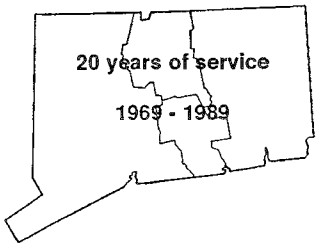
CHATHAM LAKE SUBDIVISION

HADDAM, CONNECTICUT
MARCH 1989

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.



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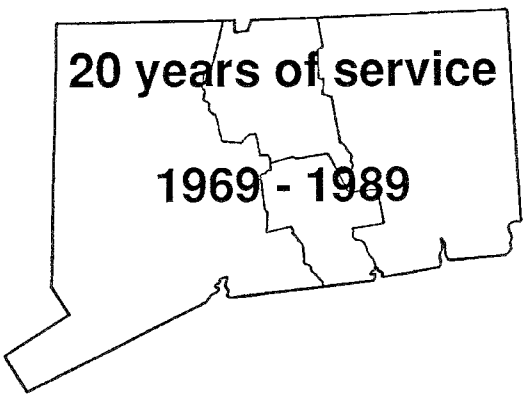
REVIEW DATE: JANUARY 31, 1989

REPORT DATE: MARCH 1989



Eastern Connecticut Resource Conservation and Development Area, Inc.
Eastern Connecticut Environmental Review Team
P.O. Box 70, Route 154
Haddam, Connecticut 06438
(203) 345-3977

ENVIRONMENTAL REVIEW TEAM REPORT
ON

CHATHAM LAKE SUBDIVISION
HADDAM, CONNECTICUT

This report is an outgrowth of a request from the Haddam Planning and Zoning Commission to the Middlesex County Soil and Water Conservation District (SWCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The ERT met and field checked the site on Tuesday, January 31, 1989. Team members participating on this review included:

Nick Bellantoni	*State Archaeologist*	*CT Museum of Natural History*
Geoffrey Colgrove	*Planning Director*	*Midstate Regional Planning Agency*
Kevin DesRoberts	*Wildlife Assistant*	*DEP-Eastern District*
Jim Dunn	*Asst. Planning Director*	*Midstate Regional Planning Agency*
Tom Gilligan	*Regional Planner*	*Midstate Regional Planning Agency*
Steve Gladczuk	*Regional Planner*	*Midstate Regional Planning Agency*
Steve Hill	*Wildlife Biologist*	*DEP-Eastern District*
Charles Lee	*Environmental Analyst*	*DEP-Water Compliance,Lakes Mgnt*
Nancy Murray	*Biologist*	*DEP-Natural Diversity Data Base*
Chuck Phillips	*Fisheries Biologist*	*DEP-Eastern District*
Rob Rocks	*Forester*	*DEP-Cockaponsett Forest Hdqtrs*
Joyce Scheyer	*District Conservationist*	*USDA-Soil Conservation Service*
Tony Sullivan	*Planning Specialist*	*CT Office of Policy & Management*
Elaine Sych	*ERT Coordinator*	*Eastern CT RC&D Area*
Bill Warzecha	*Geologist/Sanitarian*	*DEP-Natural Resources Center*

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, soils map and overall site plans. During the field review the Team members were given soils information, full plans and lake association by-laws. The Team met with, and were accompanied by the Assistant Town Planner, the developer and his engineers and consultants. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

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

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in making your decisions on this proposed subdivision.

If you require additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
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Haddam, Connecticut 06438
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1. SETTING and TOPOGRAPHY

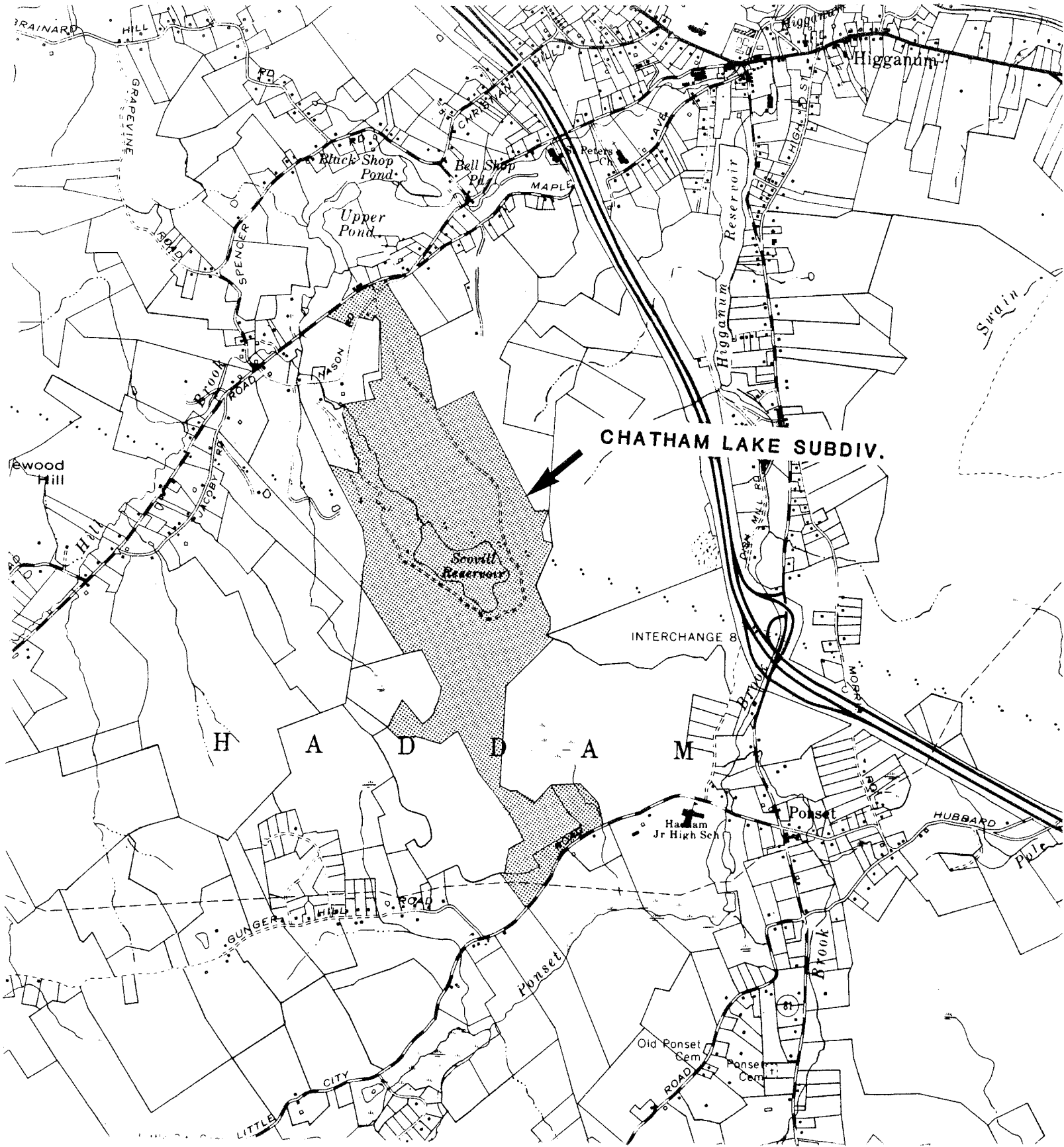
The proposed residential subdivision, about ±350 acres in size, is located in the eastcentral parts of Haddam. The site is bounded by Pytlik Road and Little City Road on the south, Nason Road on the north and private, undeveloped land on the east and west. A Connecticut Light and Power Company high-tension wire right-of-way traverses the central parts of the property in a northwest to southwest direction. The interior road system (Highland Road and Lakeshore Drive) which will also include two cul-de-sacs will access the site via Nason and Pytlik Roads.

The main topographic feature of the site is Scovill Reservoir (a.k.a. Chatham Lake). The outlet stream for the reservoir, which is unnamed, flows in a northerly direction enroute to Candlewood Hill Brook. The reservoir, which was used for industrial water supply purposes by the Scovill Company, is an impoundment. A dam is located at the northern end of the reservoir. Access to the reservoir, which is about 21 acres in size will be available by open space land on the reservoir's eastern and southern shore. In addition, the rear yards of 15 lots will border the high water mark of the reservoir. (**NOTE**: The plan distributed to Team members indicated that open space area 3, which represents Scovill Reservoir, is 54.61 acres. The Team's geologist, using a digitized planimeter, calculated the size of the reservoir to be about 21 acres. The town may want to verify this.)

The site is located in an area which is zoned for 2 acre (80,000 square foot) building lots. Present plans indicate that the applicant wishes to construct 75 residential lots, which range in size from 2 acres to almost 8 acres. The majority of lots are in the 2.5 to 5 acre size. Each lot would be served by an on-site well and subsurface sewage disposal system.

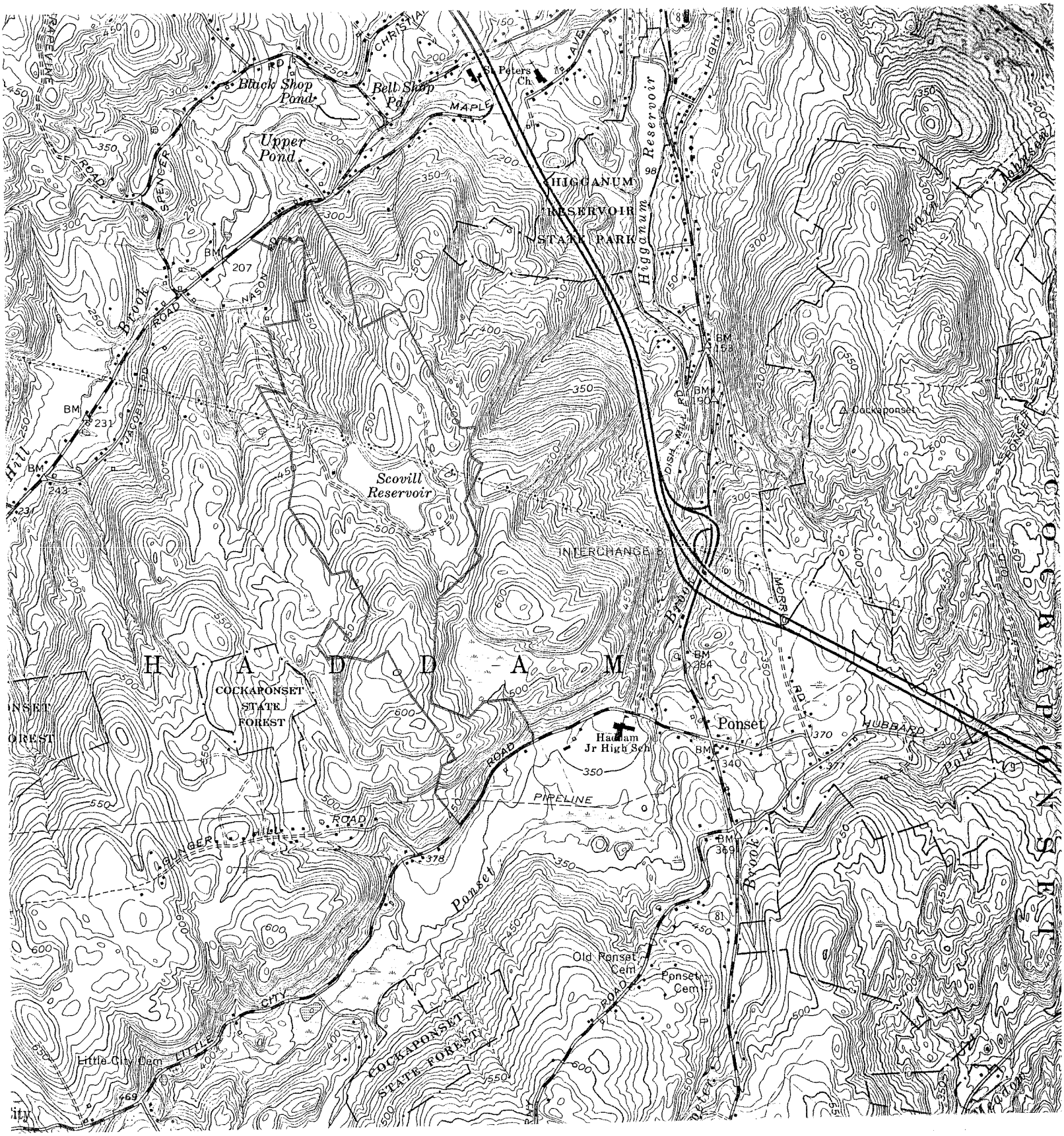
Except for the cleared CL & P right-of-way, the entire parcel is wooded. The wetlands that occur on the site have been delineated in the field by a certified soil scientist. Wetlands are scattered virtually throughout the site. The greatest concentrations of wetland are located in the interior sections of the site east, west, and south of Scovill Reservoir.

