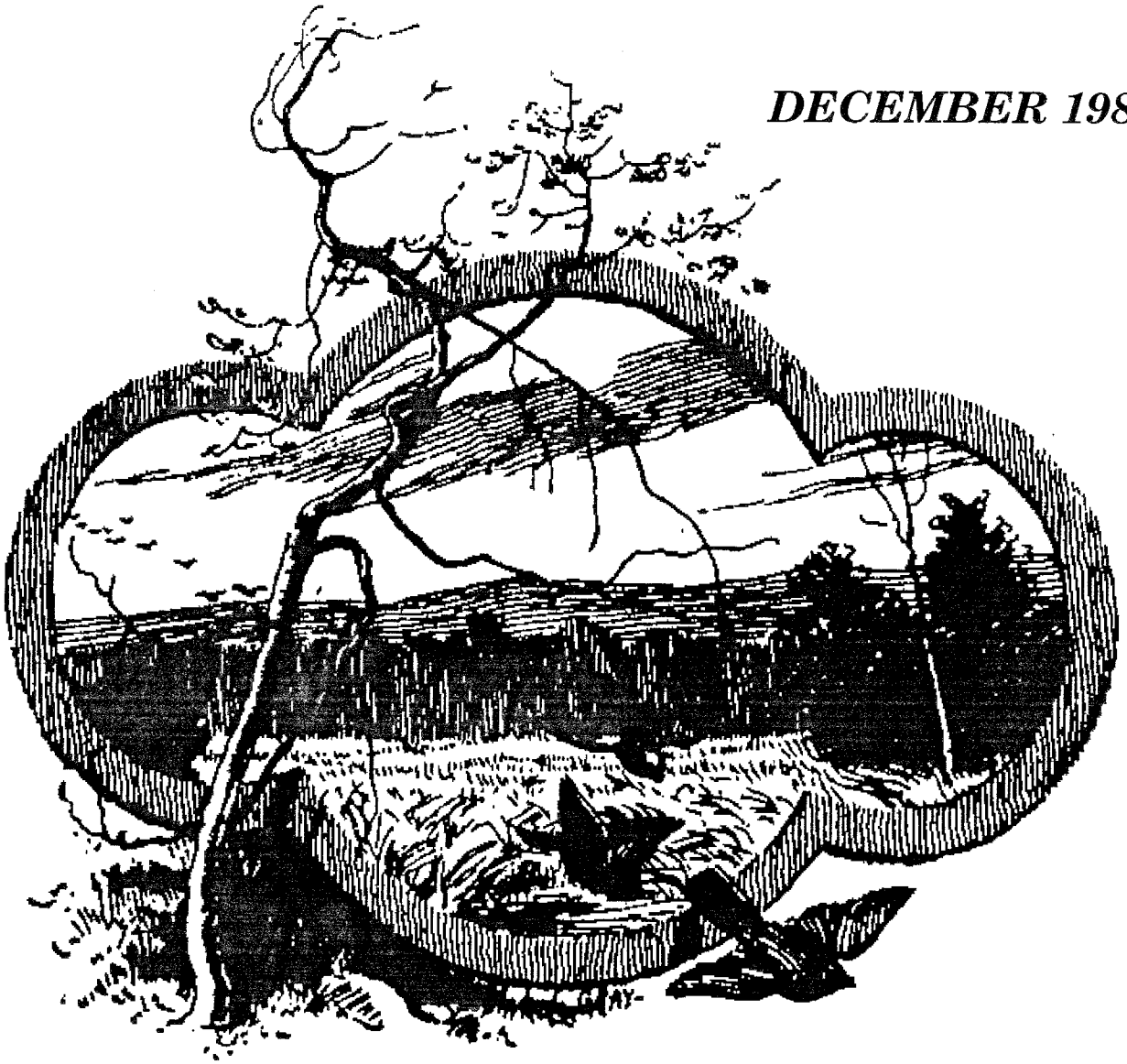
VEILLEAUX PROPERTY SUBDIVISION

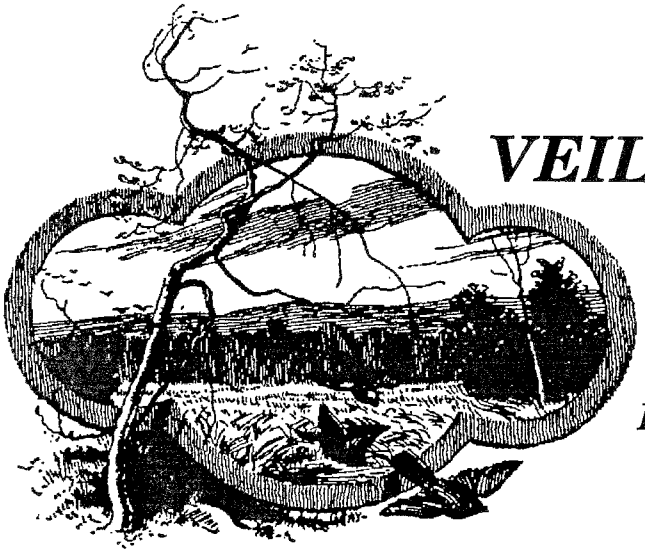
EAST HAMPTON, CONNECTICUT

DECEMBER 1989



EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

Eastern Connecticut Resource Conservation and Development Area, Inc.



VEILLEAUX PROPERTY SUBDIVISION

EAST HAMPTON, CONNECTICUT

REVIEW DATE: OCTOBER 26,1989

REPORT DATE: DECEMBER 1989

THE EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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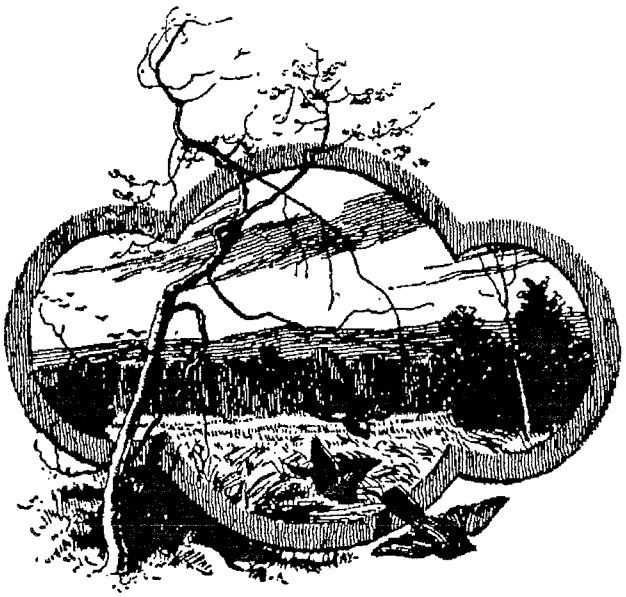

ENVIRONMENTAL REVIEW TEAM REPORT
ON

VEILLEUX PROPERTY SUBDIVISION
EAST HAMPTON, CONNECTICUT

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

The ERT met and field checked the site on Thursday, October 26, 1989. Team members participating on this review included:

Steve Hill	*Wildlife Biologist* *DEP-Eastern District*
Tom Ladny	*Soil Conservationist* *USDA-Soil Conservation Service*
Brian Murphy	*Fisheries Biologist* *DEP-Eastern District*
Robert Rocks	*Forester* *DEP-Cockaponsett Forest Headquarters*
Anthony Sullivan	*Planning Specialist* *CT Department of Policy and Management*
Elaine Sych	*ERT Coordinator* *Eastern CT RC&D Area, Inc.*
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 additional information. The Team met with, and were accompanied by representatives from the Town of East Hampton and the landowner and his engineer. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

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

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

If you require additional information, please contact:

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1. SETTING, ZONING AND LAND USE

The site, approximately 150 acres in size, is located in northern East Hampton. It is bounded on the north by Portland Reservoir Road, on the east by White Birch Road, on the west by Mott Hill Road and on the south by private, undeveloped land that is wooded. Portland Reservoir Road and Mott Hill Road are both unimproved town roads. The primary access road for the site will extend from White Birch Road to Mott Hill Road and will include two cul-de-sacs. Numerous frontage lots are proposed along White Birch Road and Mott Hill Road. This work will require upgrading Mott Hill Road to meet town specifications.

