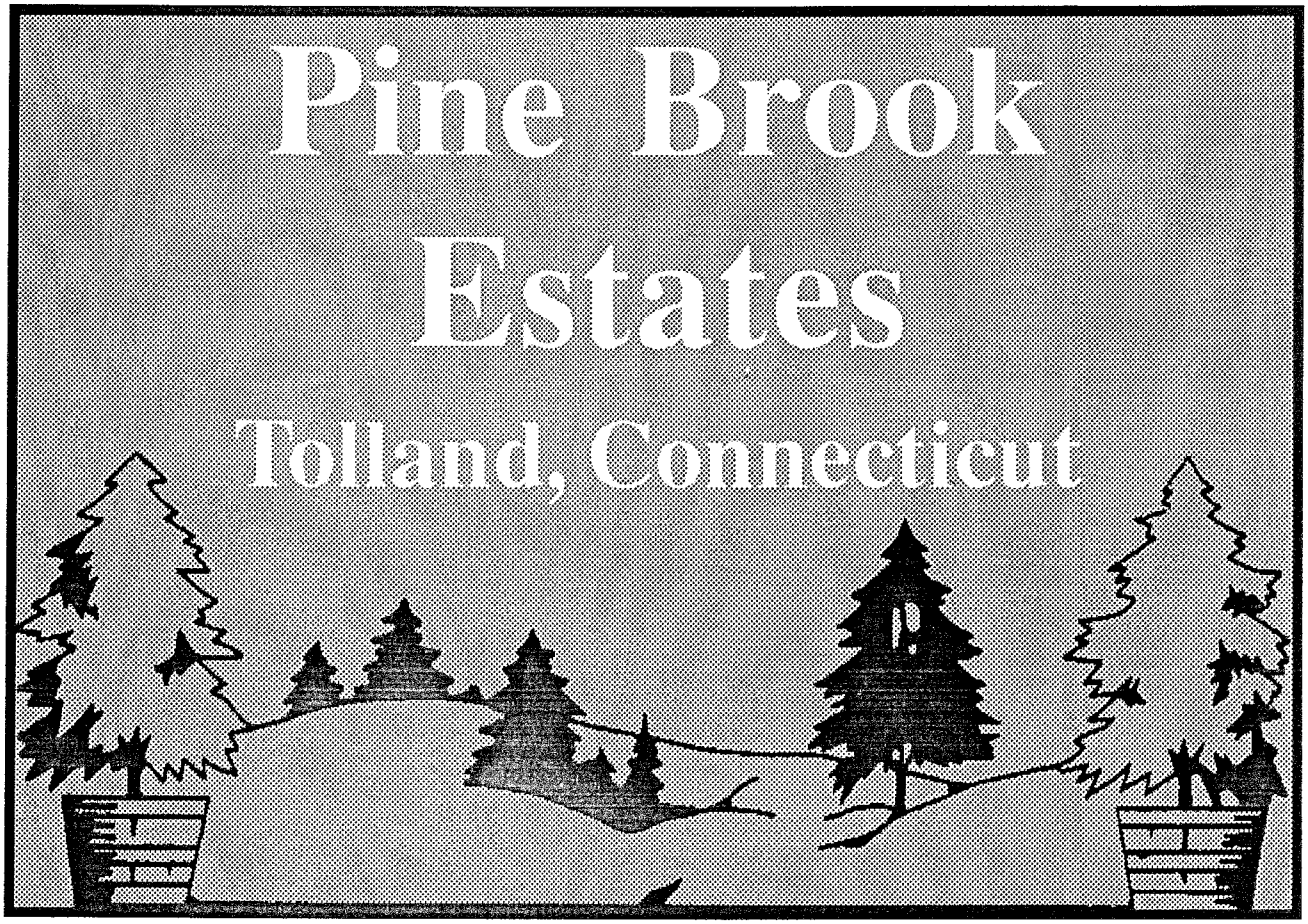



**January 1990**

# Eastern Connecticut Environmental Review Team Report

Eastern Connecticut
Resource Conservation and Development Area, Inc.

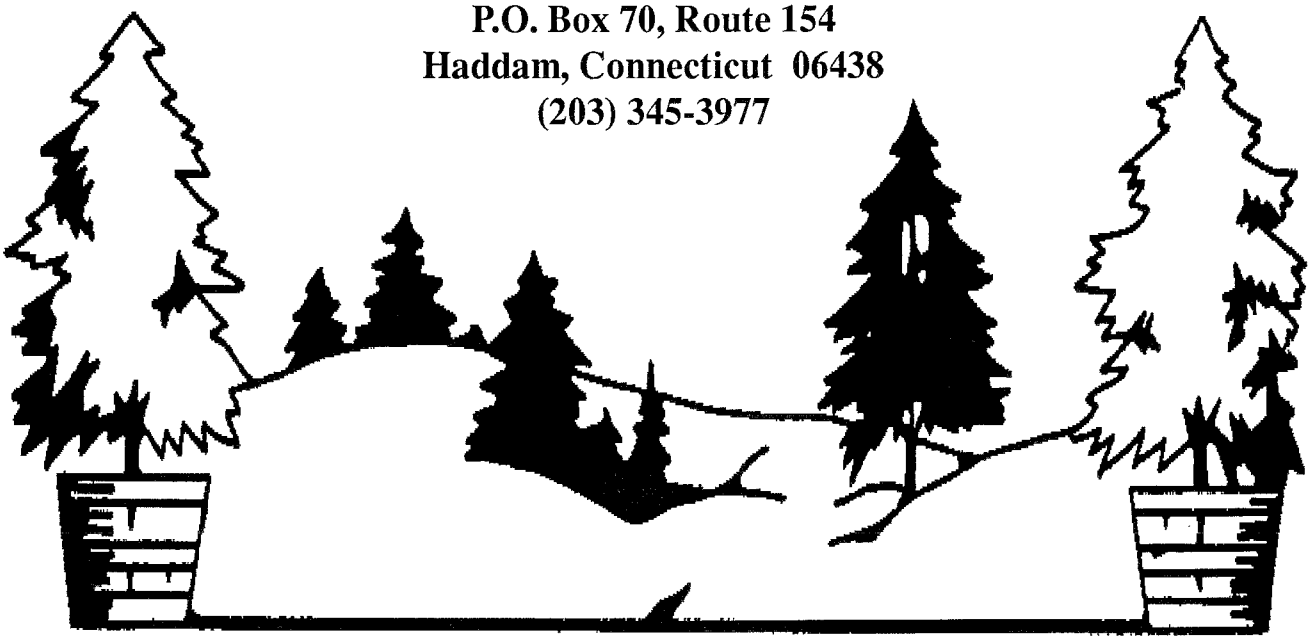
# Pine Brook Estates

## Tolland, Connecticut

**Review Date: December 21, 1989**

**Report Date: January 1990**

**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

## PINE BROOK ESTATES
## TOLLAND, CONNECTICUT

This report is an outgrowth of a request from Tolland Inlands Wetlands Commission to the Tolland 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 Thursday, December 21, 1989. Team members participating on this review included:

| | | |
|---|---|---|
| **Nick Bellantoni** | **State Archaeologist** | **CT Museum of Natural History** |
| **Carla Harvey** | **Environmental Analyst** | **DEP - Water Resources Unit** |
| **Steve Hill** | **Wildlife Biologist** | **DEP - Eastern District Headquarters** |
| **Ken Metzler** | **Biologist** | **DEP - Natural Resources Center** |
| **Brian Murphy** | **Fisheries Biologist** | **DEP - Eastern District Headquarters** |
| **James Parda** | **Forester** | **DEP - Eastern District Headquarters** |
| **Joyce Purcell** | **District Conservationist** | **USDA - Soil Conservation Service** |
| **Elaine Sych** | **ERT Coordinator** | **Eastern CT RC & D Area, Inc.** |
| **Carol Szymanski** | **Regional Planner** | **Capitol Region Council of Governments** |
| **Bill Warzecha** | **Geologist/Sanitarian** | **DEP - Natural Resources Center** |

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, and a soils map. During the field review the Team members were given plans. The Team met with, and were accompanied by the Tolland Wetlands Agent, the Town Sanitarian, and the applicant's 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 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:

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ERT Coordinator
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(203)345-3977

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# 1. LOCATION, LAND USE AND ZONING

The site, about 144 acres in size, consists of an irregularly shaped parcel of mostly wooded land located in east central Tolland. Site boundaries include Route 74 on the north, Connecticut Department of Transportation right-of-way lands for I-84 and a woods road on the south, and private, undeveloped land on the east and west. Additionally, a small segment of the property in the eastern parts abuts Nye-Holman State Forest.

The site vicinity consists mainly of low to medium density single-family homes. Commencing about 1965, sand and gravel was extracted from the western parts of the site. The land which was extensively disturbed and which retains features resulting from the mining operation encompasses mostly proposed lots 58, 74, and 75. It is characterized by unreclaimed land that includes nearly vertical slopes, a ± .6 acre pond, and poorly drained depressions. The latter two resulted when the excavation intercepted or encroached upon the local groundwater table.

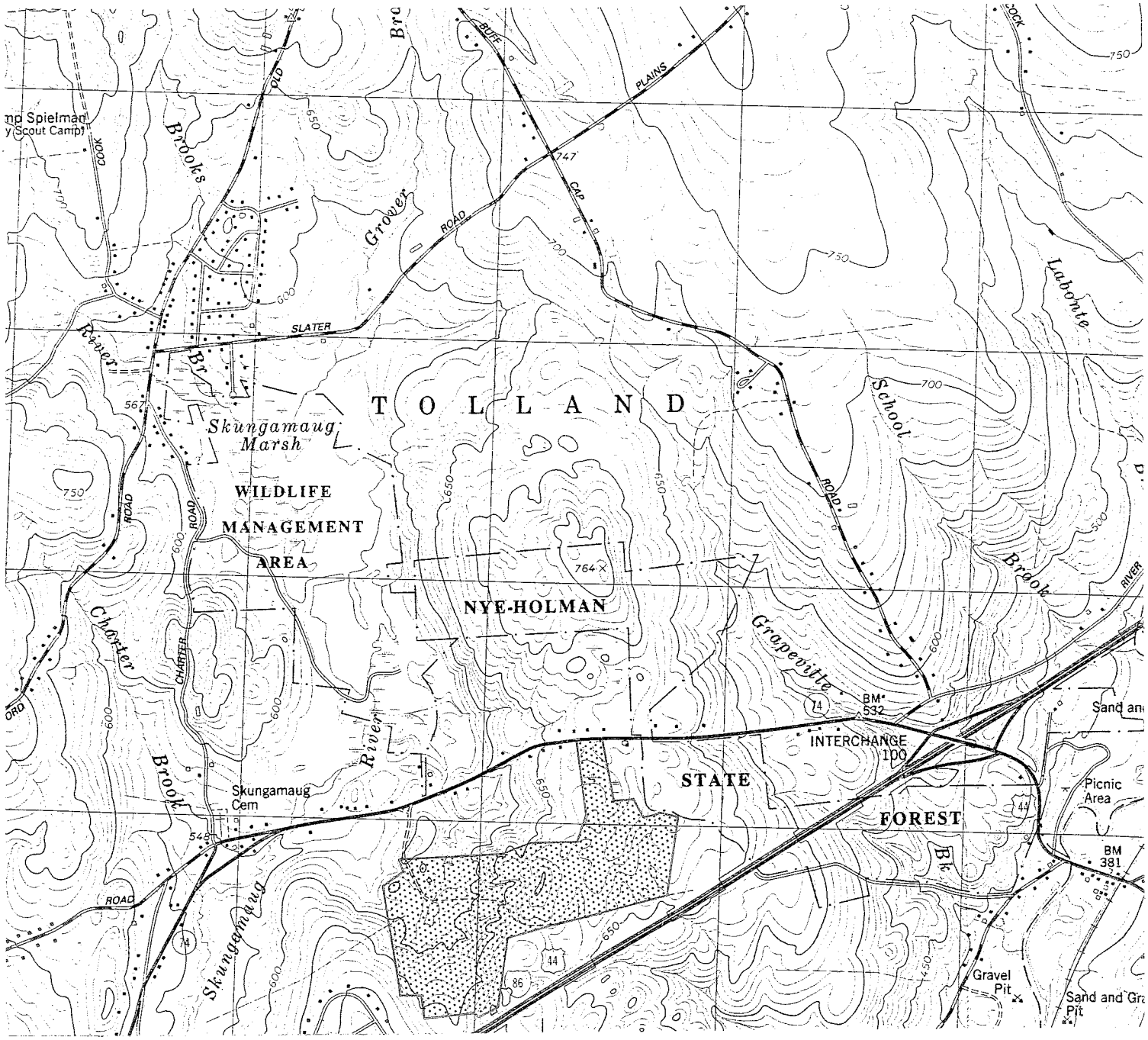
According to the Town's Zoning Regulations the site is located entirely in a Residence Zone Rl, which allows single family homes on 40,000 square foot lots (about 1 acre in size). Each lot would be served by an individual on-site septic system and well. The proposed road network consists of a loop arrangement via Route 74. Four cul-de-sacs (some are temporary) are proposed off of the loop road.

