

# **TIMBERLAND FARMS SUBDIVISION**

**WOODSTOCK, CONNECTICUT  
AUGUST 1989**



**Eastern Connecticut  
Environmental Review Team Report**

Eastern Connecticut Resource Conservation and Development Area, Inc.

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**REVIEW DATE: JULY 11, 1989**

**REPORT DATE: AUGUST 1989**

**Eastern Connecticut Environmental Review Team**

Eastern Connecticut Resource Conservation and Development Area, Inc.

P.O. Box 70, Route 154

Haddam, Connecticut 06438

(203) 345-3977

# ENVIRONMENTAL REVIEW TEAM REPORT ON

## TIMBERLAND FARMS SUBDIVISION WOODSTOCK, CONNECTICUT

This report is an outgrowth of a request from the Woodstock Planning Commission to the Windham 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, July 11, 1989. Team members participating on this review included:

<b>Nick Bellantoni</b>	<b>State Archaeologist</b>	<b>CT Museum of Natural History</b>
<b>Judy Bouse-Pahl</b>	<b>Regional Planner</b>	<b>Northeastern CT Council of Governments</b>
<b>Mark Edmonds</b>	<b>Soil Conservationist</b>	<b>USDA-Soil Conservation Service</b>
<b>Dan Mayer</b>	<b>Environmental Analyst</b>	<b>DEP-Water Resources Unit</b>
<b>Nancy Murray</b>	<b>Biologist</b>	<b>DEP-Natural Resources Center</b>
<b>Elaine Sych</b>	<b>ERT Coordinator</b>	<b>Eastern CT RC&amp;D Area, Inc.</b>
<b>Bill Warzecha</b>	<b>Geologist/Sanitarian</b>	<b>DEP-Natural Resources Center</b>

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 subdivision plans. The Team met with, and were accompanied by the Woodstock First Selectman, the Woodstock Building Official, the Chief Sanitarian from the Northeast District of Health, an SCS Soil Conservationist, the landowner and his engineer. 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  
P.O. Box 70  
Haddam, Connecticut 06438  
(203)345-3977

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## 1. SETTING, ZONING AND LAND USE

The proposed residential subdivision, about 103 acres in size, consists of wooded land and agricultural fields that are proposed to be divided into 58 single family building lots. Lot 59 in the southeast corner constitutes the proposed open space area for the subdivision. It may also serve as the site for creation of a stormwater detention facility. The subdivision is located in western Woodstock about 1/2 mile east of the Eastford town line. The site abuts Route 197 on the south, Route 198 on the east, and private, undeveloped land on the north and west. There are five farm fields located on the site totalling about 16 acres. The remainder of the land is wooded.

Each of the proposed lots would be served by individual on-site septic systems and wells. Access to the interior portions of the site will be accomplished by two new roads (Deer Run and Timberland Drive) via Route 198 and Route 197, respectively. Highland Court, a cul-de-sac off Deer Run, occurs at the northwest corner of the site. Timberland Drive also terminates as a cul-de-sac at the northeast corner.

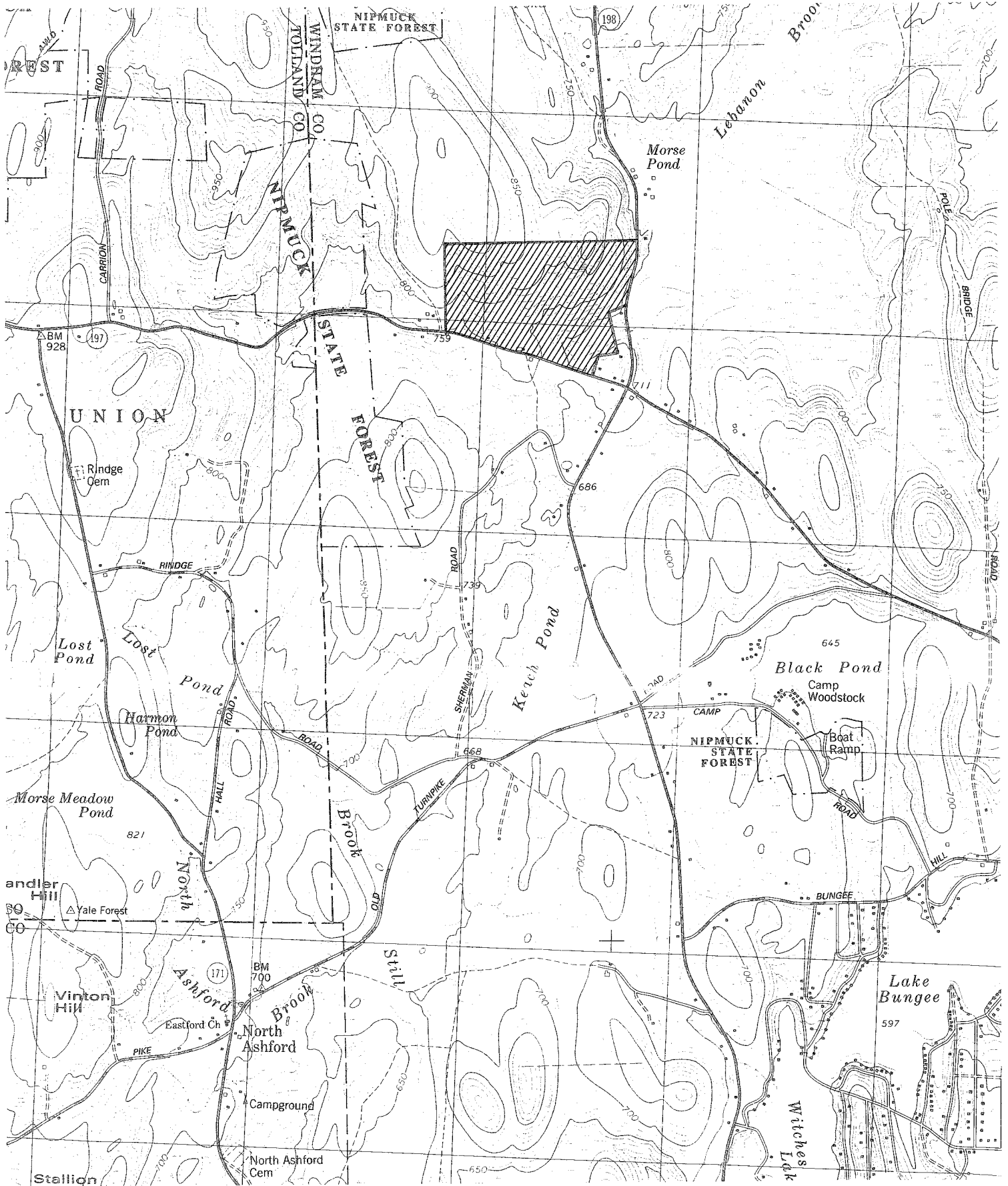
According to Woodstock's Land-Use regulations, the minimum lot size for a single family dwelling is 1.25 acres. The lot shall provide contiguous buildable area of at least 3/4 acre, exclusive of inland wetland soils. If exploration for subsurface sewage disposal reveals conditions that would be deemed "areas of special concern", then the contiguous building area is doubled. The following are determined to be areas of special concern:

- 1) **A minimum soil percolation rate faster than one inch per minute;**
- 2) **A minimum soil percolation rate slower than one inch in thirty minutes;**
- 3) **Maximum ground water less than three feet below ground surface;**
- 4) **Ledge rock less than five feet below ground surface;**
- 5) **Soils with slopes exceeding twenty-five percent;**
- 6) **Soils consisting of soil types interpreted as having severe limitations for on-site sewage disposal by most recent edition of the National Cooperative Soil Survey of the Soil Conservation Service;**
- 7) **Soils designated as inland wetland under the provisions of Sections 22a-36 through 22a-45 of the Connecticut General Statutes, as amended;**
- 8) **Areas located within the drawdown area of an existing public water supply well with a withdrawal rate in excess of fifty gallons per minute, or within 500 feet of land owned by a public water supply utility and approved for a future well site by the Connecticut Commissioner of Health Services.**

Interior lots shall be a minimum of 2 1/2 acres. Lot 6 and Lot 59 (the proposed open space area) appear to be the only interior lots in the subdivision.