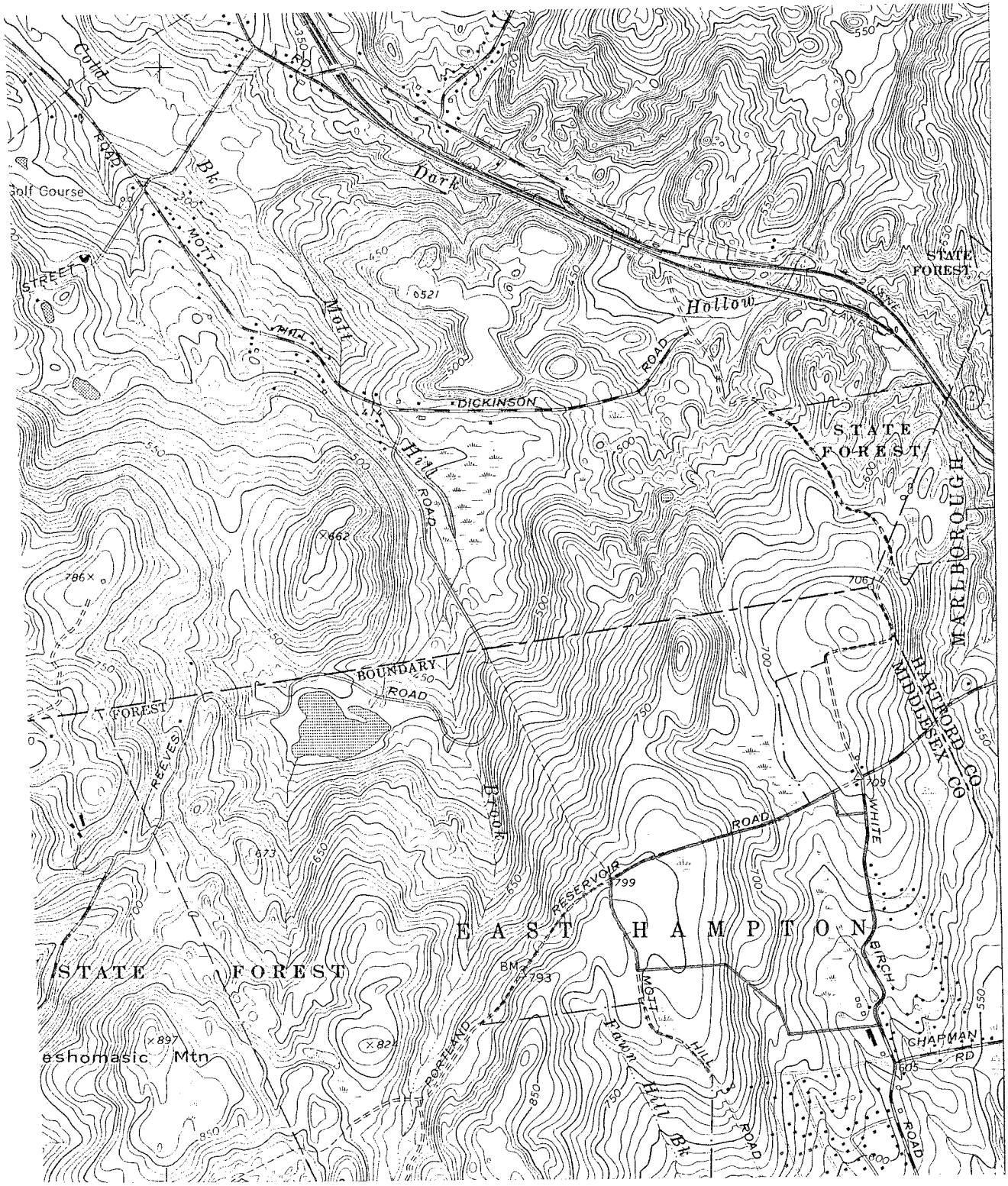
The site and vicinity is characterized by State forest (Meshomasic) to the west and north and single-family homes to the east and south. Open fields, which comprise about ±10.5 acres, occur at the eastern limits and northern limits of the site. An old apple orchard about 20 acres in size is located in the central parts of the site.

According to town officials, the site is located in a RU-2 zone which permits residential development at a minimum density of 60,000 square feet or approximately one and half acres. The site design concept is one of wooded house lots served by individual wells and septic systems.

LOCATION MAP

SCALE 1" = 2000'

—— Approximate Site



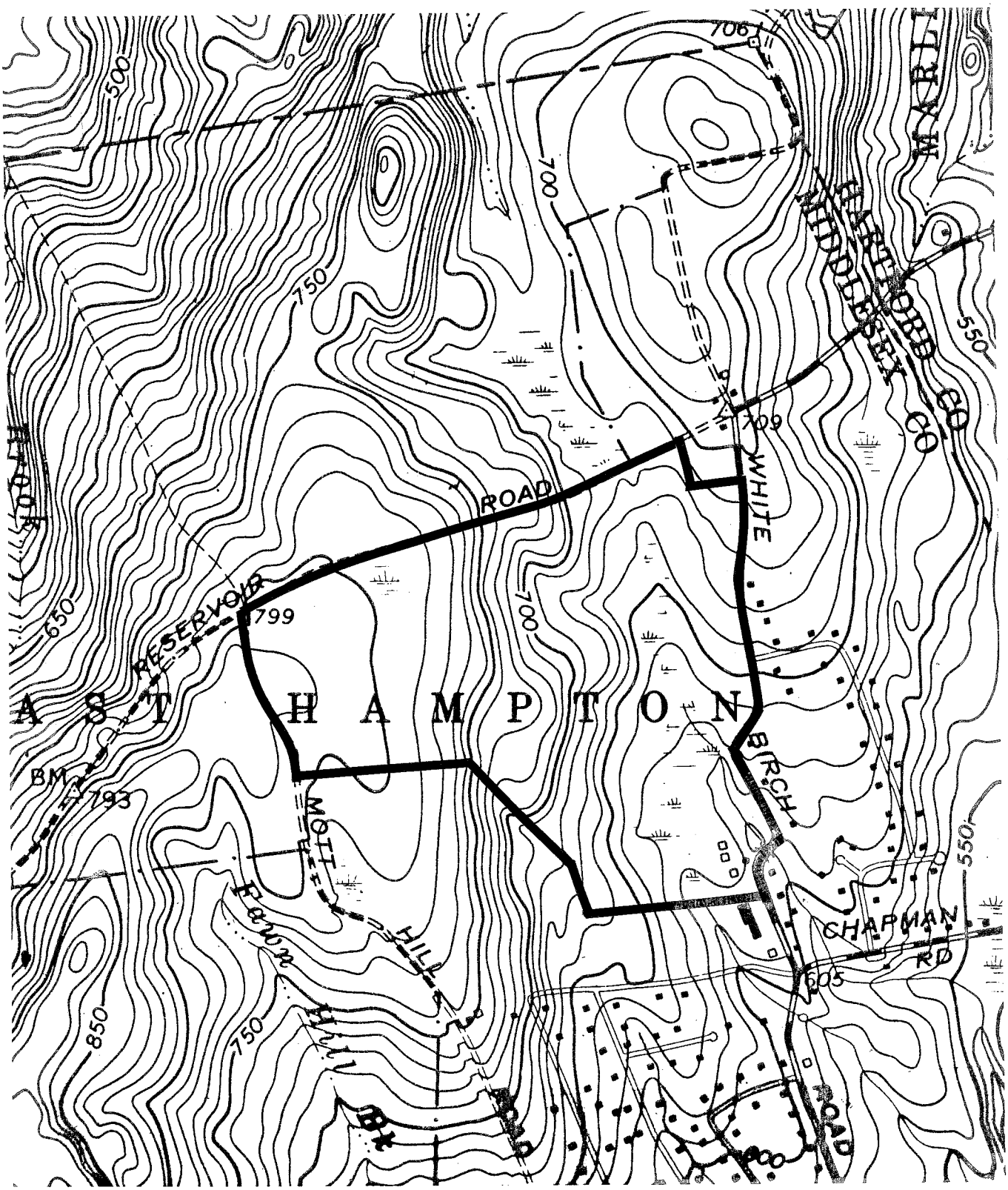
2. TOPOGRAPHY

An unnamed tributary to Fawn Hill Brook flows through the eastcentral parts of the site. In general, the site's terrain slopes to the unnamed tributary. Flattest slopes occur in the western and eastern limits (open field area). Moderate to steep, bedrock controlled slopes flank the west side of the unnamed streamcourse mentioned above. Site elevations range from a high of 810 feet above mean sea level at the westernmost property line to 620 feet above mean sea level where the unnamed streamcourse in the eastcentral parts intersects the southernmost property line.

TOPOGRAPHIC MAP

SCALE 1" = 1000'

Approximate Site Boundary



3. GEOLOGY

Based on visual observations made during the field walk and published geologic reports, continuous and/or numerous ledge outcrops were not evident on the site. However, there were areas, especially in the central parts (area of steepest slopes) where bedrock exposures are visible.

The principal geologic feature for the site and vicinity is the Great Hill syncline, a north-south trending trough that encompasses the site. This trough was created by buckling and folding of the various rock layers.

Most of the site (western and central parts) is underlain by the Littleton Formation rocks, which are Devonian in age (360-408 million years old) and the youngest rocks on the site. These rocks which occur in the middle of the trough (sycline)are described as gray to silvery, medium-grained schists and micaceous (mica-rich) quartzites. Flanking the Littleton Formation on the east are three relatively narrow bands of rock belts that trend north-south and that are progressively older in age moving west to east across the site. They consist of the Fitch Formation, a gray, fine to medium-grained calc-silicate gneiss, the Clough Quartzite, a white, medium-grained, well layered quartzite and the Collins Hill Formation, a gray, rusty-weathering, medium to coarse-grained schist. The Fitch Formation and Clough Quartzite are believed to be Silurian aged rocks (410-438 million years old) while the Collins Hill Formation is believed to be Ordovician aged rock about 439-505 million years old.

The terms schist, gneiss and quartzite mentioned in the preceding paragraph refer to the textural aspects of the rocks. All are crystalline, metamorphic rocks (rocks that have been geologically altered by great heat and pressure within the earth's crust). "Gneisses" are recognizable by their banding which results from layers of dark minerals alternating with layers of light-colored minerals. In general, the gneisses tend to be massive rocks. "Quartzites" are light colored rocks that are massive, layered and very hard (resistant). These rocks formerly comprised quartz-rich sandstone that was subjected to great heat and pressure within the

earth's crust. The Clough Quartzite is commercially mined for fieldstone and aggregate at several locations in the Great Hill Syncline in Connecticut. "Schists" are typically light, silvery to dark, coarse to very coarse-grained, and their layering is usually defined by parallel alignment of mica minerals. Schists tend to be slabby, parting relatively easily along the surface of mineral alignments.