Approximately 7.5 acres of open space are proposed in the southwest corner of the property. This represents about 5% of the total parcel. Of the 7.5 acre open space area proposed, approximately 25% or 1.875 acres comprises regulated wetland soils.

# LOCATION MAP

Scale 1" = 2000'

Approximate Site



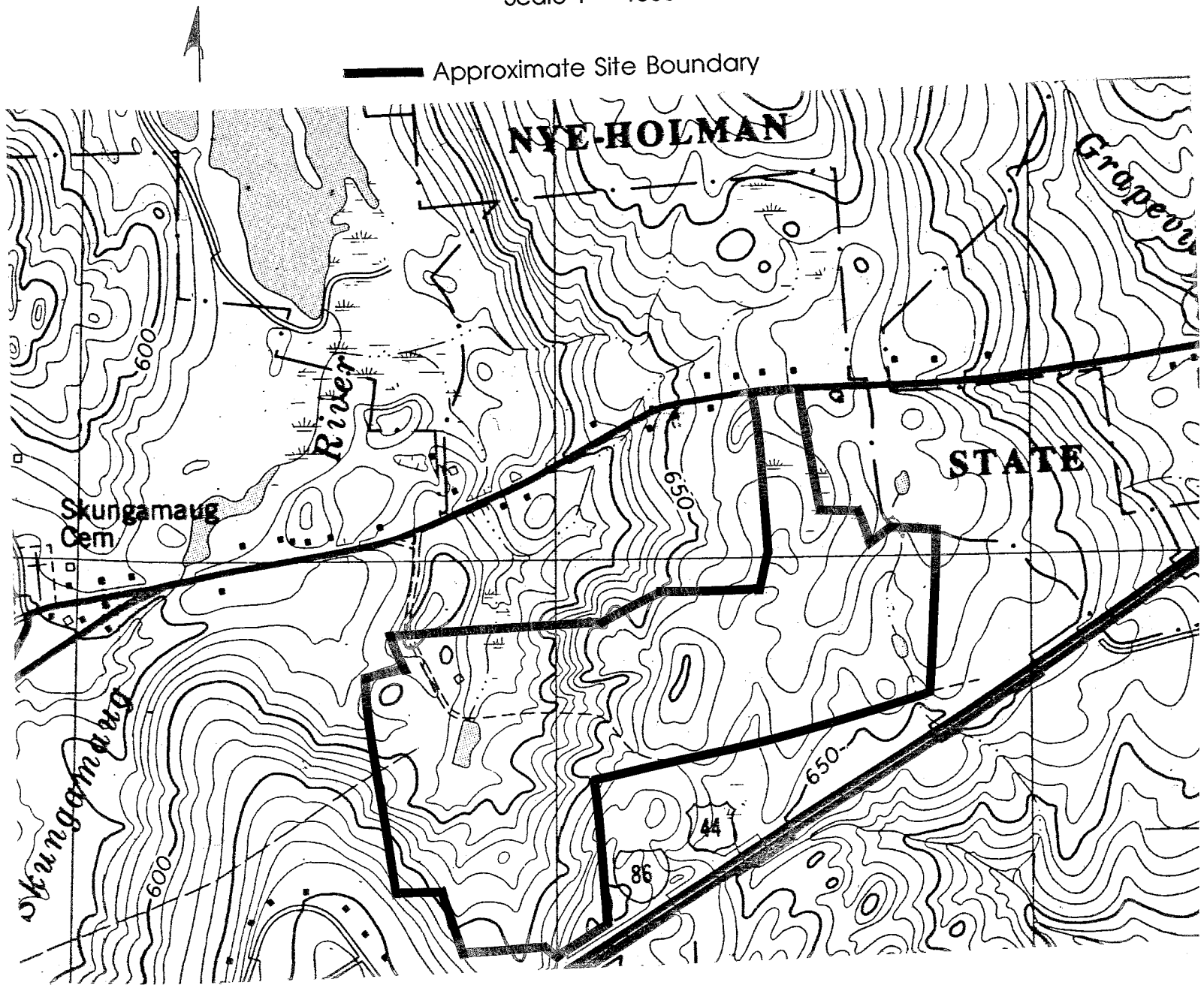
## 2. TOPOGRAPHY

Topographically, the site can be roughly divided in half. The eastern parts of the site are characterized by flat to gentle slopes. The western portion of the site contains steeper slopes, which are mainly associated with the former sand and gravel extraction operation. It seems likely that this portion of the site, primarily lots 58 and 74 will need to be reclaimed, i.e. slopes softened, land graded, etc. in order to make them suitable for development.

Maximum and minimum elevation on the site are 700 feet above mean sea level and 580 feet above mean sea level, respectively.

## TOPOGRAPHIC MAP

Scale 1" = 1000'



# 3. GEOLOGY

The site lies entirely within the Stafford Springs topographic quadrangle. A surficial geologic map (Map GQ-1216, by Maurice A. Pease, Jr.) for the quadrangle has been prepared by the U.S. Geological Survey. No bedrock map has been published for the quadrangle but there is preliminary information available for the quadrangle at the Department of Environmental Protection's Natural Resources Center in Hartford.

## Bedrock Geology

Bedrock is at or near the ground surface in several places across the central part of the site. Soils mapping data confirms the presence of shallow to bedrock soils in these areas. (see Surficial Geology map)

Two bedrock types underlie the site; Monson Gneiss and Brimfield Schist. These rock formations are separated by a thrust fault that traverses the west central parts of the site in a northeast-southwest direction.

Monson Gneiss, a light to dark, medium- to coarse-grained gneiss underlies the western parts of the site. The remainder of the site is underlain by a gray, rusty-weathering, medium- to coarse-grained, interlayered gneiss and schist (Brimfield Schist).

"Schist" and "gneiss" are crystalline rocks that have been geologically altered by great heat and pressure within the earth's crust. The terms "schist" and "gneiss" refer to the textural and structural aspects of the rocks. The rocks underlying the parcel have undergone deformation (metamorphism) one or more times during the period following their deposition as deep ocean sediments. The stresses of deformation caused the alignment of platy, flaky and elongate minerals into thin sheets or bands. Where the alignment has resulted in a slabby rock (i.e., one that parts relatively easily along the surface of mineral alignment or foliation planes), the rock is termed a "schist". Where the alignment has resulted in a banded but more massive rock, the rock is termed "gneiss". Both rock types may grade into another in a single outcrop.

The northeast-southwest trending thrust fault mentioned earlier is a structural feature that formed during the geologic past but is no longer experiencing active movement. The presence of a fault in this area suggests that the bedrock may be fractured and weathered.

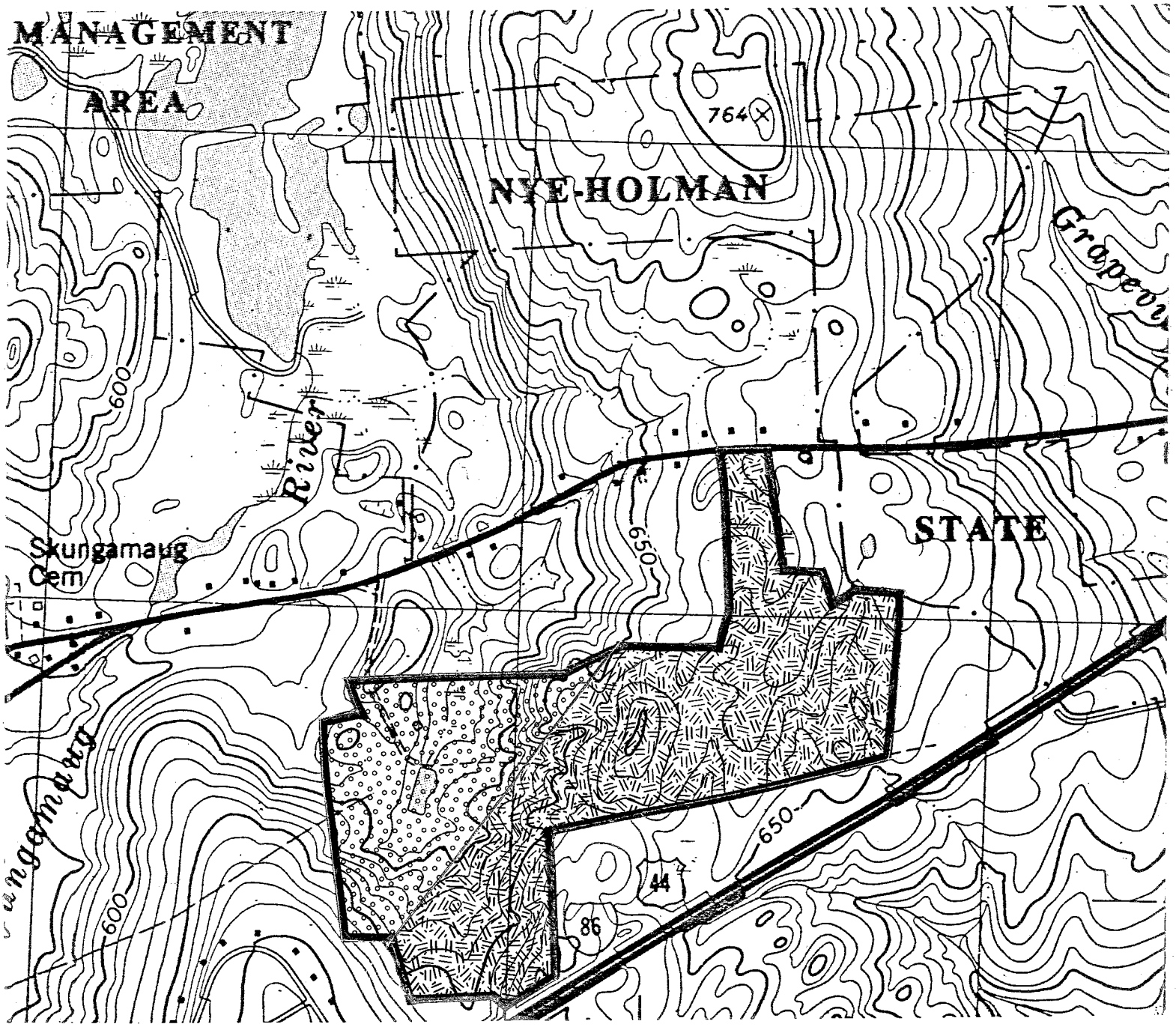
Several deep test holes excavated on the site for on-site sewage disposal exploration encountered the bedrock surface at depths of five feet or less. This will be an important design consideration with respect to on-site sewage disposal. In addition, cut areas for roads, driveways or house foundations may encounter shallow bedrock zones that require blasting. Depending upon the amount needed, blasting can raise site development and engineering costs. The logs of several deep test pits noted fragmented bedrock in several locations of the site. If this weathered or fragmented bedrock is encountered, blasting may not be necessary if only the top 1-2 feet of rock has to be removed. Heavy equipment may be able to peel away this amount of bedrock, especially in the Brimfield Schist. The Monson Gneiss, in the western parts is probably more resistant. (see also SEWAGE DISPOSAL section)

The underlying bedrock is the source of water for many homes throughout Tolland that are beyond public water supply systems which are available mainly in the center of town. The proposed subdivision will likely be served by individual on-site wells that tap the underlying bedrock. (see WATER SUPPLY section)

# BEDROCK GEOLOGY MAP

Scale 1" = 1000'

Monson Gneiss
Brimfield Schist



## Surficial Geology

Overlying bedrock on the site are two glacially deposited sediments known as till and stratified drift. Till, which covers about 80% of the site, consists of an unsorted mixture of sand, silt and clay with gravel, cobbles and boulders that were deposited directly by glacier without re-working by glacial meltwater. Particles of different sizes are generally mixed together in a complex fashion. The till covering the site is very stony.

According to the Soil Survey of Tolland County, Connecticut, the majority of till soils on the site comprise Charlton-Hollis very stony, fine-sandy loams (CrC). This undifferentiated group consists of well-drained soils formed on glaciated uplands. Topography is gently sloping to sloping from 3 to 15 percent. According to the USDA Soil Conservation Service approximately 55 percent of this complex is Charlton soil, 20 percent is Hollis and 25 percent are other soils and rock outcrops. Permeability of these soils is moderate to moderately rapid. Moderate to rapid rates of runoff are expected. Engineering concerns focus on the shallow depth to bedrock which occurs at an average depth of approximately 18 inches in the Hollis soil.

Although not characteristic of the Charlton-Hollis soil series, deep test hole information supplied to Team members by the applicant's engineer indicated the widespread presence of a compact soil zone in the till soils on the site. Depth to the compact soil zone was generally 2-3 feet. Shallow soil mottling (stained soil that identifies an historic or existing groundwater table) 36 inches or less and groundwater seepage at slightly deeper depths were noted in numerous deep test holes.

The presence of the compact soil zone results in a seasonally high water table condition that will also be an important design constraint in terms of on-site sewage disposal systems. In these areas, house foundations should be protected by building footing drains. This will hopefully protect basements from getting wet during periods of heavy precipitation.

Cuts into compact soil zones can be a problem too, requiring control drains to intercept groundwater seepage so that it does not cause icing onto subdivision roads/driveways or water related problems such as interfering with on-site septic systems or ponding on subdivision lots. Also, the cuts may be difficult to stabilize due to the seasonal high water table condition that saturates the more permeable soil zone above the compact soil zone. If the slopes are not properly stabilized, they may fail causing earth materials to slump.