# LOCATION MAP

Scale 1" = 2000'





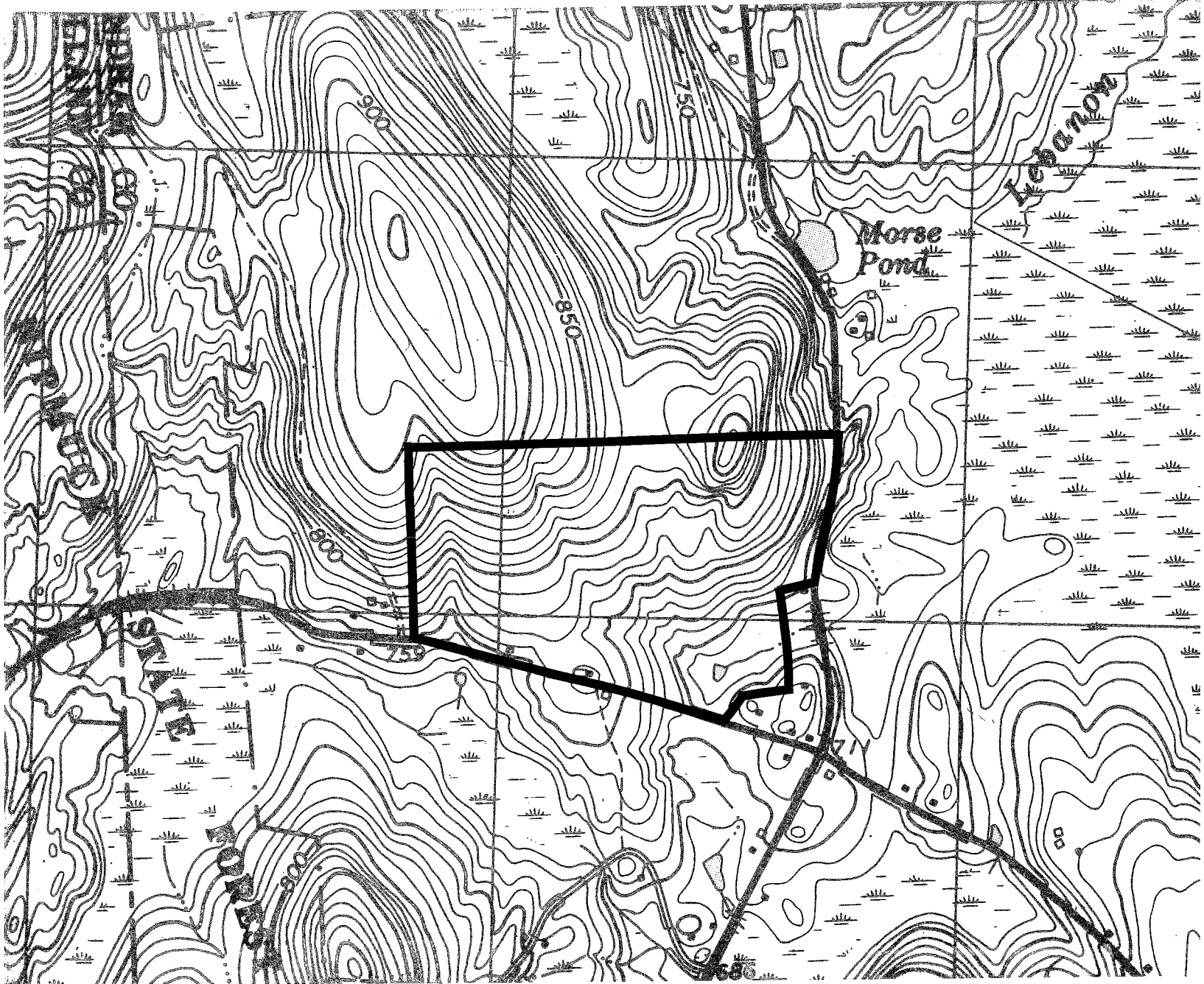
## **2. TOPOGRAPHY**

The subdivision site is located at the southern end of a rock-cored, streamlined hill whose main axis is orientated northwest-southeast. The main axis of the hill, which is a drumlin, parallels the movement of glacial ice that occupied the region about 15,500 years ago. The grade ranges from about 910 feet above mean sea level at the northwest corner to 690 feet above mean sea level at the southeast corner of the site. In general, the land slopes moderately steep to the south. Steepest slopes occur near ledge rock outcrops at the eastern limits.

# TOPOGRAPHIC MAP

Scale 1"=1000'

 Approximate Site Boundary



### 3. BEDROCK GEOLOGY

Bedrock is visible at ground surface in numerous areas in the eastern limits. Exploration for on-site subsurface sewage disposal systems, the majority of which has occurred in the western and southern parts, indicates that depths of 6 to 7 feet (84") were obtainable in most holes.

The bedrock underlying the site has been identified as Bigelow Brook Formation and two subunits. The majority of the rock consists of conspicuously banded, brownish gray, fine to medium grained schist and gneiss composed of the minerals biotite, sillimanite and garnet.

A narrow band of rocks, rich in graphite and sulphide bearing minerals (pyrite and pyrrhotite), occurs near Lots 37-40. These rocks, which are a subunit of the Bigelow Brook Formation, are medium gray to purplish gray but weather rusty brown or sulphur yellow.

The final subunit occurs southeast of the band mentioned in the preceding paragraph and is generally aligned with Lots 42-48. This rock unit consists of conspicuously banded dark and light gray gneiss that contains the calc-silicate minerals diopside and green hornblende.

The terms "gneiss" and "schist" used above refer to the textural aspect of the rocks. Both are crystalline, metamorphic rocks (geologically altered by great heat and pressure). "Gneisses" are coarse grained rocks characterized by the relatively parallel orientation of mineral grains with massive to platy appearance. Gneissic rocks respond to structural forces within the earth's crust by fracturing and forming distinct open joints.

Schists are characterized by the abundance and parallel orientation of fine grained mica and by the ease of which they part into thin layers. Unlike gneissic rock, schists respond to structural forces by slipping and folding along the layering or foliation places.

According to Map GQ-1063, "Geology of the Eastford Quadrangle", by M. H. Pease, 1973, fault zones have been mapped in the eastern parts. It is expected that the bedrock in the area of the faults is fractured and weathered in the upper few hundred feet, which may increase its ability to transmit water to drilled wells. The fault zones mentioned above happened during the geologic past and are no longer experiencing active movement. The underlying bedrock will be the major aquifer for domestic wells drilled on the site. (see WATER SUPPLY Section)

# BEDROCK GEOLOGIC MAP

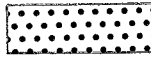
Scale 1" = 1000'



Bigelow Brook Formation - conspicuously banded, brownish-gray, fine to medium grained biotite-silimanite-garnet-schist and gneiss.



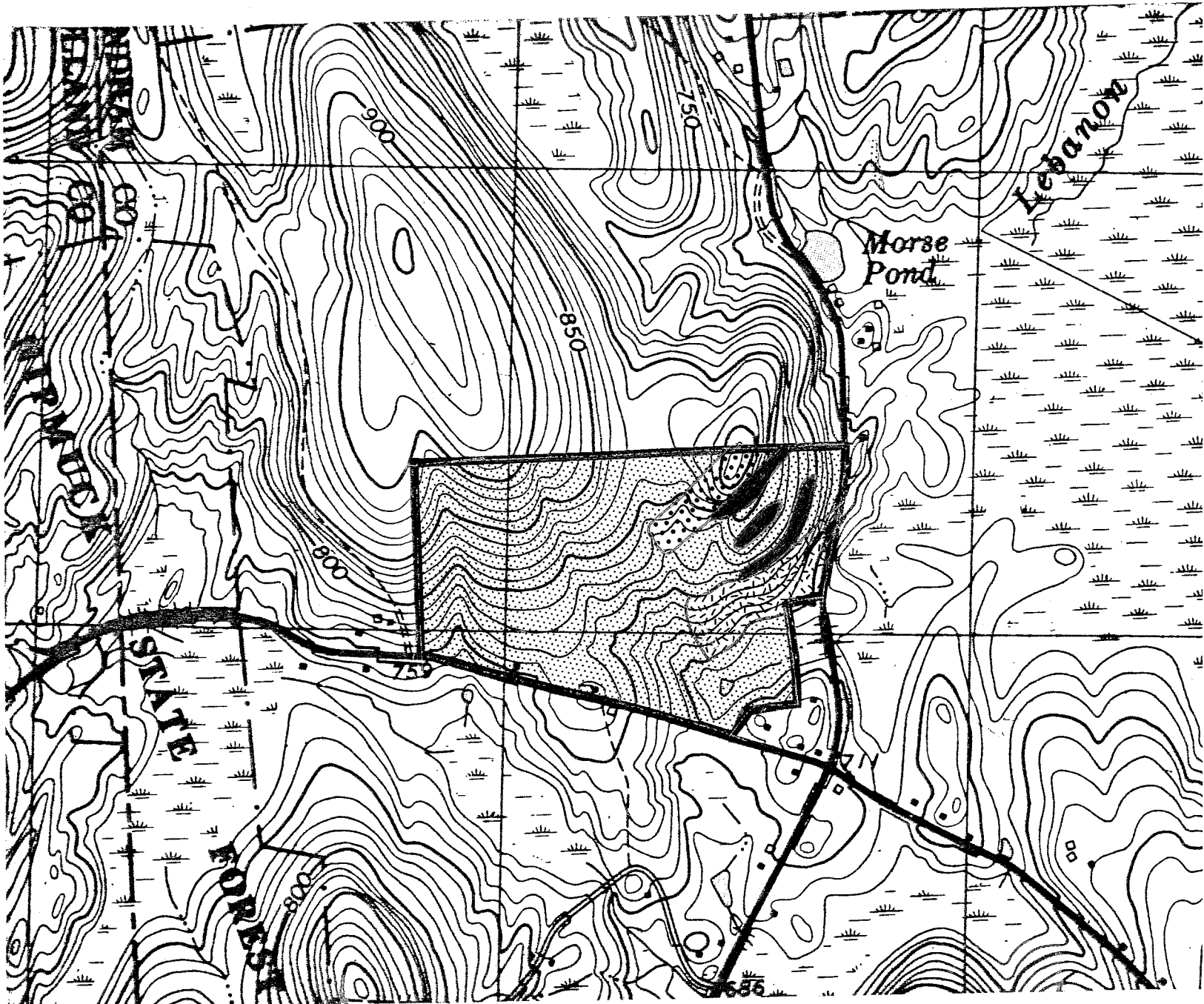
Bigelow Brook Formation Subunit - diopside biotite gneiss



Bigelow Brook Subunit - graphitic sulfidic gneiss



Rock Outcrops



## 4. SURFICIAL GEOLOGY

Most of the subdivision site is covered by till. Till is a glacial sediment that was deposited directly from glacier ice. The sediment which is dark olive brown to olive gray in color consists of varying proportions of sand, silt, gravel, clay, and boulders. Particles of different sizes are generally mixed together in a complex fashion.