LOCATION


CHATHAM LAKE SUBDIV.
Higganum
Higganum Reservoir
Black Shop Pond
Bell Shop Pd
Upper Pond
Scovill Reservoir
INTERCHANGE 8
H A D D A M
Ponset
Haddam Jr High Sch
Old Ponset Cem
Ponset Cem
Ponset Brook
SPENCER ROAD
MAPLE
HIGH ST
JACOBY RD
MASON ROAD
GUNGER HILL ROAD
LITTLE CITY ROAD
HUBBARD
Swain

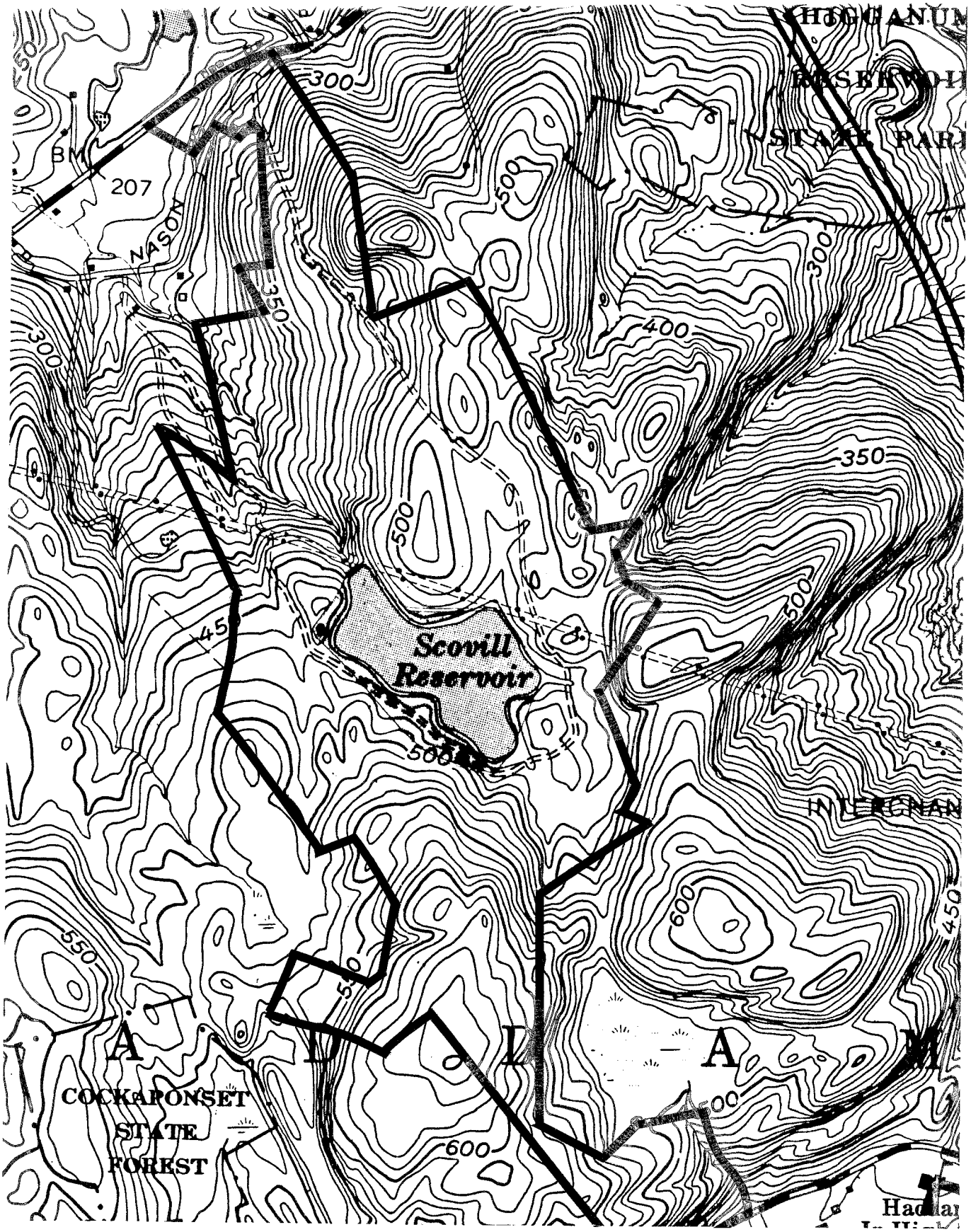
LOCATION

Scale 1" = 2000' ——— **Approximate Site Boundary**



TOPOGRAPHY

Scale 1" = 1000' Approximate Site Boundary



2. GEOLOGY

The entire site lies within the Haddam topographic quadrangle. A surficial geologic map (QR-36, R. R. Flint) and a bedrock geologic map (QR-27, L. Lundgren, Jr.) have been published for the Haddam topographic quadrangle.

Bedrock Geology

Except for a narrow, southwest/northeast trending belt of rocks called the Middletown Formation (middle and lower units) which occurs at the southern limits of the property, the bedrock indulging the remainder of the site is classified as Monson Gneiss. It consists of a gray, medium to coarse grained gneiss whose principal minerals are quartz and feldspar. This rock unit also contains amphibolite layers (an anamphibole-rich rock). The Middletown Formation is identified as an orthoamphibole gneiss, plagioclase gneiss and an amphibolite. Gneisses and amphibolites mentioned in the preceding paragraph consist of complex, crystalline, metamorphic rocks. These rocks, which are from the Orvodician geologic period (505-538 million years old) have been subjected to the heat and pressure of mountain building (metamorphism). "Gneisses" are characterized by light and dark colored minerals arranged in layers with a banded, streaked or speckled appearance.

Based on map QR-27, the site lies within an area of folded (Killingworth Dome) and faulted rock. The site is bounded on the north and south by northeast/southwest trending regional faults. In general, they are aligned with Candlewood Hill Brook valley and Ponset Brook valley. As a result, it may be expected that at least the upper few hundred feet of the bedrock surface in the area is possibly fractured and weathered. These faults formed during the geologic past but are no longer experiencing active movements.

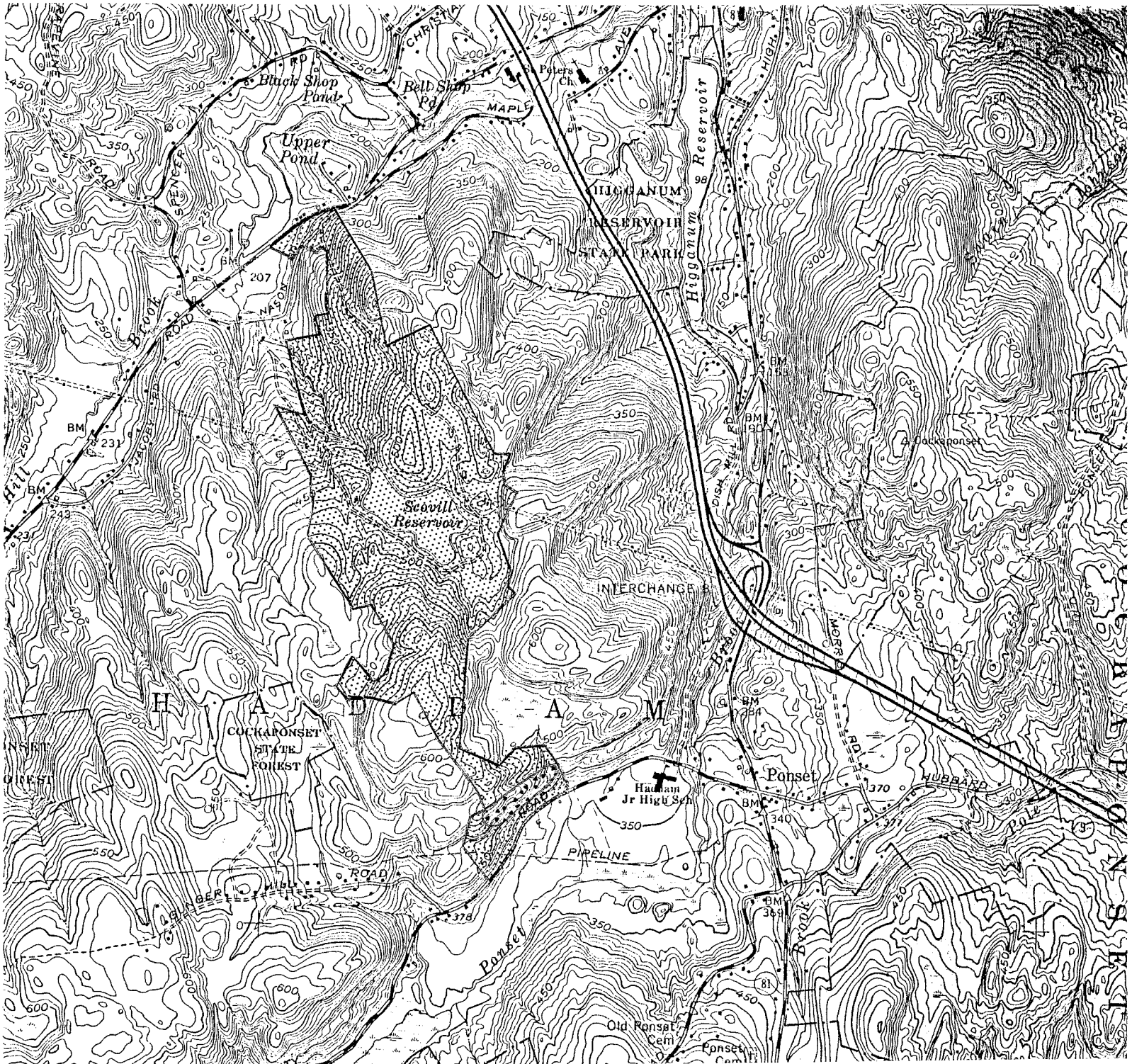
The underlying bedrock serves as the major aquifer for domestic wells in the area and is expected to be the major source of water to individual wells drilled in the proposed subdivision.