Deep test hole information compiled for the exploration of subsurface sewage disposal indicates that the bedrock surface was shallowest in the central parts of the site.

The underlying bedrock will serve as the principal aquifer for domestic water supplies on each lot. Since public water is not available to the site, all of the proposed lots will undoubtedly need to rely on drilled wells, cased with steel pipe and completed as open-bore holes into the underlying bedrock. (See WATER SUPPLY Section)

According to the Surficial Geology Map of the Glastonbury Quadrangle by William Langer, GQ-1354, which encompasses the site, the Vielleux parcel is covered entirely by a glacial sediment called till, which is light gray in color. It is a non-sorted to poorly sorted, compact mixture of silt, sand, pebbles, cobbles and boulders that contain minor amounts of clay.

In consideration of soil mapping data, the texture of the majority of the till on the site is silty, stony to very stony and is characterized by a relatively shallow compact soil zone or "hardpan" layer. The presence of the compact soil zone often results in seasonally high water tables, soil mottling (an indicator of high ground water tables) and moderately slow to slow percolation rates. Deep test hole data verifies that the till covering the site includes one or more of these characteristics.

Without proper planning and engineering the seasonally high water table condition can be a major hindrance in terms of on-site sewage disposal, road and driveway construction, especially in cut areas and there is the potential for wet basements, if they are not properly protected by building foot drains.

The exact thickness of the till on the site is unknown, but for the most part probably averages about 10 feet.

Post glacial sediments consisting of regulated wetland soils have been marked and flagged on the site by a certified soil scientist. The boundaries were superimposed onto a site plan made available to Team members.

The principal wetlands occur in the eastern parts and are associated with the unnamed tributary to Fawn Hill Brook. The other prominent area of wetland soils occurs at the western limits. Based on review of the Soil Survey of Middlesex County, the wetland soils delineated on the site are comprised mainly of the Lg (Leicester-Ridgebury-Whitman very stony complex) soil series.

The Lg soils mentioned above 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.

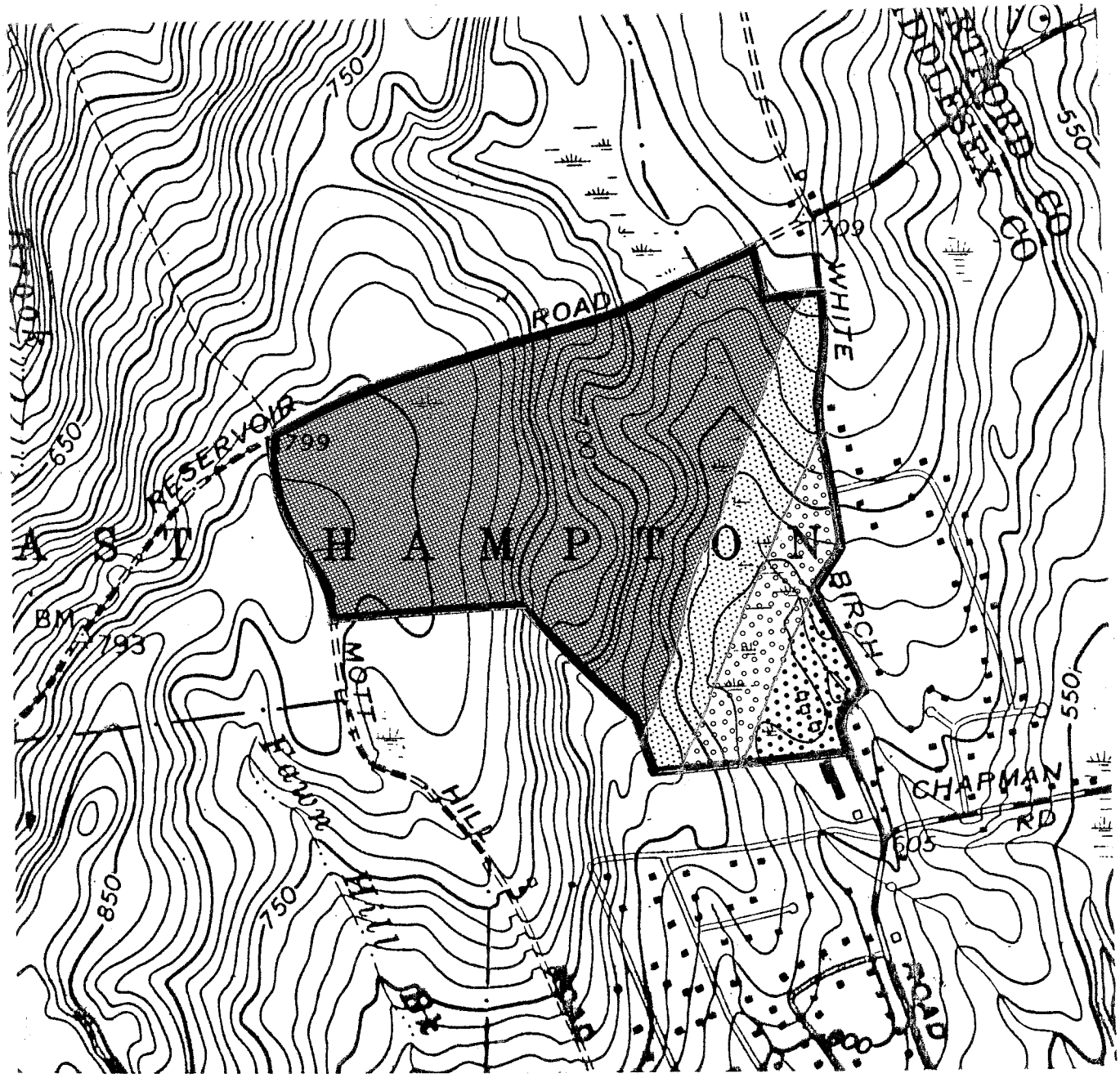
The primary road will need to cross about 200 feet of Lg soils and a through flowing stream in the eastcentral parts. In addition, driveway crossings and grading for roads may, in places, infringe on the regulated wetland soils.

BEDROCK GEOLOGIC MAP

SCALE 1" = 1000'

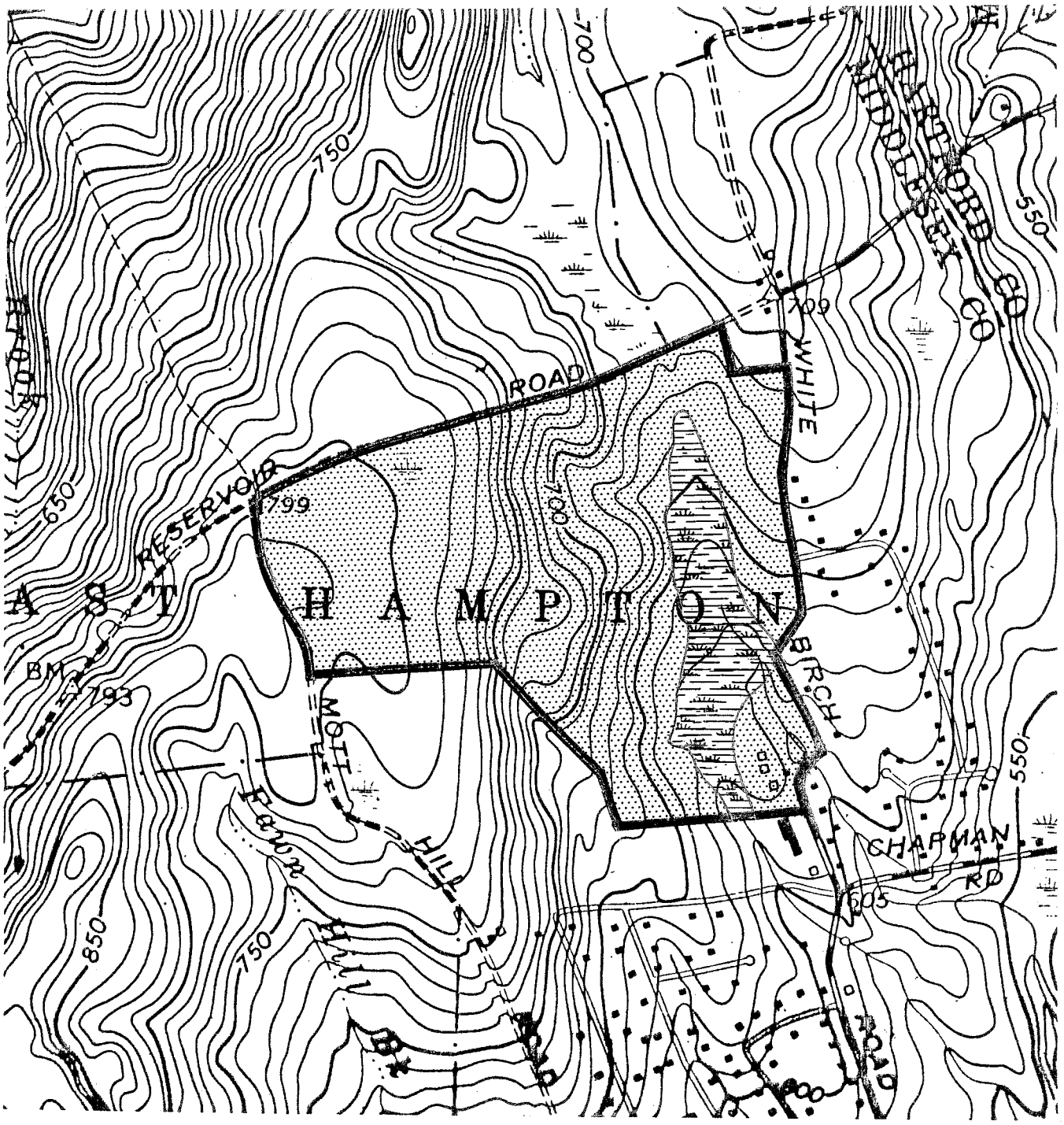
Littleton Formation
Fitch Formation
Collins Hill Formation
Clough Quartzite