Based on soil mapping data for the area and deep test hole information supplied by the applicant, the texture of the till covering the site ranges from sandy, very stony and loose to a silty, very stony variety. The latter variety of till is characterized by a relatively shallow compact soil zone. The presence of this compact soil zone usually results in seasonally high water tables, soil mottling (an indicator of high groundwater tables) and moderately slow to slow percolation. Many of the deep test holes excavated on the site verify that the till covering the site includes one or more of these characteristics. Without proper planning and engineering, the seasonally high water table can be a major hindrance in terms of on-site sewage disposal and road and driveway construction, particularly in cut areas. Also there is the potential for wet basements. Consideration should be given to installing building footing drains on those lots characterized by seasonally high water tables. Footing drains will hopefully keep basements dry. (See **SEWAGE DISPOSAL** Section)

The southeast corner of the site is covered by stratified sands and gravels. Visual observations made during the field walk indicate that the stratified drift deposits are mostly pebble-gravel sized. They were laid down by glacial meltwater streams. The deposits are presently being mined on the site. Due to the highly permeable nature of the sand and gravel in these areas, it is expected that these deposits are characterized by rapid percolation rates. The exact thickness of the stratified drift on the site is unknown, but it probably does not exceed 10 feet in most places.

According to the site plan made available to Team members, regulated wetlands have been mapped on the site by a certified soil scientist. It is suggested that the soil scientist who performed the field work review the wetland boundaries shown on the site plan, then sign and date the map indicating the information is an accurate representation of conditions in the field.

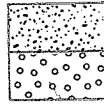
Wetlands occur in two areas on the site. The major wetland system bisects the central parts of the site in a northwest/southeast direction. Surface water that collects in this system is

ultimately routed to a large wetland east of Route 198. A relatively narrow wetland system flows through Lot 1 and Lots 23-26 at the western boundary line of the site. Surface and subsurface water discharging in this wetland flows under Route 197 and is tributary to an unnamed streamcourse that empties into Keach Pond.

Soils information provided to Team members indicates that the soils comprising the wetlands consist of Rn-Ridgebury, Leicester and Whitman extremely stony fine sandy loams. Soil texture and mottling indicates a seasonally high water table at an average depth of approximately 6 inches in the Ridgebury and Leicester soils, and at or near the surface in the Whitman soils. (Also see **SOIL RESOURCES** section)

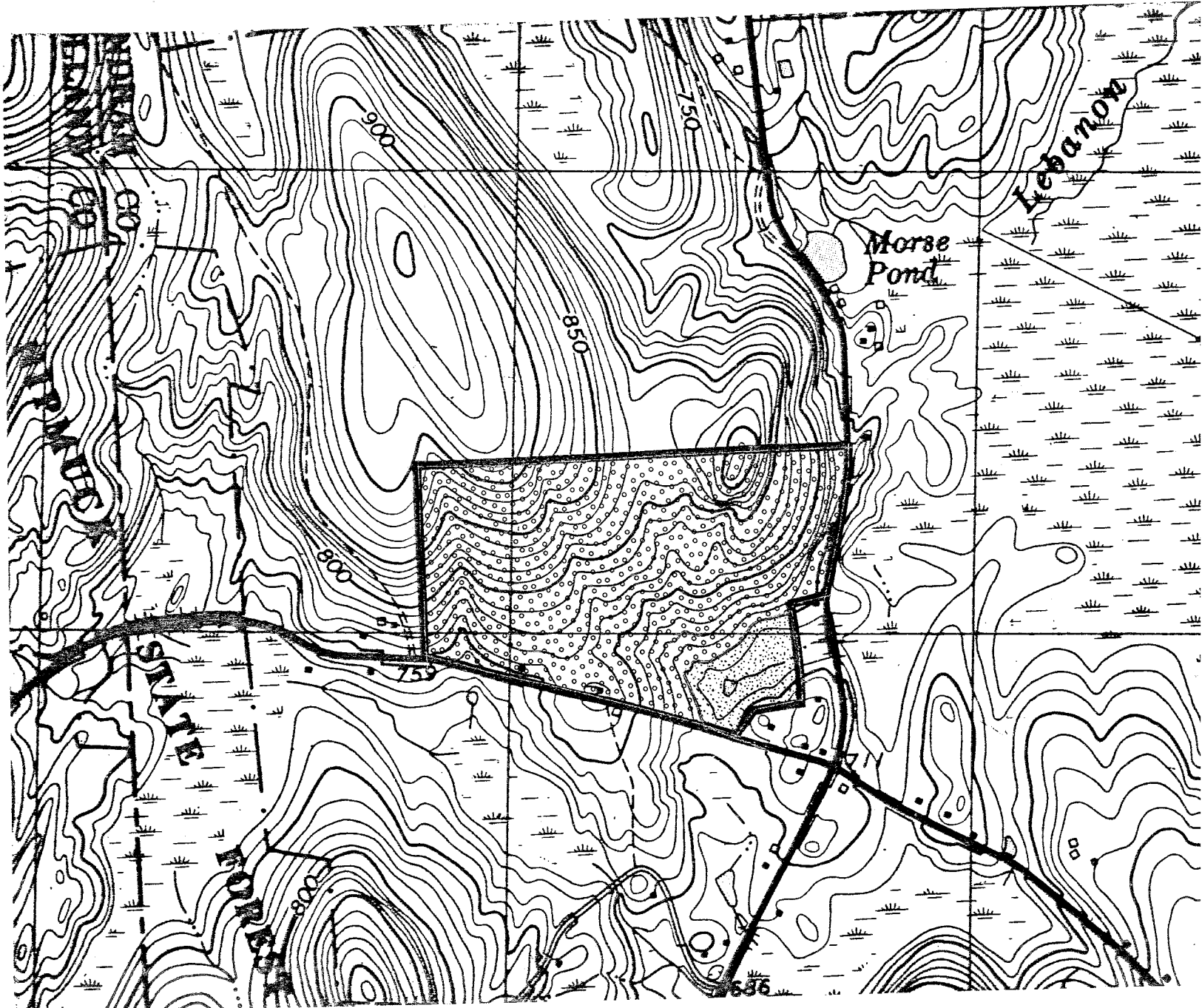
# SURFICIAL GEOLOGIC MAP

SCALE 1" = 1000'



Stratified Drift (sand and gravel)

Till



## 5. SOIL RESOURCES

The soils range from excessively well drained Brookfield-Brimfield soils (BkC, BkD) to poorly drained RidgeburyLeicester-Whitman (Rn) soils. While assisting the Department of Health, a Soil Conservation Service soil scientist looked at the soils in greater detail than the mapping done for the Windham County Soil Survey. The revised soil series delineations are shown on the accompanying soil map. Of the 103 acres, approximately 21 acres are Prime Agricultural Land (CbB, PbB) and approximately 9 acres are Farmland of Statewide Importance (CbC, PbC).

The Canton-Charlton soils (CbB, CbC, CdC) have little or no limitations for septic systems, except in areas of pure Canton soil, where filtering is fair to poor. In these areas systems should be designed to keep infiltration rates to acceptable levels. Brookfield-Brimfield soils (BkC, BkD) have limitations due to shallow depth to bedrock, except in the valley areas where soils tend to be deeper. When installing septic systems in either of these soil groups, slopes steeper than 15% should be avoided due to the potential for effluent to break out at the surface. Paxton soils (PbB, PbC, PeC) have limitations for septic systems due to slow percolation rates and a seasonal high water table on top of the hardpan. Absorption fields are generally designed with fill and/or curtain drains, drainage swale and a larger area for the distribution of effluent.

As a result of overland flow, some pits in well drained soils filled with water. This does not reflect on the soil's capacity for absorption fields, but indicates the need to direct surface water around house and septic locations on sites at low slope positions. So far test pits have been a scattered sampling. Testing required for individual lots will reveal whether the number of systems required for the proposed development are feasible, based on existing Department of Health standards. (Also see **SEWAGE DISPOSAL** section)

Residential development of the area will increase stormwater runoff and increase the potential for erosion. An erosion and sediment control plan should be prepared according to town regulations, showing measures planned during road construction and for individual lots. Road construction should be completed prior to clearing any lots. Development could be phased so the road is completed in sections and lots developed in each section prior to beginning the next road section. Land clearing should be kept to a minimum to maintain as much stable vegetated land as possible. The Windham County Soil and Water Conservation District will review a detailed erosion and sediment control plan if requested.



Steep slopes in the area are a concern for both erosion and construction. Specially designed, multi-level construction may best fit on these slopes to minimize cutting and filling. If steep driveways are not paved they may pose a continual erosion control problem. Additionally, in areas with hardpan soils, cuts may "bleed" water, making slope stabilization more difficult.