Overlying bedrock and till on the remainder of the site, about 20%, is stratified drift. These

deposits which cover the west central parts of the parcel consist mainly of well to poorly sorted sand in layers of variable thickness. These deposits were laid down by glacial meltwater streams. As mentioned earlier, the sand on the site was mined in the past probably for construction materials. The exact thickness of the sand on the site is unknown,but it probably does not exceed 40 feet.

Because of their highly permeable nature, the sand deposits are commonly characterized by moderately rapid percolation rates. The concern here is a potential for groundwater contamination by septic tank effluent which will have little opportunity to be renovated by the soil components. Special care needs to be taken in these areas to ensure that septic systems are conservatively separated from on-site wells and the groundwater table. ( see SEWAGE DISPOSAL section) Careful examination is warranted in the area of the former sand and gravel pit where the mining operation may have infringed upon the groundwater table.

From a town map that shows aquifer protection zones, the northwest corner of the site overlays the eastern edge of a large stratified drift deposit along the Skungamaug River in Tolland. It should be noted that map GQ-1216 indicates that till covers most of the aquifer protection zone on the site. West of the site, the Connecticut Water Company has a dug well (12' deep) that taps the stratified drift aquifer. No other data such as yield was available for the well.

Depending on certain hydrogeologic factors such as saturated thickness, proximity to major streamcourses, texture of the stratified drift deposits, hydraulic conductivity, and transmissivity stratified drift can be a productive source of groundwater for individual wells yielding between 50 - 200 gallons per minute. Hydrogeologic data for the sand deposits covering the Pine Brook site are lacking. No public water supply wells are known to tap the sand aquifer on or near the site. It appears that the deposits may be fine-grained, (a difficult material to finish a well in), of insufficient thickness and, at its closest point about 1,750 feet from the Skungamaug River. Additionally, according to the Groundwater Availability in Connecticut Map, D. Meade, 1978, the stratified drift deposits covering the site have a water saturated thickness of less than 10 feet, which will probably diminish its aquifer potential. Generally speaking, 40 feet of water saturated thickness is required. In order to ascertain the aquifer potential of the sand deposits on the site, it will be required to conduct further investigations. (See also HYDROLOGY Section)

Based on the preliminary subdivision plan made available to Team members, approximately 16 acres or 11% of the site contains regulated inland wetland soils (this number also includes the man-made pond in the western parts). The wetland soil boundaries were delineated in the field by the

applicant's soil scientist and superimposed onto the subdivision plan. Several relatively small wetland pockets (.5 acre or less) occur in the eastern parts of the site. Also, a ±3 acre contiguous wetland area occurs at the neck of the site in northern limits. In part, this wetland covers lots 18, 19 and 22-26. The principal wetland areas on the site occur in western parts of the site and are associated with the unnamed inlet and outlet stream for the pond on the site.

According to the Soil Survey of Tolland County, Connecticut, the wetland soils on the site are comprised mainly of the Lg (Leicester-Ridgebury-Whitman very stony complex) soil series. It is not known if the applicant's soil scientist has identified all of the regulated wetland soils on the site as Lg soils. No soils report was made available to Team members.

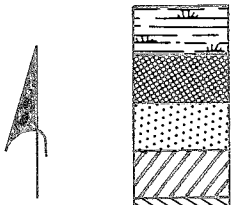
The Lg soils have been mapped as an undifferentiated unit comprising Leicester, Ridgebury and Whitman soils. All three soils are very deep, loamy soils that formed in glacial till. The Ridgebury and Whitman soils develop in the compact glacial till while the Leicester soils develop in the more friable till. They range from poorly drained (Leicester and Ridgebury) to very poorly drained (Whitman). In general, the Leicester and Ridgebury soils are nearly level or gently sloping soils in drainageways and low-lying positions of till covered uplands. The Whitman soils occur or nearly level to gently sloping depressions and drainageways on till covered uplands.

The major concern of these soils from an engineering standpoint focuses on a seasonally high water table. A high water table condition is at or near ground surface in the Leicester and Ridgebury soils generally between November and May. In the Whitman soils, a high water table condition, at or above ground surface, occurs September through June.

According to project plans, it is estimated that approximately 540 linear feet of wetland soils will be impacted (crossed) by the proposed loop road. Additionally, grading for roads are expected to impact wetlands in a few areas.

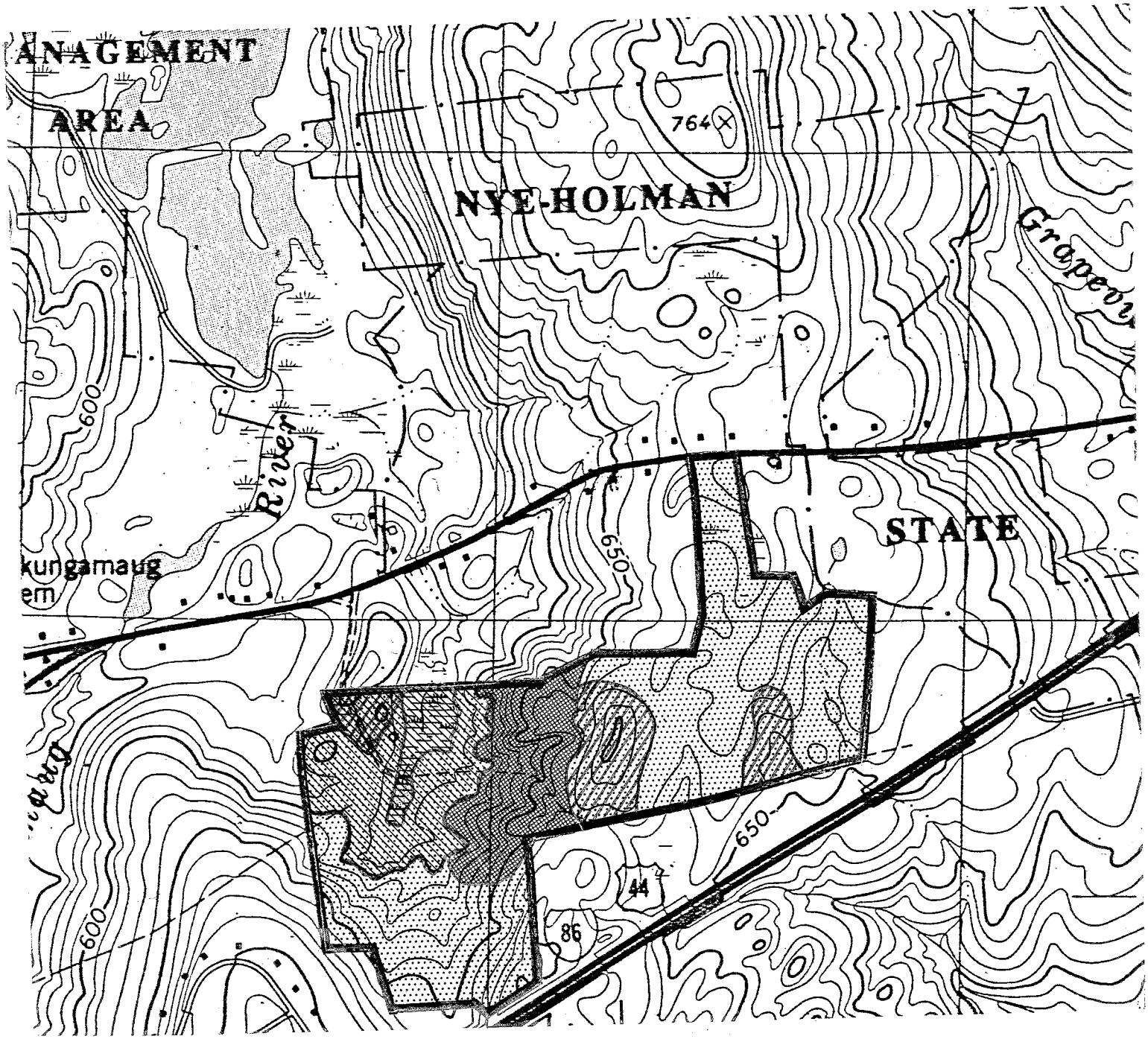
## SURFICIAL GEOLOGIC MAP

Scale 1" = 1000'





Swamp Deposits
Stratified Drift Deposits (sand)
Till
Shallow to Bedrock Areas
Aquifer Protection Zone (Approximate)



# 4. SOIL RESOURCES

## General Soils Information

The information contained in the Soil Survey of Tolland County, CT appears to be adequate for planning purposes. Basic interpretive information for the noted map units are attached for inclusion into the report. If the commission requires additional information it is suggested that the applicant retain the services of a qualified private soil scientist to review the information contained in the Soil Survey of Tolland County, CT, examine conditions in the field and provide the Commission with a verified map and more detailed interpretive information for the site.

## Wetland Boundary Information

Wetlands on this site were identified in the field by a soil scientist, however station numbers were not shown on the plan. The District suggests that the Commission require the applicant to provide for review a plan map with the field delineated boundaries and station numbers shown. The soil scientist who performed the field work should then review and sign a statement on the map(s) certifying that the information is substantially correct. The certification statement should be similar to the following:

> The wetland soils on this site were identified in the field using the criteria required by Connecticut P.A. 72-155 as amended by Conn. P. A. 73-571, Conn. P. A. 87-338 and P. A. 87-533. The boundaries of these soils and of the identified watercourses are accurately represented on the plot plan.

The Commission and/or appropriate staff should then arrange to meet with the applicant and the soil scientist to review these boundaries in the field and compare field conditions to the information submitted, especially in areas where alterations to the wetlands, road crossings, or stormwater discharge are proposed. If this procedure is followed and discrepancies are found, the Tolland County Soil and Water Conservation District can on request review the submitted information for adequacy and provide comments and/or on-site technical assistance.

## Soil Erosion and Sediment Control Plan

A detailed and site specific soil erosion and sediment control plan should be developed and implemented for this site using the criteria contained in the Connecticut Guidelines for Soil Erosion

and Sediment Control (1985 updated). A detailed narrative noting the sequence of activities and installation of measures proposed, as well as a checklist developed based on the detailed narrative should be developed for this site. Areas of concern include the aquifer protection zone, the proposed roadway crossings of wetlands, steep roadway sections, storm drain outlets into wetlands, the pond, and stabilization of the cuts and fills that will be required to construct the road network and residences. The Commission may also want to require the following (or similar) statements on the plan which relate to implementation and inspection of the soil erosion and sediment control plan:

1. "The contractor shall secure the services of a certified professional soil erosion and sediment control specialist or professional engineer who shall verify in the field that controls required by this plan are properly installed, shall make inspections of such facilities not less frequently than weekly and within forty-eight (48) hours of any significant rainfall, and shall by written report, inform the owner or his agent not less frequently than weekly and the Town Planning and Zoning Commission not less frequently than monthly of observations, maintenance, and corrective activities undertaken. An approved checklist may be used to document the inspection findings."

2. "There shall be a pre-construction meeting with the Town soil erosion and sediment control agent, the Town wetlands agent, the contractor and the contractors's professional soil erosion and sediment control specialist to discuss the plan and inspection and report requirements."

The Tolland County Soil and Water Conservation District would appreciate the opportunity to review this plan prior to final approval.

