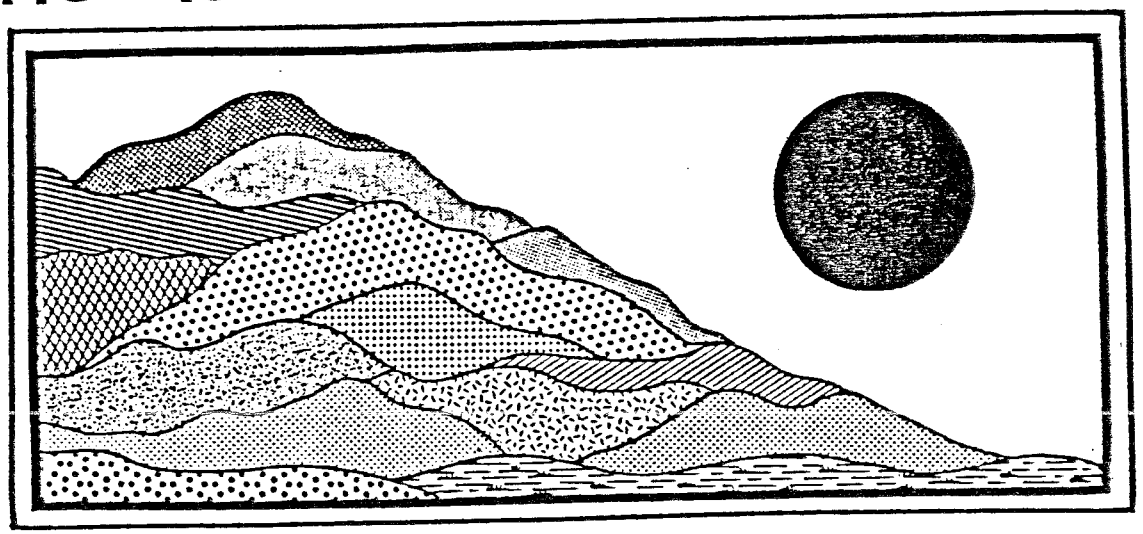
Wyassup Lake Subdivisions

North Stonington, Connecticut

June 1988



ENVIRONMENTAL REVIEW TEAM REPORT

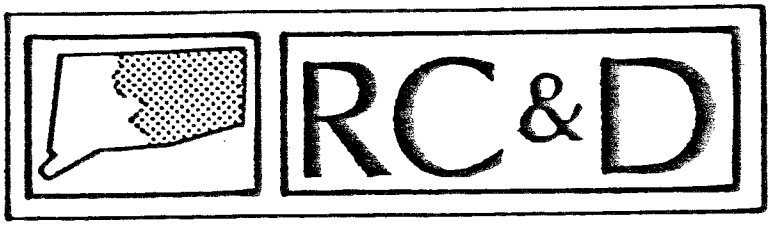
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Wyassup Lake Subdivisions

North Stonington, Connecticut

Review Date: APRIL 19, 1988

Report Date: JUNE 1988



ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

ENVIRONMENTAL REVIEW TEAM REPORT
ON
WYASSUP LAKE SUBDIVISIONS
EAST, CENTRAL AND WEST
NORTH STONINGTON, CONNECTICUT

This report is an outgrowth of a request from the North Stonington Conservation Commission and Inland Wetlands Agency to the New London Soil and Water Conservation District (S&WCD). 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, April 19, 1988. Team members participating on this review included:

Nick Bellantoni	--State Archaeologist - CT Museum of Natural History
Don Capellaro	--Sanitarian - CT Department of Health
Barry Cavanna	--District Conservationist - U.S.D.A., Soil Conservation Service
Pete Merrill	--Forester - DEP, Patchaug State Forest
Brian Murphy	--Fisheries Biologist - DEP, Eastern District
Elaine Sych	--ERT Coordinator Eastern CT RC&D Area
Bill Warzecha	--Geologist - 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, and a soils map. During the field review the Team members were given plans. The Team met with, and were accompanied by Commission Members, the applicant and his engineer and environmental consultant. 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 and conclusions 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 Committee hopes you will find this report of value and assistance in making your decisions on these proposed subdivisions.

If you require any additional information, please contact:

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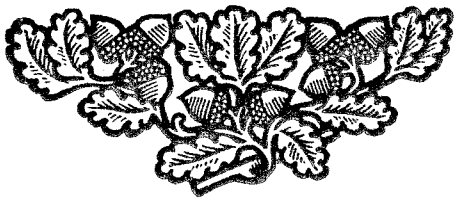
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 198
Brooklyn, CT 06234
(203) 774-1253



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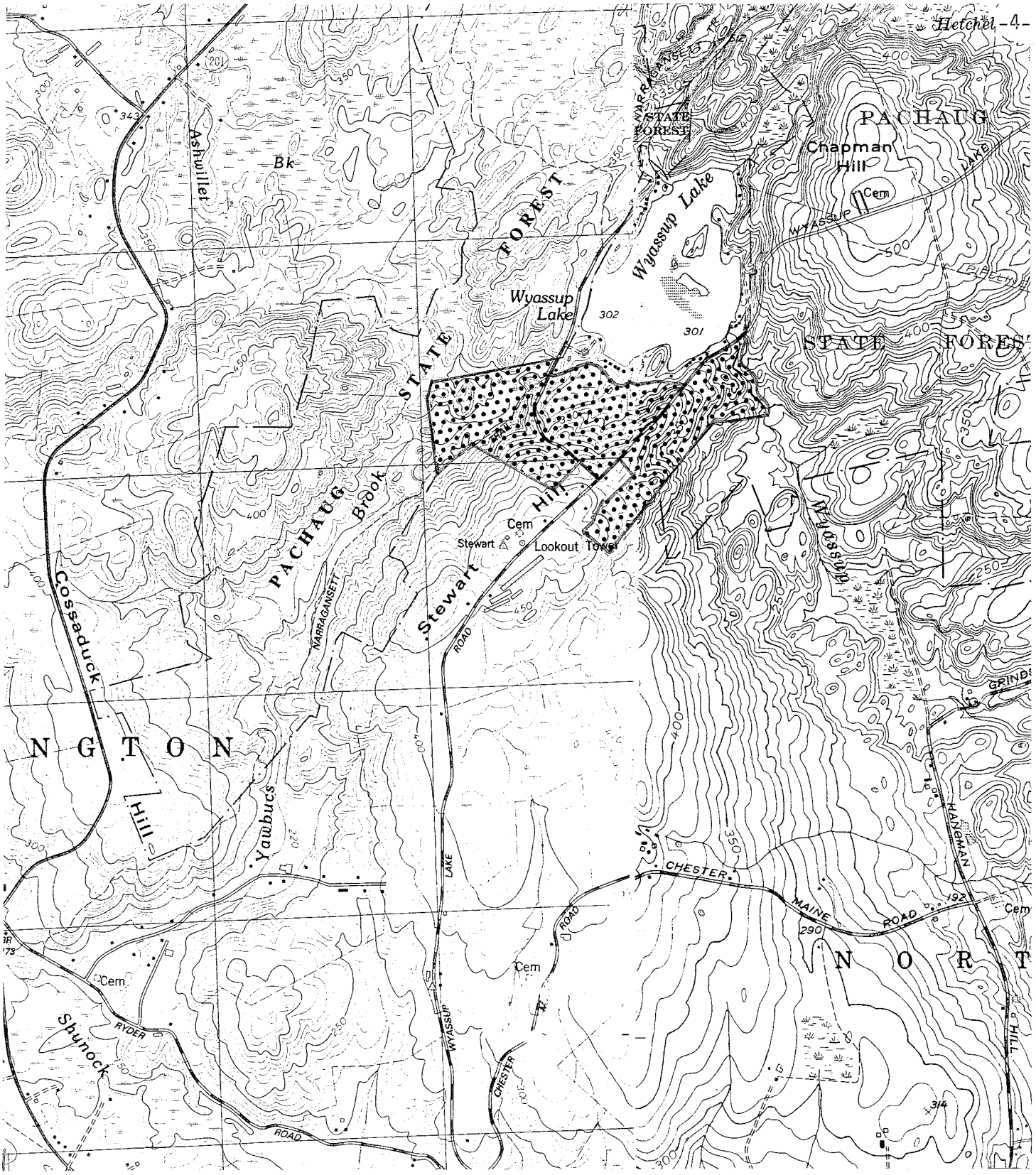