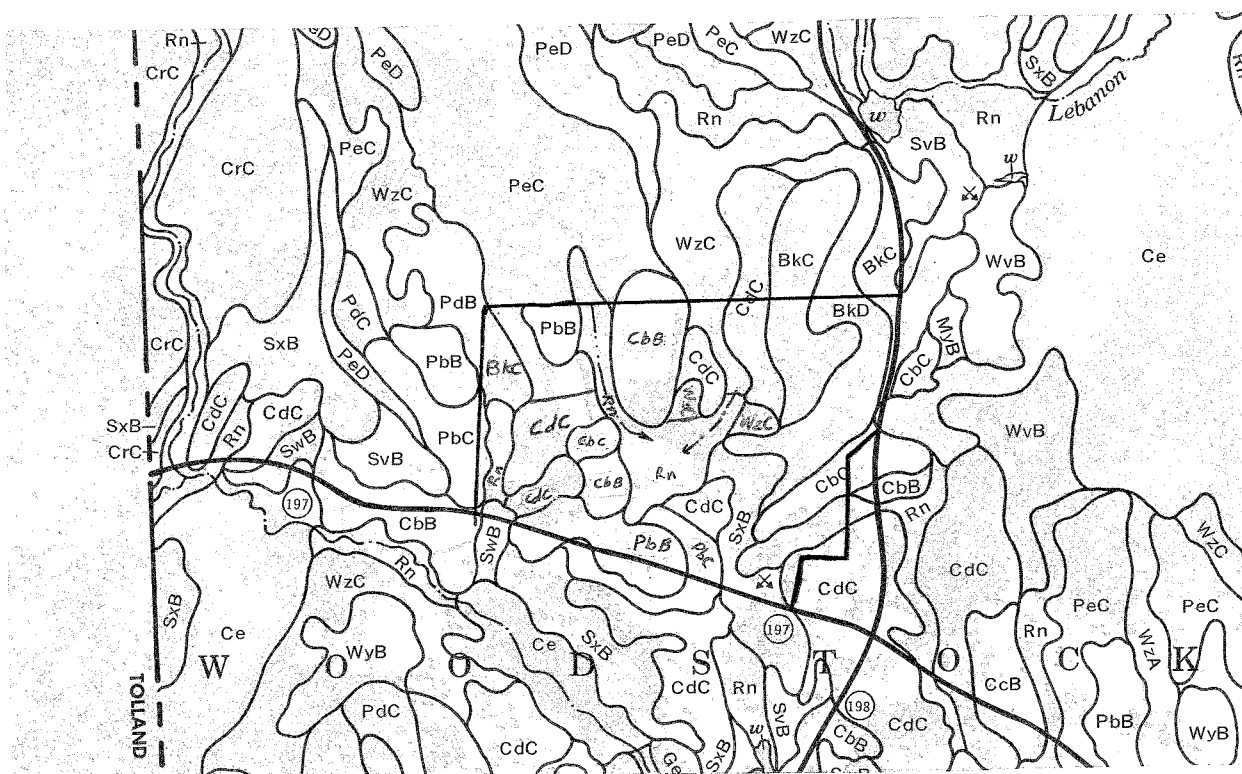
Mr. Eisenhaur has a shallow well in the main wetland corridor and plans to continue use of this well after development. With a road crossing and at least a portion of several lots in the watershed above the well, a reliable supply of quality drinking water is questionable. Possible contaminants could include lawn fertilizers and chemicals, oil, and road salt. (Also see **WATER SUPPLY** section)

The developing engineers' calculations show a need for stormwater detention to maintain pre-development runoff under Route 198. Design of the detention area should be such that it compliments the adjacent wetland areas, and is not detrimental to them. The ownership and maintenance of unbuildable "Lot 59", with the detention basin and wetlands, should be decided at the time the subdivision is approved. (Also see **WETLAND AND WATERCOURSE REVIEW** section)

# SOIL MAP

Owner Wilson Eisenhauer Operator \_\_\_\_\_  
 County Windham State Connecticut  
 Soil survey sheet(s) or code nos. #5 Approximate scale 1"=1320'  
 Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating  
 with Windham County Soil and Water Conservation District

Revised Soil Survey - July 1989



## SOILS

- BkC - Brookfield-Brimfield fine sandy loams, very rocky, 3 to 15 percent slopes.
- BkD - Brookfield-Brimfield fine sandy loams, very rocky, 15 to 35 percent slopes.
- #CbB - Canton & Charlton fine sandy loams, 3 to 8 percent slopes.
- CbC - Canton & Charlton fine sandy loams, 8 to 15 percent slopes.
- CdC - Canton & Charlton extremely stony fine sandy loams, 3 to 15 percent slopes.
- #PbB - Paxton fine sandy loam, 3 to 8 percent slopes.
- PbC - Paxton fine sandy loam, 8 to 15 percent slopes.
- PdB - Paxton very stony fine sandy loam, 3 to 8 percent slopes.
- PeC - Paxton extremely stony fine sandy loam, 3 to 15 percent slopes.
- \*Rn - Ridgebury, Leicester & Whitman extremely stony fine sandy loams.
- SwB - Sutton very stony fine sandy loam, 3 to 8 percent slopes.
- SxB - Sutton extremely stony fine sandy loam, 3 to 8 percent slopes.
- WzC - Woodbridge extremely stony fine sandy loam, 3 to 15 percent slopes.
- #Prime farmland soil
- \*Designated wetland soil by Public Act 155

## 6. HYDROLOGY

Surface drainage as well as subsurface drainage, which tends to mimic the surface flow on the site, can be divided into two areas; (1) the western third of the site drains to an intermittent streamcourse and its accompanying wetlands, which routes the water under Route 197 to Keach Pond; (2) the central and eastern portion of the site drains to the pond/wetland system located in the southeast corner. The outlet stream for the pond is routed under Route 198 to a very large wetland that Lebanon Brook flows through.

The subdivision of the property as planned followed by the construction of homes, roads and driveways can be expected to lead to increases in runoff from the site.

The drainage plan for the proposed project indicates that the road drainage which may intercept runoff from driveways, roof leaders, and curtain/building footing drains would be collected and piped to various discharge points. The discharge points and the methods for protecting the outlets were not shown on the plan. A few potential detention basin sites which will maintain post development flows at pre-development flows are shown in the southeast corner of the site. No details were shown on the plan. Since wetlands have natural detention capabilities, it would be wise to construct detention facilities on upland soils of the site, but only if hydrologic computations show that there is a need for on-site detention. (See **WETLAND AND WATERCOURSE REVIEW** section)

It is suggested, that once plans become more definite (i.e., number of house lots determined, new roads required, etc.) that a hydrologic study that includes a summary report be prepared for the Town.

The report should demonstrate that no adverse impacts such as flooding or erosion (streambank) are anticipated from post-development flows. All downstream culverts should be checked for adequacy. Connecticut's Guidelines for Soil Erosion and Sediment Control (1988) should be closely followed paying special attention to Chapter 9.

A detailed and site specific soil erosion and sediment control plan should be developed and implemented for the development. Areas of concern include the proposed roadway crossing of the watercourses on the site and their accompanying wetlands, storm drain outlets near wetlands or watercourses and stabilization of the cuts and fills that may be necessary to construct roads and

driveways. The plan should be developed using the criteria contained in the Connecticut Guidelines for Soil Erosion and Sediment Control (1988) and enforced by the Town.

The till soils covering parts of the site are characterized by a "hardpan" layer. Deep cuts, (i.e., roads, driveways, etc.) into soils with "hardpan" layers are extremely difficult to stabilize due to seepage of groundwater over the compact zone (hardpan layer). The water creates an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to move downslope. After this begins, the slope is extremely difficult to stabilize. The establishment of a good vegetative cover is practically impossible on these eroding slopes.

Another concern is that partially treated effluent may break out at the cut embankments if the leaching field is located too close to the embankment. Unless permeability testing can demonstrate that sewage effluent will be properly renovated before reaching the cut embankment, it is recommended that no portion of the primary or reserve leaching area be located 75 feet from the cut embankment in these soils.

Especially in the eastern parts of the site, it is expected that road construction may encounter the underlying bedrock and require blasting. Because of the mineralogy of the Bigelow Brook Formation and its subunits underlying the site, there is a chance that freshly blasted rock may change the physical and chemical quality of water which it comes in contact with. Of special concern would be the potential for acid mine drainage problems to impact the aquatic environment of ground or surface waters on or off the site. Every effort should be made not to deposit any rock material near surface water bodies or too close to the groundwater table, if it is found to have acid production potential. Modification of experiments such as acid/base accounting and simulated weathering experiments can be used to predict the field occurrences of acidic drainage in the Bigelow Brook Formation and its subunits on the site.

The project calls for three wetland road crossings of  $\pm 25$  feet,  $\pm 50$  feet, and  $\pm 12.5$  feet. Wetland road crossings are feasible, provided they are properly engineered. Provisions should be made for removing unstable material beneath the roadbed, backfilling with a permeable road base fill material, and installing culverts as necessary. When crossing any wetlands, the roads should be at least 1.5 feet and preferably 2 feet above the surface elevation of wetlands. This will allow for better drainage of the roads. It will also decrease the frost heaving potential 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.