BEDROCK GEOLOGY

Scale 1" = 2000'

Monson Gneiss - gray quartzite-plagioclase gneiss with amphibolite layers

Orthoamphibolite Gneiss,plagioclase gneiss,amphibolite



Surficial Geology

Based on surficial geologic and soil mapping data, the unconsolidated materials overlying bedrock on the site consist of glacial till and minor deposits of stratified drift. The till was plastered onto the metamorphic bedrock underlying the site by moving glacial ice. It consists of ground up rock material which may range in size from clay to boulders or any combination of these intermediate sizes. Because the ice moved the particles without regard to their sizes or shapes, till textures are locally quite variable. Two types of till have been identified in Connecticut. One is fairly loose and sandy, while the other is typically silty, crudely layered and compact. Based on review of soil mapping data, it appears that the sandier, looser variety of till covers the greatest percentage of the site. A shallow bedrock zone also characterizes these soils on most of the site. The siltier, compact variety of till is found mainly in the northern parts. A firm or compact soil zone has developed in the till deposit about 1.5 to 3.0 feet below ground surface. The presence of this firm layer may impede the downward movement of water resulting in a seasonally high water table. This would occur mainly during the wet months of the year when the upper, more permeable soil zone becomes saturated. The minor stratified drift deposits occur at the northcentral part mainly in the valley downstream from the Scovill Reservoir dam. Sand and gravel are the major components of stratified drift. Either a sandy, till deposit, or stratified drift deposit was observed during the field review in a borrow pit at the southern end of the reservoir.

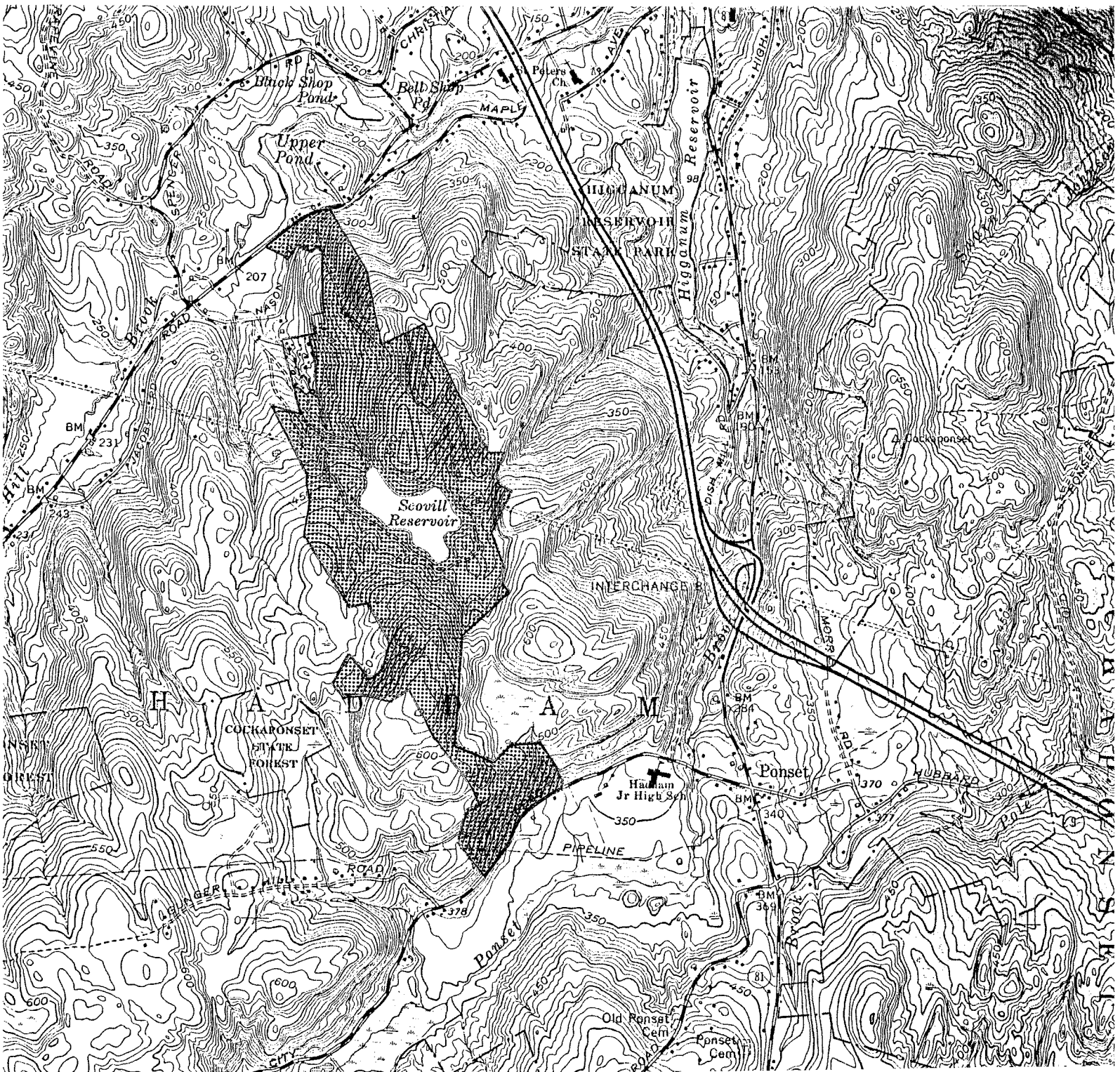
Based on the subdivision plan submitted to Team members, regulated inland-wetland soils have been mapped throughout the site. They were field checked by a certified soil scientist and their boundaries superimposed onto the subdivision plan. The wetland soils generally parallel the perennial and seasonal watercourses throughout the site and are narrow. There are also a few small to medium sized wetland pockets scattered throughout the site. The soils comprising these areas range from poorly to very poorly drained and are found mainly in drainageways and depressional features on the upland till soils, respectively.

Because the seasonally high water tables and frequent flooding (mid-November to mid-April and following major storm events) characterize these areas, they hold very low potential for development purposes.

SURFICIAL GEOLOGY

Scale 1" = 2000'

Stratified Drift
Till
Shallow to bedrock areas



3. SOIL RESOURCES

The attached soil map will indicate the approximate areas of various soils over the 347.8 acre tract of land. The map is a duplicate of map sheet numbers 21 and 27 in the Middlesex County Soil Survey by SCS.

Listed below are soil map symbols found within the subdivision with their interpretive names.

CcC - Canton and Charlton very stony fine sandy loams, 8 to 15% slopes
CrC - Charlton-Hollis very stony fine sandy loams, 3 to 15% slopes
*LG - Leicester, Ridgebury, and Whitman extremely stony fine sandy loams
HpE - Hollis-Charlton extremely stony fine sandy loams, 15 to 40% slopes
HSE - Hollis-Rock Outcrop Complex, 15-40% slopes
PeD - Paxton and Montauk extremely stony fine sandy loams, 15-35% slopes
Rp - Rock Outcrop - Hollis Complex
*Sb - Saco silt loam
WkD - Wethersfield loam, 15-35% slopes
WmC - Wethersfield very stony loam,8-15% slopes
WnC - Wethersfield extremely stony loam, 3-15% slopes

*Designated inland wetland soil.

For detailed map unit descriptions of each of the above soils, please refer to the published Soil Survey Report of Middlesex County, Connecticut.

The landscape at this site is mostly sloping with steep hills and ridges. Areas of rock outcrop are common on steep slope breaks. Two of the soils are designated inland wetland. No prime farmland soils or soils of state farmland significance are found on this site.

The main soil limitations on this site for building development are slope, large stones, and depth to rock. Frost action may be a concern where local roads or streets cross the Wethersfield soils. The Hollis soils overlay unweathered schist bedrock at a depth of approximately 14 inches, making

excavation difficult and requiring very careful design and installation of septic systems.

The tendency in the landscape of this site is for Hollis soils to be found mixed in with Canton soils and Charlton soils which are more suitable for community development. Extra attention should be given to use of deep test pits for on-site investigation on each lot to determine the soil suitability for homesites without contamination of groundwater or surface water with septic effluent or sediment.

For detailed soil interpretations, please refer to the published Soil Survey and the attached document entitled "Soil Potential Ratings - Septic Tank Absorption Fields for Single Family . Residences". (Available under separate cover)

Many of the lots include wetland acreage in the front yard and driveway crossing. The protection of these wetland areas is desirable and should be detailed in the deed so that prospective buyers can plan accordingly.

Site Plans submitted to this office for the Chatham Lake development indicate a subdivision of 75 lots. Based on the soil limitations for homesites and roads, fewer lots would be recommended. Lots containing significant acreage of wetland, and those located on map units including the shallow Hollis soils might be deleted or revised. High seedling mortality on these soils could cause difficulties replacing trees removed for/or damaged by construction. The Wethersfield soils may have slow percolation rates, causing problems for septic tank absorption fields.

Alternate land uses for the site would focus on retaining the existing woodland with a minimum of development for recreation. The reservoir provides an open body of water in an undisturbed setting of great aesthetic value. A combination of some homesites and some woodland is preferable.

Erosion and Sediment Control Plans for this site should follow "CT Guidelines for Soil and Erosion Sediment Control". The storm drains currently shown discharging directly into the lake may damage water quality unless filter strips or sediment catchbasins are added. The design does not indicate a parking area for public access to open space trails. This may result in roadside parking or overuse of driveways and old logging roads. Trailheads would ease this dilemma and provide organized parking areas for approved users.

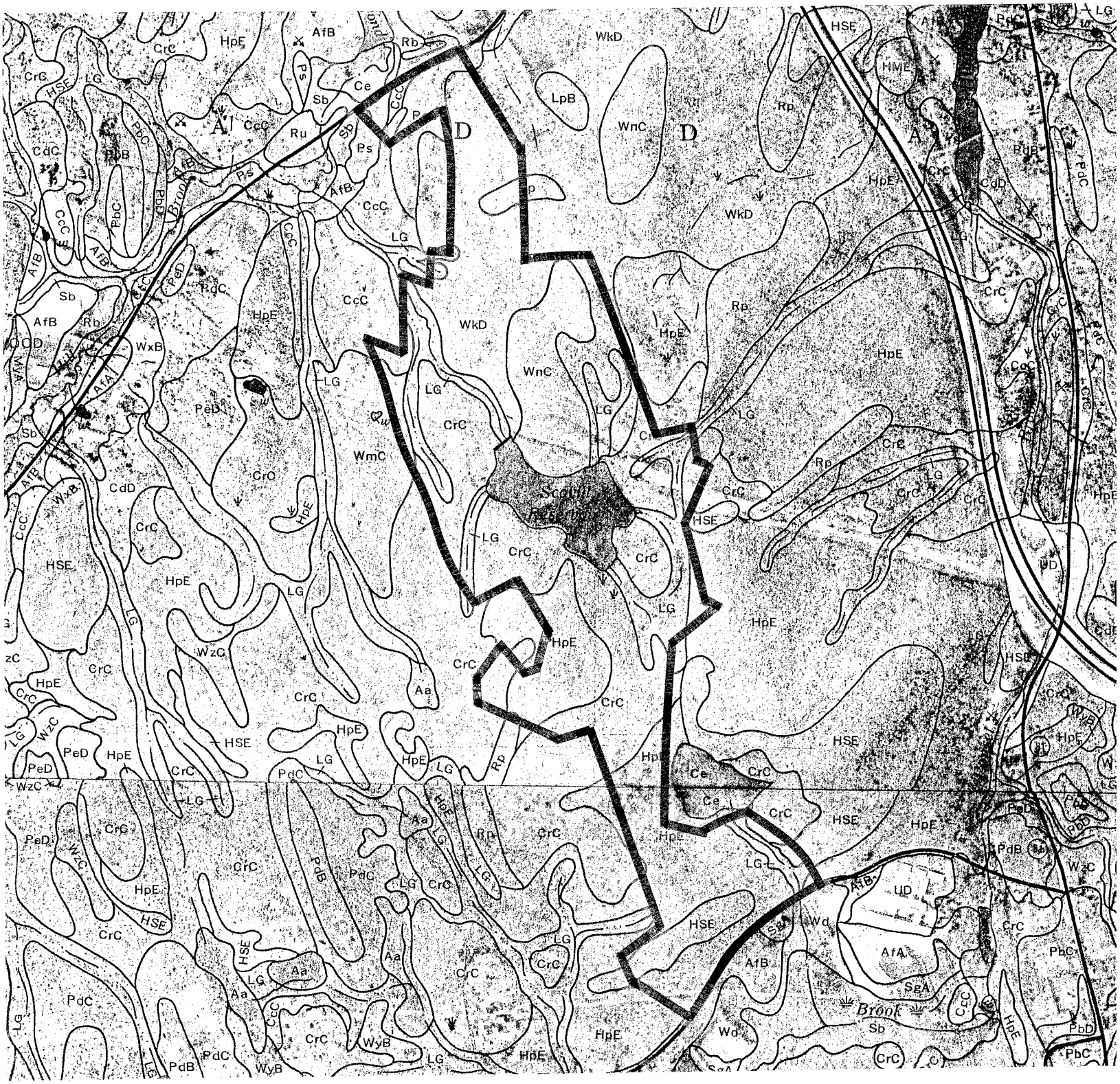
During the site visit, access road and some clearing was already ongoing with no visible Erosion and Sediment Control practices in place. Some fill had