LOCATION

Scale 1" = 2000'

1. INTRODUCTION, SETTING AND TOPOGRAPHY

NOTE: TEAM MEMBERS HAVE BASED THEIR REPORTS ON THE PLANS SEEN ON THE FIELD REVIEW DAY 04/19/88. THIS REPORT DOES NOT REFLECT SUBSEQUENT REVISIONS.

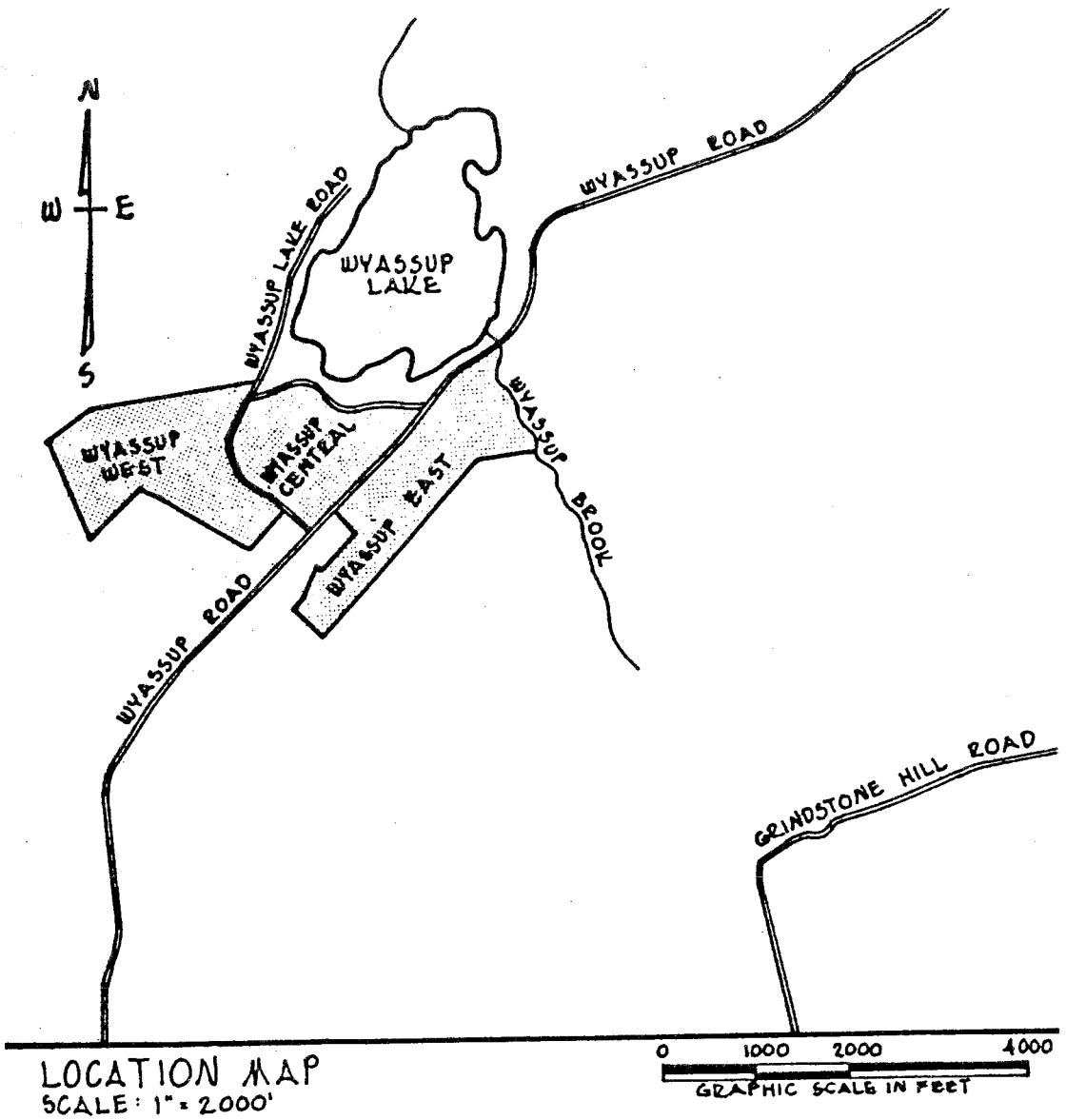
The Eastern Connecticut Environmental Review Team has been asked by the North Stonington Conservation Commission and Inland Wetlands Agency to review 3 proposed subdivisions. The following sections of this report provide natural resource information, highlight areas of concern, and provide recommendations for the mitigation of potential problems associated with the developments.

The proposed "Wyassup Lake Subidivisions" can be divided into three sections; Wyassup West Subdivision, Wyassup Central Subdivision and Wyassup East Subdivision. (See **Location Maps**) They are comprised of 51 acres (6 lots), 44 acres (10 lots) and 59 acres (11 lots), respectively. The total acreage is ±154, and the total number of lots is 27. The proposed subdivision sites are located in northcentral North Stonington near Wyassup Lake, a ±93 acre natural surface water body. The level of the lake was raised by a small earthern and masonary dam in the southeast part. All lots, which are 2 acres (80,000 square feet) or more in size, have frontage on Wyassup Road, Wyassup Lake Road or an unnamed private road. The latter, which is north of Wyassup West is gravel based. The land encompasses the northern end of a northeast/southwest trending rock-cored hill called Stewart Hill. As a result of the geologic setting, topographic conditions are controlled by the underlying bedrock. Slopes throughout the parcel of land range from gentle to very steep. The steep to very steep sloping land is associated with rock outcrop areas. Several seasonal drainageways that act as conduits for surface runoff and outlets for wetland pockets occur on the site. Water for the site is ultimately routed to Yawbucs Brook, Wyassup Lake or Wyassup Brook.