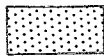


# WATERSHED BOUNDARY MAP


Scale 1" = 1000'

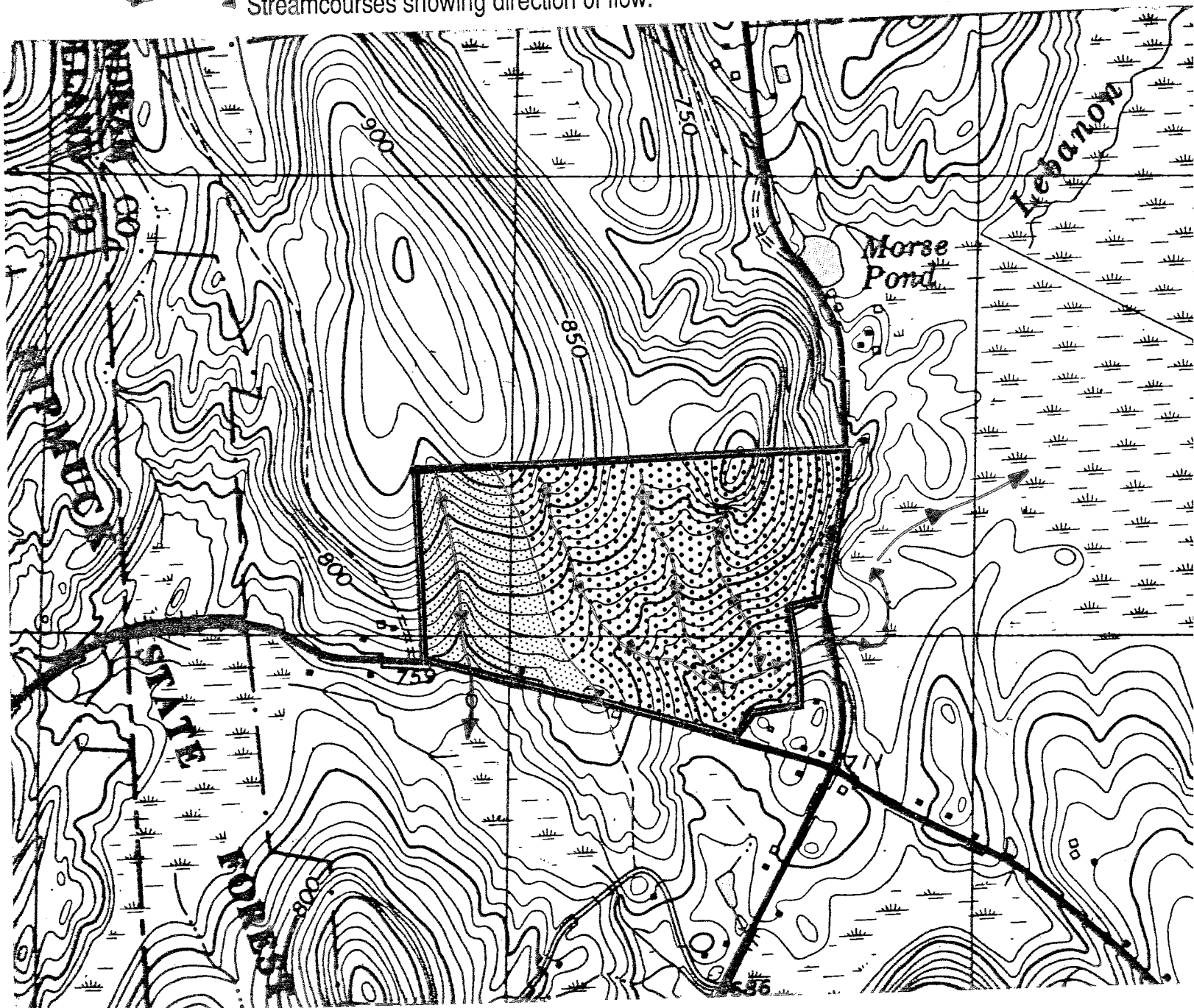


Portion of site that drains to large wetland east of the site through which Lebanon Brook flows (GA groundwater).



Portion of site that drains to an unnamed streamcourse which is the main feeder stream to Keach Pond (GAA groundwater).

 Streamcourses showing direction of flow.



## **7. WETLAND AND WATERCOURSE REVIEW**

### **Wetland Classification and Function**

The wetland systems which exist on site are primarily drainageways and swales which carry runoff as well as waters from a spring located in the area of Lots 54 and 56. The majority of the wetlands are associated with the drainage network located in the central portion of the site which flows southeast to an old farm pond, and eventually discharges into the headwater wetlands of Lebanon Brook. There is also an intermittent watercourse flowing along the western boundary of the site which contributes to the Keach Pond watershed. As defined by the U.S. Fish and Wildlife Service the wetlands found on site are classified as follows:

**POWH Palustrine, open water, permanent.**

**PFOIE Palustrine, forested, broad leaved deciduous, seasonally saturated.**

While most of the wetlands found on the site are saturated only intermittently throughout the year, they still exhibit a variety of functions, including water conveyance, water renovation, sediment trapping, aesthetics, water supply and wildlife habitat. Overall, the wetlands on this site are of good quality and functional value.

### **Development Impacts**

The proposed development includes three roadway crossings of wetland areas and the construction of a detention facility for runoff which will be generated from the site. Additionally, the development will include a septic system and well to serve each individual house lot proposed (58 total lots, one open space lot). Two of the crossings, (Deer Run between Lots 29 & 56, and Timberland Drive between Lots 49,15 & 16), are located high up in the drainage swales and will have little impact on the function of the wetlands. The third crossing is located along Timberland Drive between Lots 12-13 and 53-55. Although this is the largest of the roadway crossings it appears that few long term impacts to the function of the wetlands will occur if disturbance is limited to the minimum necessary, no unnecessary clearing of vegetation is allowed, stabilization is well planned out and implemented as quickly as possible, and proper erosion and sedimentation controls are used. With regard to the detention basin, the applicant had designated three potential areas for its location, (A,B & C on the plans). Of these three potential locations Area "A" (Lot

59) presented the most suitable setting for the purposes of detention and also presented the least amount of wetland disturbance and encroachment. The issue of potential impacts to the wetlands and groundwater in the area from the proposed septic systems is speculative based upon the information available to this point. Ideally, a site plan which possessed larger lots and a lower density would reduce the potential risk of effluent reaching the water resources in the area. However, based upon the information available the site does appear to be capable of handling the proposed density of systems.

### **Recommendations and Conclusions**

1) The proposal possesses limited impacts to the wetlands and watercourses on site. The commission may want to consider including permit conditions which would define the staging of the construction to be done on the site as well as specify any sediment and erosion controls maintenance requirements which the commission may view as appropriate.

2) The location of the proposed detention facility at Area "A" (Lot 59) would require the least degree of wetland disturbance and encroachment while still providing the functions needed to handle stormwater runoff from the site.

3) It is recommended that the applicant explore the possibility of expanding the lot sizes to a minimum of 2 acres. Such change could maintain the feasibility of the project while reducing the potential risk to the water resources of the area from effluent runoff.

4) It is the opinion and recommendation of the DEP-Water Resources Wetland Unit that proposed Lot 59 be eliminated from the plans if it is to be a building lot. This is the only lot proposed within the plan which would require the crossing of and encroachment upon wetlands. This lot would also disturb much of the integrity of the habitat which exists in this portion of the site. Additionally, there is a greater risk of effluent contamination from this lot due to its proximity to the surrounding wetland system, soils and layout.

## 8. WATER SUPPLY

Based on review of hydrogeologic data, the principal aquifer on the site is the underlying crystalline, metamorphic rock. Although sand and gravel deposits can be favorable for ground water development, the deposits in the southeast corner would probably be too thin and of insufficient areal extent. Wells drilled in bedrock generally supply small but reliable yields of ground water that fill openings (fractures and joints) in the rock. They are also more flexible and generally afford greater protection than shallow wells (dug or driven). 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 the fracture is irregular, there is no practical way to predict the yield of a well in a specific location, outside of drilling the well first. Experience has shown that openings such as fractures usually occur within the first few hundred feet of the bedrock surface. Below this depth, the presence of fractures tend to decrease in number. As a result the chance of increasing the yield of a well usually decreases with depth. The presence of mapped faults in the eastern parts may have increased the secondary porosity and hydraulic conductivity of the bedrock aquifer by creating fractures, cracks and openings in the rock.

Using some basic assumptions, the Team's geologist evaluated available recharge and predicted water use of the subdivision to estimate the potential impact on the bedrock aquifer. Specifically, recharge calculations show that the amount of water available to the site each day is about 60,000 gallons. This is based on groundwater recharge amounts of 8 inches per year for an upland, mostly till-covered site and 100 pervious acres (less 3 acres for impervious surfaces) allowing for infiltration. Predicted water use at the site is estimated at 17,400 gallons per day per capita water usage. This is based on a 75 gallon per day per capita water usage. An assumption of 4 persons per single family residence (58 lots) was used.

Based on these figures, it is estimated that the planned subdivision will receive about 3.5 times the recharge as is necessary to balance water demand. In addition, induced recharge by properly renovated septic system effluent (about 95%) plays an important role in the groundwater budget. The latter stresses the need for properly designed and installed septic systems.

It must be kept in mind that the computations in the preceding paragraphs assumes the underlying bedrock is fractured and is capable of transmitting usable amounts of water to the proposed wells. This cannot be determined exactly without first drilling the well.



Where possible, new wells should be spaced 200 feet or more between each other. This will provide about one acre (200' x 200') or 595 gallons per acre of direct discharge to each well. This separation distance should help to minimize the chances for mutual interference between pumping wells. The latter assumes the fractures in the underlying bedrock are saturated and capable of transmitting water to a well.

Each well should ideally be located on a relatively high portion of the lot, properly separated from the sewage disposal system or any other potential pollutant (e.g., road drainage, curtain drain pipe, 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 quality of bedrock water, all wells will need to be properly installed in accordance with all applicable State Public Health Code and Connecticut Well Drilling Board regulations. In addition, the District sanitarian will need to inspect and approve well locations.

The natural quality of groundwater should be satisfactory. As mentioned in the **BEDROCK GEOLOGY** section of this report, the rock units underlying the site may have undesirably high concentrations of iron and manganese. Additionally, the rock units having sulfidic and graphitic schist layers may produce high sulphide concentrations. The sulphide would be recognizable by its foul smell (rotten egg odor) and the iron or manganese by its reddish or blackish staining qualities. Filters are available on the market to remove most undesirable mineral induced concentrations of elements in well water.

Except for the western parts of the site, groundwater in the area is classified by the Department of Environmental Protection (DEP) as GA, which means that it is suitable for private drinking water supplies without treatment. (Water Quality Classifications Map of Connecticut, Murphy, 1985.) The western parts (approximately west of the cart path on the site plan) is located within a GAA area. This means ground waters are within a public water supply watershed. The water is presumed suitable for direct human consumption.