Note: see text for detailed descriptions



SURFICIAL GEOLOGIC MAP

SCALE 1" = 1000'



4. SOIL RESOURCES

The soils in this property are of three basic series: Paxton, Woodbridge and the Leicester, Ridgebury and Whitman complex. All are formed in compact glacial till derived mainly from gneiss, schist and granite. The Paxton series is well drained; it ranges from non-stony to extremely stony and is found on broad hill tops, ridgetops and side slopes of glacial uplands. This series has a fragipan (hardpan) at a depth of 15 to 36 inches which contributes to a perched water table and a medium potential rating for septic tank absorption fields. It is a soil of special concern by State regulations for septic systems and an engineer's design is required. In some cases, the soil is unsuitable for septic systems in its natural condition. Bank cuts and slopes that intercept the hardpan layer are subject to slumping due to seep lines that occur. Reestablishment with permanent vegetation cover can be difficult.

The Woodbridge series exhibits the same soil limitations as the Paxton series for septic tank absorption fields but its potential rating is low. The same concern by State regulations for this series as for the Paxton series applies. Slow percolation rates and depth to the water table are the main concerns with stoniness and slope adding to this concern. Seep lines will also occur in cut banks and reestablishment of protective cover can be difficult. This soil series is usually found on broad hilltops and concave side slopes of drumlins and glacial till plains and it is moderately well drained.

The Leicester, Ridgebury and Whitman series forms the Lg complex which incorporates the three soils because they react similarly to most uses and management. This complex consists of nearly level to sloping, poorly drained and very poorly drained soils in drainageways and depressions of glacial till uplands. Soil mottling occurs in the upper subsoil and this complex is defined by Public Act 155 as a regulated inland-wetland in this state. It has very low potential rating for septic tank absorption fields and is generally unsuitable for other uses associated with development.

SOILS DESCRIPTIONS

***Lg** - Leicester, Ridgebury, and Whitman extremely stony fine sandy loams

***PbB** - Paxton and Montauk fine sandy loams, 3-8% slopes

PeC - Paxton and Montauk extremely stony fine sandy loams, 3-15% slopes
PeD - Paxton and Montauk extremely stony fine sandy loams, 15-35% slopes

***WxA** - Woodbridge fine sandy loam, 0-3% slopes
***WxB** - Woodbridge fine sandy loam, 3-8% slopes

WyA - Woodbridge very stony fine sandy loam, 0-3% slopes
WyB - Woodbridge very stony fine sandy loam, 3-8% slopes

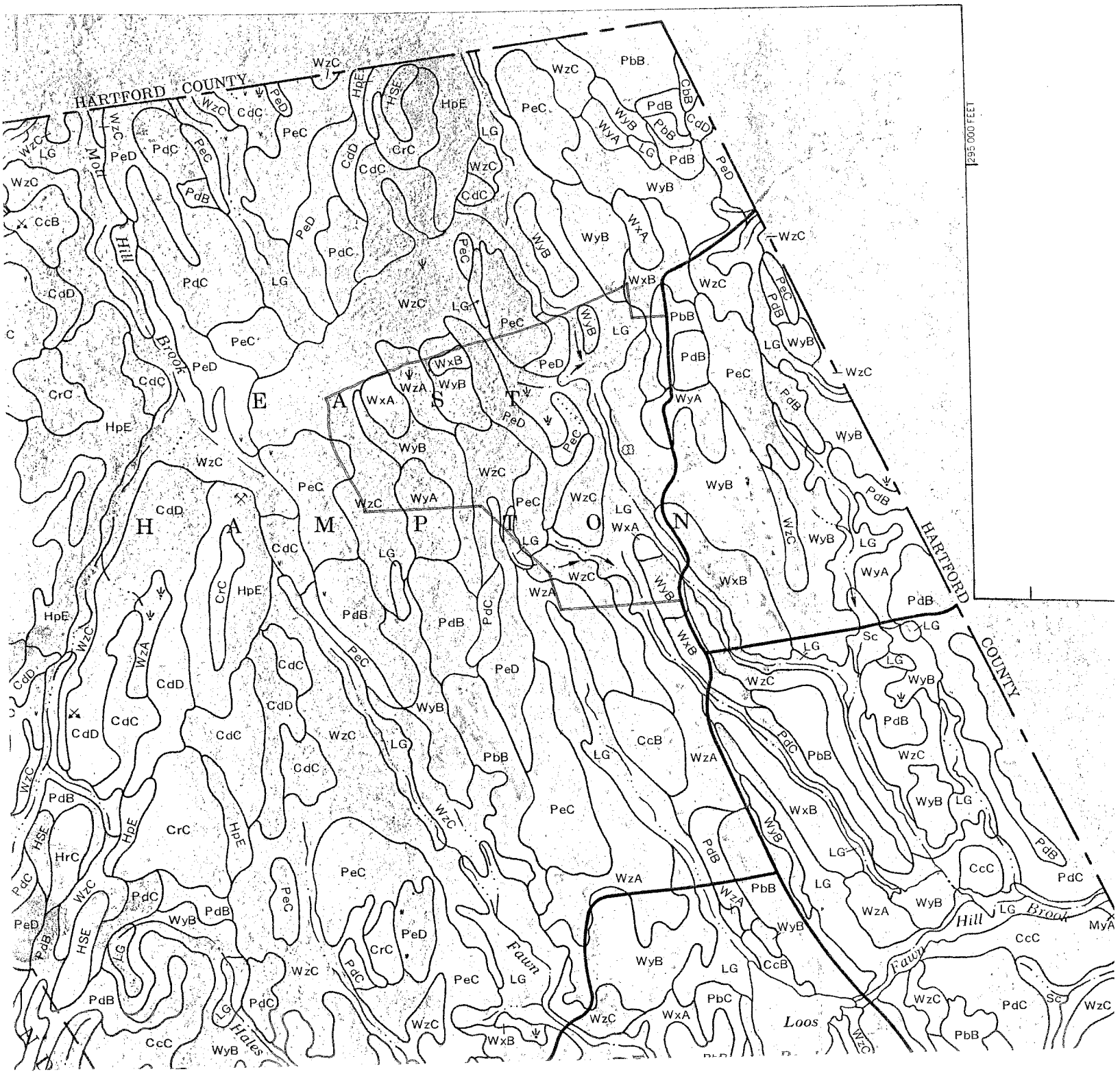
WzA - Woodbridge extremely stony fine sandy loam, 0-3% slopes
WzB - Woodbridge extremely stony fine sandy loam, 3-8% slopes

****Prime farmland soil***
*****CT inland wetlands soil***

SOILS MAP

SCALE 1" = 1320'

——— Approximate Site Boundary



5. EROSION AND SEDIMENT CONTROL

Development of this property would require mandatory erosion and sediment control planning and implementation under Public Act 83-388, "An Act Concerning Soil Erosion and Sediment Control". Town regulations have incorporated the requirements of this Act usually within the planning and zoning regulations. The requirements and specifications are detailed in the Connecticut Guidelines for Soil Erosion and Sediment Control , revised 1988. Chapter 4 of the Guidelines provides a detailed list of what is required. The erosion and sediment control plan should address all requirements using the Guidelines for proper design and installation details. Once the plan is developed, the proper town commission(s) need to review it, have revisions incorporated and certify the plan when it is deemed suitable and in accordance with its regulations. Once the work is to begin: the erosion and sediment control measures need to be installed and maintained by a designated person(s) who will be directly responsible for this implementation. In many cases, the town may require bonding specifically for erosion and sediment control during the life of the project until full protection and stabilization has occurred. The bond should be accessible enough to insure that erosion and sediment control measures can be installed and maintained in a timely and quick manner should the need arise.

This parcel has a few severe slopes that will require special attention in applying proper sediment and erosion control. Other areas requiring special attention would be wetland crossings or development adjacent to wetlands, banks and cuts that intercept the hardpan (especially north facing slopes), slopes steeper than 4:1 or 50' or more in height and large areas of disturbance. Recommended mitigating measures include sediment basins, phased construction in small sections, erosion control blankets for slopes of 3:1 or steeper, embankments greater than 50' high or road banks at wetland crossings. The temporary sediment basins should not be constructed within the wetlands. Also needed is timely and aggressive reestablishment of temporary and permanent vegetation, mulching and the restriction of the amount of disturbed land at any one

time. Winter protection of disturbed land is very important as well as temporary vegetative cover for stockpiled soil. Restabilization of north facing cuts will be more difficult and these cuts should be avoided as much as possible. Finally, enforcement and follow-up by the town officials is necessary to insure that the erosion and sediment control plan is properly implemented. On several occasions, additional measures will have to be added or adjusted to meet with unforeseen problems that may occur. Inspections and immediate repairs during and after heavy storms is recommended to be effective.