## Other

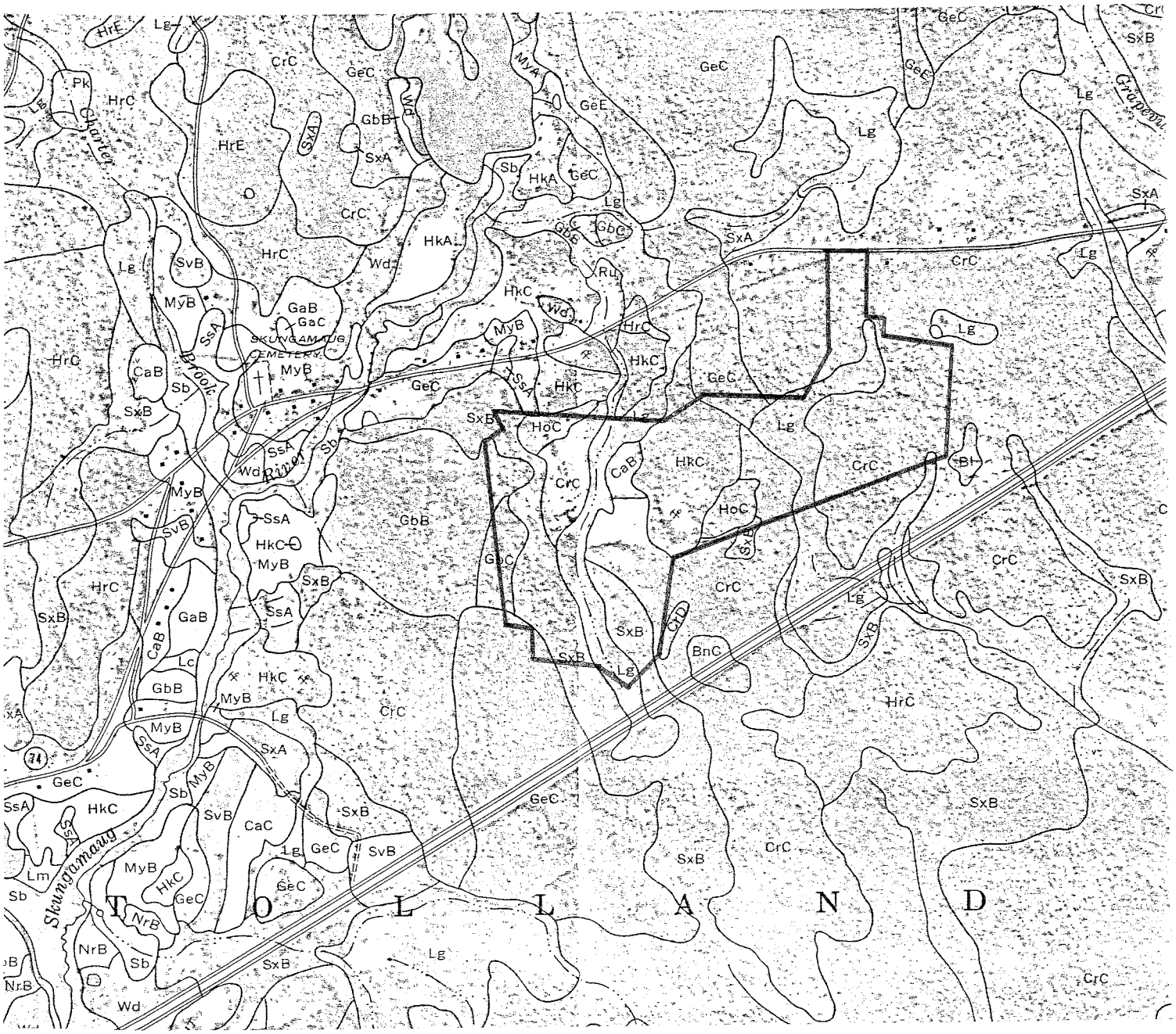
A hydrologic review and summary were not available for Team review. It is suggested that these be prepared and submitted with the final proposal for the development. Stormwater management should be addressed using the criteria prepared by the Tolland County Soil and Water Conservation District in their Model Runoff Management System Regulations - May 1989. Design of the two proposed detention basins shall be in accordance with the Detention Basin (DB) measure contained in the Connecticut Guidelines for Soil Erosion and Sediment Control (1985). A plan of operation and maintenance shall be prepared for use by the owner, or others responsible for the system, to ensure that each component functions properly.

The applicant is responsible for obtaining all necessary permits from the Army Corps of Engineers and the Connecticut Department of Environmental Protection - Dam Safety Unit in addition to local Inland Wetland Commission approvals.

## SOILS MAP

Scale 1" = 1320'

Approximate Site Boundary



## 5. HYDROLOGY

The site can be divided into two drainage areas. The western half and northern neck of the site drain to the wetland area north of the man-made pond in the northwest corner. Water in the wetlands is routed under Route 74 and then flows about a 1/3 of a mile before discharging to the Skungamaug River. The eastern parts of the site drain generally southward to the small wetland pockets located along the southern property line. Water in the wetlands is routed through a drainage pipe under I-84 to an unnamed tributary to the Willimantic River. The latter streamcourse is also piped under South River Road before it empties into the Willimantic River.

According to the Department of Environmental Protection Water Quality Classifications of Connecticut, Murphy, 1987, the surface waters on the site have not been classified and, by default, are presumed to be Class "A" streamcourses.

Class "A" surface waters maybe suitable for private drinking water supply, recreational or other uses and may be subject to absolute restrictions on the discharge of pollutants, although there maybe certain discharges that would be allowed.

Groundwater within the site is designated as GA by the Department of Environmental Protection. A GA water resource is suitable for private drinking water supplies without treatment.

Development of the site for approximately 75 single-family homes can be expected to raise post-development runoff conditions from existing runoff conditions. These increases will arise from the creation of impervious surfaces such as roads, driveways, rooftops, sidewalks, and patios.

The two major concerns with increased runoff are the potential for flooding and stream channel erosion. From a flooding standpoint, the applicant has indicated on the site plan that two detention control structures (basins) will be utilized to maintain post developmenmt flows at pre development flows. One detention basin will be created on lot 36 by expanding a ±.4 acre wetland area. The other detention basin will be created by utilizing the man-made pond in the northwest corner. The purpose of the detention basins will be to release post development runoff at a slower rate so that flooding problems do not occur in downstream areas. Details for the proposed detention and the stormwater management plan were not available for review by Team members. A stormwater management plan that includes pre- and post-development calculations should be prepared by the applicant's engineer and presented to the town for their review. It is strongly suggested that applicant's engineer reference Connecticut Guidelines for Soil Erosion and Sediment Control

(revised 1988) and the Tolland County Soil and Water Conservation Districts Model Runoff Management System Regulation for the preparation of the stormwater management plan.

The detention facility proposed for the pond in the northwest corner is located within the Town's aquifer protection zone. Since the water in the pond reflects the local ground water table, there is a concern for the introduction of stormwater that may be laden with road sand and salt, automobile residue, etc. which certainly poses a threat to existing ground and surface water quality, even though some of these pollutants may be removed by the detention facility. Wet ponds utilize both settling and biological uptake, and are capable of removing both particulate and soluble pollutants. Careful planning is essential to ensure that road drainage tributary to the pond is being managed properly for potentially sensitive groundwater supply areas (surface collection, treatment, and discharge). Consideration should be given to exclude direct stormwater discharge to the pond. Also, in order to protect local ground water particularly in the aquifer protection zone, de-icing salt applications should be prohibited (use alternative de-icing compounds such as calcium chloride) or restrict de-icing salt applications to a lean 7:1 sand/salt mix.

The other concern with post-development runoff is the potential for gullying and streambank erosion. Because the till soils, which may contain silt, fine sand, and clay sized particles and seasonally high water table conditions that characterize the site, the potential for erosion is apparent. Areas of moderate to steep slopes will exacerbate this potential problem.

Conscientious construction practices should be employed so that water quality problems do not arise in streamcourses on and off-site. Stormwater discharge points should outlet outside of wetland areas, preferably to well protected, shallow basins. These outlet control structures should be designed so that flow rates are minimized, and peak volumes decreased. Also, these basins can provide a sediment retention function and should be designed to do this.

In any well run activity of this type, silt fences, haybales, temporary sediment basins, and anti-tracking devices are necessary to reduce the chance for environmental damage to wetlands and watercourses on and off-site and complaints from neighbors.

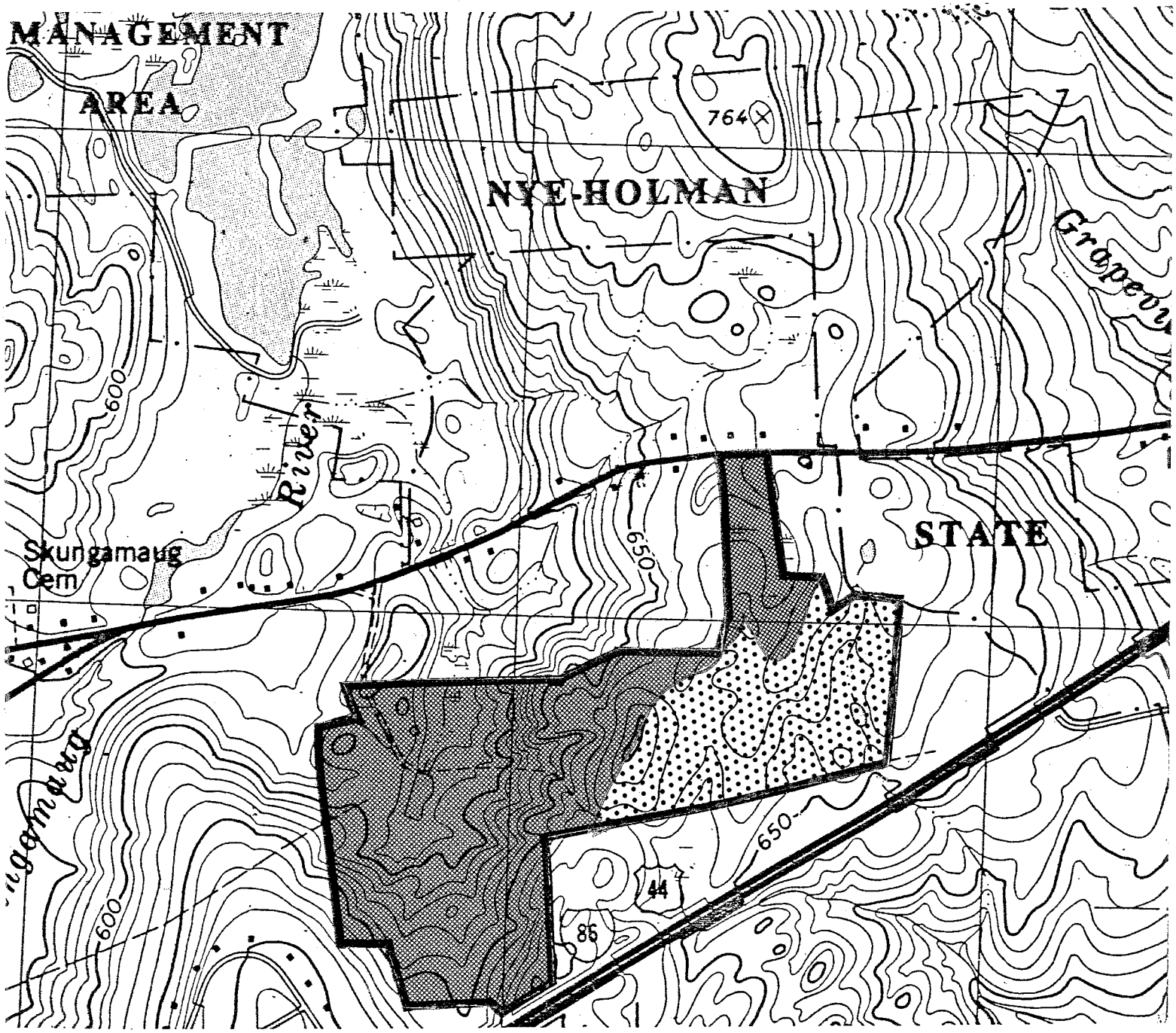
In order to minimize erosion problems and surface water quality degradation, a carefully designed and detailed erosion and sediment control plan should be developed, closely followed and periodically policed by town officials.

# WATERSHED BOUNDARY MAP

Scale 1" = 1000'

Portion of site that drains to Skungamaug River

Portion of site that drains to an unnamed tributary to the Willimantic River



## 6. WATER SUPPLY

Based on the hydrogeologic setting and water supply in the vicinity of the site, the proposed subdivision will likely be served by individual wells that tap the underlying schists and gneisses.

Gneisses are commonly characterized by the parallel orientation of the mineral grain with massive to platy appearance. Gneissic rock responds to movements and deformation stresses within the earth's crust by fracturing and forming distinct open joints and fractures. Schists are characterized by parallel orientation and abundance of mica minerals and by the ease with which the rock parts into thin layers. Unlike the gneisses, the schist rock responds to geologic stresses by slipping and folding along the layered planes. The openings that develop in schist are generally small and discontinuous. As a result, studies have shown that wells that tap gneissic rock are slightly more productive than wells in schist rock.

The sand and gravel in the northwest corner may have some potential for yielding usable volumes of water to well(s), however, too little is known at the present time about their hydrogeologic characteristics such as saturated thicknesses, texture, hydraulic conductivity, etc. Further testing, which includes this type of information and test wells would be necessary to determine its water producing capabilities.

Wells drilled in bedrock generally supply small (3-5 gallons per minute) but reliable yields of groundwater. Because the yield of a given well depends upon the number and size of waterbearing fractures that it intersects and because the distribution of the fractures is highly irregular, there is no practical way of predicting the yield of a well in a specific location before drilling the well. Experience has shown that most water-bearing fractures occur in the top few hundred feet of the bedrock surface. It should be noted that the thrust fault bisecting the site may have increased the secondary porosity and hydraulic conductivity of the bedrock aquifer by creating fractures, cracks, and openings in the rock.

The proposed subdivision should cause minor changes in recharge to the bedrock aquifer. Increases in impervious surfaces will probably be less than 5%, but this will depend upon the final lot and road layout.

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 81,550

gallons. This is based on groundwater recharge amounts of 8 inches per year for an upland, mostly till-covered site and parcel size of 137 pervious acres, allowing for infiltration. Predicted water use at the site is estimated at 22,500 gallons per day. This is based on a 75 gallons per day per capita water usage. An assumption of 4 persons per single-family residence was used for a 75 lot subdivision.

Based on these figures, it is estimated that the planned subdivision will receive about 3.6 times the recharge as is necessary to balance water demand. In addition, induced recharge by properly renovated septic system effluent (about 95%) plays important role in the groundwater budget. This stresses the need for properly designed and installed septic systems. (See SEWAGE DISPOSAL Section)

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

Where possible every effort should be made for the spacing of about 200 feet between domestic wells in the proposed subdivision. This will provide about one acre of direct discharge to each well, which should help to minimize the chances for mutual interference between neighboring wells during pumping periods. Again the latter holds true only if the fractures in the underlying bedrock are saturated and interconnected and capable of yielding water to a well. It seems likely that the recommended 200 foot spacing on between neighboring wells may be difficult to achieve on many of the proposed lots because the majority are only about one acre in size.