Because of the site's existing water quality and because leakage from underground fuel storage tanks is a frequent cause of groundwater contamination in the State, it is recommended that residential tanks of this nature be prohibited on the site.

Team members were informed on the review day that there is an active spring located on the proposed Lot 53 which serves the Eisenhower homestead. It is not shown on the site plan. Development of the site for residential purposes undoubtedly poses a threat to the water quality of

the spring. If the subdivision is approved, it would be wise to abandon the spring in compliance with Connecticut Well Drilling Board Rules and Regulations and a new well be drilled on the Eisenhower property.

## 9. SEWAGE DISPOSAL

Sewage disposal in this rural part of Woodstock depends upon the installation of private on-site subsurface sewage disposal systems. Subsurface exploration by the applicant's engineer has been conducted in some areas of the site. The result of these deep test holes was made available to Team members on the review day.

Based on deep test hole information, soil mapping data and visual observation made during the field walk, the major geologic limitations with respect to subsurface sewage disposal on the site are: **(1)** areas of steep slopes in the northeast corner where bedrock is at or near ground surface; **(2)** the presence of shallow to bedrock soils in the eastern parts; and **(3)** the presence of till soils which may have moderately slow to slow percolation rates and which may be characterized by seasonally high water tables. As noted earlier, sand and gravels soils occur in the southeast corner of the site. While these soils are generally favorable for on-site sewage disposal, there is a concern that they may be too permeable and therefore have little opportunity to be renovated by the soil components. If the percolation rate of these soils in this area is faster than 1 minute/inch, the separating distance between on-site wells and septic systems should be doubled (150 feet instead of 75 feet). This will hopefully help to minimize the chance for well pollution.

Soil testing for on-site sewage disposal has not been completed for the entire site. Certainly in the eastern parts where rock outcrops and shallow ledge rock soils occur, a comprehensive testing program is needed for information relative to possible variation in ledge rock depths. Of particular concern will be those areas where ledge rock is at 4 feet or less.

Soil testing completed to date which has occurred mainly in the southeast corner of the site revealed moderately favorable conditions for on-site sewage disposal but that the presence of seasonally high water table conditions, shallow soil mottling and slow percolation will necessitate specially designed (engineered) septic systems on many lots. For lots with seasonally high ground water tables, improvements such as intercepting drains for leaching systems with suitable well drained fill material will probably be required. In areas of shallow to bedrock soils as well as those with seasonally high water tables, every effort should be made to keep leaching fields shallow, relatively large and spread out over the contours to enhance lateral disposal.

While Town land regulations would require minimum lot sizes of 1.25 acres, subsurface conditions throughout the 103 acres have a number of obvious and apparent adverse conditions

and limitations for sanitary and environmental purposes. It seems reasonable to expect that for subdivision feasibility larger lots of varying sizes may be necessary in order to mitigate various conditions and concerns.

Before a possible approval is granted for the subdivision, the applicant's engineering firm must demonstrate 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 State's Public Health Code and the Town's land-use regulations.

The process should be a coordinated effort between the design engineer and the Northeast District Department of Health. Since it is expected that some lots will be deemed 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 district health department for review and approval by their certified staff.

The final configuration of lots should not be approved until the district health department is assured of the feasibility of each lot meeting all of the State Health Code Requirements and Town regulations.

As explained earlier, the western third of the site lies within a GAA area, a public water supply reservoir watershed (Willimantic Water Works). Included with this report is a copy of Section 19-13 B32, Sanitation of Watersheds, (a-i), which addresses the protection of water quality from subsurface sewage disposal systems and storm drainage systems in public water supply watersheds.

**Sec. 19-18-B32. Sanitation of watersheds.** Unless specifically limited, the following regulations apply to land and watercourses tributary to a public water supply including both surface and groundwater sources.

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

(b) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located within one hundred feet of the high water mark of any reservoir or within fifty feet of the high water

mark of any stream, brook, or watercourse flowing into any reservoir used for drinking purposes.

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

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

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

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

(g) Where fertilizer is identified as a significant contributing factor to nitrate nitrogen occurring in excess of 8 mg/l in a public water supply, fertilizer application shall be made only under current guidelines established by the commissioner of health in cooperation with the state commissioner of agriculture, the college of agriculture of the University of Connecticut and the Connecticut agricultural experiment station in order to prevent exceeding the maximum allowable limit in public drinking water of 10.0 mg/l for nitrate plus nitrate nitrogen.

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

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

## **10. THE NATURAL DIVERSITY DATA BASE**

The Data Base maps and files regarding the study area have been reviewed and according to the 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.

For your information, Lebanon Brook Swamp/Great Swamp is a Natural Area Inventory site. This swamp lies east of Route 198 and adjacent to the site in question. The 1972 NAI file reports Black Spruce, Atlantic White Cedar, Tamarack, Bobcat and Otter as having been found in Great Swamp. These records have not been updated.

In 1972 the Connecticut Forest and Park Association, Inc. prepared a Natural Area Inventory which included 459 sites. These were nominated as significant sites for one or more of the following attributes: geologic, hydrologic, biologic, archeologic, cultural, aesthetic, research/educational. Being listed as a Natural Areas Inventory site does not impart any restrictions or provide legal protection, it identifies areas that should receive consideration before any proposed development is approved.

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

## **11. PLANNING CONSIDERATIONS**

The subject parcel contains  $\pm 103$  acres and is characterized by mature forests, active agricultural fields, open spaces, a natural spring, a stream, wetlands and some areas of severe slope. The preliminary subdivision plans show 58 building lots and Lot 59 reserved as a possible detention area for the natural wetlands, stream, and drainage area. Two major roads and two cul-de-sacs are proposed. Deer Run Road would be approximately 3700', Timberland Drive would be approximately 2900' long with 1000' of its length being a cul-de-sac serving 7 lots which would not otherwise have road frontage. The additional Highland Court cul-de-sac would be approximately 550' and would serve 3 building lots which would not otherwise have road frontage.

The preliminary plans show these lots and roadways to be in conformance with Woodstock's Land Use Ordinance and Subdivision Regulations. All lots are over 1.25 acres with 150' of road frontage. It should be noted under the Land Use Ordinance .75 acres of any lot to be approved as a building lot must be buildable without soil areas of special concern: percolation problems, ledge near the surface and slopes of over 25%. Given the nature of preliminary plans it was not possible to make this determination for the proposed 58 lots, although field observation seemed to show that most of these lots would prove buildable. In some areas it was also noted that soil conditions could make it possible to have denser development of housing units otherwise known as clustered housing.

### **Roadways and Traffic**

Proposed road right-of-ways are 50' wide and conform to Woodstock's Subdivision Regulations. It was noted that the regulations require the entire 50' right-of-way to be cleared and then later replanted. Given the presence of mature trees and the desire to retain a rural, wooded atmosphere, it might be desirable to retain some of the trees and natural vegetation outside of the 30' pavement width. Of primary importance in determining width of right-of-way should be safety concerns relating to the ability of town road equipment and fire equipment to have easy access. Another public safety concern which the Planning Commission must take into consideration is the possible need for fire ponds on the property.

Development of this parcel is proposed to be phased in over a 5-8 year period. Eventually these 58 lots will generate between 6-10 trips per day (t.p.d.) for a total of 348-580 t.p.d.. Traffic will probably be equally divided between State Routes 197 and 198. The applicant has filed required

documents with the Connecticut Department of Transportation (ConnDOT) for the two proposed roads which will access on Routes 197 and 198. Road profiles, intersection details, drainage plans (calculations, proposed culverts) will be evaluated by ConnDOT during their review and approval process.

### Open Space and Site Design

Woodstock's Subdivision Regulations allow the Planning Commission to require that 10% of land in a proposed subdivision be dedicated to open space. The Commission should consider: **1)** "the increased need for recreational or park land generated by the subdivision; **2)** "the Town's overall open space and recreational pattern, and the way in which the addition of open space would best contribute to this pattern; and **3)** "the capability of the Town, homeowner's association, or other proposed owner to maintain properly the open space." Lot 59's large detention area might be considered as a part of the 10% requirement or the Town could request another area which would fulfill its three major objectives.