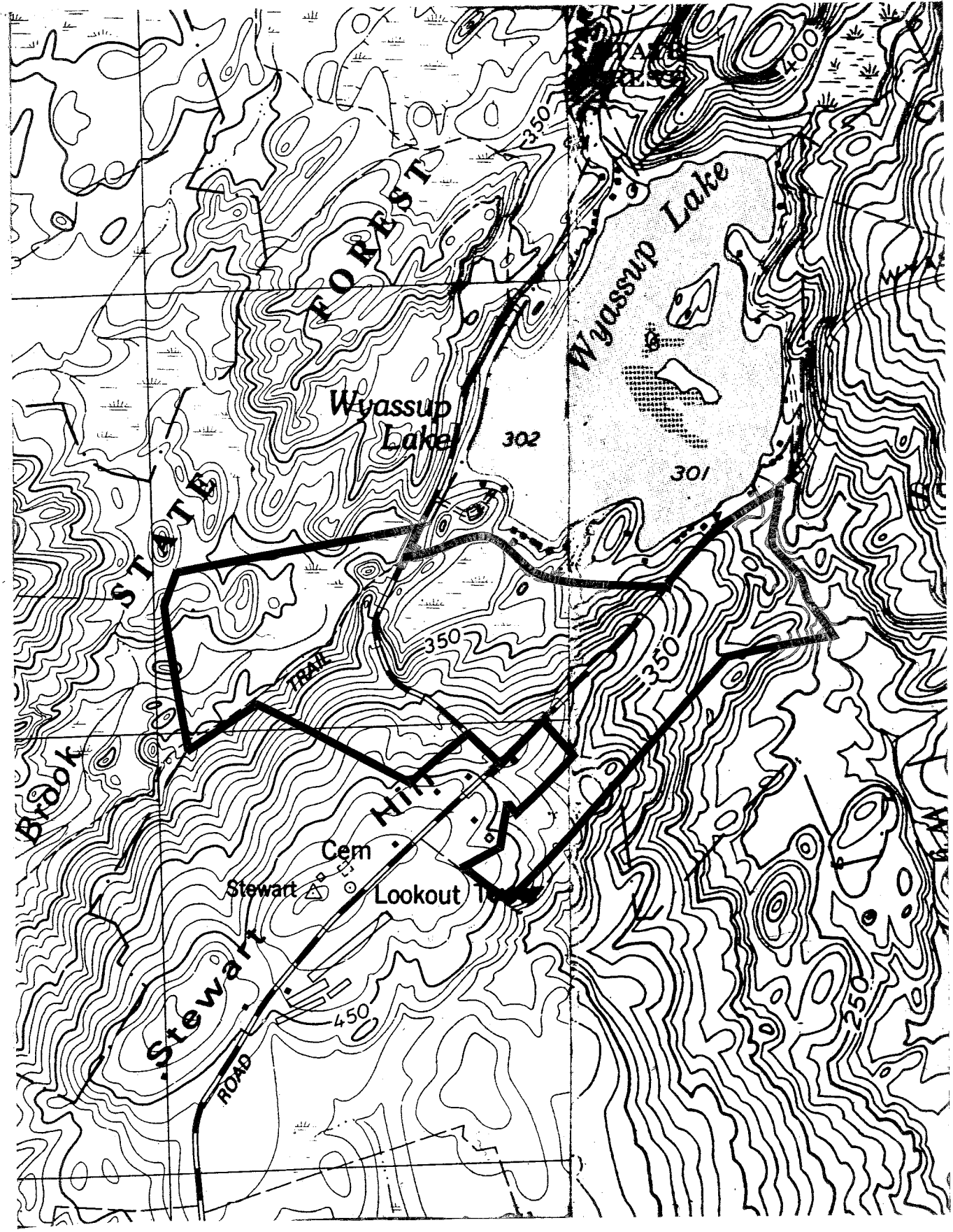
Maximum and minimum elevations on the site are about 470 feet and 250 feet above mean sea level.

2. GEOLOGY

The total site is encompassed by the Old Mystic and Ashaway topographic quadrangles. A bedrock geologic map (GQ-403) and a surficial geologic map (GQ-712) for the Ashaway quadrangle have been published by the U. S. Geological Survey. Only the bedrock geologic map (I-1524) has been published for the Old Mystic quadrangle. There is, however, preliminary surficial geologic data for the Old Mystic Quadrangle at the DEP's Natural Resources Center in Hartford.



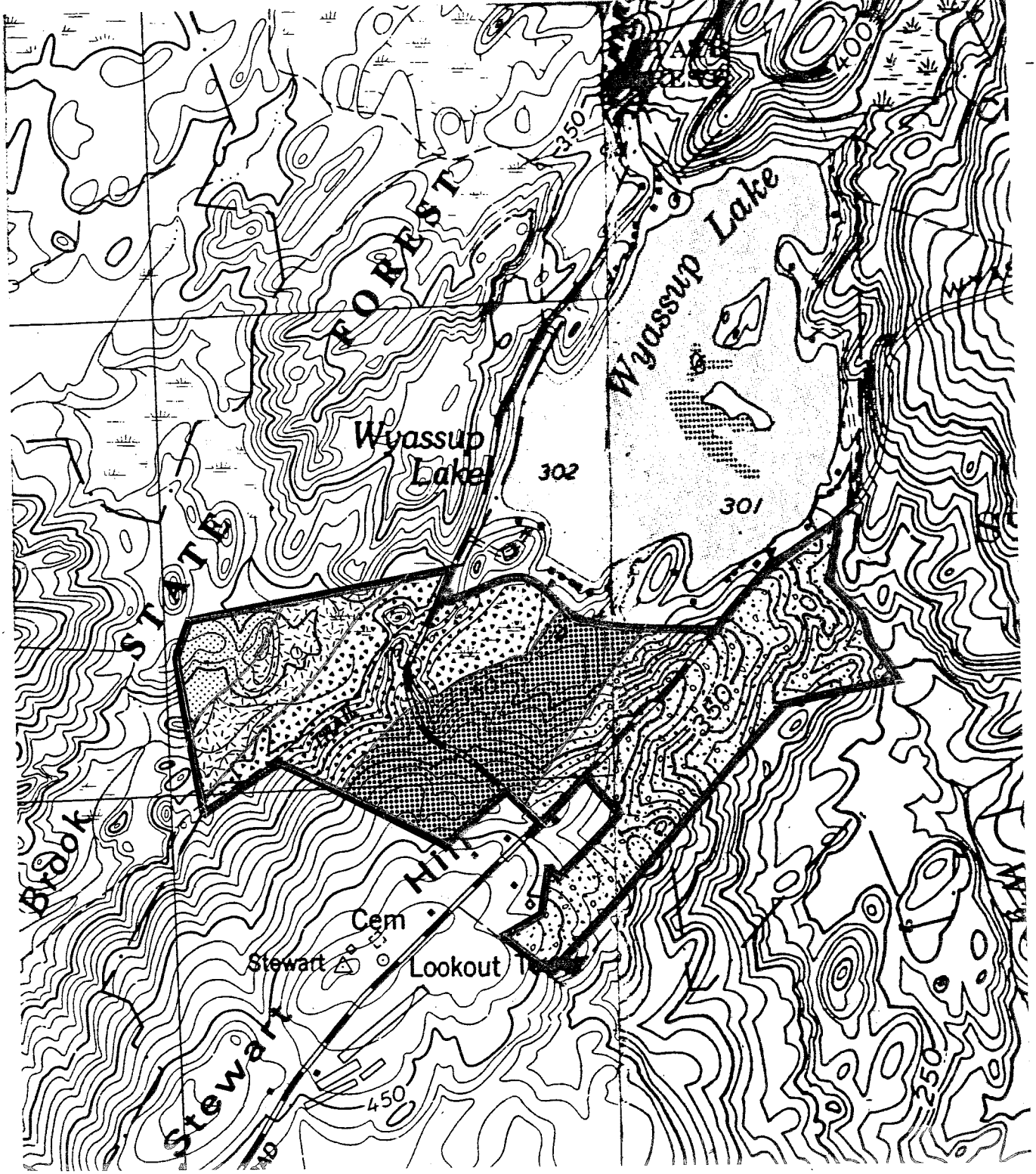
LOCATION MAP
SCALE: 1" = 2000'



