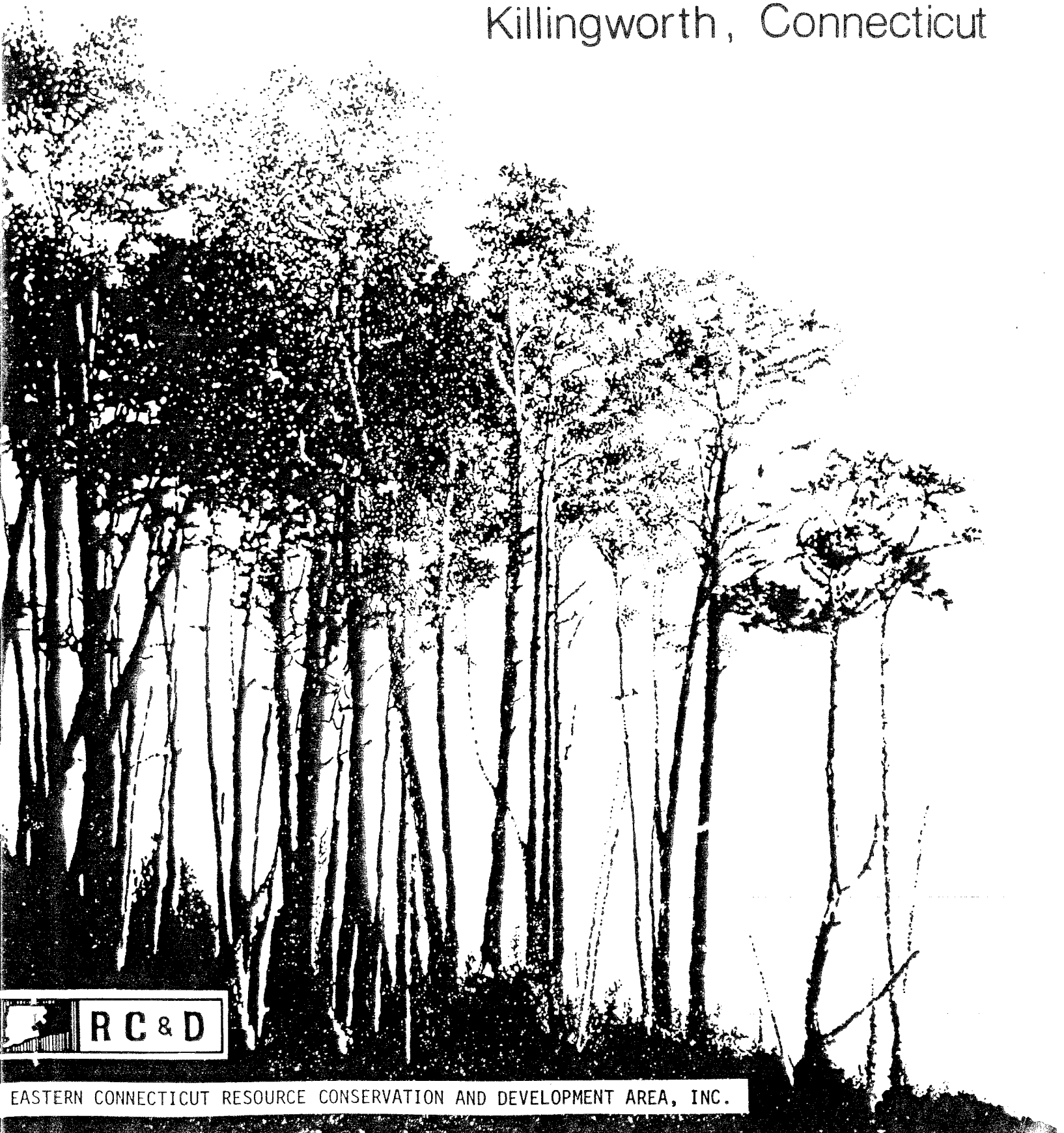
Environmental Review Team Report

Excess Watershed Lands

Killingworth, Connecticut



R C & D

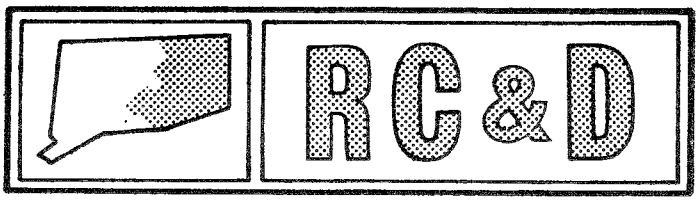
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Environmental Review Team
Report