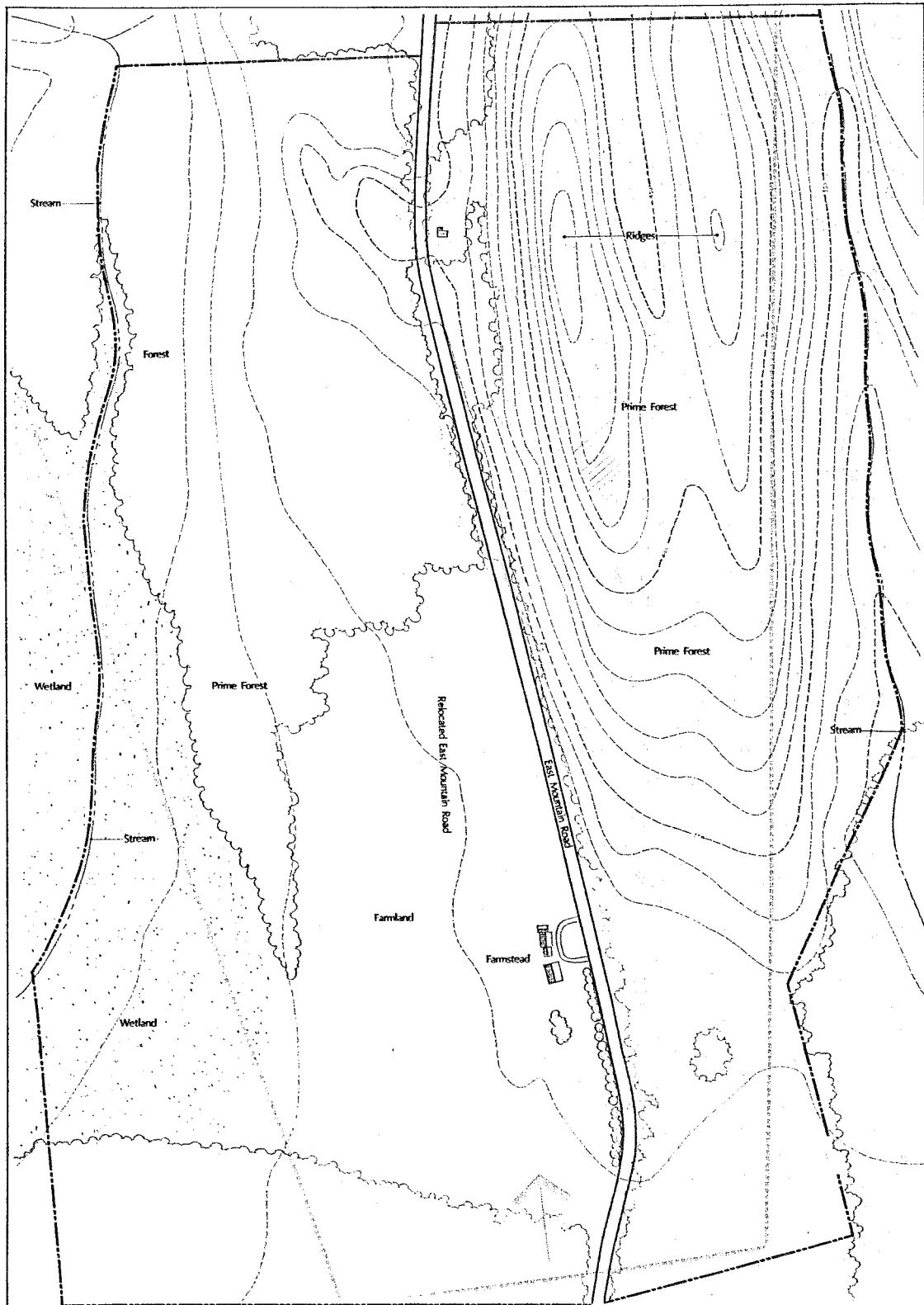
Development of this parcel into 58 building lots will change the natural character of the property by active farmland, open pasture, and mature forestland becoming fragmented or lost with the building of fifty-eight homes as now proposed. An alternative to this outcome would be a proposal based on planned unit development or clustered housing. In a clustered housing development large areas can be dedicated to active farmland, open space, greens and mature forests while housing units are sited close together in sections of the property. Such a technique can help to retain rural character and farming activities. It was noted that several areas of this parcel could possibly sustain higher density housing development while other natural forested and cultivated areas could remain undisturbed. Presently the Town of Woodstock does not have regulations which allow for clustered development. However, Woodstock's Plan of Development consultants are preparing possible zoning regulations which could include planned unit development regulations. Currently the Northeastern CT Council of Governments (NECCOG) is also developing sample cluster regulations in conjunction with a law firm. Presently the NECCOG does have samples of planned unit development regulations from several towns which could be made available to the Planning Commission if they so desire. It should be noted, however, that in areas not served by municipal sewer and water, the Town should require bonding agreements for possible replacement of community water and sewage systems.

Dealing with Change in the Connecticut River Valley: A Design Manual For Conservation and Development published by the Lincoln Institute of Land Policy and the Environmental Law



Foundation provides examples of developments under both conventional zoning and under clustered development/mandatory open space zoning. This publication also provides model regulations for cluster/open space zoning. The following pages taken from the design manual illustrate a parcel similar to the Timberland Farms Subdivision and shows the parcel before development and after conventional zoning development and after creative development.

# BEFORE DEVELOPMENT



## Connecticut Valley Design Guidelines

**C**

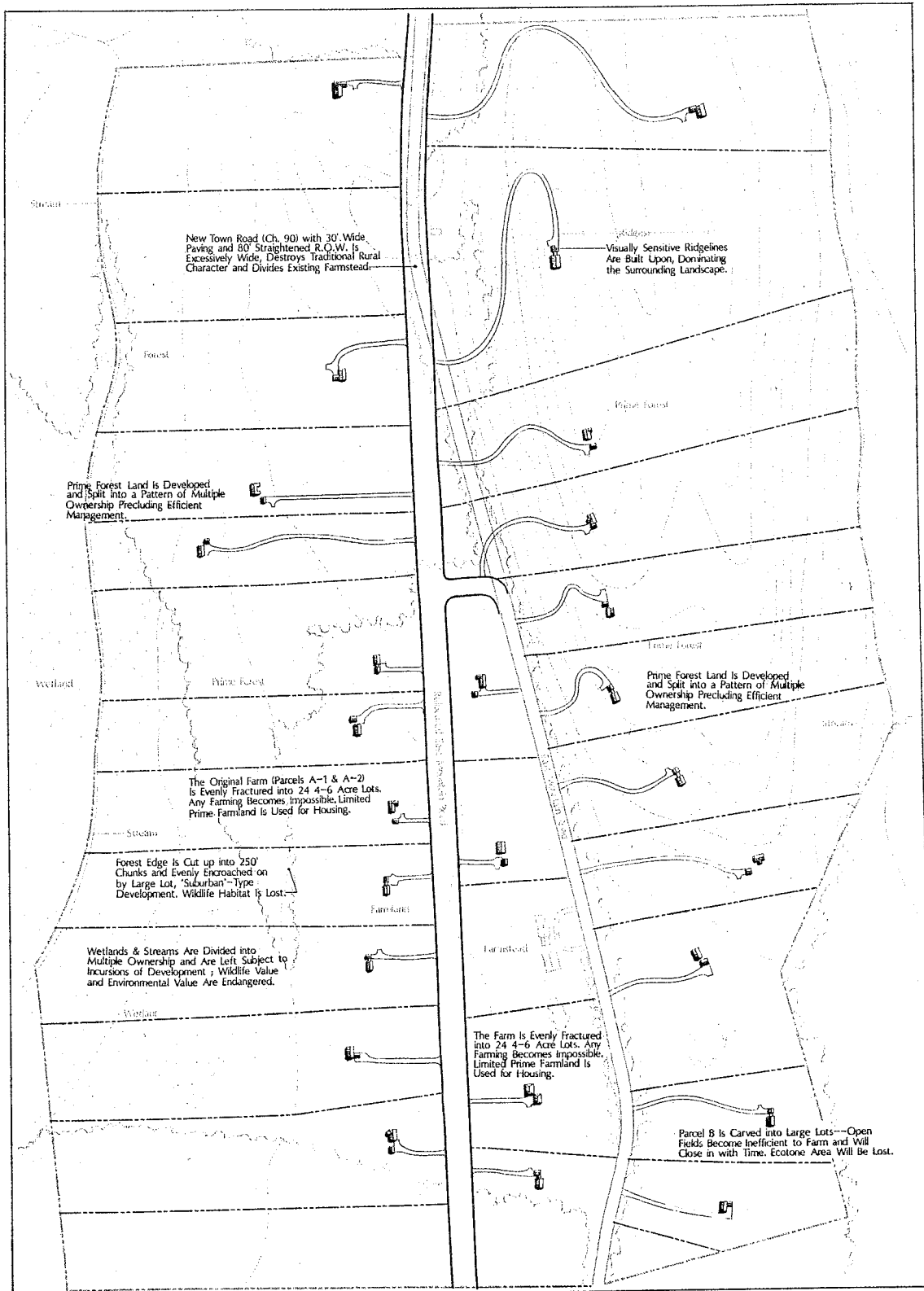
O'Neill Property

**EXISTING CONDITIONS**

Landform: Tributary Valley  
 Landuse: Dairy Farm, Town Road  
 Landcover: Field, Wetland, Forest  
 Utilities: No Town Water or Sewer  
 Zoning: 1 Acre Min., 150' Frontage