TOPOGRAPHY

Approximate Site Boundary

Scale 1" = 1000'



BEDROCK GEOLOGY

Quartzite

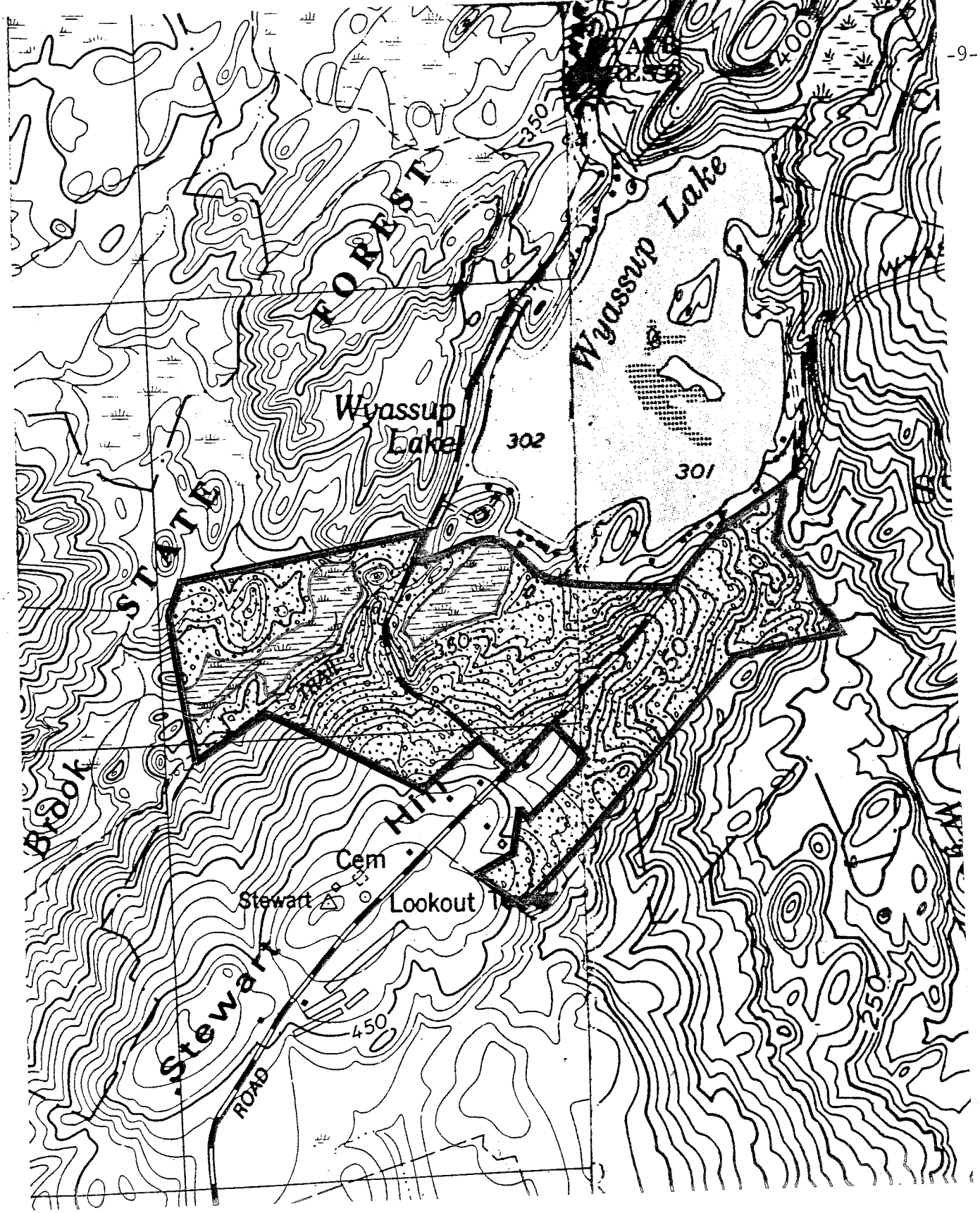
Hornblende Gneiss and Amphibolite

Light pink to grey, medium to coarse-grained granitic gneiss

Interlayered, thinly bedded quartzite mica schist and dark grey gneiss

Light grey, glassy, generally thinly bedded quartzite

Scale 1" = 1000'



SURFICIAL GEOLOGY

Till

Swamp Sediments

Scale 1" = 1000'

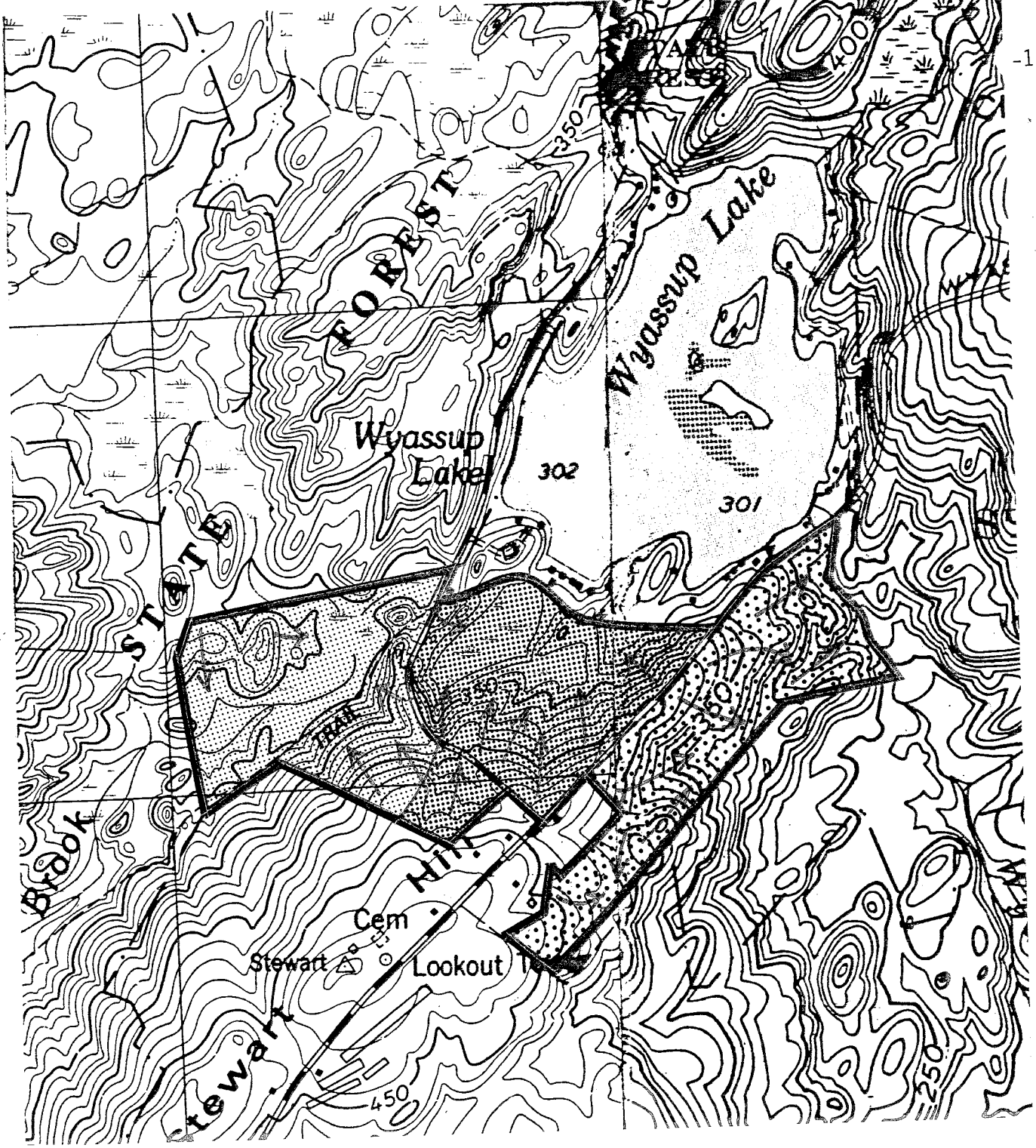
The entire site is covered by glacial sediments called till. Till consists of poorly sorted mixture of rock fragments and particles deposited directly by glacier ice. Rock fragments and particles found in the soil were derived from the local bedrock (see below). According to soils mapping data, the till covering all sections is generally sandy and loose to moderately loose. Deep test hole information, soil mapping data and visual observation made during the field review suggests that bedrock is at or near ground surfaces throughout much of the subdivision (generally 8 feet or less). Percolation tests conducted on several lots indicates that the till has moderately slow permeabilities. The boundaries for regulated soils (inland-wetlands) have been delineated on the subdivision plan. Relatively large wetland pockets (Aa soils in the soil map) occupy Wyassup Central and West. Regulated soils also parallel several drainageways on the 3 parcels.