been placed as well. A detailed E & S Plan should be developed and implemented immediately to protect the site from soil erosion, and to maintain water quality.

SOILS

Middlesex County USDA-SCS
Middlesex County Agricultural Center
Haddam, CT 06438
345-3219

SCALE 1" 1320'



4. HYDROLOGY

The ±350 acre site drains either to Candlewood Hill Brook or Ponset Brook. Surface runoff in the southern parts flows either directly towards Little City Road, ultimately emptying into Ponset Brook or it flows into an off-site wetland area. This wetland is east of the site. The outlet stream (unnamed) for the wetland, which parallels a section of the site's property line at the southwest corner, flows southerly to Ponset Brook.

Surface runoff in the northern and central parts of the site flow to discharge points such as Scovill Reservoir, its outlet stream, or the unnamed, intermittent and perennial streams on and off-site. The water is then routed to Candlewood Hill Brook. Surface runoff arising in the far eastern limits of the site drains to intermittent streamcourses that route the water to Higganum Reservoir.

The drainage area for Scovill Reservoir at the intersection of the dam and its outlet stream is about .245 square miles or 158 acres. Nearly 132 acres or 84% of the drainage area is encompassed by the site. Therefore, the future of the reservoir's environmental health and water quality will depend largely on how carefully the site is developed.

Scovill Reservoir and the streamcourses on the site are classified as 'A' by DEP. A class 'A' surface water body means that the surface waters may be suitable for drinking water supply and that compatible discharges to the waters are restricted to treated backwash/ drinking water treatment facilities and minor cooling in clean water.

Converting the wooded land on the site to a residential subdivision at proposed densities would be expected to increase the amount of runoff shed from the site. Increased runoff would result from soil compaction, removal of vegetation and placement of impervious surfaces (roof tops, roads, driveways, etc.) over otherwise pervious soil. Keeping disturbed areas to a minimum will help to reduce the potential for adverse impacts especially erosion and siltation problems.

Based on present plans, the applicant proposes to artificially collect storm drainage arising from roads, driveways and rooftops in catch basins. The water will then be routed into detention basins and Scovill Reservoir. In order to comply with town regulations, the developer is proposing to maintain postdevelopment flows at pre-development flows for the 50-year storm frequency. It is recommended that Connecticut's Guidelines for Erosion and

Sediment Control be closely followed with regard to stormwater management on the site. The management plan and calculations should be carefully reviewed by the Town's engineer and other appropriate town officials.

The impacts of post-development runoff in the study area should be clearly understood in terms of flooding and streambank erosion. Of particular concern will be the examination of all downstream culverts, especially those at Nason Road and Pytlik Road/ Little City Road. Additionally, every effort should be made to protect the streamcourses on and off the site as well as Scovill Reservoir. In order to protect the reservoir, temporary and/ or permanent sediment basin(s) will be required during the construction phases, especially in view of the moderate slopes and silty soil. It may be possible to have the proposed detention basin serve a dual function, and to include sediment retention functions. In either case, the basins will need to be maintained on a regular basis. Therefore, an access road for maintenance vehicles should be shown on the plan and a decision made as to who will maintain them. Catch basins and roads in the subdivision will also need to be maintained regularly in order to protect watercourses in the area and Scovill Reservoir.

A nearby resident expressed concern with respect to the detention basin proposed west of Lot #1. The amount of land to be developed within the drainage area would be about 17 acres and would include Lots 2-5 and Frontage Road. The culvert passing under Nason Road should be analyzed to insure that it can handle peak flows following major storm events (such as the 50-year or 100-year storms) and that the property to the north would not be flooded.

The soils (Paxton soils) in the area of this detention basin appear to be characterized by hardpan soils. Deep cuts in hardpan are extremely difficult to stabilize due to seepage of water over the hardpan layer. This water creates an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to flow down the slope. Once this begins, the slope is very difficult to stabilize. The establishment of a good vegetative cover is practically impossible on the eroding slope. These conditions will hold true for all types of cuts in hardpan soils on the site and therefore need to be addressed very carefully.

The proposed detention basin will be excavated in close proximity to an existing house west of the detention. Since the well for this house is at the rear, it seems likely that its septic system is in the front yard. In view of the hardpan

soils that exist in the area, every effort should be made to insure that the septic system serving the house is at least 75 feet from the proposed 'cut' area for the detention basin. This will hopefully prevent untreated septic effluent from reaching the basin. Since the hardpan coils are characterized by seasonally high water tables, the applicant's engineer should make sure that detention capability of basin is not diminished during the wet time of the year (springtime), when the water level may be higher and remain for longer periods of time.

WATERSHED BOUNDARY

Scale 1" = 2000'

Watershed Boundary for Scovill Reservoir

Point of Outflow

Portion of site that drains to Candlewood Hill Brook

Portion of site that drains to Higganum Reservoir

Portion of site that drains to Ponset Brook

5. SEWAGE DISPOSAL

A review of soil mapping data and the deep test hole information supplied to Team members identified the major limiting factors for septic system installation constructed on the site to include the following: shallow to bedrock, slope, and seasonally high water tables. The latter is a result of a compact soil zone (hardpan layer) about 1.5 to 3.0 feet below ground surface that impedes the downward movement of groundwater. During the wet time of year, a seasonally high ground water table typically occurs in these areas.

The fact that most soils have moderate to severe limitations for septic systems does not necessarily preclude their use for this purpose. Physical limitations, such as those mentioned above, do indicate, however, that the use of the soil is limited by certain conditions or restrictions which require extensive and costly measures to overcome.

A shallow to bedrock condition is present on nearly half of the proposed building lots. According to State Health Code criteria an area with less than five feet is construed to be an "area of special concern" and requires special design, i.e., engineered plan. In recognition of this, the town sanitarian has required that the developer place sufficient, well-drained fill on those lots characterized by shallow bedrock conditions to meet health department criteria. It should be pointed out that, if there is less than four feet of soil above bedrock, the lot is considered unsuitable for on-site sewage disposal at that time.

The placement of the fill material allows for the raising of the leaching field above the original ground level to achieve a four foot vertical distance from the bottom of the leaching field to the bedrock surface. The fill is placed, compacted and tested before the final sewage disposal plan is approved and a building permit issued. This puts the "burden of proof" for making the site improvements entirely on the applicant, and tends to discourage the installation of sewage disposal systems in areas with less than 4 feet of naturally occurring soil over ledgerock.

The construction of on-site sewage disposal systems in shallow to bedrock areas should proceed only with great caution. A sufficient number of test holes should be excavated in those areas so that a good profile of the bedrock surface can be accurately determined. Experience has shown that these areas are generally very troublesome, particularly where a number of

building lots are involved, each to be served by an on-site sewage system and water supply well. Well pollution frequently occurs in such areas.

The other major limitation with respect to sewage disposal on the site is the presence of a shallow compact soil layer and the existence of a seasonally "perched ground water condition." The main concern relative to this soil condition is the ability of the naturally occurring soils to adequately absorb or disperse the expected volume of sewage effluent without overflow, breakout or detrimental effects on ground or surface waters.

In general, proper fill material and/ or intercepting curtain drains are used relative to construction of systems under these conditions. "Hardpan" soils usually allow for the installation of curtain drains as long as there is sufficient slope to outlet the pipe to daylight. A properly designed and constructed curtain drain installed in accordance with all applicable codes can effectively lower the groundwater so it does not interfere with the proper functioning of the septic system. Ideally, curtain drains should be outletted to the storm drainage system when possible. If this is not possible, it should outlet at a point where it does not create water problems, i.e., near septic systems, near neighboring properties, etc. If curtain drains appear to be useful on certain lots, they should be installed first and monitored through the wet season to determine whether or not they effectively lower groundwater level in the vicinity of the leaching field.

A curtain drain may be used in conjunction with building foot drains. Because of the potential for high groundwater levels on the site, footing drains should probably be required for all homes constructed in the subdivision. This will hopefully keep basements from getting wet during the wet time of year.
Before subdivision approval, the applicant's engineering firm must show that each of the proposed lots in the subdivision meets the minimum soil standards set forth in Section 19-13- B103e(a) (3) of the Public Health Code and be able to hydraulically disperse the expected discharge from the home's sewage disposal system into the site's natural soil layers per Section 19-13-B103e(a)(4) of the Code.

The process should be a coordinated effort between the design engineer and the town sanitarian. Because most of the lots will be deemed an area of "special concern" by the State Public Health Code, plans for the design of the subsurface sewage disposal facilities (along with the placement of each on-site well water supply) must be prepared by a professional engineer and submitted to the Health Department for review and approval by their certified staff.

The final configuration of lots should not be approved until the Health Department is assured of the feasibility of each lot meeting all of the State Health Code Requirements. Every effort should be made to protect Scovill Reservoir from sewage effluent. Therefore, it is suggested that septic systems serving the 15 lots which immediately surround the reservoir be set back as far as possible, but not less than 100 feet from the high water mark of Scovill Reservoir.

6. WATER SUPPLY

Each lot in the proposed subdivision would be served by an individual on-site well. It appears that wells will need to tap the underlying bedrock aquifer. Wells drilled in bedrock generally supply small but reliable yields of groundwater. However, since the yield of a given well depends upon the number and size of water-bearing fractures that it intersects and since the distribution of fractures in bedrock is irregular, there is no practical way, outside of drilling the well, to predict the yield of a well drilled in a specific location. Because fractures in the rock generally occur within the first 100 to 150 feet below the surface, it has been shown that the probability of increasing the yield of a well decreases with depth below this level. A survey of bedrock wells yields in the Candlewood Hill Brook and Ponset Brook valley was conducted by staff at the DEP's Natural Resource Center. The purpose of this survey was to determine the degree of fracturing of the underlying bedrock in the valleys. In general, the yields of bedrock well were reported to range from 2 to 20 gallons per minute.