In the Shetucket River basin (in which the site lies), 134 domestic wells tapping crystalline bedrock were surveyed from Connecticut Water Resources Bulletin No. 11. The yield of these wells ranged between 0.5 to 112 gallons per minute with an average yield of 13 gallons per minute. Ninety percent of these wells yield 3 gallons per minute which is usually enough water for domestic purposes.

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., curtain drain, road drainage, 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 town sanitarian will need to inspect and approve well locations.

The natural quality of groundwater should be satisfactory. However, the bedrock (Brimfield Schist) beneath the central and eastern parts of the site may have elevated amounts of iron and/or manganese minerals, which could lower the overall quality. There are suitable treatment filters available to ameliorate these potential water quality concerns.

Because of the site's ground and surface 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 underground fuel storage tanks and distribution lines, at the least in the aquifer protection zone, but preferably the entire subdivision, be prohibited. Alternatives for fuel storage include putting the tanks in basements or in water tight vaults.

If the sand and gravel deposits in the northwest corner are investigated and found to have potential for yielding moderate to large amounts (25 gallons per minute or more) of water to well(s), the applicant may wish to consider the development of a community water supply system, which would serve the proposed subdivision.

As noted earlier, shallow depth to bedrock will be an important design constraint for on-site sewage disposal. Well pollution is frequently a problem in areas of shallow to bedrock soils, especially where there are a number of building lots involved, each served by on-site septic systems and water supply wells. Utilizing one or two community water supply wells in an isolated area of the site, far removed from on-site septic systems may help reduce the chance of well pollution on the site.

Under this type of arrangement, the applicant must obtain a "Certificate of Public Convenience and Necessity" from the Department of Public Utility Control (DPUC) and Department of Health Services (DOHS) for the construction of a community water supply. The applicant should contact Richard Albani, DPUC, at 827-1553 regarding this matter.

The well or wells for the subdivision will be classified as a public water supply and will require approval for well locations by the DOHS, Public Water Supply Section in conjunction with the local health department. If it is considered, the DOHS should be contacted as soon as possible regarding the proposal. Water quality, yield and plans for pumpage, storage and distribution must be reviewed and approved by DOHS, Public Water Supply Section. Consideration will need to be

given in advance to provide for proper operation and maintenance of the community water supply system (i.e., takeover by a private or municipal water supply company).

# 7. SEWAGE DISPOSAL

As public sewers are not available to the site, each lot in the proposed subdivision will need to be served by on-site sewage disposal systems.

Based on visual observations, existing soils maps and the findings of a number of deep test holes for subsurface sewage disposal exploration, the site is not particularly favorable for on-site sewage disposal purposes. While some areas are limited by slope and wetlands, the major concern or important design constraint will be the presence of shallow to bedrock soils (CrC and HoC) and till soils (SxB) characterized by seasonally high water table conditions. No percolation test data was available for Team members, but there is a strong possibility that the till soils will be characterized by moderately slow to slow percolation rates. This is due to a compact soil zone that was encountered in many deep test holes.

The Public Health Code requires the bottom area of any leaching system to be a minimum of 4 feet above ledge rock and at least 1.5 feet above maximum groundwater level. In general, when ledge rock is found at less than 4 - 5 feet below ground surface, the lots would certainly be of special concern. In particular where both on-site wells and sewage systems are utilized, there is greater possibility for well contamination or water quality problems. Sewage effluent may not receive adequate filtration and renovation before the sewage reaches the bedrock where it may enter fractures or seams, traveling to nearby wells. (See WATER SUPPLY Section)

Where topography permits, the installation of curtain drains may be required on some lots to protect septic systems from a seasonally high water table condition. In addition, well drained, fill material may also be required to raise the leaching system above the local groundwater table.

Curtain drains are installed to intercept groundwater above the leaching field so that it does not rise up into the leaching system and impair its hydraulic capacity. When properly installed, curtain drains tend to provide fail-safe protection for this potential type of malfunction. Prior to approving a lot for subsurface sewage didposal the applicant may first have to install the curtain drain to demonstrate that it will effectively lower the water table on a particular lot during the wet time of year.

Ideally, curtain drains should be outletted to the storm drainage system when possible. If this is not possible, it should outlet at a point where it does not create water problems with nearby septic systems, neighboring properties, wells, etc. Depending upon the layout of the house, well, and

septic system (and its size). it may be difficult to install a curtain drain on a one acre lot and meet all the separating distances required by the Public Health Code.

Considering the quantity of sewage discharged fo single family residences (200-300 gallons per day), one acre lots would normally be considered of sufficient size to accommodate both a well and septic system. However, where unfavorable soil conditions and/or terrain exists, considerably larger lots (i.e., lower density of development) should be provided. Also, large lots themselves do not necessarily assure the availability of sufficient suitable area for sewage disposal purposes. Thsi can only be demonstrated by adequate on-site testing.

Due to the shallow to bedrock soils and seasonally high groundwater table condition, it is probable that a high percentage of the proposed and future lots in the study area will require detailed plans prepared by a registered professional engineer. This requirement, along with the potential for select fill material, curtain drains, large sized septic systems, etc. will undoubtedly raise the cost of development on those affected lots.

Present plans indicate that 13 lots or parts there of, are located within the town's aquifer protection zone. It appears that the proposed residential lots, a minimum of one acre in size, would be compatible with permitted uses in the aquifer protection zone, provided discharge to on-site septic systems in the zone does not exceed an amount equivalent to the discharge from one three bedroom single-family dwelling per acre. Connecticut Department of Environmental Protection ranks medium density residential land use (1/2 to 1 acre lots) as a slight to moderate risk to groundwater quality.

It is reasonable to assume that the stratified drift deposits (sand and gravel) that covers the aquifer protection zone will be characterized by fast to very fast percolation rates. This is a concern since septic tank effluent may not have the opportunity to be properly renovated before it reaches the groundwater table. To fully quantify the groundwater quality impacts to the aquifer protection zone by residential septic tank effluent, a pollutant renovation analysis may need to be conducted in order to fully understand if there will be adverse impacts to the aquifer. The State Public Health Code requires that lots with percolation rates faster than 1 minute per inch maintain a 150 foot well to leaching system separation. The latter assumes that the well serving the lot withdraws under 10 gallons per minute. It may be difficult to achieve the 150 foot separating distance on a one acre lot. If a community water supply system was developed in the aquifer protection zone, it is likely there would be a rearrangement of lot lines or reduction of lots in this area.

## 8. NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files regarding the proposed project area have been reviewed. According to the information, there are no known extant populations of Connecticut "Species of Special Concern" or Federal Endangered and Threatened Species that occur at the site in question. North of this site, however, is habitat for both a plant and invertebrate "Species of Special Concern." With the similarity of habitat at the site in question, the potential exists for the presence of these species on parts of the proposed site of development. These species are the Hartford Fern (Lygodium palmatum), a plant which occurs in moist acidic sandy soils at the edge of wetlands and a Buck Moth (Hemileuca lucina), a species which inhabits wet meadows with an abundance of Meadow Sweet (Spiraea alba). A careful survey of similar habitats on the site of the proposed subdivision should be undertaken to determine the present status of these species.

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.

# 9. VEGETATION

## Vegetation Type Descriptions

**Stand 1: 54 acres.**
Mixed hardwoods (red oak, black oak, white oak, red maple, black birch, hickory, sugar maple, white pine). This stand was harvested in the recent past. Except for some larger diameter culls, all merchantable trees greater than 14 inches diameter were removed. The understory shrub growth consists of blueberry, huckleberry, grape, viburnum, blackberry and raspberry. Several 10" - 14" diameter trees are tall, straight and firmly rooted. These healthy, well-formed trees are the ones to leave on and around houselots.

**Stand 2: 14 acres.**
Hardwood swamp. (red maple, spicebush, redosier dogwood, viburnum, fern, club moss, sweet pepperbush, high bush blueberry).

**Stand 3: 16 acres.**
Softwood - Hardwood (black oak, white oak, scarlet oak, black birch, white pine). This stand has several overmature oaks, a liability in houselots, and occasional old road side sugar maples. A thick understory of white pine exists with healthy, well-formed trees 10-30 feet tall. Widespread large diameter white pine also occur. The understory is hazelnut and huckleberry.

**Stand 4: 20 acres.**
Old field/former gravel pit (grey birch, aspen, pitch pine, white pine, oaks, sweet fern, grasses, autumn olive, black cherry, golden rod, shadbush, blackberry, elderberry, grape, sumac). This stand is in various stages of early plant succession growth. The area ranges from exposed soil to sapling tree growth.

**Stand 5: 10 acres.**
Plantation (white pine, pitch pine, 10% hardwoods). This is a healthy stand of poletimber and sawtimber sized (8" - 16" diameter trees) white pine and pitch pine. Trees have grown close together for several years and depend on each other for side support. Openings created in this stand could lead to windthrows in the taller trees.

**Stand 6: 30 acres.**
Mixed hardwood (black oak, red oak, white oak, hickory, yellow birch, red maple, black birch).

The understory is composed of witch hazel, blueberry, huckleberry, and viburnum. In this stand, which is approaching maturity, the black oak and white oak is in decline from two-lined chestnut borer and shoestring root rot. Also, more than half of the poletimber oaks and black birch are suppressed and growing poorly. Red oak, hickory and yellow birch are generally healthy and growing well.

## Environmental Considerations

The techniques outlined in this review can reduce erosion problems, help control storm water, save valuable vegetation and utilize certain timber resources. Woodlands provide a protective influence on soil stability and water quality. The forest also provides habitat for a variety of wildlife from amphibians and reptiles to small mammals, a variety of birds, predators and larger mammals. They depend on woodland for food, water, shelter and breeding habitat. Trees have a positive influence on air quality as they convert carbon dioxide to oxygen and act as terrestrial sinks (collectors) to reduce airborne particulate and gaseous pollutants. Forests provide a cool ecosystem from shade that is absent in open areas. Woodlands also provide wood fiber that people use daily. Many products which we all need come from wood, including lumber, paper, foods, plastics, pharmaceuticals, and fuel to name a few. It is the wise use of our resources today that will provide continued wood supply for future generations.

## Limiting Conditions

Trees are very sensitive to the condition of the soil within the entire area of their root systems. Construction practices involving excavation, filling and grading for road building and structures, and soil compaction from heavy equipment disturbs the balance between soil aeration, soil moisture level and soil composition. Disturbances to soil near trees can cause a decline in tree health and vigor resulting in mortality in three to five years. Cutting or bruising roots with machinery creates breeding areas for root fungi which can also kill a tree in a short time. Trees with cut root systems do not have proper soil holding capacity, windfirmness or water-nutrient absorption ability. This also results in reduced health and vigor and opens the tree for insect and/or disease infestation. Mechanical injury which physically damages bark and scars the surface of the tree can lead to hollow trees which are structurally unsafe around people and homes. The older and/or larger a tree is the more readily it is affected by the negative impact of construction related activities. Once houses are built and trees begin to die from past carelessness from construction the aesthetic quality of an area is reduced. The dead trees become a hazard and are expensive to remove when near roads, homes or utility lines.

Research has shown that trees on a houselot will enhance the value of that houselot. In general, only favor healthy, high vigor trees to be left on houselots. Individual trees should be straight, well-formed and firmly rooted. Avoid extremely tall or larger diameter trees as they may be more subject to windthrow or mortality, unless advised to by a forester, due to height or reduced vigor due to age. The best trees to save on houselots would be sugar maple, red oak, white pine and hickory. Trees may be left in groups or "islands" to reduce the impact of soil disturbance and mechanical injury. Both individual trees or "islands" can be designated for retention with flagging prior to construction by a professional forester so they will be avoided. No excavation, equipment or filling should occur within 20-50 feet (depending on tree diameter - the larger the tree the further away disturbance should occur) of single trees or groups of trees. A general rule to follow is no equipment or excavation within two times the radial spread distance of the crown. Finally, trees left on site around houses should be away from the house at least for a distance equal to the height of the tree. The negative effects of construction on trees is not usually visible at the time the work is done. However, soil compaction, root injury, and scraped bark contribute to insects and disease infesting the tree after machinery has left the site. This creates hazards and problems for home owners as trees die several years after construction. These problems can be minimized or eliminated with proper care taken with vegetation during development.