The bedrock core of the parcels consist of several northeast/southwest trending bands of metamorphic rocks. All of Wyassup East and a narrow section along Wyassup Road consists of a light pink to gray, medium to coarse grained granitic gneiss. The central and northwestern parts of Wyassup Central consist of an interlayered thinly bedded quartzite mica schist and dark gray gneiss and a light-gray, glassy, generally thin-bedded quartzite, respectively. The western limits of Wyassup West can be divided into two rock types; the west central parts are underlain by quartzite and the western limits by a hornblende gneiss with amphibolite layers (see accompanying **Bedrock Geologic Map**). The terms schist, gneiss and quartzite refer to the textural characteristics of the rock. As mentioned earlier, all three rock types are metamorphic. They all have long, very complex histories and comprise some of the oldest rocks (Precambrian geologic period) found in Connecticut. As a result, they have been subjected to great heat and pressure (metamorphism) of mountain building periods. The rocks have greatly changed since their deposition as mud, silt, sand and volcanic material. Foliation or the layering of the platy minerals have developed as micas, that grew along preferred direction in response to heat and pressure (metamorphism).

The underlying bedrock is the principal source of water to residences throughout North Stonington. It will also be the source of domestic water to proposed homes in the subidivision. As with most bedrock wells, yields from the rock underlying the site can be quite variable. It depends largely on the number of fractures and openings within the rock and whether or not they are intersected by the well. (See **Water Supply Section** for further information)

3. HYDROLOGY

Surface runoff in the subdivision can be divided roughly into three subareas. Surface runoff and groundwater on Wyassup East drains generally eastward to Wyassup Brook via seasonal drainageways. Wyassup Brook is the outlet stream for Wyassup Pond and ultimately flows into Spalding Pond. It flows through at least two large wetlands before it reaches the pond.



WATERSHED BOUNDARY

Portion of site that drains to Yawbucs Brook

Portion of site that drains to Wyassup Lake

Portion of site that drains to Wyassup Brook

Surface runoff showing direction of flow

Scale 1" = 1000'

Surface runoff arising from Wyassup Central and Lot 1 and parts of Lot 2 and 3 of Wyassup West drain to the large wetland in the central parts of Wyassup Central. The outlet stream for the wetland is piped under the private road north of Wyassup Central, daylights on a residential lakeside lot and ultimately is routed to Wyassup Lake. Finally, the surface water and groundwater to the remainder of Wyassup West is routed to Yawbucs Brook, a Shunock River tributary.

As mentioned earlier, groundwater in the area is classified by the DEP as GA. As a result, homeowners need to be very careful as to the disposal of certain household chemicals to subsurface sewage disposal systems. Certain chemicals and substances could deteriorate groundwater quality in the area.

Development of the site for residential use would be expected to lead to some increases in the amount of runoff shed from the parcel. The amount of increases will depend upon the extent of develoment, the impervious surfaces created and the amount of vegetation removed or preserved. In view of the low densities foreach subwatershed area currently proposed and no interior road systems planned, it seems likely that increases would be low. Also, the natural detention capabilities of the wetlands along Wyassup Brook and Yawbucks Brook, Spalding Pond and Wyassup Lake will help to alleviate any potential for flooding problems. However, close examination of the pipes passing under the private road (outlet stream for the wetland in Wyassup Central) and Wyassup Lake Road (lot 1 and parts of Lots 2 and 3 in Wyassup West) is warranted to ensure the post-development runoff increases do not cause overtopping of these roads during storm events.

The other concern regarding increased runoff is the chance for streambank erosion and gullying. Connecticut's Soil Erosion and Sediment Control Act (P.A. No. 83-388) requires that the applicant devise a thorough erosion sediment control plan that is properly enforced. Because of the moderate and steep slopes present on all tracts and silty soils, the concern for potential erosion becomes a significant one. A well managed activity will need to take all necessary measures to contain and filter disturbed water so that it does not cause environmental damage on and off the site. Extra efforts should be made to ensure that Wyassup Lake, Wyassup Brook and Yawbucs Brook is properly protected from silty, turbid waters, which may arise during the construction periods. In this regard, it might be wise to construct at least temporary sediment basins during construction periods. The project engineer should reference the **Guidelines for Soil Erosion and Sediment Control** with respect to design criteria. The best solution for erosion sediment control will be to keep disturbed areas to a minimum.

4. SOILS CONCERNS

--Due to the soils and slopes on most lots, it would be advisable to review detailed site plans for each lot prior to their approval as building lots.