Ideally, each well should be located on a relatively high portion of a lot, properly separated from the sewage disposal system and any other potential pollutant (e.g., stormwater drainage systems, etc.) and in a direction opposite the expected direction of groundwater movement. They should all be cased with steel pipe into the underlying bedrock. In order to provide adequate protection of the bedrock aquifer, all wells will need to be properly installed in accordance with applicable State Public Health Code and Connecticut Well Drilling Board regulations. In addition, the town sanitarian will need to inspect and approve all well locations.

In the lower Connecticut River basin, 314 wells tapping crystalline metamporphic bedrock (i.e., gneisses, schists, etc.) were surveyed for Connecticut Water Resources Bulletin No. 31. Of these, 90 percent yielded just under 2 gallons per minute or more, 50 percent yielded about 6 gallons per minute or more and 10 percent yielded about 17 gallons per minute or more. A well yield of 3 gallons per minute is generally satisfactory for most domestic uses.

The Team's geologist estimated a water budget for the project using some basic assumptions. It was calculated that annual ground water usage for the site would not exceed annual ground water demand. (This water

budget assumes, of course, that the underlying bedrock is fractured and is capable of transmitting water to the wells). As indicated earlier, this cannot be predicted without drilling the well first.

Present lot layout permits the spacing of domestic wells by 200 feet or more. This will help to minimize the chances for mutual interference, since at least one acre of direct recharge would be available to each well.

The natural quality of groundwater should be satisfactory. However, if iron or elevated iron and/ or manganese levels are present in the water, it may be necessary to provide suitable treatment filters.

According to the Water Quality Classification Map of Connecticut (Murphy, 1987), groundwater in the area of the site is classified as GA, which means that it is suitable for drinking water supplies without need for treatment.

7. BEDROCK AND BLASTING

As mentioned earlier, bedrock is at or near ground surface at many points throughout the site. This suggests the need for possible blasting, particularly with respect to the placement of utility lines, roads/driveways and house foundations.

Any blasting that takes place on the site should be done only under the strict supervision of persons familiar with the latest blasting techniques. Only then will the environmental effects of blasting be kept to a minimum. For the most part, these concerns include flyrock, ground virations, airblast and dust and gases. Of special concern with respect to the above is the moderate density of residential homes east of the site. It is strongly suggested that the blaster be required to conduct a pre-blast survey in the area. A thorough blasting record should accompany the survey. There are several methods that can be employed which will help reduce the potential environmental effects mentioned. These include: (1) blasting to an open face; (2) multiple small-charge blasting and (3) use of millisecond delay between detonations. This will, of course, depend on the blasting requirements of the site.

8. WETLANDS

Based on site plans distributed to Team members, it appears that the applicant has made a reasonable effort to minimize the potential impacts to wetland disturbances with respect to the road layout. Approximately 165 feet of road will need to cross regulated wetland soils on the site. In addition, there are several areas on the site where roadway or driveway grading will extend into wetlands.

Although undesirable, wetland road crossings are feasible provided they are properly engineered. These roads need to be constructed adequately above the surface elevation of the wetland. This will permit better drainage of the road and also decrease the frost heaving potential. Roadbed preparation needs to include removal of all organic material before the fill material is placed. In cut areas, underdrains should be installed on either side of the road. Road construction through wetlands should preferably be done during the dry time of the year and should include provisions for effective erosion and sediment control. Culverts should be properly sized and located so as not to alter the water levels in the wetland or cause flooding problems.

The applicant's engineer should quantify the amount of fill to be placed over regulated soils and delineate the fill lines on the subdivision plan. This will also greatly help local decision makers during their review of the plan.

It seems that the flood control attributes and sediment retention capabilities of the wetlands are good. The best areas are those which have gradients that are flat and relatively wide. The drainageways, which have steep gradients, serve as conduits for surface runoff to adjacent, larger streamcourses or wetland areas.

All areas identified as wetland soils are considered "regulated areas" under Chapter 440 of the Connecticut General Statutes. This boundary has also been shown on the subdivision plan. Any proposed activity such as grading, filling or modifications that impact regulated areas are subject to approval by the Haddam Inland-Wetland Commission. In reviewing a proposal, the Commission needs to determine the impact that the proposed activity will have on the wetland. If the Commission feels that the regulated areas are serving an important hydrologic or ecologic function and that the impact of the proposed activity will be severe, they may deny the activity altogether, or at least require measures that would minimize the impact.

9. LAKE MANAGEMENT

Scovill Reservoir (Chatham Lake) is a 21 acre impoundment which drains into Candlewood Hill Brook. It is reported to have been created to service the manufacturing needs of the downstream industries. Recreational activity has been unorganized to date and therefore DEP Water Compliance has collected no biological or chemical data from this lake. However, the watershed to lake surface area ratio is 7.5 to 1 (158 acre watershed, 21 acre lake surface area). This indicates a small drainage area relative to the size of the waterbody, thus a limited potential for fertilization of the lake from water draining through the watershed. The water quality of the lake has been further protected by the surrounding forest which retains plant nutrients such as phosphorous and nitrogen and prevents plant productivity (eutrophication) within the lake. With these two favorable conditions one can assume that present water quality of Scovill Reservoir is excellent.

The proposed Chatham Lake subdivision composes approximately 90% of the Scovill reservoir drainage basin. A development that changes land use from wooded to residential is considered unfavorable when water quality is an issue. Septic systems, fertilizers, and other nutrient sources from residential areas increase phosphorous loading in receiving waterbodies which augments plant productivity (eutrophication). Additionally, runoff from stormwater sewers carries sand, silt, salt, and oil into a body of water resulting in the polluting of many ponds. However, with 90% of the watershed within the subdivision the extent of degradation can be controlled by proper planning and maintenance of the subdivision.

Stormwater runoff from impervious surfaces is a major source of pollution to lakes. Haddam residents will have access to the lake through the open space agreement, and the town will be responsible for maintenance of the stormwater structures. Therefore potential degradation of the lake from stormwater and maintenance needs of the drainage system should be reviewed as part of subdivision approval process. Careful design, and proper maintenance of stormwater drainage structures and adjacent roads is the key to minimizing impacts from stormwater runoff.

The plans provided to the Review team appear to lack detailed information pertaining to stormwater structures and maintenance A stormwater drainage system should be developed with consideration of physical suitability, peak discharges, and targeted pollutants to be removed. Physical restrictions include topography, water table depth, depth to bedrock, proximity to foundations, space consumption, land use, sediment input, and thermal impacts. Peak discharge is calculated by the amount of precipitation during a storm with a statistical occurrence interval of a given number of years. This is than calculated for the area which will receive the precipitation and structures should be designed accordingly. Pollutant removal should be based on the waterbody which is receiving the stormwater. Pollutants that impair lake water quality include phosphorous, nitrogen, trash, debris, and sediments.

The type of treatment selected for the Chatham Lake development is detention ponds. This type of system is adequate for the the removal of sediments but is less efficient in removing dissolved pollutants such as phosphorous and nitrogen during peak flow periods. The effectiveness can be improved by filtering the water through a vegetative area such as a wetland near the entrance of the pond. Maintenance of a detention pond can be high to moderate. Maintenance may include mowing banks, removing brush, sediment removal, and structural inspections.

Other methods of treating stormwater include wet ponds, infiltration trenches, infiltration basins, porous pavement, grass swales, and wetlands. Each system is referred to as a best management practice or BMP when it is designed and maintained correctly. Other BMPs included, various types of catch basins. If a catch basin is properly placed and maintained it will enhance the effectiveness of the previously described treatment systems. Catch basins can have sumps which allow solids to settle and skimming mechanism to remove road oil. The plans for this proposal have two types of catch basins, it is unclear which type will be installed for water discharging into the lake. The minimum catch basin BMP that directs water to the lake should be of the sump type.

Once the water leaves the treatment system a non-erosive drainage system should be used. This may be a riprap channel, underground pipe, or grass swale. There appears to be no mention of this in the plans.

The developer should put the storm water management plan in report form so that commission members can clearly review the conclusions. If commission members feel they do not have the expertise to evaluate the

stormwater management plan, professional guidance should be sought from the town engineer, county Soil Conservation District, or a consulting engineer with experience in this area. The cost of this service will be justified if it will prevent a costly lake restoration program.

Public Act 83-388 designates authority to municipalities to enforce soil erosion control regulations through inland wetland commissions. Strict continuous enforcement of these regulations by the towns during construction of the subdivision is essential to protecting Scovill Reservoir.

Soil erosion from poorly managed construction activities have filled in sections of many lakes. Although construction is short in duration, disturbed and exposed soils are highly susceptible to erosion. These filled areas become suitable habitat for aquatic weeds by increasing shallow areas and providing a nutrient rich substrate.

Turbidity levels will increase if particulate size is sufficiently small. Small particles or colloids do not settle as quickly as larger particles such as sand. These fine particulates will remain suspended in the water column resulting in higher than background turbidity headings. This may be detrimental to aquatic organism such as fish and zooplankton.

The inland wetland commission should be aware that lots abutting the lake or its tributaries, and lots with slopes greater than 15% may require additional soil protection. In order to assure that critical areas are protected, the wetland commissions could request the developer to produce a map which would depict lots with these characteristics. This will serve to inform both the wetlands commissions and the developer of the location of these erosion prone areas.

At the time of the the field inspection there were a number of potential erosion problems already occurring. Bottom vegetation has been disturbed, roads have been cut, and sand trucked in for septic systems was eroding into the lake. If this is an indication of how this development is going to be managed than town should scrutinize this development closely for soil erosion problems.

The restrictive agreement presented by the developer lacks details which should be addressed by the town for clearness and water quality protection. The individuals serving on the Chatham Lake Association's Architectural and Site Review Committee will be appointed by the developer. There is no mention of the criteria needed for appointment to this committee. This should be clearly addressed in this document. The town may also want a member of the

wetlands commission serving on this committee. Consideration should be given to developing a sub-committee who's specific responsibilities are to manage the lake. This sub-committee could seek the assistance of the Department of Environmental Protection, Water Compliance Unit, Lake Management Section for technical assistance (566-2588).

Particular segments of the contract which could be changed or added to the agreement which would further protect the quality of the lake are as follows:

Natural color houses such as shades of brown, blue, and green should be considered. This will give Scovill Reservoir the appearance of being undeveloped.

Septic systems should be pumped once every two years.

Cleared land usually adds more phosphorous to a waterbody than land covered by natural vegetation. Therefore a restriction controlling the percentage a lot can be cleared would be beneficial to the water quality of the lake.

Waste disposal procedures should be outlined so that lawn or garden debris is is not discarded near the lake or its tributaries.

The concept of the setbacks should be expanded to include buffer zones around the lake and its tributaries. A recommended buffer zone of 50 feet would prevent soil and phosphorous from reaching the lake. Within this buffer zone no vegetation or leaf letter should be disturbed. Setbacks should be increased to 150 feet from the lake and its tributaries.

If the buffer zone recommendation is considered to restrictive than a viewing corridor of 25 - 50 feet wide could be allowed. Although this would not be as effective as a complete buffer strip it would allow property owners access to the lake.