Excess Watershed Lands

Killingworth, Connecticut

August 1984

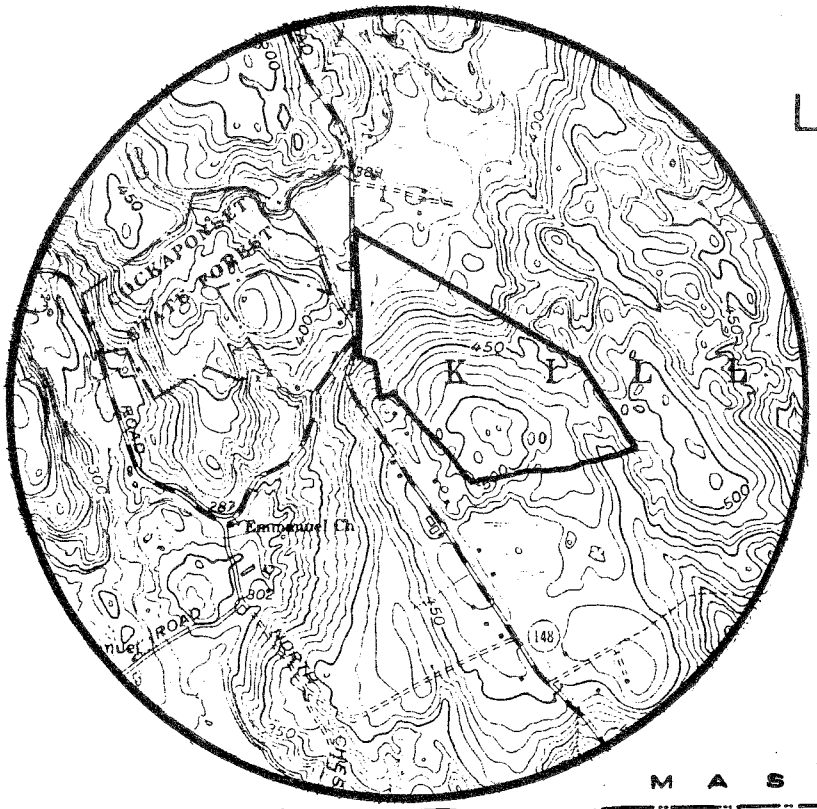


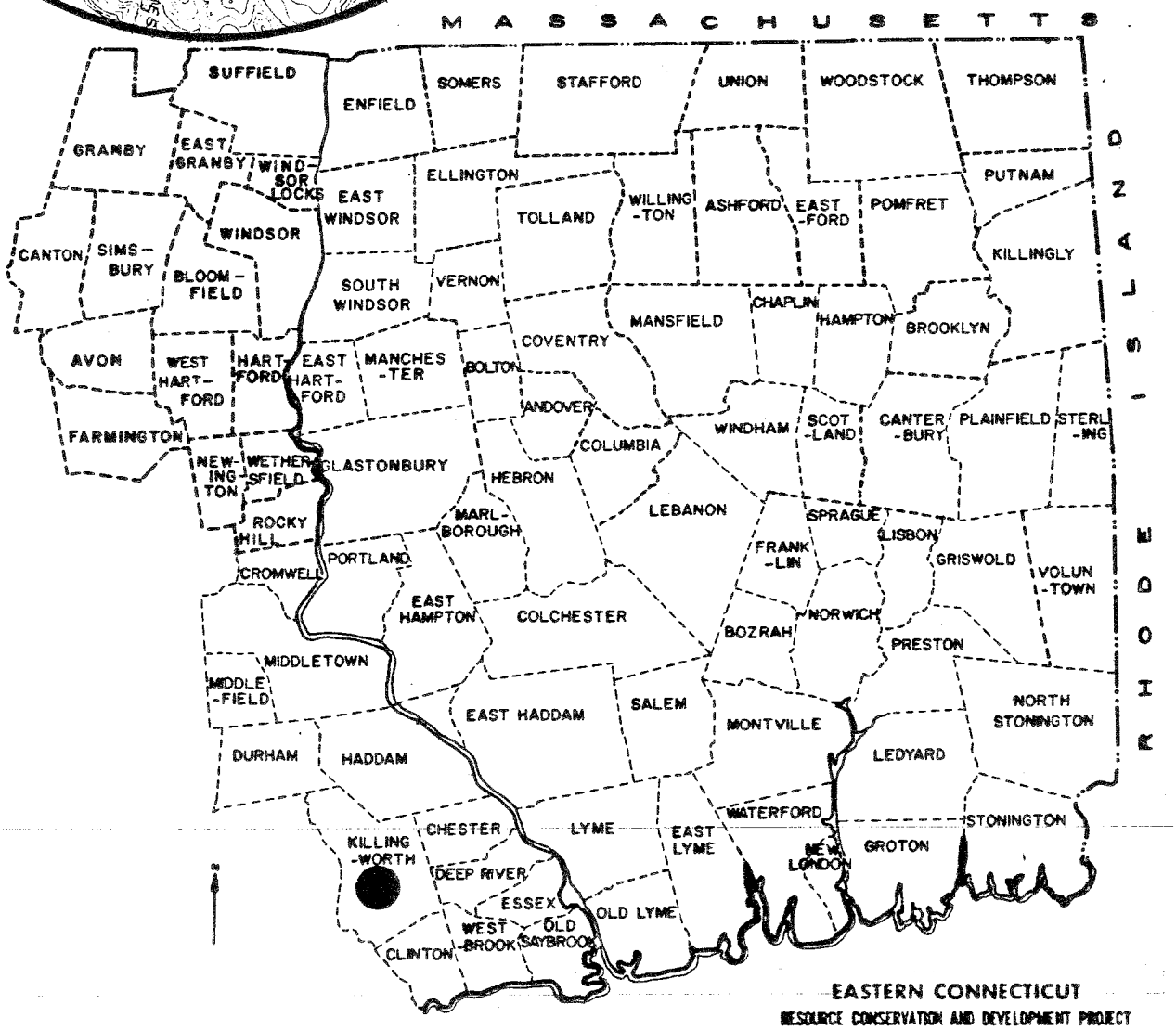
Eastern Connecticut Resource Conservation & Development Area

Environmental Review Team
PO Box 198
Brooklyn, Connecticut 06234

Location of Study Site

EXCESS WATERSHED LANDS
KILLINGWORTH, CONNECTICUT





EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
EXCESS WATERSHED LANDS
KILLINGWORTH, CONNECTICUT

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

The soils of the site were mapped by a soil scientist of the United States Department of Agriculture (USDA), Soil Conservation Service (SCS). Reproductions of the soil survey map as well as a topographic map of the site were distributed to all ERT participants prior to their field review of the site.