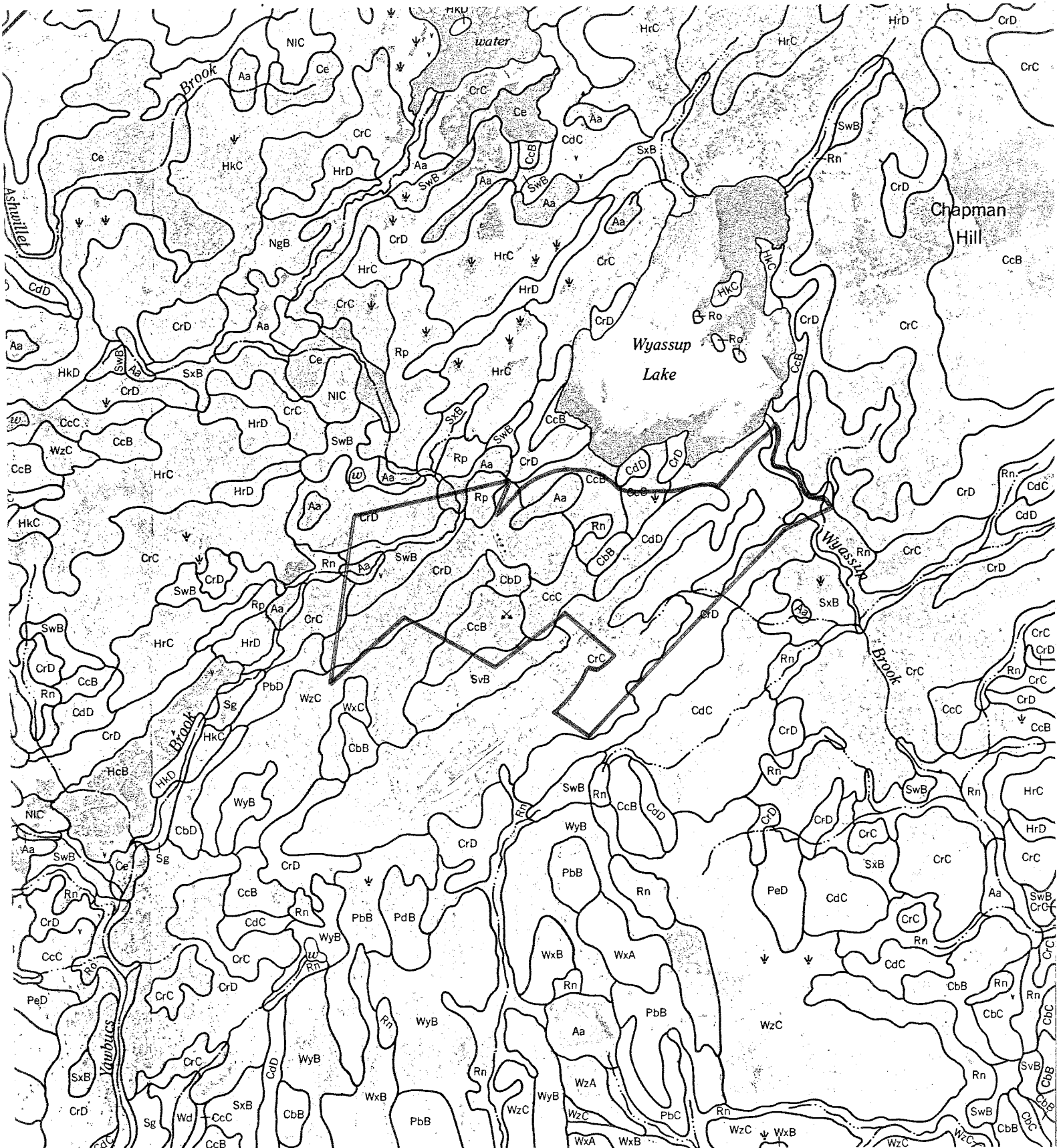
--If and when these site plans are approved, the town should have an inspector at all times to insure that they are followed during construction.

United States Department of Agriculture

Soil Conservation Service

New London County USDA-SCS
562 New London Turnpike
Norwich, CT 06063
887-4163

Scale 1" = 1320' Approximate Site Boundary



SOIL POTENTIAL RATINGS FOR SEPTIC TANK ABSORPTION FIELDS BY MAP UNIT
NEW LONDON COUNTY, CONNECTICUT

MAP SYMBOL	MAP UNIT NAME	POTENTIAL RATING	CONCERNS	CORRECTIVE MEASURES	ADDITIONAL CONSIDERATIONS	STATE REGULATIONS
Aa	- Adrian muck	EXTREMELY LOW	Organic soils, depth to water table.		Drainage needed. Access to drainage outlet unlikely.	2,3,4
CbB	- Canton and Charlton fine sandy loams, 3-8% slopes	VERY HIGH	None.			
CbD	- Canton and Charlton fine sandy loams, 15-25% slopes	VERY HIGH	None.			
CcB	- Canton and Charlton very stony fine sandy loams, 3-8% slopes	VERY HIGH	None.			
CcC	- Canton and Charlton very stony fine sandy loams, 8-15% slopes	VERY HIGH	None.			
CdD	- Canton and Charlton extremely stony fine sandy loams, 15-35% slopes	HIGH#	Slope.	Design and installation to accommodate for slope.	Increase area of investigation to utilize the flattest slopes.	1 for slopes >25%
CrC	- Charlton-Hollis fine sandy loams, very rocky, 3-15% slopes	MEDIUM			Feasibility study. Increase area of investigation to utilize the deepest soils. Verify depth to bedrock.	5
	Charlton part	very high	None.			
	Hollis part	extremely low	Depth to bedrock.			
CrD	- Charlton-Hollis fine sandy loams, very rocky, 15-45% slopes	VERY LOW			Feasibility study. Increase area of investigation to utilize the deepest soils and flattest slopes. Verify depth to bedrock.	1 for slopes >25%
	Charlton part	high#	Slope.	Design and installation to accommodate for slope.		5
	Hollis part	extremely low	Slope, depth to bedrock.			
Rn	- Ridgebury, Leicester, and extremely stony fine sandy loams	VERY LOW**	Depth to water table.	Curtain drain and fill.	Access to drainage outlet.	2,3,4

**The rating assumes that the water table in the naturally occuring soil can be drained to a depth of 18 inches or more.

1 Identified as an area of special concern by state regulations - engineer's design required.
2 Identified as unsuitable in its natural condition by state regulations - an engineer's evaluation is needed to determine whether an absorption field can be built.
3 Identified as inland wetlands or tidal wetlands by state regulations. Local, state, and/or federal wetland permits may be required.
4 A permit to install an absorption field cannot be issued if the site cannot be drained. A permit cannot be issued if the groundwater level is less than 18 inches below the soil surface for one month or longer.
5 A permit to install an absorption field cannot be issued if the depth to bedrock, of the naturally occurring soil, is less than 24 inches.

--Vigorous enforcement of compliance with the plans as approved is essential.

5. GEOLOGIC DEVELOPMENT CONCERNS

In terms of the proposed subdivisions, the major geologic limitations which warrant close examination include the following:

1. those lots which have shallow to bedrock conditions, generally 7 feet or less;
2. areas of moderate to steep slopes; and
3. the presence of till soils, that have moderately slow to slow percolation rates and elevated water tables.

It should be noted that a standpipe on Lot 1 (Wyassup West) revealed groundwater at or near the ground surface. As a result, it is strongly suggested that the applicant's engineer re-test for a more suitable leaching system area on the lot, since present subsurface conditions indicates potentially unsuitable conditions for subsurface sewage disposal. (Field review 04/19/88)

The above geologic limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems serving homes constructed in the proposed subdivision. In addition, they may present problems in terms of house and driveway placement. Based on subsurface data supplied by the applicant's engineer, it seems likely that special engineered design plans will be required on many lots to overcome the geologic limitations mentioned above. For example, improvements such as curtain drains and/or elevating areas designated for leaching systems with suitable fill material will be required for lots with high groundwater conditions. Sufficient exploratory work is warranted on the lots that are characterized by shallow to bedrock conditions. Septic system areas should ideally be located in areas where slopes do not exceed 25 percent. Because of numerous outcrops and shallow to bedrock conditions on Lot 6 (Wyassup West), the leaching areas for the proposed septic systems will probably need to be located 100 feet or more from the potential house location where deeper soils are found. In order to accomplish this, the distribution line needs to traverse shallow soils and very steep terrain. The major concerns with this are: 1) the potential for effluent to freeze in the pipe if not properly covered 2) the potential for flooding at the first distribution box due to high velocity of the effluent as it travels down the steep grade and 3) since the pipe will need to be close to the bedrock surface, ensure all pipe joints are sealed tight so that sewage does not leak into the underlying bedrock. Finally, it is suggested that clearouts be provided between the septic tank and leaching areas. Close examination is warranted for all of these concerns.