The presence of hardpan and the common occurrence of a perched water table will necessitate the use of curtain drains around septic systems and building foundations. This would require additional planning and disturbances that may add to the sediment load.

6. HYDROLOGY

With the exception of about 6 acres in the western limits which drains to Mott Hill Brook, the site lies entirely within the Fawn Hill Brook watershed. At its point of outflow to Dickinson Creek in East Hampton, the brook drains an area of 4.02 square miles or 2,573 acres. The principal streamcourse on the site, which is unnamed and is located in the eastcentral parts is tributary to Fawn Hill Brook. Another unnamed streamcourse tributary to Fawn Hill Brook originates near the southern property line.

Based on the site's hydrogeologic setting subsurface flows should closely mimic the surface flows.

According to the Department fo Environmental Protection Water Quality Classifications of Connecticut, Murphy, 1987, the surface waters mentioned earlier are presumed by default, 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, except for the land area that drains to Cold Brook Reservoir, an emergency public water supply reservoir for the Metropolitan District Commission which is classified as GAA. A GA water resource is suitable for private drinking water supplies without treatment. A GAA water resource means that the groundwater is tributary to a public water supply reservoir or within the area of influence of public water supply wells. It appears that the land classified as GAA will be left undisturbed.

Development of the site for about 60 single-family homes will lead to increases in runoff. 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's engineer should demonstrate that post-development peak discharges to the streamcourses on the site will not cause flooding problems downstream and/or aggravate existing problems. Close examination of downstream culverts beneath White Birch and Chapman Road is warranted.

Because of the site's position in the upper parts of Fawn Hill Brook watershed, it may be necessary to construct detention basin(s) on the site which would release the water at a slower rate so that flooding problems do not occur downstream nor compound flood prone areas downstream, if they exist. A stormwater management plan that includes pre and post-development runoff calculations should be prepared by the applicant's engineer for the town's review. The Connecticut Guidelines for Soil Erosion and Sediment Control , (revised 1988) should be used as a guide for determining peak discharges and in the design of detention basins, paying special attention to Chapters 8 and 9.

Another concern with post-development runoff is the potential for gullying and streambank erosion. Because of the moderate to steep slopes in the central parts, the till soils that contain silt, fine sand, and clay sized particles, and seasonally high water tables, the potential for erosion is great. 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 checked by town officials.

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 will help reduce the chance for environmental damage to wetlands and watercourses and complaints from neighbors.

Based on the preliminary subdivision plan submitted to Team members, the principal wetland/stream crossing, about two hundred feet in length, will occur in the eastcentral parts.

The proposed crossing would be aligned with an existing woods road and at a relatively narrow point along the wetland corridor. Additional impacts to regulated wetlands, mainly due to grading may occur at the end of the two proposed cul-de-sacs. If Portland Reservoir Road is upgraded, it seems likely that wetlands may also require disturbance (filled, modified or piped) in places.

According to the Soil Survey of Middlesex County, Connecticut an undifferentiated group (LG) of poorly drained (Leicester and Ridgebury) and very poorly drained (Whitman) soils occur in the area of the proposed wetland road crossing. The major engineering concern with the LG soils will be a high water table condition and slowly permeable substratum in the Whitman and Ridgebury soils.

Wetland crossings are feasible provided they are properly designed (e.g. culverts are properly sized and installed and permeable road base fill material is used). The roads should be constructed at least 1.5 feet and preferably 2 feet above the surface elevation of the wetlands. Unstable material should be removed and replaced with a permeable road base material. This will allow for better drainage of the roads and decrease the frost heaving potential of the road. It is recommended that any road construction through wetland areas be done during the dry time of the year with adequate provisions for effective erosion and sediment control.

Detailed plans for the proposed wetland road crossing was not available on the review day. It is strongly suggested that the applicant be required to submit detailed plans for all wetland crossings and/or disturbances. The

plans would indicate specific site development details, erosion and sediment control measures, fill lines, amount of fill to be placed, the impacts of filling, watercourse channel location and flow direction, disturbed areas, etc.

WATERSHED BOUNDARY MAP

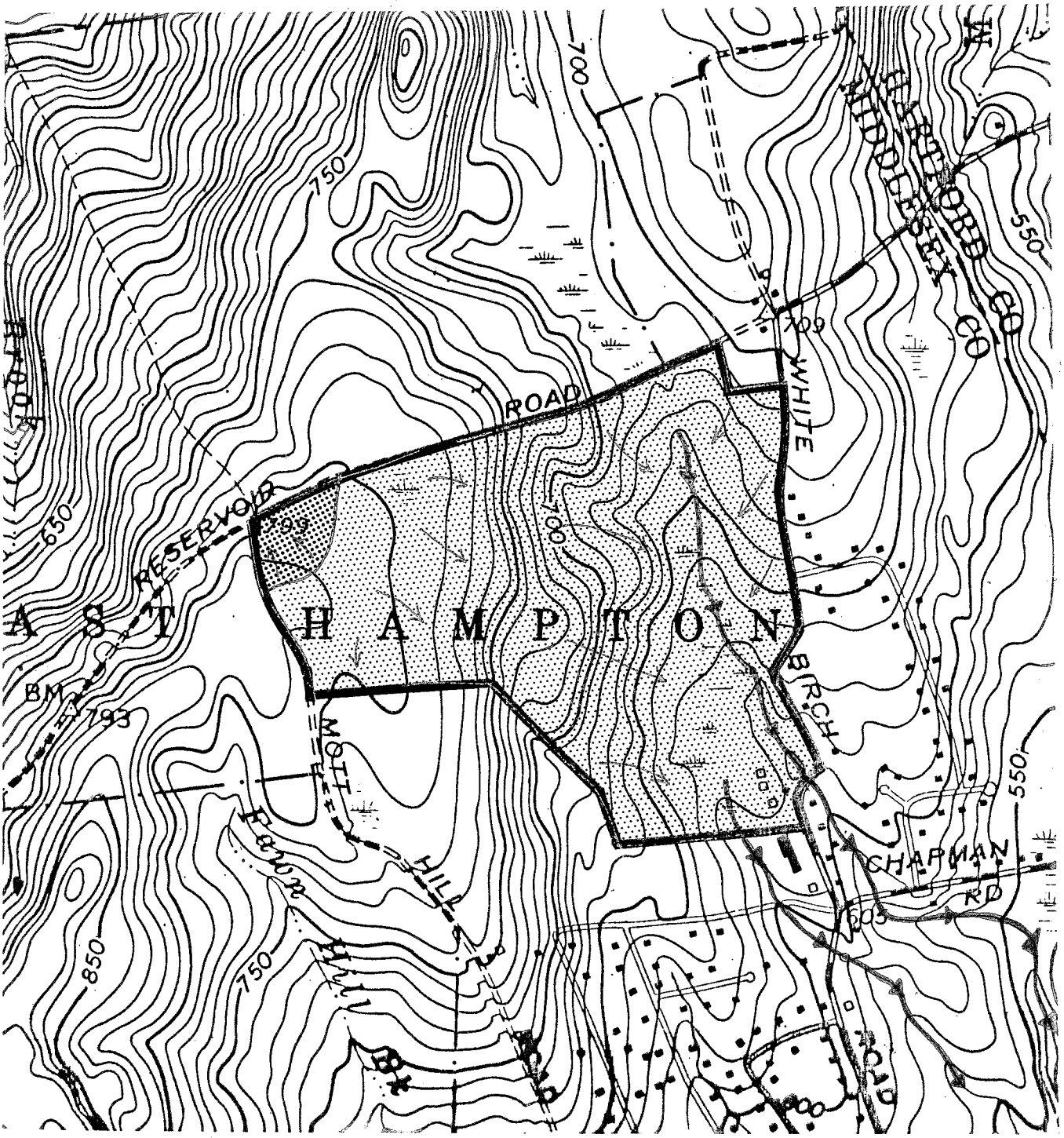
SCALE 1" = 1000'

Portion of site that drains to Cold Brook Reservoir

Portion of site that drains to Fawn Hill Brook

Watercourses showing direction of flow

Surface flow showing direction of flow



7. 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, gneisses and quartzites. 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 water-bearing 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.

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 85,716 gallons. This is based on groundwater recharge amounts of 8 inches per year for an upland, mostly till-covered site and parcel size of 146 pervious acres, allowing for infiltration. Predicted water use at the site is estimated at 18,000 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 60 lot subdivision.

Based on these figures, it is estimated that the planned subdivision will receive almost 5 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.

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 amounts of water to the proposed wells. This cannot be determined exactly without first drilling the well(s).

Where possible every effort should be made for spacing of about 200 feet between domestic wells in the proposed subdivision. This will provide about 1 acre of direct discharge to each well, which should help to minimize the chances for mutual interference between neighboring wells during pumping periods. The latter assumes the fractures in the underlying bedrock are saturated and capable of yielding water to a well.