The restriction of fertilized lawns within 100 feet of the lake should be expanded to include the total Chatham Lake Subdivision. If

fertilization of lawns is permitted soil analysis of each lawn should be conducted to determine the ratio of phosphorous to nitrogen to potassium needed given the intended use.

The committee should promote the use of porous materials for the construction of driveways. This will reduce the amount of impervious surface within the watershed which is advantages for water quality. Consideration should also be given to a restriction of driveway size which would help accomplish the same objective.

Any proposal to alter the shoreline or the lake bottom should be brought before the town inland wetlands commission. These activities may be regulated by the commission and residents should be aware of this.

Restrictive agreements can be a valuable tool to manage development in lake watersheds. A fine example of this is Woodridge Lake in Goshen Connecticut. With restriction similar to the ones outlined property owners have enjoyed increased property values due to the proper management of the lakes watershed.

Haddam residents will have access to some open space areas of the subdivision and Chatham Lake subdivision owners will have access to all the open space including the use of the lake. According to the subdivision plans the lake comprises 54 acres of this open space. DEP map digitizing equipment and dot grid calculation indicate a lake surface area of approximately 21 acres. The areas provided for access to the lake appear to be of marginal quality. One open space area with access to the lake is the dam area. This site is steep and has the potential to be dangerous if activity is high. The other area slated for open space with access to the lake is lot 8. This lot is located in the right of way of CL&P and has a wetland in the middle southern section. These conditions may restrict access to the lake. It is recommended that the town have a clear understanding of the lake access and open space before the approval process is complete.

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A Watershed Management Guide for CT Lakes

W.A. Norvell, C.R. Frink 1975
Water Chemistry and Fertility of
Twenty-Three Connecticut Lakes
Connecticut Agriculture Experiment Station
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Controlling Urban Runoff
A practical Manual For Planning and Designing of BMPs
Dept. of Environmental Programs
Metropolitan Council of Governments

10. NATURAL DIVERSITY DATA BASE

The Data Base maps and files have been reviewed for the area of the Chatham Lake Subdivision. According to this information there are no Federal Endangered and Threatened Species or Connecticut "Species of Special Concern" that occur at or adjacent to the area in question.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resource Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new informtion is incorporated into the Data Base as it becomes available.

11. VEGETATION

The Chatham Lake Subdivision Tract which totals nearly 350 acres may be divided into four distinct vegetation types (please see the vegetation type map). These vegetation types include two mixed hardwood stands which total approximately 270 acres, several hardwood and shrub swamps which total approximately 37 acres and a utility right-of-way which totals about 20 acres and is made up of old field vegetation.

Many large healthy trees and flowering shrubs are present throughout this tract. Not only do these trees and shrubs have high aesthetic value, but they also provide a positive and protective influence on water quality, soil stability and air quality.

The loss of trees to windthrow may be intensified if linear clearings are made in or alongside wetland and streambelt areas. Impact on vegetation resulting from road crossing of the wetlands should be minimal, providing culverts are properly sized and placed.

Improvement thinnings throughout the forested portion of this tract would reduce crowding and result in healthier more stable trees over time.

Trees which are removed for development purposes should be utilized as fuelwood and where feasible sawlogs.

Vegetation Type Description

Type 1: Mixed Hardwoods. This area which totals approximately 270 acres is made up of a large variety of tree species in all size classes which are becoming crowded. Included are sugar maple, red maple, tulip tree, yellow birch, black birch, red oak, and white ash in the valleys where moist deep soils are present and black oak, white oak, American beech, hickory, black birch and red maple where soils are somewhat shallower but not excessively well drained. The understory throughout this area is dominated by hardwood tree seedlings, witch hazel, high bush blueberry, flowering dogwood, maple leaved viburnum, blue beech, azalea and scattered mountain laurel. Ground cover and herbaceous vegetation consists of Pennsylvania sedge, aster, poison ivy, evergreen wood fern, Christmas fern, hayscented fern and club mosses.

Type 2: Hardwood Swamp/Shrub Swamp/Stream Belts. Approximately 37 acres of this tract is designated as wetland. The hardwood swamp and stream belt areas are made up predominantly of red maple with scattered black gum, white ash and yellow birch.Occasional tulip tree are present where the wetland meets other vegetation types. The condition of the trees in terms of health and vigor vary greatly throughout these areas. Understory vegetation consists of sweet pepperbush, highbush blueberry, spice bush, witch hazel, swamp azalea, swamp rose, poison sumac and mountain laurel. Herbaceous ground cover and vines include tussock sedge, sphagnum moss, skunk cabbage, sensitive fern, cinnamon fern, Christmas fern, evergreen wood fern, poison ivy, green briar, grape vine and club moss.

The shrub swamps which are located along the utility right-of-way are dominated by highbush blueberry, sweet pepperbush, deciduous holly, witch hazel, pussy willow, swamp rose, swamp azalea, steeple bush and meadowsweet. The herbaceous vegetation which is present includes several sedges, cattail, sensitive fern, cinnamon fern, skunk cabbage and sphagnum moss.

Type 3: Mixed Hardwoods. Crowded pole size chestnut oak, white oak, scarlet oak, black oak, hickory, American beech and red maple are present on the droughty shallow soiled knolls which comprise approximately 100 acres of this tract. Understory vegetation consists of maple leaved viburnum, witch hazel, mountain laurel, lowbush blueberry, huckleberry and hardwood tree seedlings. Greenbriar, Pennsylvania sedge, bracken fern and club moss dominate the ground cover throughout this area.

Type 4: Utility Right-of-way/Old Field Vegetation. Approximately 20 acres of this tract is utility right-of-way where tall tree species have been controlled or eliminated in the past. Plant species which are present include white pine, eastern red cedar, gray birch, flowering dogwood, shad bush, mountain laurel, highbush blueberry, maleberry, staghorn sumac, witch hazel, sweet fern, green briar, steeple bush, raspberry, poison ivy, grasses, and assorted wildflowers.

Aesthetic Considerations

At this time a majority of the forest covering this tract is made up of trees which have the potential to have high aesthetic and shade value.

Healthy, high quality trees should be selected for retention and worked into the final site plans for individual houselots.

It should be noted that trees are very sensitive to the condition of the soil within the entire area under their crowns. Development practices near trees such as excavation, filling and grading for construction of roadways and buildings may disturb the balance between soil aeration, soil moisture level and soil composition. These disturbances may cause a decline in tree health and vigor, potentially resulting in tree mortality within three to five years. Mechanical injury to trees may cause the same results. Dead trees reduce the aesthetic quality of an area and may become hazardous and expensive to remove if near roadways, buildings or utility lines.

Care should be taken during the construction period not to disturb the trees that are to be retained. In general, healthy and high vigor trees should be favored for protection over unhealthy trees because they are usually more resistant to the environmental stresses brought about by construction.

Where feasible, trees should be retained in small groups or "islands". This practice lowers the possibility of soil disturbance and mechanical injury. Individual trees and "islands" of trees should be temporarily, but clearly marked so they may be avoided during construction.

Several species of flowering trees and shrubs, including flowering dogwood and mountain laurel are present throughout this tract. These flowering species should be retained where feasible for their aesthetic value. The flowering of these species can be stimulated by allowing increased direct sunlight to reach them. This can be accomplished by removing the trees in the overstory which are blocking the sunlight.

Limiting Conditions and Potential Hazards

Windthrow is a potential hazard throughout the hardwood swamp areas and also along the streams which pass through this property. Tree root depth is restricted by saturated soils in these areas. Under these conditions trees are unable to become securely anchored and are susceptible to windthrow. Trees

which are crowded and rely on each other for stability have an even greater potential for windthrow problems and top breakage. These conditions may be intensified if linear openings, which allow wind to pass through rather than over these areas, are made. Openings and clearings in and along side these wetland areas should be avoided if at all possible. Undisturbed buffer zones of at least 25 feet deep around the wetlands should help to reduce the windthrow potential.

Alterations in wetland areas which permanently raise the water table such as restricting natural drainage and stream flows, may eventually have a negative impact on the vegetation in these areas. Raising the water table may drown roots causing widespread mortality in the trees, shrubs and herbaceous vegetation which are now present. The impact on vegetation created by construction of the proposed road crossings of the wetlands area will be minimal providing that the culverts that are utilized are adequately sized and properly placed.

Management Considerations

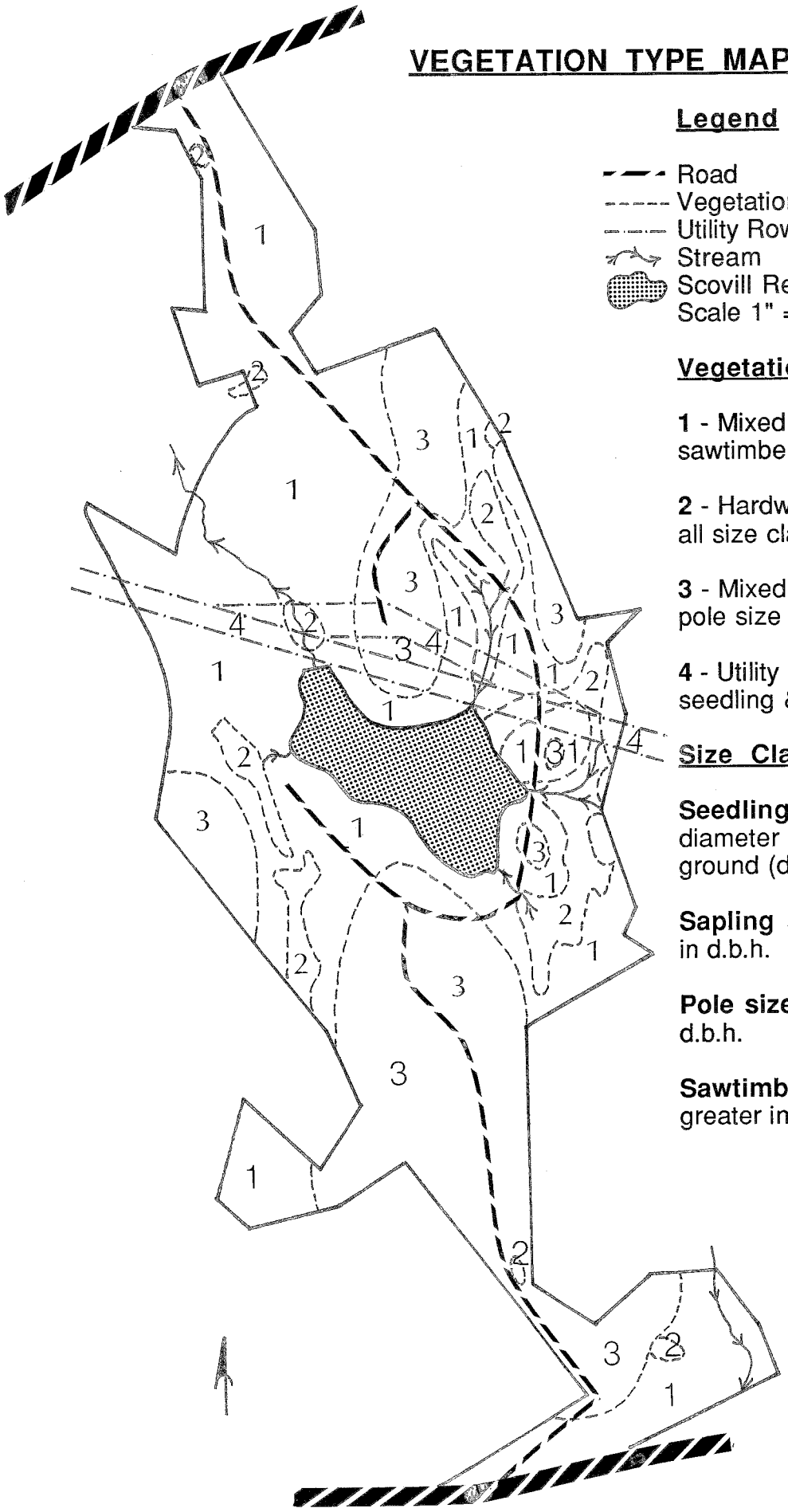
Trees which are unhealthy and not growing vigorously due to crowded conditions are most susceptible to further degradation from environmental stresses brought about by development, disease, insect infestation and adverse weather conditions. Improvement thinnings, such as those which are presently taking place throughout the tract, which remove undesirable trees and reduce competition for space, sunlight, nutrients and water between the high quality residual trees will, over time, allow trees to improve in health, vigor and stability. These thinnings when implemented properly can improve the aesthetic value of an area and provide wood products.