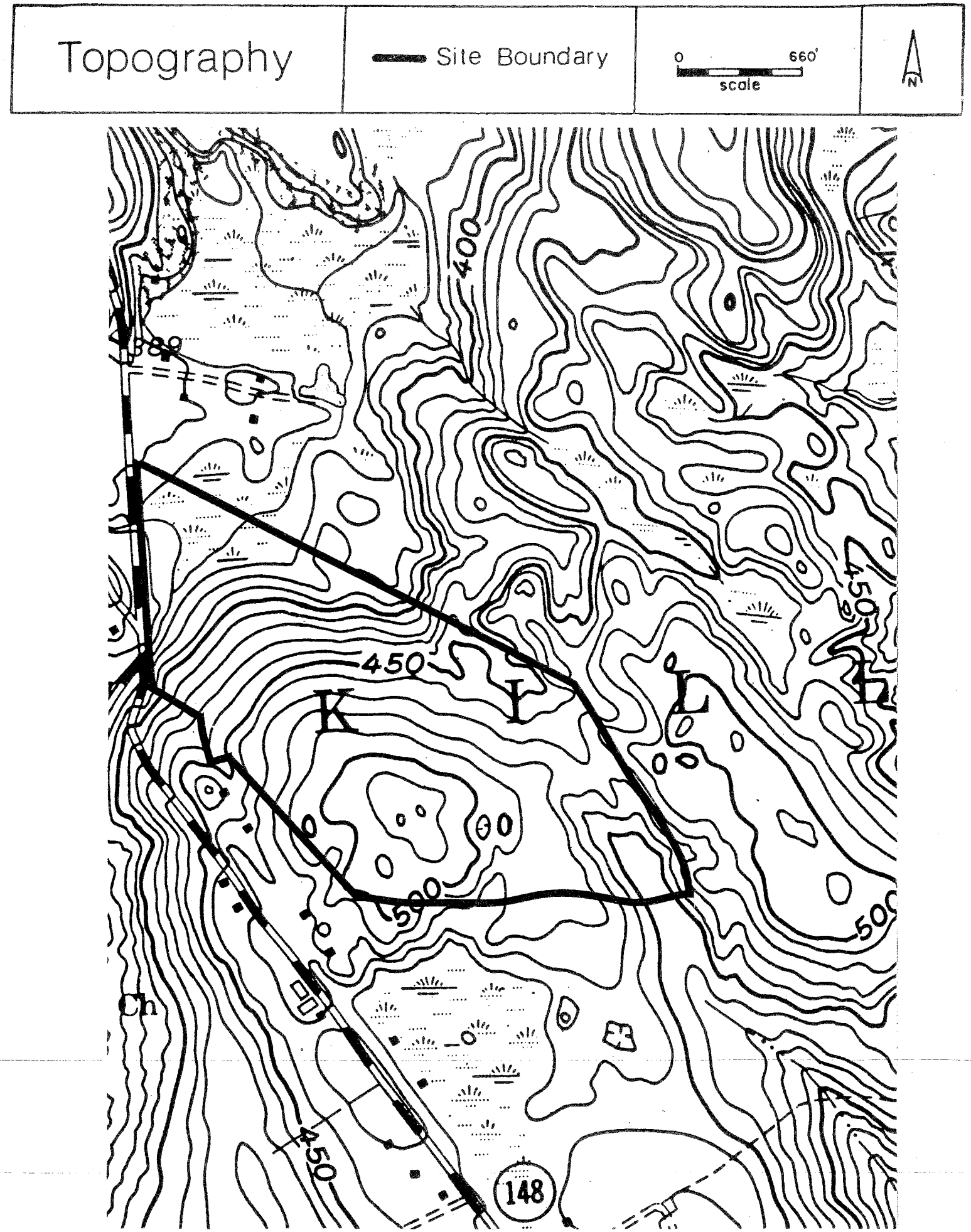
The ERT that field-checked the site consisted of the following personnel: Pat Scanlon, District Conservationist, SCS; Bill Warzecha, Geologist, Connecticut Department of Environmental Protection (DEP); Karl Lutz, Biologist, DEP; Rob Rocks, Forester, DEP; Donald Capellaro, Sanitarian, Connecticut Department of Health; Richard Joly, Regional Planner, Connecticut River Estuary Regional Planning Agency (CRERPA); and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field-checked the site on Thursday, May 26, 1983. Reports from each Team member were sent to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site dsigns or detailed solutions to development problems. 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 of Killingworth. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The Eastern Connecticut RC&D Area Committee hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, Route 205, P.O. Box 198, Brooklyn, Connecticut 06234, 774-1253.


Topography
Site Boundary
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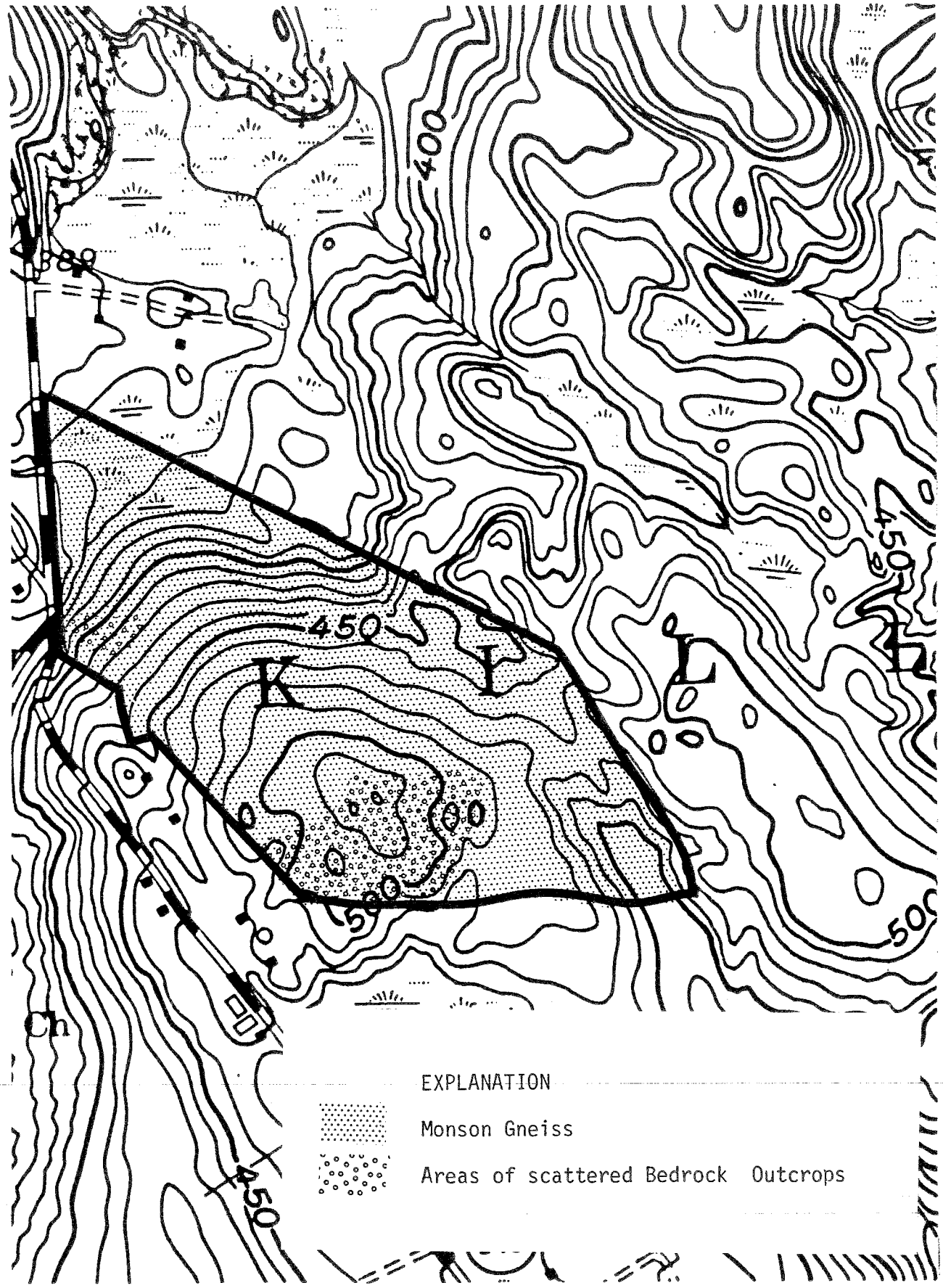
INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment for potential subdivision of a 91 acre parcel in the Town of Killingworth. The South Central Connecticut Regional Water Authority (formerly the New Haven Water Company) is considering disposal of some of their excess watershed lands. The project site is located on the eastern side of Route 148, adjacent to the Venuti peat and gravel excavation site. The lower, western side of the property contains a watercourse and large associated wetland area. The central and eastern sections of the site are fairly steep and rocky. No municipal sewer or water service would be available to development on this site. Plans for development of the site have not been prepared at this time, however, two acre single family residential development is allowed in this area and the Team has been asked to evaluate it as such.