The presence of bedrock at shallow depths on the parcels suggests that blasting may be required in order to place driveways, foundations, septic tanks and leaching systems and water lines. Any blasting that takes place on the site should be done very carefully and under the strict supervision of people experienced with the newest technology in blasting techniques. This will hopefully help to reduce the chance for undue seismic shock and potential damage claims. In this regard, it is also wise to conduct a pre-blast survey of the area. Generally speaking, it is only when blasting is conducted without regard to seismic shock or air-blast impacts that there are no problems on surrounding properties.

6. WATER SUPPLY

Present plans indicate that the proposed house lots for all sections would be served by individual on-site wells. The underlying bedrock will be the likely source of water to the wells. Although, not prolific aquifers, the metamorphic bedrock beneath the site is generally capable of yielding quantities of water adequate for most domestic uses. A yield of 3-5 gallons per minute is generally desired for residential use. According to Water Resources Bulletin #15 Lower Thames River and Southeastern Coastal River Basins in which the site lies, 90 percent of the metamorphic bedrock wells surveyed (200 wells) had yields of 3 gallons per minute or more.

The presence of faulted and folded bedrock in the region suggests that at least the upper few hundred feet of the bedrock surface is probably fractured and weathered. Fractured and weathered zones in the bedrock provides storage for groundwater which in turn will hopefully be intersected by the drilled wells in the subdivision.

Newly drilled wells should be located at the high side of lots with proper separating distances from on-site sewage disposal systems, buried fuel storage tanks, water courses, drainageways and other potential sources of contamination.

In certain rock formations, usually those high in iron and manganese, excessive minerals may be found in the groundwater. If these concentrations exceed recommended drinking water standards they can impart taste, color and odor, and the water staining of clothes and fixtures can be a problem. In such cases it is necessary to make provisions for appropriate water treatment. Groundwater below the site is classified by the DEP as GA, which means that it is suitable for private drinking water supplies without treatment i.e., not contaminated by industrial wastes, road salt, hydrocarbons, etc.

7. VEGETATION

Wyassup East (11 Lots)

Forest cover type: Oak/hickory; the predominate species are black and scarlet oaks with some white oak, black birch, red maple, American beech and hickory. The understory is mainly black birch, hornbeam with some beech and red maple. There is very little oak, except where there is natural mortality, especially in Lots 1, 2, 3 and 4. In these areas there is also a considerable amount of blackberry brambles and greenbriar.

The designated wetlands generally have an overstory of black oak, red maple, yellow birch and tulip poplar. The understory is usually dominated by spicebush with some highbush blueberry, yellow birch and bluebeech.

Most of the lots in this development shouldn't create too many surface problems, except Lot #1, which is the upper reaches of an intermittent stream of Lot #8. Lot #8 will require the house to be placed on quite a steep slope which feeds a small stream. This could place the house and septic system within 600-700 feet of Wyassup Brook, via the small stream. Septic placement in Lot #11 is critical, so as to not pollute the spring near the brook in the area noted as open space. Some of the neighbors have deeded rights to this spring. (Based on plans seen onthe field review day 04/19/88)

Wyassup Central (10 Lots)

The forest cover type is similar to Wyassup East. Most of the overstory is black/red oak with some black birch and red maple. Understory is sparse in most areas and consists of bluebeech, hornbeam, black birch and witch hazel.

There are three designated wetland areas in this development, the largest of which is quite significant and does include seasonal open water. These areas are basically red maple with some yellow birch and white ash. The understory is quite heavy to spicebush and especially in the largest area there is sweet pepperbush, highbush blueberries and azalea.

Lots #1, 2 and 3 have a very steep slope to an intermittent stream and wetland, which is only 300-400 feet from Wyassup Lake. Any pollution or sedimentation into this area will readily make its way into Wyassup Lake.

Lots #9 and 10 are also of concern for the same reason, very steep slopes into a wetland. (Based on plans seen on the field review day 04/19/88)

Wyassup West (6 Lots)

This area also would be classified as an oak/hickory type, although Lots #1 and 3 have a dominance of white ash, red maple and black birch as well as the oaks. The understory is mostly bluebeech.

The rest of the area is dominated by red/black oak with an understory of bluebeech, hornbeam and witch hazel. The designated wetlands are primarily red maple with yellow birch and a few black gum. The understory is varying amounts of spicebush, sweet pepperbush, highbush blueberry, azalea and species of the viburnum family.

Lots #5 and 6 will be difficult areas to site a house and prevent problems because of the steep slopes.

In general, although many of the slopes are quite steep, the oaks that are the dominant trees in this development are deep rooted and would not be particularly subject to windthrow, although some tree breakage may be expected around the edges of the tree canopy holes created in the houselot development. Any opening encroaching into or on the designated wetlands can be expected to cause significant windthrow.

Because of the large lot size, it is not expected that large contiguous openings will be made, which negate normal wind damage.

The designation of the open space area in Wyassup East and Wyassup West should help greatly to minimize the effects on these two streams.

8. FISH RESOURCES

SITE DESCRIPTION

A. Proposed Development Location - The proposed Wyassup Lake Subdivisions will be located south of Wyassup Lake, the primary surface hydrological feature of fisheries concern in the immediate area. A total of 27 bilding lots are proposed (minimum size 80,000 square feet). All residential lots will be served by on-site water and sewage disposal. Three wetland areas have been designated by the developer as "open space". The subdivision will not directly abut the lake; however, surface drainage from steeply sloped lands that characterize this property will ultimately drain into the lake or local streams. More specifically, lands on the Wyassup East Parcel (11 lots) drain into the outlet of Wyassup Lake, called Wyassup Brook. Wyassup Central (11 lots) drains into an extensive wetland habitat that directly outlets into the lake. Wyassup West (6 lots) drains into an extensive wetland of Yawbucs

Brook. (Plans used for review were those seen on the field review day 04/19/88). Consequently, subdivision housing development at these locations will have to be carefully planned to avert man-induced water pollution inputs to the lake and surrounding streams.

B. Wyassup Lake - Wyassup Lake, natural in origin, is 93 acres in size. A small dam, located on the southeastern portion of the lake, was built to raise original water levels. Maximum water depth is 28 feet with an average depth of 8.9 feet. Total watershed size is 518.4 acres, 4.4% of which is classified as urban and 95.6% as wooded or wet. Two small feeder streams drain into the northern section of the lake. Bottom substrate is comprised of a sand, gravel, rubble, and boulder mixture. The lake has been drawndown in the past for the control of water milfoil and spatterdock.

Surface waters of the lake are defined by the Department of Environmental Protection (DEP) as "Class A". Designted uses for this classification are as follows: potential drinking water supply; fish and wildlife habitat; recreational uses; agricultural and industrial supply.

Wyassup Lake is defined in limnological terms as in a "mesotrophic" state of eutrophication or lake aging. During the process of eutrophication as its fertility increases, a lake typically passes through three major states of succession; oligotrophy, mesotrophy, and eutrophy. The transition from one state to the next may take thousands of years; however, eutrophication can be rapidly accelerated by man-made inputs of nutrients such as excessive soil erosion,roadway runoff, and septic tank leachate. A "Mesotrophic" state of eutrophication essentially means that moderate levels of nutrient enrichment have occurred. Mesotrophic lakes are susceptible to the development of periodic "algae blooms" that will discolor the water and they support moderate amounts of aquatic weeds.