When highly absorptive forest soils are disturbed (grades on hills cut and filled to create roads, driveways, lawns and houselots) the overland flow of water increases because the sponge-like effect of the litter and humus layer is lost. The resulting soil compaction prevents rain from soaking into the soil surface as it falls. This causes water to collect and run over the lawns and roads. The run off has the potential to build erosive power in short distances, tear soil loose and result in sedimentation and siltation. The greatest impact on water quality from loss of absorptive forest soils is during, or just after construction. The increased erosion can cause sediment accumulation in streams, ponds or reservoirs, destruction of aquatic wildlife habitat by siltation and reduction of water quality from turbidity. Forested areas contribute little sediment to streamflow. Converting a forest environment to an urban one could affect water relations drastically. Peak flows may increase as well as sedimentation. One set of estimates has shown run off increasing by 15, 29, and 41 percent by paving 25, 50, and 75 percent of a forested watershed. This is because urbanization reduces interception or rain, infiltration, soil moisture storage, and evapotranspiration, and increased overland flow and run off. Forestland is also beneficial in protecting water quality by minimizing eutrophying nutrients, such as phosphorus, and soil-borne contaminants. Phosphorous is generally the limiting nutrient for aquatic ecosystems and usually tightly held by forest ecosystems. However, on-site sewage disposal generates large quantities of phosphorous, which can enter aquatic systems and accelerate eutrophication. Phosphorous export from forested

land is estimated to be one-seventeenth that of urban land. In the Pine Brook subdivision stream water quality may be adversely affected by erosion, sedimentation, and/or nutrient inputs from **stand(s) 5 and 6** during and after development. Exposed soils on the slopes in **stand(s) 5 and 6** should be avoided during and after construction.

When making road and grade cuts, remove trees back from the cut for a distance of two feet for each foot of depth of cut, e.g. 20 feet back for a 10 foot cut. This will be very important in **stand(s) 3 and 5.**

## Management Considerations

Due to the high value of trees today, proper forest management is essential before, during and after construction. A forester views a proposed subdivision as a group of plant communities. Each of these communities (commonly called a "stand") have developed to accommodate the existing environmental restrictions of light, soil, moisture and nutrients. Each plant community will react differently to changes caused by construction. A professional forester is essential in evaluating tree health and vigor, insect and disease problems, species longevity, potential mortality, management of open space for recreational opportunities and wildlife habitat. Management recommendations are not only based on present tree condition, but also on expected future conditions of the trees in 10, 20, or 30 years. A pre-development thinning in **stands 1, 3, 5 and 6** could serve to strengthen trees in these areas against breakage and windthrow while raising revenue for future plantings along roads, on houselots and other woodland improvements, i.e. hiking trails. A forester should be involved in the overall development plan to advise on individual tree retention, tree island retention, erosion and sedimentation control and site limitations which can create future hazards. Names of qualified foresters are available from the Division of Forestry (295-9523).

In **stand 1** the old tree tops are too rotten to be saleable. However, much of the poletimber (6"-11" diameter trees) could be harvested for fuelwood. The tall, straight 10" -14" diameter oaks can be retained on site if widely spaced and proper precautions taken with machinery. Larger diameter culls (hollow, cracked, crooked, rotted trees) should not be left in houselots as they are high liability specimens. Also, be sure to keep even tall, firmly rooted trees away from future houses by at least the distance of the height of the tree.

In **stand 3**, the white pine, especially those 10-30 feet tall will make excellent yard trees. In this area "islands" of trees should be left to grow. Although individual trees can be left in houselots as long as their shallow root systems are not damaged by construction activity. Older, overstory oaks

should be removed in a harvest, while protecting the vigorous younger white pine. To protect old sugar maple be sure to keep equipment two times the radial spread distance of the crown away from the base of the tree.

In **stand 5** openings in the densely grown white pine will encourage windthrow because the side support has been removed. Taller, larger diameter trees are the most likely to fall over in high winds on this west facing slopes. A pre-development thinning would reduce the risk of blow down by strengthening root systems and removing the high liability trees.

**Stand 6** is in poor health as a forest. Minimal disturbance will accelerate impending mortality. A thinning, conducted by a professional forester, can remove high liability trees to reduce mortality after construction yet still leave a forest of vigorous trees of all sizes.

The Nye-Holeman State Forest is adjacent to the proposed subdivision and is accessible from Route 74 east and north of the property. This state forest is used primarily for hunting and forest management. The state forest is open to the public 7 days a week during daylight hours. Unauthorized vehicle usage camping and fires are prohibited.

A vegetative sound barrier along the south boundary of the property is not practical. Large, well established trees and dense underbrush will prohibit 12" seedlings from growing by robbing them of sunlight, water and soil nutrients. A barrier would take too long to cultivate and grow (a generation at least) and require expensive brush clearing and regular maintenance for 10 years to be sure the barrier was properly established.

## Conclusion

Trees have value in reducing climatic extremes, controlling runoff, filtering out polluting particles from air and water, reducing noise, providing aesthetic enjoyment, creating wildlife habitat, recharging aquifers, supplying wood fiber and functioning as a carbon sink. Healthy vegetation provides the long term amenities. Therefore a good relationship between urban growth and forest lands must exist. Trees around houses can be healthy, long lived and valuable if treated properly in the conversion from forested habitat to subdivision. What is lost due to development is the wildlife carrying capacity of the forest and its ability to produce wood fiber for generations in the next century and beyond.

# VEGETATION MAP

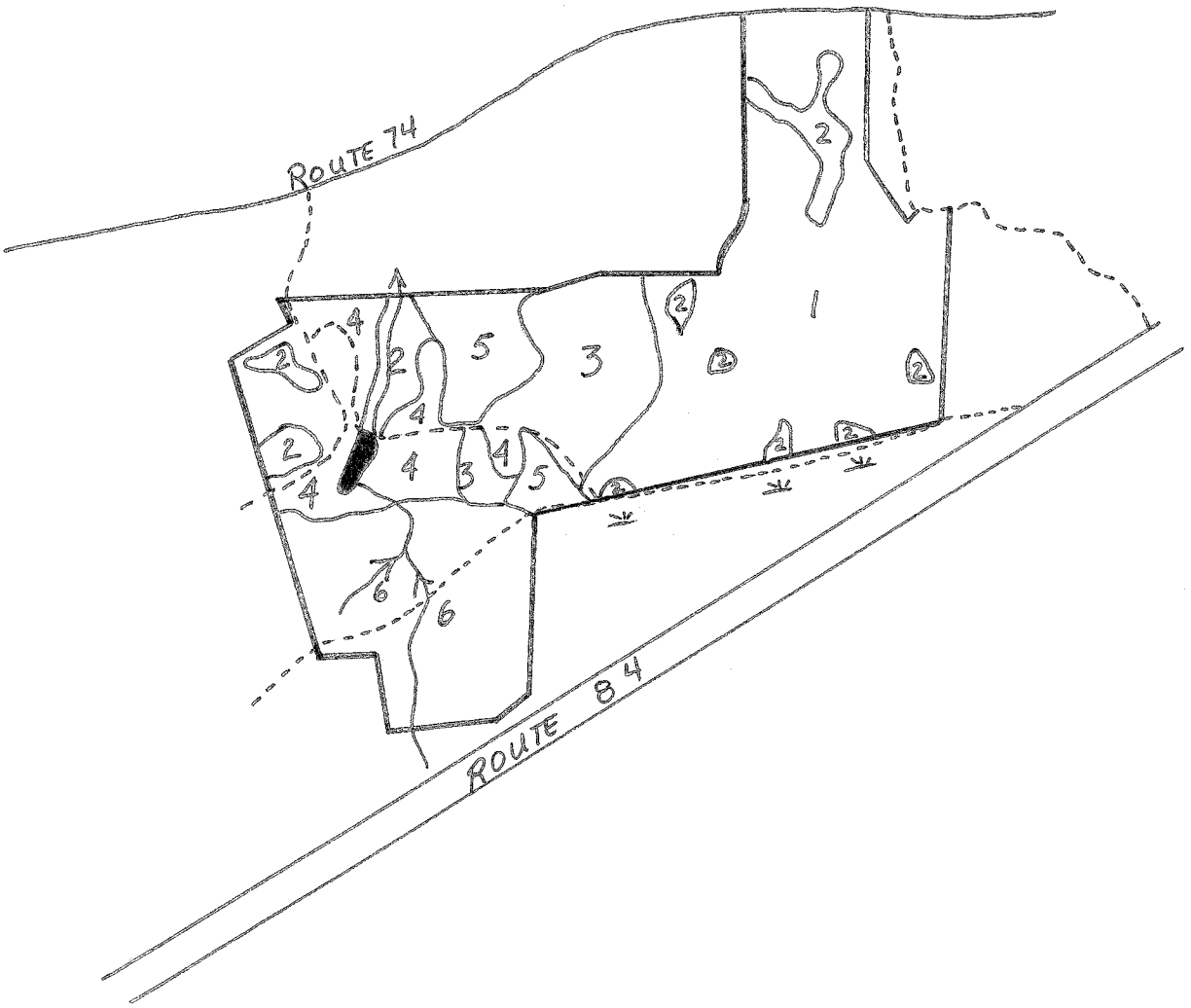
Scale 1" = 1000'

**KEY**

- Boundary
- Woods Road
- Hardwood Swamp
- Perennial Stream
- Pond

**LEGEND**

Stand 1: Mixed Hardwoods
Stand 2: Hardwood Swamp
Stand 3: Softwood-Hardwood
Stand 4: Old Field
Stand 5: Plantation
Stand 6: Mixed Hardwood



# 10. WILDLIFE RESOURCES

## Habitat Type Descriptions

The habitat types on these properties include mixed hardwood forest, softwoods, open field, and wetland area. The variety of habitat types provides for a diversified wildlife population. Examples of wildlife species in each habitat is provided along with an list of species likely to be found in these areas.

### Mixed Hardwood Forest

This habitat consists of a variety of hardwood species including red maple, beech, red oak, elm, hickory and birch. Understory vegetation includes witchhazel elderberry, multiflora rose, grape. blackberry and hardwood regeneration. Wildlife frequenting such habitat types include deer, fox, raccoon, gray squirrel, woodpeckers (pileated, hairy and downy), ovenbirds, scarlet tanangers, black-throated blue and green warblers, barred owls, broad-winged hawks and various non-game species such as porcupines, shrews, voles and snakes.

### Softwoods

This habitat consists of white pine and pitch pine. Understory vegetation consists of hardwood regeneration and green briar. Wildlife frequenting such habitat types include red squirrel, fox, black-capped chickadee, ruffed grouse.

### Open Field

Open land habitat is very beneficial to wildlife. Vegetation provides food as well as structural diversity, creating cover for a great array of wildlife ranging from mice and shrews to deer. Fields also attract numerous insects, a major food item of various wildlife species such as birds and small mammals including bats. Another important feature of fields is the edge created where fields meet forest. This valuable zone for food and cover consists of dense berries, shrubs and grasses. Wildlife utilizing open field habitat include deer, woodcock, woodchuck, fox, raccoon, skunk, mourning dove, bluebirds, eastern kingbirds, mockingbirds, flycatchers, blue and golden winged warblers, robins, kestrels, red-tailed hawks, eastern screech owls and cottontail rabbits.

### Wetland/Riparian Zone

This habitat type consists of red maple wooded swamp and small pond located in old gravel area. Associated vegetation includes red maple, birch, alder, dogwood, jewel-weed, spicebush, sweet

pepper bush, skunk cabbage, false helebore, and various grasses and sedges. Wildlife using such sites include deer, fox, raccoon, skunk, muskrat, mink, woodducks, swallows, red-winged blackbirds, grackles, kingbirds, cedar waxwings, hooded and wilson's warblers, titmice, woodpeckers, and numerous amphibians and reptiles including water and garter snakes, salamanders, and spotted and painted turtles.

## Impacts of Development

### Wetland/Riparian Zones

At time of field review snow/ice cover prohibited a complete examination of plant species in the wetland areas. The impact of development due to the proposed wetland crossings and construction in proximity to the pond area could not be thoroughly evaluated. The following is based on current recommendations.

Wetlands support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply which allow for a high carrying capacity (Brown et. al. 1978). There are many species that require access to streams or water body margins for survival even though they may spend much of their time in other habitats (Milligan and Raedeke 1986). Part of the food supply for many vertebrates is the high abundance and diversity of insect populations that are typical of wetland ecosystems (Brown et al. 1978).

Wetlands presently provide important habitat for a variety of wildlife species and function as areas for absorption of natural runoff. Any planned diversion of stormwater into wetlands will increase water flow, sedimentation and pollution. This will alter the present ecological structure of the wetland and reduce species diversity. Even though stormwater retention and filtration plans may alleviate some of these problems, the long term effects of stormwater diversion into wetlands tend to be negative. Retention and filtration systems may still allow fine silt and pollutants to enter.

Not only are wetlands important to wildlife, they are also important to humans. Various functions of wetlands include flood control, ecological integrity, fish and wildlife habitat, nutrient and sedimentation trappings, educational potential, visual/esthetic quality, recreation, groundwater use potential and botanical sites. There are usually inherent limitations in developing wetlands due to poorly drained and unstable soil types.

Vegetation removal in wetlands may have severe impacts on wildlife, especially reptiles and amphibians. One or several of the cover, food, breeding habitat, and hibernation areas may be

altered. Species dependent on specialized habitat are eliminated and more adaptable species are reduced in numbers (Campbell 1973). Barriers, such as roads, to seasonal movement and population dispersal are also serious threats (Campbell 1973). To minimize impact maintain a 100 foot wide buffer zone of vegetation around wetland/riparian areas. This buffer zone will help filter and trap silt and sediments, provide excellent wildlife cover and be an aesthetic and educational asset to the community.