The trees which are present in vegetation Stands 1 & 3 are declining in health and vigor as a result of their crowded conditions. Under these circumstances the trees are under stress and major disturbances in their environment such as changes in soil conditions and mechanical injury caused by construction in these areas, may rapidly lower their health. Fuelwood thinnings in these stands, following the "crop tree selection method" would help to reduce the crowded condition and improve tree health and vigor. Following the "crop tree selection", 100 of the highest quality trees in each acre should be identified (trees spaced about 20' x 20' will equal 100 trees per acre), and one,

two, or three trees that are in direct competition with each of those identified should be removed. The 100 trees per acre that are selected as crop trees should be healthy, large crowned, and show little or no signs of damage. Trees which are not competing with the 100 selected trees should not be removed, unless they are severely damaged. These thinnings, if implemented, will provide between 4 and 5 cords of fuelwood per acre.

As a significant portion of this tract is going to be cleared for development of roadways, utilities, driveways, houses and septic systems, trees which are going to be removed should be utilized as fuelwood and where feasible sawlogs.

VEGETATION TYPE MAP



Legend

Road
Vegetation Type Boundary
Utility Row
Stream
Scovill Reservoir
Scale 1" = 1000'

Vegetation Types

1 - Mixed hardwoods, 170 acres sawtimber size class

2 - Hardwood swamp, 37 acres all size classes

3 - Mixed hardwoods, 100 acres pole size class

4 - Utility row, 20 acres seedling & sapling size class

Size Class Explanations

Seedling size - trees <1" in diameter at 4 1/2' above the ground (d.b.h.)

Sapling size - trees 1" to 5" in d.b.h.

Pole size - trees 5" to 11" in d.b.h.

Sawtimber size - trees 11" and greater in d.b.h.

12. WILDLIFE RESOURCES

Wildlife Habitat Description

The area of the proposed Chatham Lake subdivision is composed of three major habitat types; mixed hardwoods, powerline, and wetland areas. These areas currently provide important habitat for a diversity of wildlife species.

Mixed hardwoods occupy the majority of the site. The overstory consists predominantly of oak with hemlock and pine occurring in areas around Scovill reservoir. Understory vegetation is dominated by witch hazel, red maple, maple leaf viburnum, and scattered mountain laurel.

The powerline crosses the property East to West just north of the reservoir. Vegetation is typical of powerlines, consisting of blackberry, witch hazel, spirea spp., and sweet fern.

A number of small wetland areas occur throughout the mixed hardwood habitat. Overstory vegetation consists of yellow birch, red maple, and beech in transitional areas. High bush blueberry, spice bush, and swamp azalea dominate the understory. Wetlands support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply, and a high carrying capacity (Brown et al. 1978). Part of the food supply for many vertebrates is the high abundance and diversity of insect populations that are typical of wetland ecosystems (Brown et al. 1978). Wetland areas currently provide important spring breeding pools for amphibians and reptiles. These areas also provide nesting sites for a variety of birds and important habitat for a number of small mammals.

The Scovill reservoir is characteristically an open water type habitat. With the lack of islands, vegetated shores, and shallow wading areas it offers limited wildlife use. It may be used as a stop over area for migratory waterfowl.

Effects of Development on Wildlife

The majority of development will occur in upland areas. This will result in fragmentation of the mixed hardwood habitat which will in turn reduce species diversity and richness. Species that are intolerable to human disturbance will be forced to emigrate into adjacent habitat. Species dispersion

into adjacent habitats may result in competition with species already occupying the area. Many species will also be forced to inhabit less desirable habitat; decreasing survivability. Species more tolerable to man such as starlings, robins, house sparrows, and raccoons may increase in number and become a nuisance.

Since seventeen of the proposed building lots contain wetlands there will be a negative impact on these areas if there is any clearing or removal of vegetation within wetlands. Vegetation removal in wetlands would have severe impacts on wildlife, especially reptiles and amphibians. Soil and water types, cover, food, breeding grounds, and hibernation areas may be altered so that species dependent on specialized habitats are eliminated and more adaptable species reduced (Campbell 1973). Barriers to seasonal movement and population dispersal, such as roads are also serious threats (Campbell 1973). The proposed road network crosses wetlands in four locations and there will be two driveway crossings.

The planned discharge of stormwater into wetlands may have negative impacts on invertebrates, amphibians, and reptiles due to increased pollution, sedimentation, and water levels (Campbell 1973).

Mitigation of Impacts on Wildlif

Several measures can be taken to minimize the impacts of development on wildlife. There should be at least a **100 foot buffer** surrounding all wetland areas in which no vegetation removal should take place. Owners of lots containing wetlands should be discouraged from any removal of vegetation within this buffer. These buffer strips will help limit disturbance to wetlands and provide important corridors for a number of wildlife species. A permanent **100 foot buffer** should be established surrounding Scovill reservoir in which no vegetation removal should take place. This buffer will help limit developmental disturbances to the reservoir. (Also refer to Lake Management section for other recommendations concerning setbacks)

Since the average lot size is 2 acres, as much of each lot as possible should be left wooded. This would reduce vegetation removal, habitat destruction, and be more aesthetically pleasing for the residents of the development. Owners of lots should also be discouraged from removal of dead wood. The existence of many wildlife species depends on the presence of dead

trees. Removal of snags will reduce potential nest sites for both primary (cavity excavating) and secondary cavity nesting birds (i.e. black-capped chickadees, downy woodpeckers, white-breastednuthatches) (Best et al. 1978). Fallen trees are also a necessity for many species (i.e. salamanders, snakes, mice, shrews, insects) (Hassinger 1986) and should not be removed.

Clearing of the understory has taken place on some of the building lots creating a park like appearance. Understory cover is necessary for the survival of many species of small mammals and birds. Regeneration should be permitted to allow vegetation to reestablish.

Owners should be encouraged to include ornamental trees and shrubs that are resistant to deer browsing when considering landscape design.

Literature Cited

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13. FISH RESOURCES

Site Description

A. Proposed Development Location - The proposed subdivision will surround Haddam's Chatham Lake (Scovill Reservoir), the primary surface hydrological feature of fisheries concern in the immediate area. A total of 75 building lots, minimum size 80,000 square feet are proposed. All residential lots will be served by on-site water and sewage disposal. Several wetland areas have been designated by the developer as "open space". The subdivision will directly abut the lake; surface drainage from the sloping lands that characterize this property will ultimately drain into the lake. Consequently, development at this location will have to be carefully planned to avert man-induced water pollution inputs to the lake and surrounding streams.

B. Chatham Lake - Chatham Lake is 21 acres in size. A dam, with a large spillway is located on the northern end of the lake. Morphological data on the lake basin is not available. The lake is characterized by a small watershed, the vast majority of which is wooded. Two small feeder streams drain into the lake, one at the south end and one in the northwest corner. Bottom type is a gravel/silt mixture. The lake has been drawn down in the past for the benefit of the previous owner's (Scovill Corporation) plant operations. Since it is located in the headwaters of the Candlewood Hill Brook watershed, this lake would be expected to have a slow flushing rate and be highly susceptible to eutrophication.

Fish Population

Chatham Lake's fish population has not been sampled, but the lake would be expected to be able to support a variety of warmwater fish species including largemouth bass, chain pickerel, yellow perch, brown bullhead, bluegill sunfish, pumpkinseed sunfish and golden shiner.

Impacts

Plans are to allow use of the lake shoreline and hiking trails by town residents in organized groups through special request to the Chatham Lake Association. Primary use of the lake for waterbased recreation will be by Association members only. Since the residents will be the prime beneficiaries of the lake's aquatic resource, all possible efforts should be made to protect this fragile watershed on their behalf.

The following impacts of the Chatham Lake subdivision on the lake and its watershed can be expected if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of the lake and watercourses through increased runoff from unvegetated areas - devegetation of sloped land on this development site presents a situation conducive to the development of serious soil erosion problems. If a siltation problem develops, watercourses and storm drains will provide direct avenues for siltation into the lake. Subdivision lots of particular concern are those which immediately surround the lake.

Erosion and sedimentation due to residential housing construction has long been regarded as a major stimulus in the lake eutrophication or aging process. Silt is considered a serious pollutant. Lake eutrophication can be accelerated by excessive erosion and sedimentation and seriously impact resident fishes, water quality, and overall lake recreational value. In particular, excessive siltation of Chatham Lake and its watershed will:

* Reduce the amount of usable fish habitat used for spawning purposes - preferred substrate that becomes compacted with silt is no longer available for spawning. Fish will be forced to disperse to other areas not affected by siltation.

* Reduce fish egg survival - water free of sediment particles is required for egg respiration (biological process of extracting oxygen from water) and successful hatching. Silt deposits will smother eggs.

* Reduce aquatic insect production - sediment-free water is also required for successful aquatic insect egg respiration and hatching. Aquatic insects are the primary food source of young and adult fishes. Reduced insect levels will adversely affect fish growth during their early growth period. Ultimately, this will lead to reduced growth rates and negative impact fish survival.

* Reduce water depth within the lake and stream "pools" - this occurrence will result in a further reduction of usable fish habitat.

* Contribute to the depletion of oxygen - organic matter associated with soil particles is decomposed by micro organisms contributing to the depletion of oxygen in waters overlying sediments.

* Adversely affect "gill" function and impair feeding activities - studies have documented that high sediment concentrations and turbidity will disturb fish respiration and gill function.

* Encourage the growth and survival of rooted aquatic plants in streams and along the lake shoreline and precipitate dense "algae blooms" - eroded soils contain plant nutrients such as nitrates and phosphates. Although algae and aquatic plants require these nutrients for growth, most lakes and streams contain very limited amounts. Consequently, these nutrients act as fertilizers once they are introduced into a aquatic habitats resulting in accelerated plant growth. Extensive algae blooms may turn the water a pea-soup or soupy brown color. Fish kills due to oxygen depletion in the summer called "summerkill" may occur in lakes when algae populations die. Dead algae are rapidly decomposed by bacteria in the summer sometimes causing low oxygen levels. Unfortunately, summer lake dissolved oxygen levels are naturally at their lowest and the introduction of nutrients can only serve to make a bad situation critical.