The Team is concerned with the effect of this potential development on the natural resource base of this site. Although many severe limitations to development can be overcome with proper engineering techniques, these measures can become costly, making a project financially unfeasible for a developer. Severe limitations to development and various mitigation measures are discussed in as much detail as possible at this stage of project design, in the following sections of this report. Should more detailed information be desired, it is suggested that a preliminary site development plan be submitted to the Team for review.

Bedrock Geology



ENVIRONMENTAL ASSESSMENT

TOPOGRAPHY

The project site is located in western Killingworth adjacent to Route 148 and approximately 3/8 mile east of Emmanuel Church. The property consists primarily of a bedrock controlled hill. Slopes are steepest throughout the northern half of the site ranging between 10 and 15 percent. The southern half of the property, which includes the summit of the hill, is relatively flat. Elevations on the site, as adapted from the published Haddam topographic quadrangle range between ±370 feet above mean sea level along the unnamed stream in the northwest section of the site and ±520 feet above mean sea level at the summit mentioned above.

A tributary of the Hammonasset flows in a southeasterly direction through the northwest corner of the property. This stream which drains most of the property, originates in wetland areas north of the site.

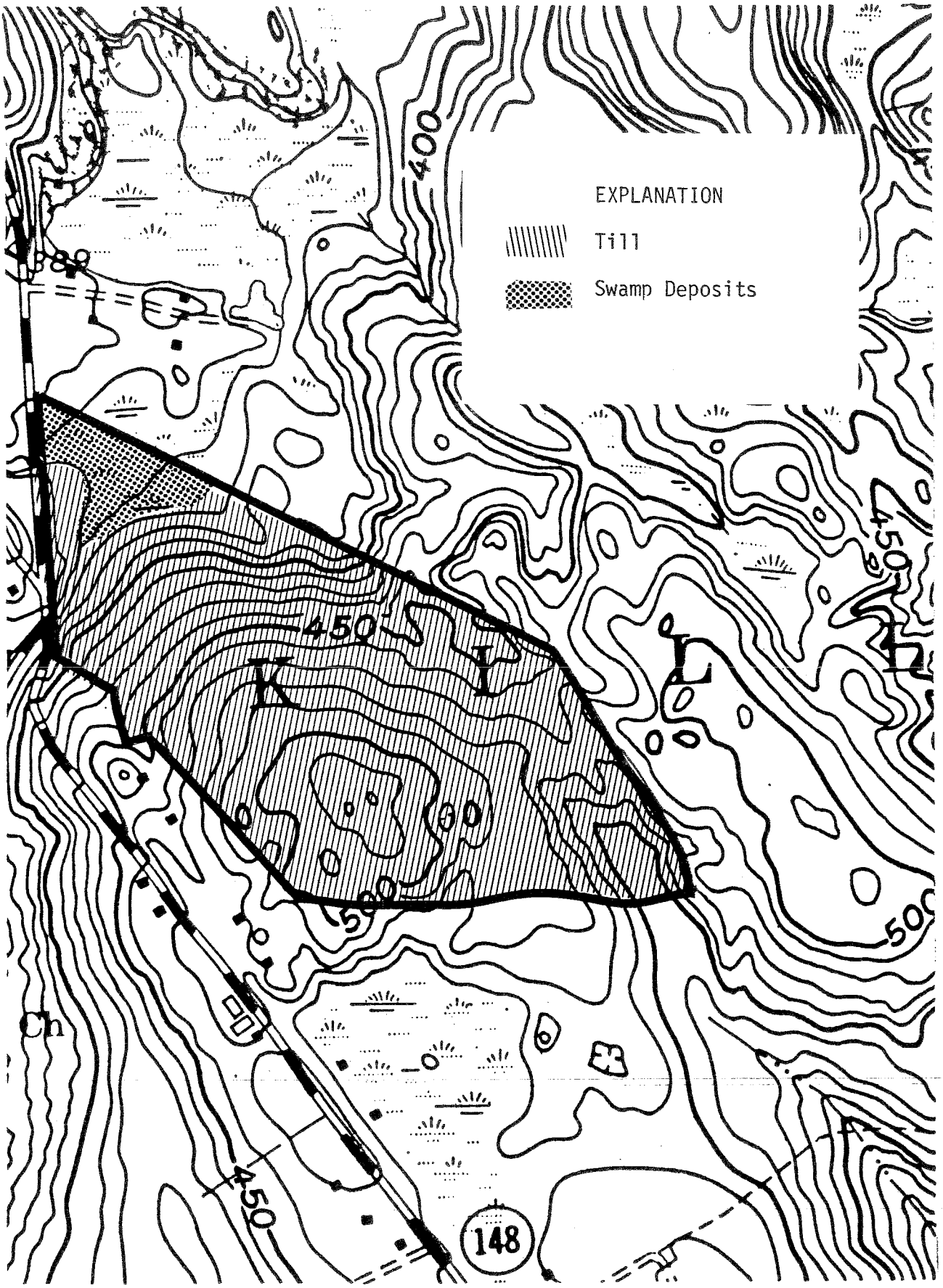
The site, which is ±91 acres in size, is located entirely within the Haddam topographic quadrangle. Both the bedrock geologic map (QR-37) by Lawrence Lundgren, Jr. and the surficial geologic map (GQ-468) by Richard Foster Flint, have been published by the State of Connecticut and United States Geological Survey respectively. Location of bedrock outcrops indicated on the surficial geologic map were compiled by James L. Rolstone. These maps are available at the Natural Resources Center of the Department of Environmental Protection in Hartford.

GEOLOGY

Bedrock outcrops were observed primarily in the northwest and southern sections of the property. The rock type that outcrops and underlies the site is Monson Gneiss. It is described as a gray, quartz-plagioclase gneiss with amphibolite layers.

"Gneisses" are crystalline, metamorphic rocks (i.e., altered) that formed as a result of intense pressure and heat to which the rocks were subjected when they formed deep within the earth's crust. They are rocks characterized by banding, which occurs as a result of thin layers of dark platy, flaky or elongate minerals that alternate with layers of lighter more granular minerals. "Amphibolite" is a rock of metamorphic origin, also. It consists largely of the minerals hornblende (amphibole mineral) and plagioclase and usually contains very little if no quartz. As the content of quartz increases the rock grades into a gneiss. The color of amphibolites is commonly green to black. Monson Gneiss has been quarried in the area in the past probably for building stone. Numerous large

Surficial Geology



boulders (surface stones) were observed throughout the site. The presence of these boulders may interfere with construction activities, particularly where excavating is required.