The diversified habitats at this site provide for the needs of a wide variety of wildlife species that inhabit the general area. As the demand for land increases and land is developed, there will be an immediate and lasting negative impact on wildlife. The primary impact is the direct loss of habitat due to buildings, roads, driveways, parking areas, walkways, recreational facilities and other structures. Loss of habitat also occurs where cover is cleared for lawns and landscaping. Additional impact occurs with increased human presence, vehicular traffic and the number of free roaming cats and dogs. Development of this area will decrease the amount of habitat simply because the land will he occupied by physical buildings and roads. Human activity in the area will greatly increase, even after construction is completed. Some species of wildlife will not tolerate increased human activity and will emigrate from the area. Other species, tolerate of human activity, might be attracted to the area, and may become a nuisance to area residents (i.e. raccoons, skunks, moles).

### Upland Wooded Areas

Fragmentation of habitat may lead to a decline in species diversity and richness. Sensitive, interior species that require large tracts of undisturbed forest, such as veeries, ovenbirds and scarlet tanangers may decrease and no longer occupy the area.

## Mitigation of Disturbances

There are several management guidelines which should be considered during the planning process in order to minimize adverse impacts on wildlife:

1. Make use of natural landscaping techniques (avoid and/or minimize lawns and chemical applications) to lessen acreage of lost habitat and possible wetland contamination.

2. Maintain a 100 foot wide buffer zone of natural vegetation around wetland/riparian areas to help filter and trap silt and sediments. These vegetated zones provide excellent wildlife cover and travel corridors.

3. Stone walls, shrubs and trees should be maintained along field borders.

4. During land clearing care should be taken to maintain certain forestland wildlife requirements:

a. Encourage mast producing trees (oak, hickory, beech).
b. Leave 3-5 snag/den trees per acre as they are used by many birds and mammals for nesting, roosting and feeding.
c. Exceptionally tall trees are used by raptors as perching and nesting sites and should be encouraged.
d. Trees with vines (fruit producers) should bn encouraged
e. Brush debris could be windrowed to provide cover for small mammals, birds and amphibians and reptiles.
f. Removal of dead and down woody material should he discouraged where possible. The existence of many wildlife species (salamanders, snakes, mice, shrews and insects) depends on the presence of dead trees (Hassinger 1986).

5. Implementation of backyard wildlife habitat management practices should be encouraged. Such activities involve providing food, water, cover and nesting areas.

On small acreages with many buildings, landscaping can do a great deal to provide habitat and make an area attractive to wildlife. First, leave as many trees as possible around the buildings. This will not only benefit wildlife by providing food, cover and nesting sites (i.e. especially for songbirds), but will also be more aesthetically pleasing for the residents of the development. Plant trees and shrubs which are useful to wildlife and landscaping. Large expanses of lawn with no trees or shrubs present should be discouraged.

Planting shrubs that are less palatable to deer may lessen problems with nuisance deer. Shrubs less palatable to deer include evergreen hybrid rhododendrons, American Holly, Scotch pine, White and Norway Spruce, Japanese cedar, Flowering dogwood, mountain laurel, Common lilac and White pine. Taxus spp. (yews) experience a greater degree of damage as they are preferred winter foods of deer (Conover, 1988).

The proposed development is in close proximity to Charter Marsh, a state owned wildlife sanctuary. This area is closed to all public access except by authorized permits.

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**REPTILES**

Common Snapping Turtle
Painted Turtle
Spotted Turtle
Wood Turtle
Eastern Box Turtle
Eastern Worm Snake
Eastern Ribbon Snake
Northern Black Racer
Northern Ringneck Snake
Black Rat Snake
Eastern Milk Snake
Eastern Smooth Green Snake
Northern Redbelly Snake
Eastern Garter Snake

**AMPHIBIANS**

Jefferson's Salamander
Spotted Salamander
Marbled Salamander
Northern Dusky Salamander
Northern Two-lined Salamander
Northern Spring Salamander
Four-toed Salamander
Redback Salamander
Slimy Salamander
Mudpuppy
Red-spotted newt
Eastern American Toad
Northern Spring Peeper
Gray Tree Frog
Bullfrog
Green Frog
Pickerel Frog
Northern Leopard Frog
Wood Frog

**MAMMALS**

Opossum
Masked Shrew
Water Shrew
Smoky Shrew
Short-tailed Shrew
Least Shrew
Hairy-tailed Mole
Eastern Mole
Star-nosed Mole
Little Brown Bat
Keen's Myotis
Silver-haired Bat
Eastern Pipistrelle
Big Brown Bat
Red Bat
Hoary Bat
Eastern Cottontail
Eastern Chipmunk
Woodchuck
Gray Squirrel
Red Squirrel
Southern Flying Squirrel
White-tailed Deer
Beaver
Deer Mouse
White-footed Mouse
Boreal Red-backed Vole
Meadow Vole
Woodland Vole
Muskrat
Southern Bog Lemming
Norway Rat
House Mouse
Meadow Jumping Mouse
Woodland Jumping Mouse
Porcupine
Coyote
Red Fox
Gray Fox
Raccoon
Short-tailed Weasel
Long tailed Weasel
Mink
Striped Skunk
River Otter

**BIRDS**

Northern Goshawk
Broad-winged Hawk
Rough-legged Hawk
American Kestrel
Ring-necked Pheasant
Wild Turkey
Red-shouldered Hawk
Red-tailed Hawk
Sharp-shinned hawk
Ruffed Grouse
Northern Bobwhite

Killdeer
Mourning Dove
Yellow-billed Cuckoo
Eastern Screech Owl
Barred Owl
Short eared Owl
Common Nighthawk
Whip poor-will
Ruby-throated Hummingbird
Red-headed Woodpecker
Yellow bellied Sapsucker
Hairy Woodpecker
Pileated Woodpecker
Eastern Wood-Pewee
Acadian Flycatcher
Willow Flycatcher
Eastern Phoebe
Eastern Kingbird
Purple Martin
Northern Rough-winged Swallow
Cliff Swallow
American Crow
Black capped Chickadee
Red-breasted Nuthatch
Brown Creeper
House Wren
Marsh Wren
Northern Mockingbird
Eastern Bluebird
Gray cheeked Thrush
Hermit Thrush
American Robin
Ruby crowned Kinglet
Cedar Waxwing
Loggerhead Shrike
White-eyed Vireo
Yellow-throated Vireo
Philadelphia Vireo
Blue-winged Warbler
Tennessee Warbler
Nashville Warbler
Yellow Warbler
Yellow-rumped Warbler
Magnolia Warbler
Black-throated Blue Warbler
Pine Warbler
Palm Warbler
Blackpoll Warbler
Black and White Warbler
Prothonotary Warbler
Ovenbird
Louisana Waterthrush
Connecticut Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Northern Cardinal

American Woodcock

Common Barn-Owl
Great Horned Owl
Long-eared Owl
Northern Saw-whet Owl
Chuck will's-widow
Chimney Swift
Be#ted Kingfisher
Red bellied Woodpecker
Downy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Yellow-bellied Flycatcher
Alder Flycatcher
Least Flycatcher
Great Crested Flycatcher
Horned Lark
Tree Swallow
Bank Swallow
Blue Jay
Fish Crow
Tufted Titmouse
White-breasted Nuthatch
Carolina Wren
Winter Wren
Gray Catbird
Brown Thrasher
Veery
Swainson's Thrush
Wood Thrush
Golden-crowned Kinglet
Blue-gray Gnatcatcher
Northern Shrike
European Starling
Solitary Vireo
Warbling Vireo
Red-eyed Vireo
Golden-winged Warbler
Orange-crowned Warbler
Northern Parula
Chestnut-sided Warbler
Black-throated Green Warbler
Cape May Warbler
Blackburnian Warbler
Prairie Warbler
Bay-breasted Warbler
Cerulean Warbler
American Redstart
Worm-eating Warbler
Northern Waterthrush
Kentucky Warbler
Mourning Warbler
Hooded Warbler
Canada Warbler
Scarlet Tanager
Rose-breasted Grosbeak

Indigo Bunting
Rufous-sided Towhee
Chipped Sparrow
Vesper Sparrow
Fox Sparrow
Lincoln's Sparrow
White throated Sparrow
Dark-eyed Junco
Red-winged Blackbird
Rusty Blackbird
Brown-headed Cowbird
Northern Oriole
Purple Finch
Red Crossbill
Common Redpoll
American Goldfinch
House Sparrow
Dickcissel
American Tree Sparrow
Field Sparrow
Sharp-tailed Sparrow
Song Sparrow
Swamp Sparrow
White-crowned Sparrow
Bobolink
Eastern Meadowlark
Common Grackle
Orchard Oriole
Pine Grosbeak
House Finch
White-winged Crossbill
Pine Siskin
Evening Grosbeak

Species potentially inhabiting habitats of study area.

* Connecticut Wildlife checklist of birds, mammals, reptiles and amphibians.

# 11. FISH RESOURCES

## Site Description

The proposed residential housing development includes a total of 75 single family housing lots that will be served by on site wells and septic systems. Total land parcel size is approximately ±144.0 acres of which 7.5 acres has been designated as open space. Four wetland crossings are proposed.

Two small intermittent streams originate within the property. The stream on the western edge of the property flows northerly into the Skungamaug Marsh which is owned by the State of Connecticut. This stream contains a small pond which the applicant plans to utilize as a stormwater detention basin. The other small intermittent stream flows southerly into the Willimantic River. One of the primary functions of these small streams and associated wetlands is to provide clean and unpolluted waters to downstream areas.

This report will address all major impacts to aquatic resources and delineate mitigation measures required to minimize impacts.

## Fish Population

Intermittent streams on the property do not support viable fish populations. The small pond on the westerly stream may support warmwater fishes that are commonly found in ponds. Fishes expected to inhabit this pond would be: largemouth bass, bluegill sunfish, pumpkinseed sunfish, golden shiner, and brown bullhead.

Both streams enter waters of critical concern to the Department of Environmental Protection (DEP) Inland Fisheries Division. The Willimantic River is a major coldwater river in eastern Connecticut of high recreational value. It is annually stocked with more than 11,300 adult brook, brown, and rainbow trout. The river also has the distinction of containing the only Trout Management Area in eastern Connecticut. Trout stocked in this area are for "catch and release" only. The Skungamaug River which is a major tributary of the Hop River is another important coldwater fisheries resource. This river is annually stocked with more than 5,000 brook, brown, and rainbow trout.

## Impacts

The following impacts of the proposed subdivision on local aquatic resources and associated wetlands can be expected if proper mitigating measures are not implemented:

**1. Construction site soil erosion and sedimentation of watercourses through increased runoff from unvegetated areas :** During construction, topsoil within the proposed building lots will be exposed and susceptible to runoff events. Erosion and sedimentation due to construction has been regarded as a major cause of stream degradation in Eastern Connecticut. Excessive sediment deposition could damage downstream ecosystems by:

* Reducing the amount of usable fish habitat used for spawning purposes.

* Reducing fish egg survival.

* Reducing aquatic insect production.

* Contributing to the reduction of dissolved oxygen.

* Adversely affecting "gill" function and feeding.

**2. Percolation of septic effluent into watercourses :** A failure of individual septic systems to operate properly (refer to SEWAGE DISPOSAL section) would be potentially dangerous to stream environments. Nutrients and assorted chemicals that may be placed in septic systems could possible enter stream waters in the event of a septic system failure or infiltrate the groundwater during the spring when water tables are close to the surface. The introduction of septic effluent could result in a major threat to fish habitat, public health, and overall water quality conditions.

**3. Aquatic habitat degradation due to the influx of stormwater drainage from nearby residential housing :** The developer has proposed a stormwater management plan which includes the construction of two detention basins; one will be placed within wetlands (lot 36) and the other will utilize the existing pond as a basin. Stormwaters can contain a variety of pollutants that are detrimental to aquatic organisms. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts, and coarse sediment. Once introduced into stream environments, stormwater runoff will fertilize stream waters causing water quality degradation. More harmful still are spilled petroleum based chemicals or other toxicants that can precipitate partial or complete fishkills. The eutrophication or aging process in the pond that will be utilized as a stormwater detention basin will be accelerated

resulting in more frequent algae blooms and extensive growth of nuisance aquatic plants.

**4. Degradation of wetland habitat :** Degradation and loss of wetlands can be expected due to four road crossings and the construction of a detention basin within wetlands. Wetlands are beneficial in many ways. They serve to: (1) control flood waters by acting as a water storage basin, (2) trap sediment from natural and man-made sources of erosion, and (3) help filter-out pollutants from runoff before they enter watercourses.

**5. Transport of lawn fertilizers and chemicals to watercourses :** Runoff and leaching of nutrients from fertilizers on lawns will stimulate filamentous algae and nuisance aquatic plant growth in streams causing degraded water quality. Additionally, introduction of lawn herbicides can result in "fish kills".

**6. Impacts to downstream environments :** Any water quality problems and habitat degradation that occurs on the project site will eventually be observed in either the Willimantic or Skungamaug Rivers. As previously mentioned, these coldwater streams are actively managed by the DEP Inland Fisheries Division. Hence, it is important that these vital fisheries resources are afforded maximum protection from the adverse impacts of residential housing development

## Recommendations

The following recommendations should be considered by the Town of Tolland to mitigate impacts to local aquatic resources and wetlands.