In the Upper Connecticut River basin (in which the site lies), 28 domestic wells tapping crystalline bedrock were surveyed from Connecticut Water Resources Bulletin No. 24. The yield of these wells ranged between 0.7 to 25 gallons per minute with a medium yield of 9 gallons per minute. In general, 3 gallons per minute 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., fuel oil storage tank, 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 beneath 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 be prohibited on the site. Alternatives for fuel storage include putting the tanks in basements or concrete vaults.

8. SEWAGE DISPOSAL

Extensive subsurface exploration for subsurface sewage disposal has been conducted on the proposed subdivision site by the applicant's technical staff. This work, which was observed by the town sanitarian involved the excavation of numerous deep test holes on each lot and, in some places, the installation of standpipes for monitoring groundwater levels through the wet time of year. Soil testing on the site commenced in April of 1988 and groundwater levels were observed in standpipes during the winter/spring months of 1989.

A review of the deep test hole data and soil classification information as well as a walking tour of the site indicates that a seasonally high water table condition will be the most important design constraint with respect to on-site sewage disposal. The widespread presence of dense, till soils which have a relatively shallow "hard pan" layer characterizes the site. During periods of heavy rainfall, groundwater has a difficult time percolating through the "hardpan" layer. As a result, the more permeable soil zone above the "hardpan" becomes saturated. A high water table condition is created. Shallow soil mottling, which is an indicator for a high groundwater table was generally observed to be about 1.0-2.0 feet above the observed groundwater table in the deep test holes excavated on the site. Additionally, one can expect slow percolation rates in the "hardpan" soils.

Shallow to bedrock soils which also are likely to be another design constraint for subsurface sewage disposal occurs in an area mainly along the steeper slopes which bisect the eastcentral parts. In general, the bedrock surface ranged between 2 and 6 feet on several lots in this area.

The constraints (shallow to bedrock soils, seasonally high water tables) mentioned above will require detailed plans prepared by a registered professional engineer. Also, it is reasonable to assume that most systems will be filled and raised, spread laterally across the contours and large in size.

Where topography permits, the installation of curtain drains should be considered, and may be required on some lots. Curtain drains are installed to intercept groundwater above the leaching field so that it does not rise up into the leaching system and impair the hydraulic capacity. When properly installed, curtain drains tend to provide fail-safe protection from this potential type of malfunction. Prior to approving a lot for subsurface sewage disposal 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.

A curtain drain may be used in conjunction with building footing drains. Because of the potential for high groundwater levels through out the site, footing drains should probably be required for all homes constructed in the subdivision. This will hopefully keep basements from getting wet during the wet time of the year.

Based on deep test hole data, it is expected that in some areas, the site's subsurface limitations such as high groundwater tables or shallow to bedrock conditions may be too difficult to surmount even with engineering and, improvements such as elevating the system in fill and curtain draining. If soil testing of a proposed lot fails to identify a satisfactory leaching area and unsuitable conditions exist as identified in Section 19-13-B103e(a)(3), the lot or lots should be combined with adjacent properties or otherwise eliminated. It is likely that lot lines will require some adjustments once soil testing has satisfied the Town sanitarian and prior to submission to the Planning and Zoning Commissions. The final configuration of lots should not be approved until the Town Sanitation Department is assured that each lot meets all of the State Public Health Code requirements.

9. VEGETATION

The Veilleux Property Subdivision Tract which totals approximately 150 acres may be divided into six distinct vegetation types (please refer to the vegetation type map). These vegetation types include several mixed hardwood stands which total approximately 76 acres, several hardwood and shrub swamps which total nearly 31 acres, abandoned orchard which totals about 20 acres, old fields which total 11 acres, open fields which total 11 acres and an acre hemlock stand.

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

The loss of trees to windthrow may be intensified if linear clearings are made in or alongside wetland areas where the soils are poorly drained and also in areas where a hardpan layer is present in the soil.

Impact on vegetation resulting from the proposed road crossing of the stream and its associated wetland at the historical crossing site should be minimal, providing culverts are properly sized and placed.

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

Vegetation Type Description

Type A : Mixed Hardwoods. This mixed hardwood stand totals approximately 59 acres and is made up of pole-size red maple, black oak, white oak, scarlet oak and black birch. Occasional sawtimber size trees are also present, these are mostly scarlet and black oak. The understory vegetation includes hardwood tree seedlings, high bush blueberry, witch hazel, maple-leaved viburnum, blue beech and iron wood. Several small patches of white pine are also present in this area. These conifers if not

released to full sunlight in the near future will decline in health and vigor and may lose their ability to respond to release.

Type B : Hardwood Swamp/Stream belts. Approximately 31 acres of this tract is designated as inland wetland. Poor quality pole and small sawtimber-size red maple dominate with occasional yellow birch, black gum and white ash. Scarlet oak and sassafras are present on the western portion of this tract where the wetlands meet the mixed hardwood type. Understory vegetation consists of high bush blueberry, sweet pepper bush, witch hazel, swamp rose and swamp azalea. Herbaceous ground cover and vines include tussock sedge, sphagnum moss, skunk cabbage, sensitive fern, cinnamon fern, poison ivy, green briar, grape vine and club moss.

Type C : Orchard. An abandoned apple orchard occupies approximately 20 acres of this property. The apple trees which are present are no longer healthy. Hardwood tree seedlings including hickory, red maple, black birch and oak have become established in some areas. Grasses, goldenrod and staghorn sumac are present throughout.

Type D : Old Field. Approximately 11 acres of old fields are present. Black oak, red maple, sassafras, black birch and gray birch sprouts are becoming numerous. Scattered white pine, high bush blueberry, mountain laurel, maleberry, sweet fern, bayberry, spirea and meadow sweet have also become established.

Type E : Open Field. Open fields occupy about 11 acres of this tract. These fields are now dominated by grasses, goldenrod and assorted weed species. A portion of these fields may be designated as open space. If these fields are not maintained by periodic mowing, hardwood tree seedlings will become established.

Type F : Mixed Hardwoods. A stand of predominantly sawtimber-size mixed hardwoods occupy approximately 10 acres of this tract. The white oak, black oak, red maple, black birch, American beech and tulip tree that are present are becoming crowded and are declining in health and vigor. A harvest that removes the poorest quality one third of the sawtimber size

trees would reduce this crowding and allow the residual trees to improve in health, vigor and stability.

Type G : Mixed Hardwoods. About 7 acres of this tract is made up of crowded sapling to pole-size tulip tree, white birch, yellow birch, red oak, black oak and black birch. A fuelwood thinning which follows the "crop tree selection method" of thinning and removes approximately four cords per acre would reduce the crowded condition and allow the best trees (crop trees) to improve in health and vigor.

Type H : Hemlock/Hardwoods. This 1+ acre hemlock/hardwood stand is made up of pole-size hemlock with black oak, black birch and red maple intermixed. This stand provides wildlife with excellent cover, especially during the winter months. The hardwoods could be removed as fuelwood to provide more space for the hemlock to grow and become healthier.

Aesthetic Considerations

Scattered throughout the forest covering this tract are trees and shrubs which have the potential to have high aesthetic and shade value.

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

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

Care should be taken during the construction period not to disturb the trees that are to be retained. In general, healthy and high vigor trees should be

favored for protection over unhealthy trees because they are usually more resistant to the environmental stresses brought about by construction.

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

Several species of flowering trees and shrubs, including apple trees and mountain laurel are present within this tract. These flowering species should be retained where feasible for their aesthetic value. The flowering of these species can be stimulated by allowing increased direct sunlight to reach them. This can be accomplished by removing the trees in the overstory which are blocking the sunlight. The apple trees will need careful pruning to bring them back to a flowering and fruiting condition.

Limiting Conditions and Potential Hazards

Windthrow is a potential hazard throughout the hardwood swamp areas and along the streams which pass through this property and also in areas which have a soil with a hardpan layer. Tree root depth is restricted by saturated soils in the wetland areas and by the hardpan layer in other areas. Under these conditions trees are unable to become securely anchored and are susceptible to windthrow. Trees which are crowded and rely on each other for stability have an even greater potential for windthrow problems and top breakage. These conditions may be intensified if linear openings, which allow wind to pass through rather than over these areas, are made. Openings and clearings in and alongside the wetland areas should be avoided if at all possible. Undisturbed buffer zones of at least 25 feet deep around the wetlands should help to reduce the windthrow potential.

Alterations in wetland areas which permanently raise the water table such as restricting natural drainage and stream flows, may eventually have a negative impact on the vegetation in these areas. Raising the water table may drown roots causing widespread mortality in the trees, shrubs and

herbaceous vegetation which are now present. The impact on vegetation created by construction of the proposed road crossing of the wetlands area will be minimal providing that the culverts that are utilized are adequately sized and properly placed.