Overlying bedrock on the site is a non-sorted glacial sediment called till. Till, which was deposited directly by the glacier consists of a structureless mixture of clay, silt, sand, gravel and boulders. The texture of till may vary from place to place. It may be sandy or silty, compact or loose, stony or not stony. The depth of the till varies from zero in bedrock outcrop areas to probably not more than seven feet in areas between outcrops.

The other type of surficial deposit found in the northern sections of the property is swamp sediment. Wet areas were also observed in scattered low-lying areas throughout the southern portion of the site. They consist of organic substances mixed with sand, silt and clay which have been washed in by surface runoff and accumulated in low-lying areas.

Based on visual observations, the topography, geologic and soil mapping information, it appears that much of the property would not be particularly favorable for sewage disposal purposes. These limiting factors include: (1) areas where shallow depth to bedrock conditions exist, (2) the compact nature of till soils, (3) moderately steep slopes throughout the northern half of the site, and (4) wetland areas. All these factors will severely limit the possible use of on-site sewage disposal systems. When these conditions are present, construction of on-site sewage disposal systems usually require extensive site modification and special engineering designs. A specially designed septic system would have to be prepared by a professional engineer licensed in the State of Connecticut.

It appears that the area most suitable for development would be of the relatively flat to gently sloped areas in the southern half of the property. However, the overall density of a residential subdivision on the site and feasibility for on-site sewage disposal systems could only be determined after detailed testing, i.e., deep test pits, and percolation tests are conducted the on-site testing would be required in order to have specific information regarding depth to bedrock, groundwater levels, depth to compacted soil layers and seepage ability of soils. Testing should be conducted in areas where the actual sewage system(s) are to be located.

HYDROLOGY

Most of the site is located within the watershed of the Hammonasset River, which is approximately one mile southwest of the site. This portion of the site drains in a northwestward direction into an unnamed stream in the northwest section. The stream flows in a southwesterly direction until it finally discharges into the Hammonasset River. Two small sections of the property in the southern portion drain southward. One section lies within the watershed of Pond Meadow Brook while the other lies within the Chatfield Hollow Brook Watershed. Both of these brooks ultimately discharge into the Hammonasset River.

Wetland areas were observed to be scattered throughout low lying areas in the northern and southern portions of the property.

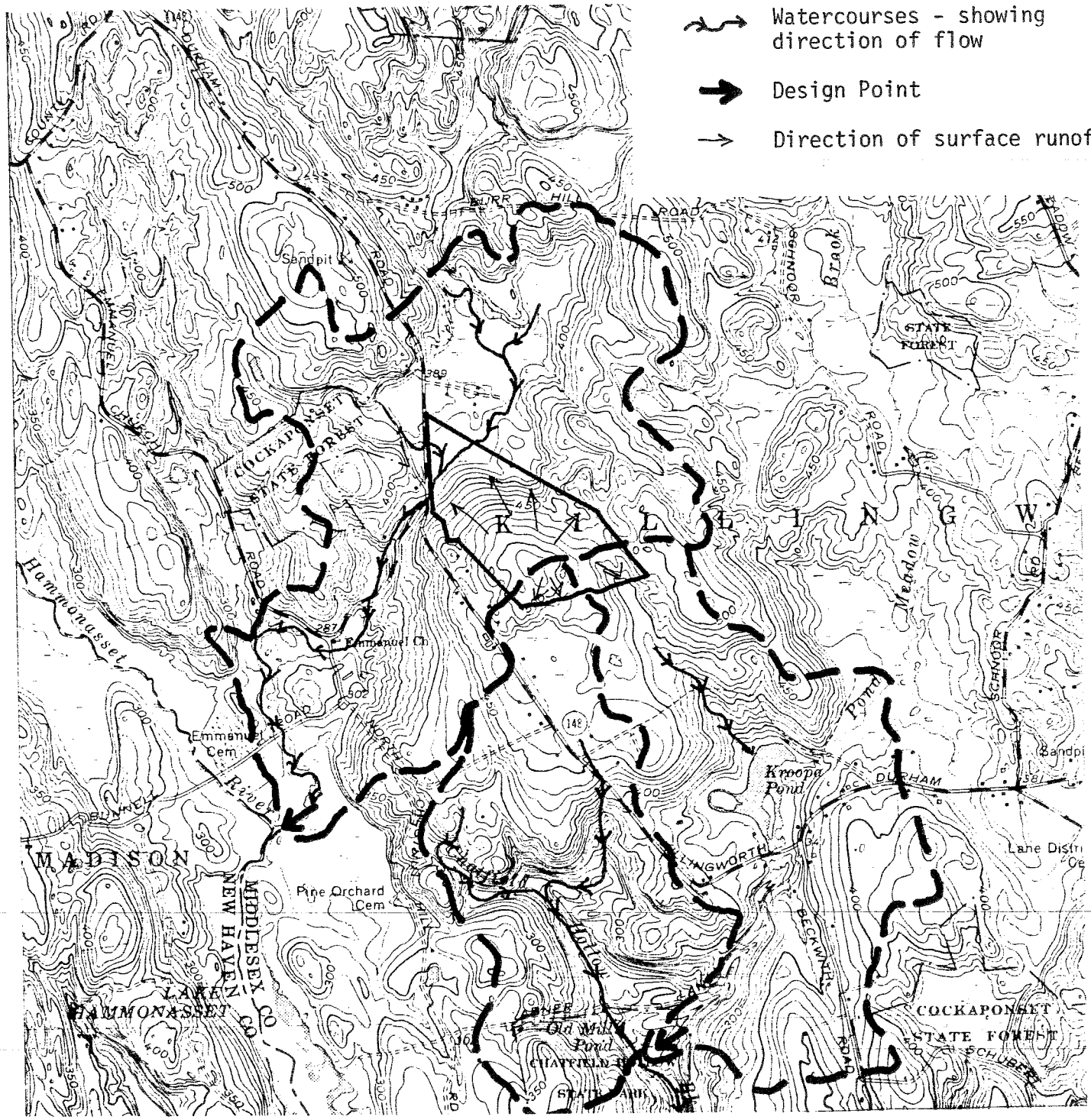
Drainage Areas

0 2000'
scale

N

EXPLANATION

- Watershed Boundaries
- Property Line
- Watercourses - showing direction of flow
- Design Point
- Direction of surface runoff



Development of the site will cause increases in the volume of runoff. These increases would be caused by removal of vegetation, compaction of soils and creation of impervious surfaces, such as roofs, paved driveways and roads. The amount of increases will depend upon the ultimate density of development. The additional runoff could cause increased overland and stream channel erosion and it could increase the peak flood flows to the stream in the northern section of the site. These problems should be addressed by formulating and implementing an erosion and sediment control plan particularly during the construction phase. This plan should also incorporate a stormwater management program for the site.