**1. It is highly recommended that at the minimum, a 100 foot open space buffer zone be maintained along all wetland boundaries associated with intermittent watercourses :** This buffer can be an effective mitigation measure at this development location. No construction and alteration of existing habitat should be allowed in this zone. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984; USFWS 1986; 0DFW 1985). Impacts such as soil erosion, can be more effectively minimized if these areas are left in their natural condition. These buffers will absorb surface runoff and other pollutants before they can enter aquatic ecosystems.

**2. Install and maintain proper erosion and sedimentation controls during site construction activities :** Silt fences and haybales should be placed within excavated trenches

to ensure that all runoff is properly contained. A town official should be responsible for inspecting this development on a regular basis to ensure that contractors have complied with all stipulated mitigation devices. Past stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis. Proper installation and maintenance of these devices is critical to environmental well being.

**3. Properly design and locate individual septic systems (refer to SEWAGE DISPOSAL section) :** It is critical that all septic systems be placed in areas that will effectively renovate septic effluent. It is the recommendation of the Team's fisheries biologist that septic systems not be installed within the 100' buffer zone (see recommendation #1). The addition of septic effluent to streams can be one of the greatest threats to stream ecology. Septic systems should!d be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly!y result in system failure. Residents should be encouraged to utilize nonphosphate laundry detergents.

**4. The developer should submit a detailed stormwater management plan for Town review :** The effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch basins and detention basins. It is recommended that detention basins not be placed in existing wetland or pond habitat and that all stormwaters be first outletted into non-wetland habitat thereby avoiding direct contact with wetlands. Alternative locations that will not directly affect wetlands should be investigated. Maintenance is very critical. Roadway catch basins and proposed detention basins should be regularly maintained to minimize adverse impacts to aquatic environments. The use of road salt to deice roads subdivision roads should be prohibited.

**5. All work near streams and/or wetlands for the purpose of road construction should take place during low flow periods :** This strategy will help minimize the impact to aquatic resources. Reduced streamflows and rainfall during the summer and early fall provide the least hazardous conditions in which to work near sensitive aquatic environments.

**6. Limit liming, fertilization, and the introduction of chemicals to subdivision lawns :** This will help abate the amount of additional nutrients to aquatic ecosystems. Also, non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

## Bibliography

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

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

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

# 12. PLANNING COMMENTS

## Affordable Housing Provisions

In an effort to increase the dwindling supply of affordable housing in the Town of Tolland, a number of approaches may be taken by the town and the developer. Mandatory set asides could be established in each development to create affordable housing units. The exact number of affordable units can be negotiated between the Planning and Zoning Commission and the developer or the Commission can preset the percentage of units to be set aside as affordable. A variety of subdivision controls can be relaxed in order to make the overall cost of development lower to permit the construction of some affordable units, including the following:

- ☆ reduce street pavement width to reduce infrastructure costs;
- ☆ reduce street frontage requirements for overall reduction of road length;
- ☆ mix unit types;
- ☆ mix market-priced housing with affordable units throughout the development;
- ☆ relax or repel minimum floor area restrictions for affordable units;
- ☆ reduce front yard setback to minimize utility lateral costs.

Permit accessory apartments for moderate-income persons. Controls can be established so that the addition of the second unit need not alter the exterior illusion of a single family home. Accessory apartments can be ideal arrangements for independent elderly family members or non-related persons in need of affordable housing.

Allow duplexes or mixed development of one and two family dwellings.

The affordable units should be secured with a 30-year deed restriction to insure long-term affordability. The Planning and Zoning Commission could assign the administrative responsibilities for monitoring the affordable housing units to the local Housing Authority.

The Town could form a Housing Partnership Committee to inventory local needs and identify local solutions to the affordable housing crisis.

## Recreation Use

A 7.5 acre parcel of open space in the southwest corner of the site is proposed for the use and enjoyment of the homeowners of the subdivision. What is the best use of the designated open space in the development?

Most likely the town will take over the ownership and maintenance of the open space. The developer should prepare the open space for the Town to take over. The Town's Plan of Development lists five public recreation facilities in short supply in town. The following listing is in the order in which the public rated these facilities with the *most important* appearing first. The lot area required for each of these activities is noted:

| Activity | Acres Required* |
|---|---|
| children's playgrounds | 2 - 3 |
| swimming facilities | .5 - 1 |
| natural parks | 1 - 3 |
| athletic fields | 8 - 12 |
| tennis courts | 1 - 2 |

**Source: Planning Advisory Service, Report No. 194, "Standards for Outdoor Recreation Areas."*

Considering the close proximity of the State forest to this residential development, the open space provided within the development should complement facilities available at the state forest. The Nye-Holman State Forest offers hiking, picnicking and hunting.

## Environmental Considerations

In addition to the proposed roadway encroachments in the wetlands, the development will further degrade wetlands through a number of driveway crossings. The development as proposed causes driveways for lots 23, 24, 25, 52 and 56, as well as access to the open space to cross wetland soils. Efforts should be made to minimize adverse impacts to the wetlands by:

- ✧ combining driveways;
- ✧ reconfiguring lots to avoid wetlands altogether; and,
- ✧ placing deed restrictions on lots containing wetland soils to avoid individual lot owners from illegally and unknowingly filling wetlands on their property.

The deed restriction will also serve to alert the homeowner to the existence of wetlands on his or her property at the time of lot purchase.

The Commission should consider adopting a "buildable lot area" or "buildable square" concept into their wetlands and zoning regulations, whereby each approved building lot must have a contiguous area on the lot suitable for placing a structure, well and septic system exclusive of land defined as

wetlands, flood zone, etc. This buildable lot area will assure that the lot can be developed without causing adverse impacts to the environment.

## Traffic Considerations

Tolland's subdivision regulations (#3.4.7) state that cul-de-sacs "shall not exceed 600 feet overall length." The cul-de-sac serving lots 1, 2, 3, 4, 53, 54, 55, and 56 exceeds the 600-foot maximum length of a dead end street and could prove dangerous to future residents in emergencies - fire or other calamity. The dotted line extension of that cul-de-sac is merely a "paper road", connecting to the former public street Patton Road. If no rights have been obtained to extend that cul-de-sac, the dead end should be shortened to meet existing zoning regulations.

Only one means of egress and ingress is proposed for the site. In case of blockage, this could prove dangerous to trapped residents. The developer should make every effort to obtain another means of egress from the site.

## 13. ARCHAEOLOGICAL REVIEW

The Office of State Archaeology has reviewed the Pine Brook Subdivision project area for its potential for prehistoric Indian sites and the significance of historic stone foundations. A review of the State of Connecticut Archaeological Site Files and Maps show no prehistoric sites in the project area. The nearest known sites are associated with the Tolland Marsh area. However, the elevated knolls with well-drained soils surrounding the existing pond and the brook systems associated with them offer excellent locations for prehistoric Indian encampments. Even though the pond was historically dammed, the upslope areas around it would have provided immediate access to the wetland resources essential to human occupation. For example, the location of a boy's summer camp associated with the existing pond is an historic marker. The environmental variables used to select a prehistoric encampment are usually similar to those used for selecting historic summer camps. As a result, we often locate Indian sites where historic campgrounds are located. The Office of State Archaeology recommends that an archaeological survey be conducted in the pond area including Lots 52, 53 and 54, to locate and identify all prehistoric sites.

The historic stone foundations are unique and well preserved. A large foundation was identified on Lot 53, along with associated stone walls. Every effort should be made to maintain the walling where feasible. These are excellent examples of 18th century construction. The foundation area should receive archaeological attention prior to any construction activities. This should include limited test excavations around and within the foundation structure, mapping and photographing. To preserve the integrity of the stone foundation, all vegetation should be removed from the cellar area, and later filled with sand to prevent any collapsing of the stones during the construction process and to allow access for historians in the future. In addition, fhe Office of State Archaeology recommends the establishment of an historic preservation easement in the foundation area of Lot 53. The easement can be managed by the Town of Tolland or the Office of State Archaeology and should be written into the deed with restrictions on subsurface disturbance of the foundation without town and state approval.

Finally, it is recommended that further archaeological testing be done along the old dirt road associated with the pond and the stone foundation. The stone foundation and road appear to date to the late 18th century and may have associated Revolutionary War camps and other historic sites in their proximity. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources.**

In summary, a professional archaeological reconnaissance survey is recommended for the elevated knolls surrounding the existing pond in the western section of the project area, as well as along the old dirt road. Stone walls should be maintained as examples of the rural significance of the property where feasible. The old stone foundation should have test excavations conducted to recover any artifactual materials associated with the structure's activities. In addition, proper mapping and recording of the existing stone foundation should be undertaken followed by filling in the feature with sand to preserve the walls. An historic preservation easement should be established for this area of Lot 53. The Office of State Archaeology is prepared to offer technical assistance to the Town of Tolland and the landowner to ensure the preservation and conservation of the cultural resources in the project area.

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 22, 1990

Eastern Connecticut Environmental Review Team
P. O. Box 70, Route 154
Haddam, CT 06438

Attention: Elaine A. Sych, ERT Coordinator

RE: Pine Brook Subdivision, Tolland CT

Dear Elaine:

This report is in response to a request from the Tolland Wetlands Commission for an environmental review of the above-referenced application. Water Resources staff were unable to attend the field walk on December 21, 1989, however, Carla Harvey has reviewed the plans that were submitted and offers the following comments with respect to the wetland impacts of the proposed subdivision.

The project site is located between Route 74 and Interstate 84, just west of the Nye-Hollman State Forest. The total area of this irregularly shaped parcel is approximately 144 acres upon which 75 single family residential lots are proposed. These lots are to be served by on site septic systems and water supply wells.

The wetlands on the western portion of the property are a complex system of broad-leaved and needle-leaved forested swamps, scrub/shrub swamps and open water bodies. This diversity of wetland/watercourse types contributes significantly to the overall habitat value of the system. The mixing of vegetative types in a given area tends to increase the diversity of wildlife that utilize that area for feeding, nesting, reproduction and shelter.

Portions of this wetland system are situated within an Aquifer Protection Zone. Wetlands, by the nature of their soils and vegetation, provide significant water quality renovation functions. By filtering sediments and pollutants from upland runoff, wetlands play a major role in pollution attenuation. This function becomes increasingly important upon the introduction of impervious surfaces such as, in this case, roadways, rooftops, driveways and manicured lawns.

A wetland crossing is proposed to be located just north of an existing pond, within the Aquifer Protection Zone, to access lots 1, 2, 3, 4, 52, 53, 54, 55 and 56. Further, driveway crossings in one or more places will be needed to access individual lots. The wetland/watercourse resources on this section of the site are important for water pollution prevention, wildlife habitat and, to

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some degree, flood storage. We would recommend that the alternative of eliminating the above-listed lots and ending the cul-de-sac east of the proposed crossing be examined. By reducing the density of the development in this area, valuable wetland and water-related resources may be protected from probable degradation resulting from construction activities and other secondary impacts.

The second major crossing occurs at the northeast portion of the property. This proposed roadway crosses a wetland system designated as a broad-leaved deciduous forested swamp, with pockets of open-water by the National Wetlands Inventory. Reviewing the several schemes presented on sheet 16 on the plans titled "Various Schemes for Wetlands Crossing Near Route 74" prepared by Fuss & O'Neill, Inc. and dated Nov. 10, 1989, it appears that the proposed crossing is a feasible and prudent alternative. This access road crosses at the narrowest point of the larger tract of wetlands, minimizing the potential for adverse construction impacts.

A detention basin for the collection of storm water is proposed on lot 36 within the flagged wetland. While this forested wetland "pocket" may not appear to be significant on the map, it may provide a refuge area for wildlife. It is our general policy to discourage the excavation of wetlands for the construction of detention ponds. Wetlands, in their undisturbed state, provide natural detention and pollution attenuation functions. The applicant should look for alternative upland locations for this, or any, detention basin.

Individual lots containing wetlands should have deed restrictions and/or conservation easements placed on them to protect the wetlands from the potential secondary impacts that often accompany home ownership. For example, wetlands on private property are often filled for lawn expansion and/or the placement of outbuildings. A restriction on the deed would deter, and hopefully prevent, this type of activity.

To summarize, we feel that the scope of the project can be reduced to eliminate many of the impacts to wetlands. Creative plan design to accommodate the sensitive resources and natural features of a site, instead of the "cookie cutter" approach, usually results in a much more attractive community development. We suggest the following alternatives be evaluated:

1. Shortening the cul-de-sac on the western portion of the site and eliminating lots 1, 2, 3, 4, 52, 53, 54, 55 and 56. This would pull much of the activity within the Aquifer Protection Zone to outside of its boundary. It would also eliminate the need for several wetland crossings.

2. Examining alternative upland locations for the placement of any and all stormwater detention facilities.

3. Placing deed restrictions on the lots containing wetlands.

4. All appropriate erosion and sedimentation controls should be in place prior to any construction activity occurring.

If you have any questions or comments, or require clarification of any of the above, please call Carla Harvey at 566-7160.

Sincerely,

Doug Cooper
Principal Environmental Analyst
Water Resources Unit

DC:CAH

# ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil 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.