2. Degradation of wetland habitat - wetlands are beneficial in several ways. Wetlands serve to: (1) control flood waters by acting as a water storage basin, (2) trap sediments from natural and man-made sources of erosion, and (3) help filter out pollutants from runoff. Siltation events that cause excessive sedimentation of wetlands can hamper their unique ability to properly filter out and trap sediments. The developer has strived to avoid wetland crossings by major roads, but several driveways and lot clearings are likely to impact wetlands. **Lots of concern are: 12, 13, 16, 17, 19, 20, 47, and 48.**

3. Percolation of septic effluent into the Chatham Lake and local brooks - a failure of individual septic systems to operate properly is potentially dangerous to aquatic habitats. Nutrients and assorted chemicals that may be placed in septic systems could enter surface waters in the event of a failure or possible infiltrate groundwater, especially when water tables are seasonally close to the surface. The introduction of septic effluent could result in a major threat to fish, public health, and overall water quality conditions. Effluent will stimulate the growth of rooted nuisance aquatic weeds along a lake shoreline and stimulate nuisance unicellular algae blooms. Septic tank leachate can rapidly accelerate the lake eutrophication process. A mesotrophic lake such as Chatham will reach a "eutrophic" condition more rapidly. **Lots of concern are: 51, 52, 53, 56 and 58** where leach fields are planned much closer to the lake edge than would appear necessary.

4. Transport of lawn fertilizers and chemicals to the lake and brooks - runoff and leaching of nutrients from fertilizers placed on lawns can stimulate nuisance aquatic weed growth and help precipitate algae blooms. The introduction of nutrients will accelerate the lake eutrophication process. Introduction of lawn chemicals may result in fish kills and water quality degradation. All lakeside lots are of particular concern as well as those that abut storm drainage facilities.

5. Impacts to downstream environments - any water quality problems and habitat degradation that occur within Chatham Lake will be felt in downstream areas as well. Specifically, Candlewood Hill Brook, stocked annually by the Bureau of Fisheries with over 300 yearling brook trout, is likely to be adversely affected by water quality degradation in Chatham Lake.

Recommendations

Impacts on Chatham Lake and its watershed may be reduced by implementing the following recommendations:

1. Modify septic leach field locations on the following lots: Lots 51, 52, 53, 56 and 58. This recommendation is based upon the need to locate these lakeside leachfields as close to their respective septic tanks as possible and remove them from the immediate edge of the lake. The Association should enforce the use of low phosphate laundry and dishwashing detergents to further reduce the level of nutrients entering on-site septic systems.

2. Install and maintain proper erosion and sedimentation controls during site construction activities - this includes such mitigative measures as silt fences and staked hay bales. Only small areas of soil should be exposed at one time and these areas should be reseeded as soon as possible (see Soil Resources Section for other recommendations). Only very limited erosion and sedimentation controls were seen on site during the review. Material from one proposed leach field site had already washed dangerously close to the lake. In order to further protect the lake from the effects of stormwater discharge, the developer should consider directing most of the stormwater from Lakeshore Drive to the north of the lake.

If this development is approved, the Town of Haddam should have an appointed official inspect this development on a daily basis to ensure that contractors have complied with all stipulated mitigation devices. Past lake and stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

3. Maintain at the minimum a 100 foot open space buffer zone along the boundaries of the lake and, wherever possible, wetlands - no construction or alteration of habitat should be allowed in this zone. Haddam officials should regulate the development activities that may or may not take

place within the buffer zone. Research has shown that 100 foot buffer zones help prevent damage to wetlands and aquatic ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985). These buffers will absorb surface runoff and other pollutants before they can enter wetlands and aquatic habitats.

4. Limit liming, fertilization, and the introduction of chemicals to subdivision lawns - this will help abate the amount of additional nutrients to the lake and stream environments. Nonphosphorus lawn fertilizers are currently available from various lawn care distribution centers.

Literature Cited

ODFW (Oregon Department of Fish and Wildlife) 1985. The Effects of Stream Alterations on Salmon and Trout Habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon. 70 pp.

USFWS (United States Fish and Wildlife Service) 1984. Habitat Suitability Information: Rainbow Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82(10.124). 64pp.

USFWS (United States Fish and Wildlife Service) 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82/(10.60). 65pp.

14. MIDSTATE REGIONAL PLANNING AGENCY COMMENTS

Chatham Lake, also known as Scovill Reservoir, is an example of a pristine environment that is rapidly becoming rare in the Northern Middlesex County. The only land use currently occurring in the Chatham lake watershed is a CL&P powerline and a system of dirt roads. With its minimal impact, the water quality and surrounding forest are in an especially pure state. The area can support numerous outdoor activities such as swimming, small boating, picnicking, camping, hiking, x-country skiing, hunting, and fishing (if the pond is restocked). Since the owners propose to develop the area with single family housing, the main environmental concern of the Midstate Regional Planning Agency is to preserve the quality and quantity of the open space and recreational uses for the area's residents.

The developer's proposed open space consists of the lake itself, 2-3 acres of waterfront, the dam, a hiking trail network, and other assorted parcels of land that are unsuitable as building lots. The proposed open space will be deeded to an Association of residents and dedicated to the Town of Haddam for use by responsible groups, with the exception of the lake & waterfront which will only be used by the Association's members. A preliminary draft documenting conservation easements and open space dedication should be provided to the Haddam Planning & Zoning Commission and other relevant town groups for review before the public hearing.

The proposed arrangement is a little vague as far as responsibilities and a little exclusive as far as usage. Many questions arise such as; How will the dam, lake, trails, and other recreational facilities be maintained? Who can join the a Association? Can town residents in general buy into the Association? Who will decide and regulate what is a responsible town group? Can responsible individuals get permission to use the hiking trails and "dry" open space parcels?

An extensive road network is being introduced, and in some cases, road frontage is being left open for adjacent land owners. With the potential for their property to be developed, can neighboring land owners join the Association?

Some lake and waterfront usage options are:

1. A closed Association for only the original subdivision residents.
2. Public open space for all Haddam residents.
3. Two waterfronts could be set aside, one for the subdivision's residents and one for Haddam residents.

Regulation of the hiking trails and "dry" open space seems awkward, needless and likely unenforceable. With the hiking trails possessing no special attraction other than the trail itself, it is probable that only residents in the immediate vicinity may be interested in using them. The Commission may want to consider other forms of open space dedication (e.g. deed to town, a land trust, ...).

The town's Subdivision Regulations state that one of the purposes of open space is to preserve desirable water related resources. This proposal does little to accommodate this. Most of the proposed waterfront property lies within the 300 ft. CL&P ROW. What type of activity can occur in this ROW? Presumably CL&P can clear cut and expand their activity in this ROW anytime in the future. The whole northeast side of the lake is dominated by these powerlines. With this being a less than desirable thing to have in a homeowner's yard, it would be more beneficial to everyone, to convert all the lots (61-64) on this side of the lake into open space.

The existing land of the proposed waterfront is very steep near the waters edge and located in the part of the lake that may have the least circulation. Maybe the waterfront should be bigger and/or located elsewhere. With better circulation near the dam, the water will stay cleaner and the scenic beauty of the falls & V-shaped valley below the dam can be enjoyed more (like Miller's Pond in Durham). The lakes topography may be useful in a more complete analysis of where to locate the waterfront open space.

It appears that no facilities are being proposed for the waterfront, if such is the case it should be noted on the plans. If it is recognized that there will be a need for rest & changing rooms, a parking lot, picnic area, a boat launch, and beach area, the details of these facilities should be planned now. This will help insure that the proper amount and location of the water front open space is being provided.

A 50 ft. greenbelt around the lake has been proposed. A more thorough examination of the types of vegetation within this greenbelt and the details of permitted uses is needed. Is a 50 ft. greenbelt adequate to maintain the present quality of the lake? All detention ponds should be deeded as open space. There will be considerable drainage from the proposed road into the lake. Since these are sources of pollution, alternative drainage should be sought so this pollution will be avoided or reduced. Indirect drainage facilities that filter the runoff before it enters the lake may prove adequate, but obviously no runoff to the lake is preferable.

Details on how the hiking trails will be constructed and maintained should be established. The hiking trails should form a complete loop to facilitate usage. The short segments and deadend spurs could be eliminated by adding a trail ROW or open space strip on the conveyed land or on the subdivision,s lots. Sidewalks could also be built to connect. open space parcels. The trail should also be through from Little City Road to Pytlik Road. Parking areas should be planned at the trail heads.

Even though there is considerable open space proposed, most of it is constricted by excessive slope, ledge outcrops, & wetlands and couldn't be built on anyway. More land should be set aside around the lake to help preserve its present quality. It would be preferable to trade some of the less useful open space parcels on the periphery of the property for some the lots on the lake, to create one large continuous open space piece. With these suggestions the open space will maintain much of the quality and usefulness that is there now in its undisturbed state, to be enjoyed by the residents and towns people for the future.

In conclusion, the proposed development is of conventional design and thus utilizes most of the total parcel area to create building lots. This particular site is environmentally unique to the Town and to the Region. It would be ideal if development of the site could occur through utilizing the more unconventional or land conservation methods in subdivision design or land development.

15. OTHER PLANNING COMMENTS

Developers of this subdivision are to be commended for cooperating with the Town in the details of approval and completion of this subdivision. Specifically, completion of a through road from Pytlik Road to Nason Road will ultimately be of benefit to the Town for maintenance, emergency vehicles, traffic circulation, deliveries, and to the owners of houses in the development.

The developer plans to put a large area of this tract into an open space classification. The final disposition of this land may be placement in a homeowners association, but, if the Town is to have any involvement in the open space, the details of the homeowners agreement should be referred to the Town's Attorney.

The plan for development as shown to the ERT, includes a narrow strip of open space, maybe twenty feet, running along the perimeter of a substantial part of the project. While this idea is commendable in concept, experience has revealed this kind of dedication of land to be undesirable. persons buying the lots with this kind of open space abutting their property have found it has a negative impact on their property for several reasons. They fear that it can become a right-of-way for vehicles, e.g. maintenance vehicles to care for any part of the open space, or still worse, snowmobiles or cross country motorcycles. Persons using this trail for hiking are perceived as peering into the backyards of owners of the abutting lots, and many times, no trespassing signs are erected to keep persons off the trails as well as out of back yards. Should vacant land abutting those trails come into development, identical feelings arise with lots of owners of the new development.

Should the developer want to dedicate a total of 107(?) acres, the project would be better served by enlarging the large parcels by an amount of land similar to the total of the 20' wide trails and continuing the lot lines to the edges of the property.

16. ARCHAEOLOGICAL REVIEW

A review of the State of Connecticut's Archaeological Site Files and Maps show that nine prehistoric sites are located in close proximity to the project area. No sites are listed within the proposed subdivision. However, the frequency of sites listed along Ponset Brook to the south, as well as, Candlewood Hill Brook to the north indicate a high probability of sites in the project area.

The prehistoric sites on file represent Native American encampments dating from early historic times to 4,000 years ago. They provide us with our only source of information on thousands of years of human adaptation to inland wetland conditions in Connecticut.

A professional archaeological reconnaissance survey is **strongly recommended** in order to locate and identify all prehistoric and historic resources which might exist in the project area. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources.**

In summary, the project area is located in a critical area of importance to prehistoric and historic Connecticut Indian lifeways. It is strongly recommended that all feasible efforts be undertaken to identify and ensure the preservation and conservation of the cultural resources in the area.

ARCHAEOLOGICALLY SENSITIVE AREAS

Scale 1 " = 2000'

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialsits, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area --- an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

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 reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

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 town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: **203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.**