Since the site lies within a public water supply watershed, residential development must be in compliance with all applicable sections of Section 19-13-B32 Sanitation of Watersheds of the State Public Health Code. Sections a-c of 19-13-B32 are included in the Appendix to this report.

SOILS

A soils map of the property is included in the Appendix to this report. As the soil map is an enlargement from the original 1,320 feet/inch scale to 660 feet/inch, the soil boundary lines are not absolute and should be used merely as guidelines to the distribution of soil types on the site. A summary of the limitations of these soils for septic systems and building site development also appears in the Appendix. The area is composed of soils developed from glacial till. Depth to bedrock varies from very shallow to greater than 60 inches deep, making the placement of homes, septic systems and roads on the site critical. Soils with compacted substratums occur throughout the central part of the site. Wetlands are on the north and east edges of the property.

Most of the soils have stones and boulders on the surface. Stone sizes range from 10 inches to greater than 48 inches in diameter and occur frequently enough to make construction costly. In many locations these stones occur throughout the entire depth of the soil. The north part of the property is particularly stony. The number and size of stones and boulders can make house, septic and road construction extremely expensive. The following is a brief description of the soils contained in each mapping unit and their potentials for community development.

Aa - This mapping unit occurs on 0 to 2 percent slopes. The Adrian soils are very poorly drained and classify as wetlands. They have dark decomposed organic layers over gray sand. These soils have a poor potential for community development. They have a high water table at or near the surface most of the year and are subject to flooding or ponding. The organic layers have very low strength and stability. If fill is placed on top of the organic layers, the fill will settle over a period of several years. If the soils are drained, the organic material subsides, and the surface of the soil is lowered. Excavating is difficult because the side slopes slump readily, and the excavations fill with water. On-site septic disposal systems cannot feasibly be used on these soils.

CdC - In this area this mapping unit is composed of Charlton soils on 3 to 15 percent slopes. The Charlton soils typically have a dark brown, extremely stony fine sandy loam surface layer over a yellowish brown gravelly sandy loam subsoil and substratum. At this location stones and boulders occur throughout the soils. These rock fragments result in a poor potential for community development. The fragments interfere with the installation of septic systems and excavation of the soils for building slab or basement foundations. Access roads are also difficult to construct around these rock fragments. Special design of septic systems on these soils is needed.

CrC - This mapping unit is composed of Charlton and Hollis soils occurring in an intermingled pattern on the landscape. Slopes are 3 to 15 percent. The Charlton soils typically are brown, fine sandy loam and gravelly fine sandy loam to a depth of 60 inches or more. The surface of these soils is very stony. The surface stones and slope of these soils result in a fair potential for community development. Special design of septic systems in these soils may be needed.

The Hollis soils are less than 20 inches deep to bedrock. They are very stony, grayish and yellowish brown sandy loams over unweathered schist bedrock. The rock fragments on the soil and shallow depth to bedrock give this soil a poor potential for site development. Excavations for roads and building foundations may require blasting. Septic systems have to be specially designed in order to properly renovate effluent and prevent downslope break out of septage which could contaminate water courses.

HrC - This mapping unit is composed of Hollis soils and Rock Outcrop occurring in an intermingled pattern on the landscape on 3 to 15 percent slopes. The description and potential of the Hollis soils for community development are the same as those listed above in the description of CrC.

The Rock Outcrop consists of ledges of exposed schist bedrock and has poor potential for community development.

Lg - In this area, this mapping unit is composed of Leicester and Ridgebury soils on 0 to 3 percent slopes. These soils are poorly drained and classify as wetlands. Both soils have extremely stony surfaces, and in places, stones and boulders occur throughout the soil. Typically, the Leicester soils have a dark brown fine sandy loam surface layer 7 inches thick. The subsoil is grayish brown, mottled, fine sandy loam 26 inches thick over a mottled, brown fine sandy loam and gravelly sandy loam substratum to a depth of 60 inches or more.

The Ridgebury soils typically have a very dark gray fine sandy loam surface layer 7 inches thick. The subsoil is grayish brown, mottled, firm, fine sandy loam substratum to a depth of 60 inches or more.

Both soils have poor potential for community development. They are limited mainly by their seasonal high water table and stoniness. The Ridgebury soils are also limited by a slowly permeable substratum. These soils are difficult to excavate because of the high water table and stoniness. The steep slopes of excavations tend to slump when saturated. These soils have poor potential for building foundations and basements because the footings generally are below the depth of the high water table and basements tend to be wet. Septic systems do not function well without very unusual and costly design and installation.

Even if carefully designed, they often have a high failure rate. The stones and boulders associated with these soils will interfere with foundation excavations and installation of septic systems.

PdB - This mapping unit is composed of Paxton and Montauk soils on 3 to 8 percent slopes. These soils have substratums composed of dense basal till that are slowly or very slowly permeable. The Paxton soils typically have a very stony, very dark grayish brown fine sandy loam surface layer six inches thick. The subsoil is yellowish brown fine sandy loam 26 inches thick. The substratum is dark grayish brown, firm, gravelly fine sandy loam to a depth of 60 inches or more.

The Montauk soils are similar to the Paxton soils except they have thin layers of loamy fine sand or fine sand in the substratum.

These soils have fair potential for community development. They are limited mainly by their slowly or very slowly permeable substratums. On-site septic systems require careful design and installation in order to prevent the break out of effluent downslope. Foundation drains should be installed around buildings to help prevent wet basements. The stones and boulders on the surface may interfere with the foundation excavations and septic system installation.

PeC - This mapping unit is composed of Paxton and Montauk soils with extremely stony surfaces on 3 to 15 percent slopes. The descriptions of these soils are similar to those described above in mapping unit PdB, except for the increased frequency of stones and boulders on the surface.

These soils have poor potential for community development. They are limited mainly by their slowly permeable substratums and stoniness. On-site septic systems require careful design and installation in order to prevent the break out of effluent downslope. The stones and boulders on the surface will interfere with foundation excavations and septic system installation.

Ru - This mapping unit is composed of the Rumney soils on 0 to 3 percent slopes. These soils are poorly drained, frequently flooded and classify as wetlands. Typically, the Rumney soils have a dark brown sandy loam surface layer 4 inches thick. The subsoil is dark grayish brown and very dark gray, mottled fine sandy loam and sandy loam 27 inches thick. The substratum is grayish brown, mottled sand to a depth of 60 inches or more.