# AFTER CONVENTIONAL DEVELOPMENT

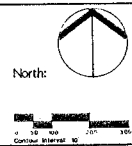


## Connecticut Valley Design Guidelines

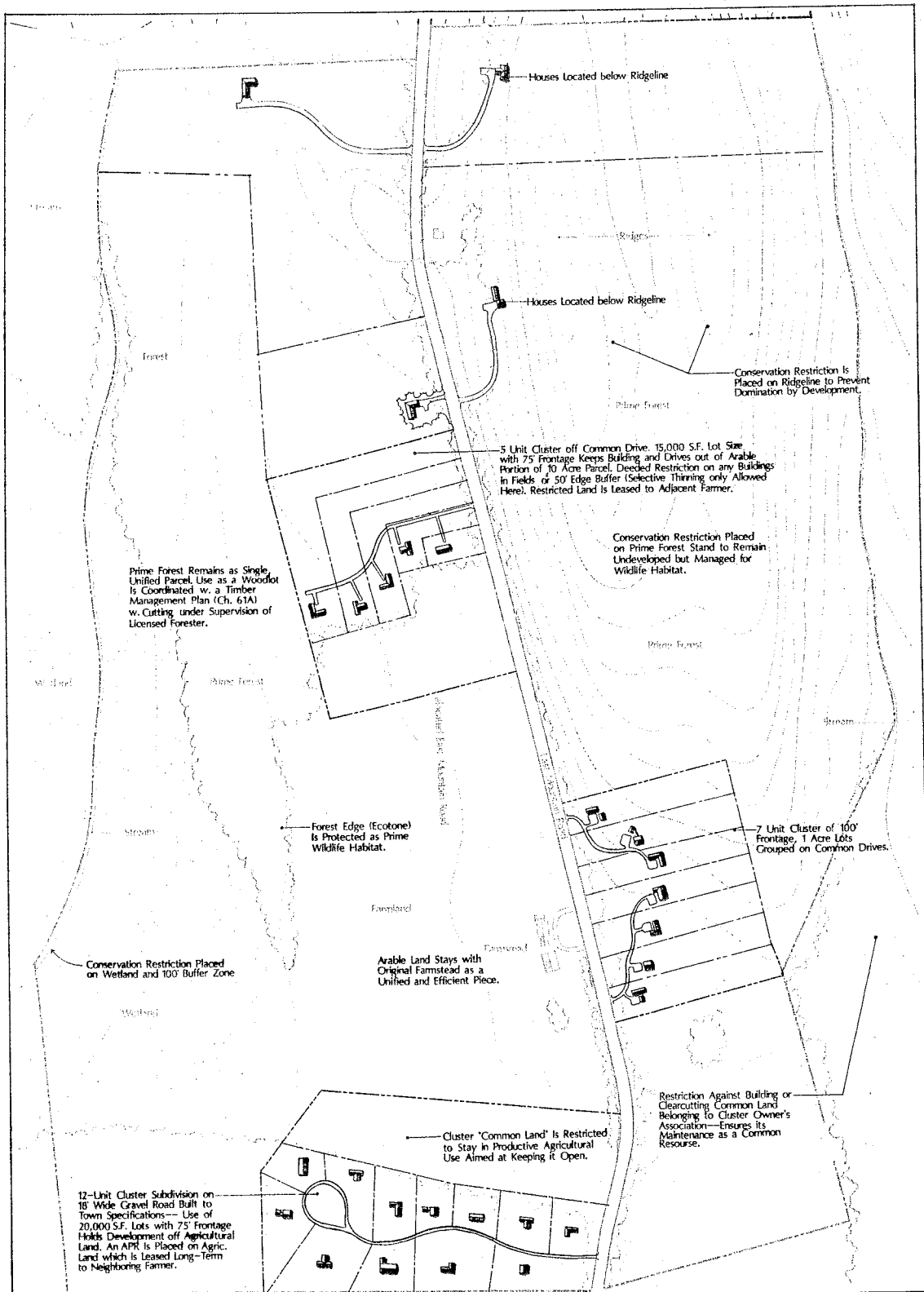
**C1**  
O'Neill Property

**EXISTING CONDITIONS**  
 Landform: Tributary Valley  
 Landuse: Dairy Farm, Town Road  
 Landcover: Field, Wetland, Forest  
 Utilities: No Town Water or Sewer  
 Zoning: 1 Acre Min., 150' Frontage

**NEW DEVELOPMENT (Conventional)**  
 Type: Single Family Residential: Detached  
 Town Road Expansion/Relocation  
 Density: Low: 10 Acres/House  
 Layout: Frontage ANR Off Relocated Road



# AFTER CREATIVE DEVELOPMENT



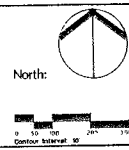
## Connecticut Valley Design Guidelines

**C 2**  
O'Neill Property

**EXISTING CONDITIONS**  
 Landform: Tributary Valley  
 Landuse: Dairy Farm, Town Road  
 Landcover: Field, Wetland, Forest  
 Utilities: No Town Water or Sewer  
 Zoning: 1 Acre Min., 150' Frontage

**NEW DEVELOPMENT (Creative)**  
 Type: Single Family Residential: Detached  
 Town Road Resurfacing  
 Low: 10 Acres/House  
 Density: Frontage/Shared Drives: 1/2A Lots  
 Layout: Open Space Subdivisions: 1/2A Lots

**IMPLEMENTATION STRATEGY**  
 New Zoning: Open Space (Cluster) Provision  
 Subd. Regs: Site Plan Review  
 Modified Site Engineering Standards  
 Reduced Widths for Drives  
 Other Tools: Modified Town Highway Policy, APR



## **12. ARCHAEOLOGICAL REVIEW**

A review of the State of Connecticut Archaeological Site Files and Maps shows no reports of cultural resources in the project area. However, a field survey of the property located an area of prime concern for prehistoric archaeological resources. In the northwest corner of the project area encompassing proposed Lots 36, 37, 38, 39 and 40, there are a series of potential rockshelter sites. These outcroppings of bedrock resulting in a ledge or wall were highly used by Native Americans for temporary, seasonal campsites. The possible rockshelters face the east and overlook Lebanon Brook and Great Cedar Swamp. While no sites have ever been recorded for the area, the combination of natural resources available for shelter and subsistence suggest a rather high probability for archaeological sites.

The current subdivision design will have no impact on these sites if house construction occurs near the proposed road and cul-de-sac. It is recommended that an archaeological survey of the sensitive area outlined in the accompanying map be conducted to locate and identify any cultural resources which might exist. If the survey uncovers a prehistoric site and if no construction is planned for the area, the Office of State Archaeology recommend an historic preservation easement or deed restrictions for the relevant lots. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources**.

In summary, an area highly sensitive to archaeological resources has been identified within the project area's Lots 36, 37, 38, 39 and 40. A professional archaeological reconnaissance survey is recommended in these areas to locate and identify all prehistoric resources which might exist. Current plans will not impact these resources, however, protection from future landowner development can be assured through easement and/or deed restrictions which can provide the Office of State Archaeology notification if any ground disturbance activities are scheduled. All feasible efforts should be undertaken to identify and ensure the preservation and conservation of the cultural resources in the project area.

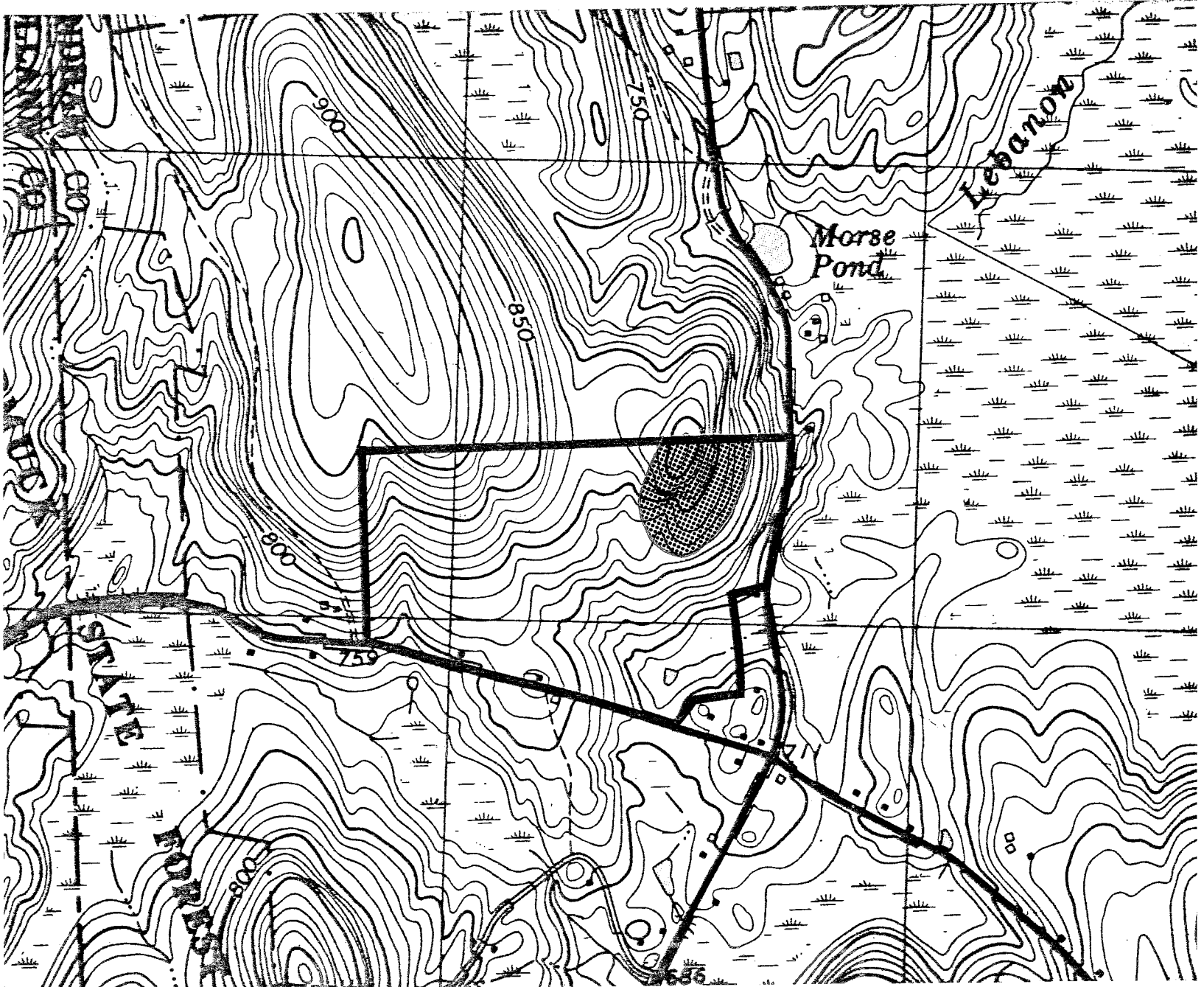
# ARCHAEOLOGICAL RESOURCES MAP



Scale 1" = 1000'



Sensitive 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, soil 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 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.**