C. Wyassup Brook - The outlet stream of Wyassup Lake meanders southeasterly through wetlands habitat into Spalding Pond. Waters are classified as "A". Approximately 7 feet in width, this brook is comprised of alternating "pool" and "riffle" habitat types. Pools are hiding and resting areas for fish as opposed to riffles which are areas where fish actively feed. Some deep pools were observed up to 2 feet in depth. Predominant substrate consists of cobble (2-12" diameter) and rocks intermixed on sands and gravels. Instream habitat is comprised of undercut stream banks and large rocks. Streamside vegetative canopy, comprised of mixed hardwoods and a mountain laurel understory, provides adequate shading and cooling of stream waters. Shading is particularly important in the summer as stream water temperatures are naturally warm.

D. Yawbucs Brook - This "Class A" small stream which flows through wetland habitat on the proposed Wyassup West parcel is an important tributary of Shunock Brook. The brook was not surveyed at the time of the field review.

FISH POPULATION

Wyassup Lake primarily supports a warmwater fishery. The lake was "reclaimed" by the Bureau of Fisheries (all fish eliminated with a fish toxicant) in the late 1950's to develop and manage a strictly warmwater fish population. Today the lake is best known for its superior smallmounth bass fishing. Fish species which have inhabited this lake are: largemouth bass, smallmouth bass, chain pickerel, yellow perch, white perch, brown bullhead, white catfish, black crappie "calico bass", bluegill sunfish, pumpkinseed sunfish, golden shiner, alewives, and American eel.

Additionally, the Bureau of Fisheries stocks this lake with trout species to provide a recreational "put and take" coldwater fishery. More than 4,000 adult (9-12") brown and rainbow trout are introduced into the lake every year.

Wyassup Brook is expected to support a native brook trout population. Other types of stream fish such as blacknose dace, longnose dace, and white sucker may also inhabit this stream. Warmwater fish from the lake may periodically move into the brook from the lake during overflow periods, although successful survival and growth of typical lake fishes in stream habitat is limited. The specific fish composition of Yawbucs Brook is not known.

IMPACTS

The following impacts of the Wyassup Lake subdivisions on Wyassup Lake, Wyassup Brook, and Yawbucs Brook 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 steep sloped land on this development site presents a situation conducive to the development of serious soil erosion problems. Furthermore, steep slopes border wetland habitat. If a siltation problem developed, wetlands will provide a direct avenue for siltation into the lake or brooks. Subdivision lots of particular concern are: **Wyassup West Lots 5 and 6 and Wyassup Central Lots 7 through 10.**

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 the Wyassup Lake, Wyassup Brook, and Yawbucs Brook 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.

3. Percolation of septic effluent into the Wyassup 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 will reach a "eutrophic" condition more rapidly.

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.

5. Impacts to downstream environments -- any water quality problems and habitat degredation that directly occurs within Wyassup Lake and its outlet stream will eventually be observed in downstream areas such as Spalding Pond. Additionally, damaged to Yawbucs Brook can result in negative impacts to downstream sections of Shunock Brook. Shunock Brook is annually stocked by the Bureau of Fisheries with more than 1,200 adult brook, brown, and rainbow trout. Increased eutrophication (aging) or nutrient enrichment over time can be expected in Spalding Pond if it receives elevated levels of nutrient enrichment. Nutrient enrichment of Spalding Pond and Shunock Brook can result in the creation of dense algae blooms, sediment accumulation,nuisance amounts of aquatic vegetation, and increased production of microorganisms that cause fish disease.

RECOMMENDATIONS

Impacts on Wyassup Lake, Wyassup Brook, and Yawbucs Brook may be reduced by implementing the following recommendations:

1. Discourage residential development on the following lots:**Wyassup West Lots 5 and 6; Wyassup Central Lots 7 through 10.** Development limitations are severe on these lots. This recommendation is based upon the presence of severe slopes that are highly susceptible to erosion events once devegetation occurs. Additionally, wetlands are situated downslope of these lots. The potential for "filling-in" wetlands and sediment transport to aquatic habitats is great.

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.

Complete mitigation of silt runoff will be difficult to achieve at this subdivision location if development is allowed on steep slopes. Some siltation should be expected, although the severity is difficult to predict. Initially, wetland habitat will be affected. Wetlands will absorb some sediment before directly outletting this pollutant to Wyassup Lake or the brooks. If this development is approved, the Town of North Stonington should have an appointed official that would be responsible for inspecting this development on a **daily** basis to ensure that contractors have complied with all stipulated mitigation devices. Past lake and strem 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. The town must be willing to immediately issue a cease and desist order if proper compliance with recommended measures is not being met.

3. Maintain at the **minimum** a **100 foot** open space **buffer zone** along the boundaries of all wetlands -- no construction or alteration of habitat should be allowed in this zone. North Stonington officials should regulate the vast array of landowner 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; ODFW 1985). These buffers will absorb surface runoff and other pollutants before they can enter wetlands and aquatic habitats.

4. Properly design and locate individual septic systems (refer to **Geologic Development Concerns Section** for specific recommendations) -- the addition of septic effluent to Wyassup Lake can lead to accelerated eutrophication. All septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure.

5. 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. Non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

BIBLIOGRAPHY

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9. ARCHAEOLOGICAL REVIEW

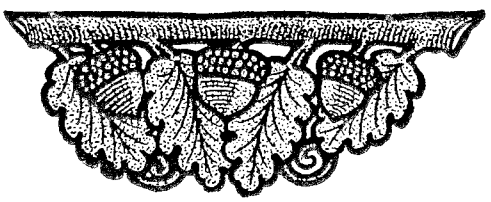
A review of the State of Connecticut's Archaeological Site Files and Maps show no prehistoric occupations within the boundaries of the proposed project area. However, knolls adjacent to wetlands were prime areas of prehistoric economic activity. The Wyassup Lake Subdivisions (West, Central, and East) contain such areas of concern.

Wyassup West contains low flat knolls the developer will set aside as open space. If development plans are altered an archaeological survey is recommended. In addition, Lot 6 of Wyassup West contains a large outcropping of bedrock with a natural ledge. These ledge locations provided an obvious shelter to prehistoric peoples. A small stone wall at the outcropping indicates historic use. If any blasting of the outcropping on Lot 6 is proposed, it is also recommended that an archaeological survey be conducted to mitigate these resources.

The Wyassup Central area has potential for prehistoric occupation along the small knoll adjacent to the wetlands and the lake. The existing development plans will maintain the area as open space. However, as mentioned above, if these plans should change, an archaeological assessment is advised.

Wyassup East has natural springs and Wyassup Brook in the northeast section of the development area. This low, wetland leads down to an historic mill (18th and 19th century) site off the project area. However, on-site inspection located a house foundation with probable association with the mill activities in Lot 8 of the subdivision. (Based on plans seen on the field review day 04/19/99) According to George H. Stone's historical account of North Stonington (Cracker Barrel Chronicle, North Stonington Historical Society, 1986), this is where the Dr. Asa Spalding mills formerly stood. The proposed development project should do everything possible to avoid impacting these historic features. An alternative would involve a professional archaeological excavation in order to locate and preserve all historical resources 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 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.



About The Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, 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 area.

The Team is 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, sanitary landfills, commercial and industrial developments, sand and gravel operations, 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 officials 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. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, a statement identifying the specific areas of concern the Team should address, and the time available for completion of the ERT study. 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 regarding the Environmental Review Team, please contact Elaine A. Sych (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.