Management Considerations

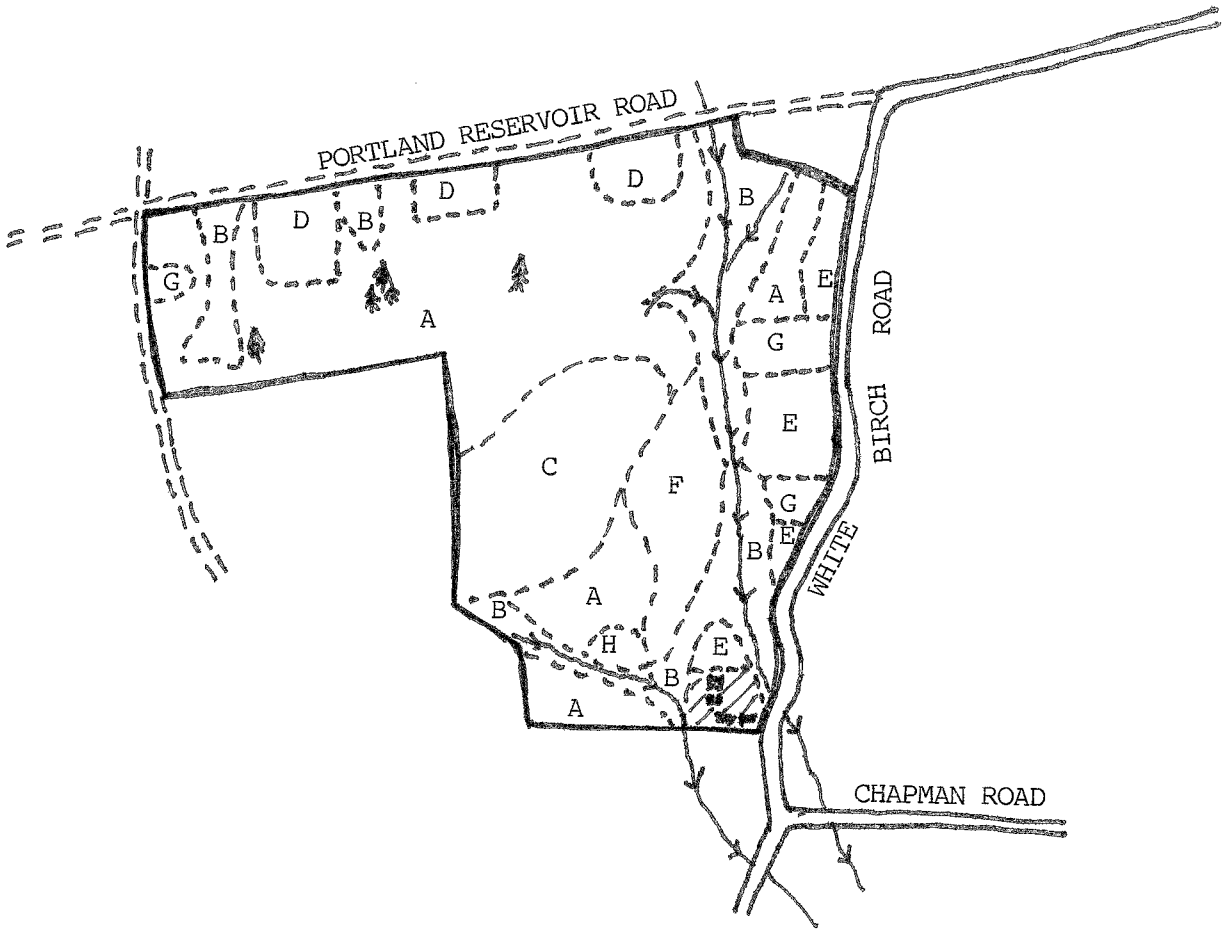
Trees which are unhealthy and not growing vigorously due to crowded conditions are most susceptible to further degradation from environmental stresses brought about by development, disease, insect infestation and adverse weather conditions. Improvement thinnings, which remove undesirable trees and reduce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

The trees which are present in vegetation **Types F & G** are declining in health and vigor as a result of their crowded conditions. Under these circumstances the trees are under stress and major disturbances in their environment such as changes in soil conditions and mechanical injury caused by construction in these areas, may rapidly lower their health. Fuelwood and sawtimber thinnings in these stands, following the "crop tree selection method" would help to reduce the crowded condition and improve tree health and vigor. Following the "crop tree selection", 100 of the highest quality trees in each acre should be identified (trees spaced about 20' x 20' will equal 100 trees per acre), and one, two, or three trees that are in direct competition with each of those identified should be removed. The 100 trees per acre that are selected as crop trees should be healthy, large crowned, and show little or no signs of damage. Trees which are not competing with the 100 selected trees should not be removed, unless they are severely damaged.

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

VEGETATION TYPE MAP

SCALE 1" = 1000'



LEGEND

- Paved Roads
- Woods Roads
- Property Boundary
- Vegetation Type Boundary
- Stream
- White Pine
- Developed Area

VEGETATION TYPES

A. Mixed Hardwoods, 59± acres

B. Hardwood Swamp/Shrub Swamp/Streambelt, 31± acres

C. Orchard, 20± acres

D. Old Field, 11± acres

E. Open Field, 11± acres

F. Mixed Hardwoods, 10± acres

G. Mixed Hardwoods, 7± acres

H. Hemlock/Hardwoods, 1± acres

10. WILDLIFE RESOURCES

Habitat Type Descriptions

The habitat types on these properties include mixed hardwood forest, reverting 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 appendix 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 nongame species such as porcupines, shrews, voles and snakes.

Reverting 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. In addition to this area is an abandoned apple orchard in a reverting state.

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 a small brook and associated wet depressions. 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: 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. Development of this site will result in fragmentation of habitat types which will in turn reduce species diversity and richness.

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 be 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, tolerant 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 be 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 be 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 safe 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).

6. In most cases, natural marshes are of more value than constructed ponds and ditches because of vegetative composition, gentle sloping edges and shallow water depths (6"-3'). If any pond work is planned they should be small (1/4) acre, shallow ponds to remove thick cattail stands.

7. All culverts installed should have screens to lessen potential damage from beaver.

8. Although Canada geese are usually aesthetically pleasing they can become a serious nuisance problem. If problems exist or develop consider these suggestions:

a. Create undesirable edge habitat around ponds (i.e. abrupt drop off, not grass zone,with gravel or chips).

b. Fencing of ponds.

c. Educate local residents on nuisance problems to discourage feeding.

d. Do not crate and/or maintain islands within ponds, Often these serve as nesting sites.

e. Plant vegetation other than grass which will be aesthetically and environmentally acceptable (i.e. shrubs, pachysandra, honeysuckle, ground juniper, Virginia creeper).

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BIRDS

Northern Goshawk
Broad-winged Hawk
Rough-legged Hawk
American Kestrel
Ring-necked Pheasant
Wild Turkey

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

Red-shouldered Hawk
Red-tailed Hawk
Sharp-shinned hawk

Ruffed Grouse
Northern Bobwhite
American Woodcock

Common Barn-Owl
Great Horned Owl
Long-eared Owl
Northern Saw-whet Owl
Chuck-will's-widow
Chimney Swift
Belted 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

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
Indigo Bunting
Rufous-sided Towhee
Chipped Sparrow
Vesper Sparrow
Fox Sparrow
Lincoln's Sparrow

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
Dickcissel
American Tree Sparrow
Field Sparrow
Sharp-tailed Sparrow
Song Sparrow
Swamp 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
White-crowned Sparrow
Bobolink
Eastern Meadowlark
Common Grackle
Orchard Oriole
Pine Grosbeak
House Finch
White-winged Crossbill
Pine Siskin
Evening Grosbeak

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 Treefrog
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

Species potentially inhabiting habitats of study area.

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

11. FISH RESOURCES

Site Description

The parcel of land under consideration for residential development is approximately 150 acres in size. The preliminary subdivision proposal calls for a total of 55 to 60 building lots (minimum size 60,000 square feet) to be served by on-site septic systems and on-site water supply wells. The proposed road network will involve crossing an unnamed tributary of Fawn Hill Brook, the main hydrological feature of fisheries concern in the area. This report will address impacts to fisheries resources on the property and delineate measures necessary to effectively mitigate impacts.

The main channel of the unnamed tributary of Fawn Hill Brook averages approximately 8 feet in width. Stream waters are very clear and free of aquatic vegetation. Streambed substrate is comprised of large boulders interspersed on a sand and gravel bottom. The stream's riparian zone contains significant stretches of wetlands. Alternating "pool" and "riffle" habitat was observed. Pools are areas where fish seek cover as opposed to faster moving riffles which are primarily used for feeding. Alternating pool and riffle habitat at a 1:1 ratio was observed at the proposed development location. This ratio is considered optimal for fish production and survival.

Fish Population

The unnamed tributary of Fawn Hill Brook is not stocked with trout by the DEP Bureau of Fisheries; however, it does support a native brook trout population. During the day of the field review, a total of 12 pairs of brook trout were observed in the preliminary stages of spawning. Spawning trout were documented in stream areas immediately above and below the proposed road crossing. These stream areas are preferred by native brook trout for spawning because of the abundance of small gravels.

Other fish expected to inhabit this brook are: blacknose dace, fallfish, white sucker, and tessellated darter.

Juvenile Atlantic salmon have been documented in lower reaches of Fawn Hill Brook above Route 66. These fish have penetrated the brook from stocked regions of Dickinson Creek. Dickinson Creek has been stocked with juvenile Atlantic Salmon for several years. It is considered one of the most important nursery habitats for juvenile Atlantic Salmon in the entire Salmon River watershed.
Surface waters of the unnamed tributary Fawn Hill Brook are classified by the DEP as "Class A". Designated uses for this classification are as follows: potential drinking water supply; fish and wildlife habitat; recreational use; and industrial and agricultural supply.