These soils have a poor potential for community development. They are limited mainly by their susceptibility to flooding and wetness. These soils are difficult to excavate because water inundates the excavations. The steep slopes of excavations are unstable. These soils have a poor potential for septic systems because of the seasonal high water table and flooding hazard. In addition, the septic system may pollute the groundwater. In places, these soils are subject to ponding for several weeks during the winter.

WzC - This mapping unit is composed of the Woodbridge soils on 3 to 15 percent slopes. Typically, the Woodbridge soils have an extremely stony, dark brown fine sandy loam surface layer 3 inches thick. The subsoil is yellowish brown, mottled fine sandy loam 24 inches thick over a mottled, firm, slowly permeable, fine sandy loam substratum to a depth of 60 inches or more.

These soils have a poor potential for community development. They are limited mainly by a seasonal high water table at a depth of about 18 inches, and their stoniness. These soils are difficult to excavate since at this location stones and boulders occur throughout their depth. Because of the seasonal high water table, excavations are frequently inundated. When the soils are saturated, steep slopes of excavations are unstable and tend to slump. Basements will be wet unless foundation drains are installed. On-site septic systems generally will not function with normal design and installation because of the seasonal high water table and the slowly permeable substratum. Very careful design and installation are required to insure that septic systems function satisfactorily and that effluent does not seep to the surface downslope from the leaching field. The presence of stones and boulders will hinder the installation of these systems.

Sediment and Erosion Control

Most of the site is wooded and soils are stabilized with vegetative cover and a litter layer or leaf mat. Some erosion is occurring along steeper sections of the trails and logging roads present throughout the parcel. Development of the site could result in severe soil erosion and sedimentation of wetland areas if adequate sediment and erosion control measures are not provided. Steep slopes and shallow-to-bedrock soils contribute to the erosion risk. Soils with surface stones and shallow soil areas can be difficult to revegetate once disturbed.

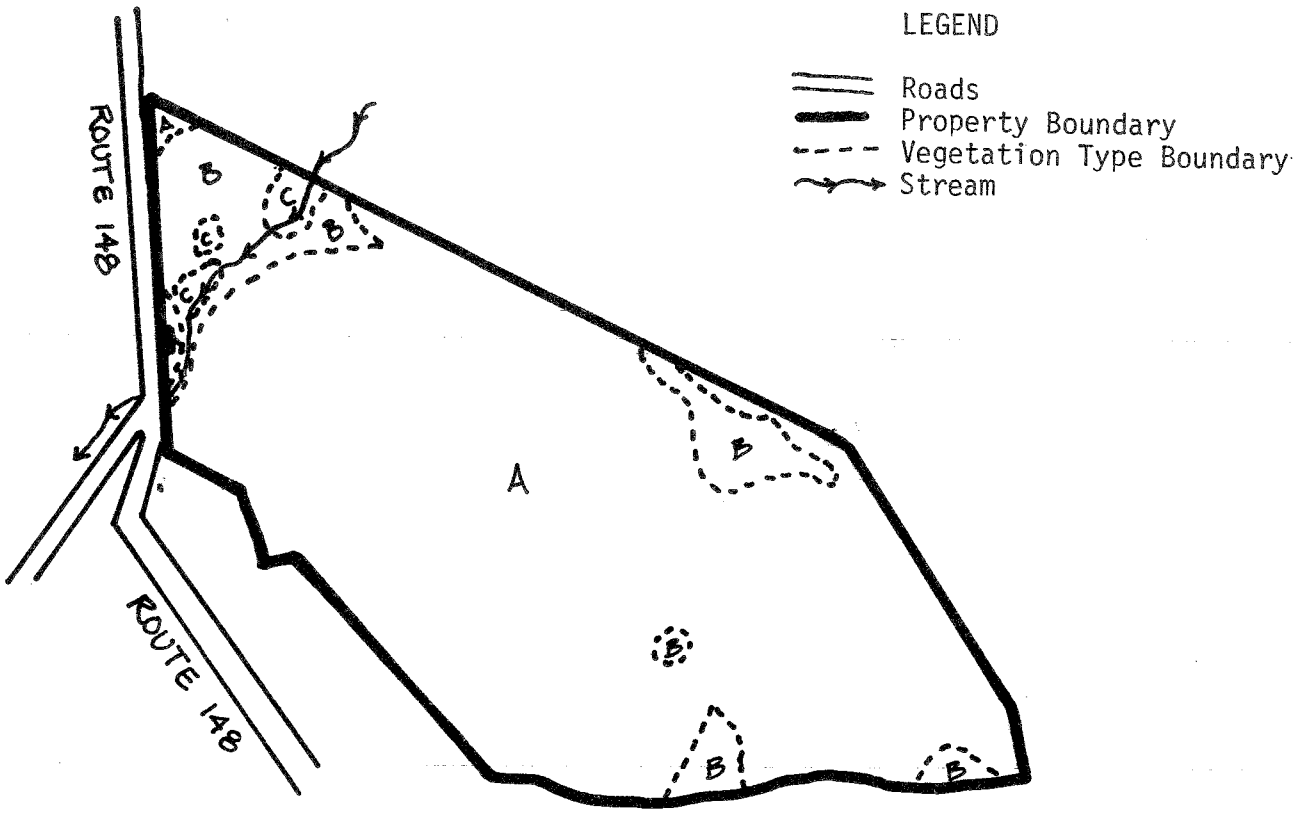
Development plans for the site should include a detailed sediment and erosion control plan and provisions for management of stormwater runoff from the site. Stormwater controls should consider not only increased volume but also the increased velocity of flow. The off-site impacts of changed runoff volumes and rates should also be considered.

VEGETATION

This site which is proposed for sale and eventual development into two-acre house lots may be divided into three major vegetation types. These include ±82 acres of mixed hardwoods; approximately 8 acres of hardwood swamp; and one acre of open swamp. These vegetation types are described below and depicted on the vegetation type map.

It should be noted that the large healthy trees and flowering shrubs which are present throughout the mixed hardwood stand should be considered for retention because of their high aesthetic value. Loss of trees to windthrow in the hardwood swamp areas may be intensified if linear clearings are made along these areas for roads or house lots. Improvement thinnings on an individual house lot basis would reduce crowding and result in healthier, more stable trees over time.

Vegetation



VEGETATION TYPE DESCRIPTIONS*

Type A: (Mixed Hardwoods) 82+ acres - Fully stocked, becoming crowded, pole size. Improvement thinning on individual lot basis if subdivided; regeneration if not subdivided.

Type B: (Hardwood Swamp) 8+ acres - Understocked, pole size.

Type C: (Open Swamp) 1+ acre .

