, Percs slowly, Large stones	Severe; Wetness, Large stones	Severe; Wetness, Frost action	Severe; Wetness, Large stones
D-1	HoC	Hollis rocky fine sandy loam, 3-15% slopes	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones	Severe; Depth to rock	Severe; Depth to rock, Large stones
	HrC	Hollis very rocky fine sandy loam, 3-15% slopes	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones	Severe; Depth to rock	Severe; Depth to rock, Large stones
D-2	HxC	Hollis extremely rocky fine sandy loam, 3-15% slopes	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones	Severe; Depth to rock	Severe; Depth to rock, Large stones
	HrE	Hollis very rocky fine sandy loam, 15-35% slopes	Severe; Slope, Large stones, Depth to rock,	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones
	HxE	Hollis extremely rocky fine sandy loam, 15-35% slopes	Severe; Slope, Large stones, Depth to rock	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones	Severe; Depth to rock, Large stones
E-1	*On	Ondawa fine sandy loam, 0-3% slopes	Severe; Floods, Poor filter	Severe; Floods	Severe; Floods	Moderate; Floods
E-3a	*Lm	Limerick silt loam, 0-3% slopes	Severe; Floods, Wetness	Severe; Floods, Wetness	Severe; Floods, Wetness Frost action	Severe; Wetness, Floods
	*Ru	Rumney fine sandy loam, 0-3% slopes	Severe; Floods, Wetness, Poor Filter	Severe; Floods, Wetness	Severe; Floods, Wetness, Frost action	Severe; Wetness, Floods

NAT. SOIL GROUP	MAP SYMBOL	SOIL NAME	SEPTIC ABSORB- TION FIELDS	BUILDINGS W/ BASEMENTS	ROADS OR DRIVEWAYS	LANDSCAPING
E-3b	*Sb	Saco silt loam, 0-3% slopes	Severe; Floods, Wetness	Severe; Floods, Wetness	Severe; Floods, Wetness, Frost action	Severe; Wetness, Floods
F-1	*Pk	Peak & Muck, 0-3% slopes	Severe; Floods, Wetness	Severe; Floods, Wetness, Low strength	Severe; Low strength, Floods	Severe; Excess humus, Wetness, floods
G-3a	*Rc	Raynham silt loam, 0-3% slopes	Severe; Percs slowly, Wetness	Severe; Wetness	Severe; Frost action, Wetness	Moderate; Wetness

EXPLANATION OF RATING SYSTEM:

<u>SLIGHT LIMITATION:</u> indicates that any property of the soil affecting use of the soil is relatively unimportant and can be overcome at little expense.
<u>MODERATE LIMITATION:</u> indicates that any property of the soil affecting use can be overcome at a somewhat higher expense.
<u>SEVERE LIMITATION:</u> indicates that the use of the soil is seriously limited by hazards or restrictions that require extensive and costly measures to overcome.

*Inland wetland soil, as defined by P.A. 155, as amended.

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, foresters, climatologists, soil scientists, landscape architects, recreation 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 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

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

REQUESTING A REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality or the chairman of an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter 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 address. When this request is approved by the local Soil and Water Conservation District and the King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.