Impacts

The following impacts on local stream and wetland resources can be expected if proper mitigation controls are not implemented:

1. Construction site soil erosion and sedimentation 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 long been regarded as a major cause of stream degradation. Nationally, silt is considered a major stream pollutant. Excessive sediment deposition could damage aquatic ecosystems in the following ways:

(1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.

(2) Sediment reduces the survival of aquatic macro-invertebrates. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

(3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to disperse to other areas not impacted by siltation.

(4) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can effectively limit fish population levels.

(5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.

(6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes (CTDEP 1989). Eroded soils contain plant nutrients such as phosphates and nitrates. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth. Presently, the unnamed tributary of Fawn Hill Brook supports very sparse aquatic macrophyte communities.

(7) Sediment contributes to the depletion of dissolved oxygen (CTDEP 1989). Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

2. Road construction over the local stream: Since development plans are preliminary at this point, no specific information was available concerning whether the brook would be crossed by culverts or spanned by bridges. If box culverts are utilized that are improperly installed, e.g. placed at streambed elevation, fish passage may be impeded. Box culverts may impede resident fish passage due to: **(1)** increased water velocities within the culvert during periods of high river flows, and/or **(2)** insufficient water depth within the culvert during summer low flow conditions. Moreover, culvert placement results in the direct loss of instream fisheries habitat since the local stream bottom will be replaced with concrete. Instream culvert placement in concert with placement of fill alongside the river will inevitably result in stream sedimentation problems if proper erosion and sediment controls are not followed. Impacts due to stream sedimentation were previously discussed.

3. Percolation of septic effluent into stream and wetland ecosystems: individual septic systems can be potentially dangerous to stream and

wetland environments (refer to Sewage Disposal section). Nutrients and assorted chemicals that may be placed in septic systems could enter aquatic environments in the event of a 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. Effluent will also stimulate the growth of nuisance aquatic vegetation and algae. Currently, the unnamed tributary of Fawn Hill Brook contains no aquatic vegetation.

4. Degradation of wetland habitat: proposed building lots will be constructed adjacent to important wetland habitat. Wetlands are beneficial in many ways. They serve to: **(1)** control floodwaters 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 stream environments. Any filling or partial destruction of natural wetland habitat may hinder its ability to assimilate water quality and control floodwaters.

5. Aquatic habitat degradation due to the influx of stormwater drainage: pollutants such as salt, gasoline, oil, and other pollutants that may be spilled on impervious surfaces can be quickly introduced into wetlands or streams. Fine silts that are commonly found in stormwaters cannot be effectively removed from catch basins. Stormwater runoff will eventually fertilize stream waters and result in overall water quality and aquatic habitat degradation. In extreme situations, spilled petroleum based chemicals or other toxicants can result in partial or complete fishkills.

6. Transport of lawn fertilizers and chemicals to wetland/stream environments: runoff and leaching of nutrients from lawn fertilizers will stimulate filamentous algae growth in streams and degrade water quality. Introduction of lawn herbicides may result in "fish kills" and water quality degradation.

7. Impacts to downstream environments: any water quality problems and habitat degradation that occur within this tributary stream will eventually be observed in downstream areas of Fawn Hill Brook or Dickinson Creek.

The survival of juvenile Atlantic salmon are contingent upon the maintenance of existing water quality standards and instream habitat conditions. If realized, the aforementioned impacts would have a severe, adverse effect upon the Salmon River watershed. Degradation of water quality and fish habitat could jeopardize Atlantic Salmon restoration efforts. Beyond these considerations, the Salmon River Task Force of the Department of Environmental Protection is embarking upon a program of erosion and sedimentation management in this watershed in concert with volunteer organizations and municipalities. These organizations have stressed the need for careful residential housing development.

Recommendations

The following recommendations should be considered by the Town of East Hampton to mitigate impacts to local stream and wetland complexes.

1. Maintain at the minimum a 100 foot open space buffer zone along all wetlands and the wetland boundary that borders the tributary stream: no construction or alteration of riparian habitat shall take place in this zone, otherwise the ability of the buffer zone to function properly will be reduced. Town officials should regulate the vast array of land owner activities that may or may not take place within the buffer zone. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985). These buffers will absorb surface runoff and other pollutants before they can enter wetlands and stream ecosystems.

2. Develop an aggressive and effective erosion and sediment control plan: install and maintain proper erosion and sedimentation controls during both road crossing and site construction activities. This includes such mitigative measures as filter fabric barrier fences, staked hay bales, and sediment catch basins. Land disturbance and clearing should be kept to a minimum and all disturbed areas should be restabilized as soon as possible. Exposed, unvegetated areas should be protected from storm events. The Town of East Hampton should have an appointed official that would be responsible for checking this development on a periodic 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.

3. Properly design and locate individual septic systems (refer to Sewage Disposal section): the Team's fisheries biologist recommends that systems should not be placed adjacent (within 100 feet) to sensitive wetland and aquatic ecosystems. It is critical that all septic systems be placed in areas that will effectively limit septic effluent. The addition of septic effluent to streams can be one of the greatest threats to stream ecology. The negative impacts associated with a septic failure would be a great concern on this parcel. All septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure. Residents should be encouraged to utilize non-phosphate laundry detergents.

4. The unnamed tributary of Fawn Hill Brook should be crossed with a span bridge rather than with concrete box culverts: span bridges will allow native brook trout and other resident fish species to move freely and unimpeded within the stream and also preserve natural instream substrate. The preservation of natural stream habitat is particularly important at the proposed stream crossing since it utilized for spawning for a large segment of the brook trout population.

5. Due to native brook trout spawning in the immediate area of the road crossing, it is highly recommended that instream work be prohibited from September 15 to October 31: instream work and land grading/filling near watercourses and wetlands is more environmentally compatible during low flow periods. This will help minimize the impact to aquatic resources. Reduced streamflows and rainfall during the summer provide the least hazardous conditions in which to work near sensitive aquatic environments and wetlands.

6. Riparian (streamside) vegetation should be restored and replanted at the proposed stream crossing: fast growing trees that provide good overhead canopy such as red maple should be planted. In addition, these plantings will greatly improve the visual aesthetics of the altered streambelt.

7. 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. Stormwaters should be only be outletted into non-wetland habitat;thus avoiding direct contact with wetlands. Maintenance of catch basins is very critical. Roadway catch basins should be regularly maintained to minimize adverse impacts to riverine/wetland habitats. The use of road salt to deice roads should be prohibited. Catch basins and plunge-pools will only trap heavy, coarse sediments reducing the likelihood of excessive stream sedimentation; however, waters that contain pollutants such as salts and even small amounts of fine enriched sediments will eventually cause water quality and aquatic habitat degradation. This impact can not be prevented since catch basins will not remove these materials.

8. Limit liming, fertilization, and the introduction of chemicals to subdivision lawns: this will help abate the amount of additional nutrients to aquatic resources. Non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

Bibliography

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12. PLANNING COMMENTS

After viewing the site on November 7, 1989, and discussing the proposal with James Carey, the Town Planning Administrator the Team Planner learned that most of his concerns have been anticipated by the Town. Those concerns voiced by the Town are discussed below.

One access via White Birch Road

One access for any subdivision that encompasses large acreage is never advisable. Some reasons for this are free access for emergency vehicles when they are called to the site. Delivery vehicles will need the same ease of entry and exit as will emergency vehicles. Snow plows are more efficient when they need not make turning maneuvers. The most important reason for multiple access is that in the consideration of approval by the Planning Commission if more than one access is available at the time of application the Commission should require it, as conditions in the future may not allow that other access and that will work against the traffic plans for the Town.

Boulevard concept for road entrance

Most Towns regulations do not require or allow this type of configuration because it creates problems, e.g. four curbs instead of two, twice the number of drainage structures and a center island to maintain. Boulevards can be attractive in the Center of a Town but will be out of place in the outer edges of the Town where no other boulevards exist.

Reservoir Road pavement and construction

In our automobile oriented society, if houses and people are to be placed in an area where no other mode of transportation exists, the road should be paved in some fashion. Other problems arise which will be mentioned later.

Narrow access at Reservoir Road entrance at White Birch Road

This is a definite problem. The road may be upgraded without major changes, but that would upset the living conditions for the residents of the two houses. Before any alterations are made to Reservoir Road all options should be explored.

The Team Planner's own observations regarding this proposal involve drainage and Reservoir Road. The entire site seems to be relatively level, as regards drainage. Because of the extent of the site it receives much precipitation. The surrounding area, roads in particular, appear to have almost no drainage structures or identifiable drainage patterns. When a subdivision is constructed on this site with-state-of-the-art drainage structures, roofs and driveways. where the water goes must be of prime concern to the Planning Commission.

The construction of improvements for Reservoir Road has many complex ramifications, not only for the persons who will be living in the lots proposed to front on Reservoir Road but for the Town and the Meshomasic State Forest. Any improvements to this road will increase traffic to a greater extent than just that which will serve the homes to be constructed. There will be increased use of the recreational aspects of the State Forest and some connecting traffic with Mott Hill Road or over towards Portland. This is already heavily utilized by recreational motorcyclists. If the road is paved it will invite other recreational use of the forest and persons will be looking for places to park autos.

Because one of the houses at the corner of Reservoir Road is very close to the roadbed, considerations should be given to moving the house to another location or making some compromise solution with the owners on the future of the house.

The approval of this subdivision should be divided into sections that will allow the Commission time to observe the gradual development and use of this area.

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.