* Seedling Size = Trees less than 1 inch diameter at 4½ feet above the ground (DBH).
Sapling Size = Trees 1 to 5 inches in DBH.
Pole Size = Trees 5 to 11 inches in DBH.
Sawtimber Size = Trees 11 inches and greater in DBH.

Vegetation Type Descriptions

Type A (Mixed Hardwoods) - This ±82 acre, fully-stocked stand is made up of predominantly pole-size white oak, black oak, chestnut oak, mockernut hickory, black birch and American beech. Tulip tree, white ash, yellow birch and black gum are present in the transition zone where this stand grades into the hardwood swamp areas. The trees in this stand are declining in health and vigor due to their crowded conditions in areas that have not received firewood thinnings. The understory is dominated by witch-hazel, azalea, flowering dogwood, mountain laurel, highbush blueberry, sweet pepperbush and hardwood tree seedlings including American chestnut, ash and sassafrass. Ground cover and herbaceous vegetation consists of huckleberry, lowbush blueberry, Virginia creeper, poison ivy, green brier, Pennsylvania sedge, pink Lady's slipper, star flower, Indian cucumber-root, wild sarsaparilla, white wood aster, Solomon's seal, false Solomon's seal, Canada mayflower, Christmas fern, hayscented fern, evergreen woodfern and club moss.

Type B (Hardwood Swamp) - Poor quality pole-size red maple dominate the under-stocked hardwood swamp areas, which total approximately 8 acres. Pole-size black gum and yellow birch are also present in these areas, but not in great numbers. A dense shrub layer, which is made up of highbush blueberry, sweet pepperbush, swamp azalea and spice bush is present throughout. Tussock sedge, skunk cabbage, sphagnum moss, cinnamon fern, royal fern and sensitive fern form the ground cover in this area.

Type C - Approximately one acre of open swamp is present within the norwestern hardwood swamp area. The vegetation in this area is characterized by red maple seedlings, highbush blueberry, sweet pepperbush, swamp azalea, tussock sedge, sphagnum moss, marsh marigold, blue flag and, in some places, skunk cabbage. The soil in this area is so saturated that trees growing any larger than seedling to sapling size cannot be supported and, as a result, fall over, creating small mounds where lesser forms of vegetation flourish.

Aesthetic Considerations

Scattered throughout the mixed hardwood area (vegetation type A) are high quality, healthy trees which are larger in comparison to a majority of the trees present within this tract. These trees have high aesthetic value and should be selected for retention should this area ever be developed. Also present within this vegetation type are flowering trees and shrubs, which include flowering dogwood, azalea and mountain laurel. These species also have high aesthetic value and should be considered for retention. The flowering of these trees and shrubs may be stimulated by removing the overstory trees around them, thus allowing direct sunlight to reach them.

With residential development of this parcel, it should be stressed 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 dwellings 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 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.

Limiting Conditions

Windthrow is a potential hazard in the hardwood swamp area. Tree root depth is restricted by saturated soils in these areas. Under these conditions trees are unable to become securely anchored and are susceptible to windthrow. The potential for windthrow may be intensified if linear openings, which allow wind to pass through rather than over these areas, are made. Openings in and alongside these wetland areas should be avoided if at all possible.

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 in time allow trees to improve in health, vigor and stability. These thinnings when implemented properly can improve the aesthetic value of an area, improve tree health and vigor, improve wildlife conditions and provide wood products.

As stated above, the trees in the mixed hardwood stand are declining in health and vigor due to the crowded condition which prevails. If this area is subdivided into 2+ acre residential lots, each lot owner could improve the resource by removing damaged and poor quality trees for fuelwood. Improvement thinnings even on this small scale, which are focused on the removal of undesirable trees, will once again reduce crowding and competition between residual trees. Up to one-third of the trees which are present in the overstory could be removed for the purposes of these thinnings. Healthy, high-quality trees should, however, be retained.

WILDLIFE

This site has good potential to support a variety of wildlife species. It is generally uniform in vegetative cover type, being heavily wooded with pole-sized trees and a thick understory. Wildlife food sources and natural cavity trees are not overly abundant on the site and may have to be obtained in other nearby areas. However, the wetlands found in the western portion of the site will supply a water source and the thick brushy understory will provide good protective cover.

Development of any of this site will displace the animals presently using this area. Some species may adapt to the disturbance, but others will be forced out the area entirely. The wetlands areas are heavily used, valuable wildlife areas and should be protected from disturbance at any cost.

Through simple forestry cutting operations, further steps can be taken to improve these areas for wildlife. Also, if development does take place, there are many mitigating measures that can be taken to help the wildlife resource. Additional information on wildlife improvement practices can be obtained through the Wildlife Office in Marlborough (295-9523).

WATER SUPPLY

At the present time there is no public water line accessible to this property. Therefore, if the property was developed for residential use, the water supply would probably be provided by the installation of individual on-site wells. Since no suitable sand and gravel aquifer appears to be present within the site, bedrock based wells would probably be the most practical source of water for the site. Bedrock wells, which are a common source of water for individual residences in the state are capable of supplying small but reliable yields that are adequate to serve the needs of an average family. Based on information in Water Resource Bulletin No. 31 (Lower Connecticut River Basin), the crystalline-bedrock aquifer, which underlies the site, is the most widespread aquifer within the basin and is tapped by the most wells. Statistical evidence in the Bulletin indicates that 314 wells tapping this aquifer have a medium yield of 6.4 gallon per minute and 95 percent yield at least 1.3 gallon per minute. Connecticut Resources Bulletin No. 31 also contains information on five bedrock wells that are in close proximity to the site. The average depth of the wells is 385 feet, with a range from 116 feet to 500 feet. The average yield of these wells is approximately 3.5 gallons per minute (gpm) with a range of 1¼ gpm to 6 gpm. Because much of the developable portion of the site is located around the top of the bedrock controlled hill, which limits the amount of groundwater recharge to the uppermost fracture zone, yields to wells in the area are likely to be smaller than average. Yield of bedrock based wells depend upon the number and size of water-bearing fractures that wells intersect, and since the fractures are distributed irregularly through the bedrock, it is extremely difficult to predict the yield of a well.

Judicious care should be taken in the proper placement of wells since on-site sewage systems would be required for each lot. Generally speaking, wells should be located at a relatively high point or side of any lot in a direction which will be away from the normally expected flow of contaminants, such as on-site sewage disposal systems.

The quality of water from bedrock-based wells usually provide satisfactory supplies of good quality water.

WASTE DISPOSAL

As the Town of Killingworth does not have any public sewerage facilities, any possible development would have to depend on acceptable on-site subsurface sewage disposal systems.

Based on visual observations and Soil Conservation Service mapping data, it is generally concluded the property is unfavorable for subsurface sewage disposal due to the presence of wetlands, steep slope, shallow ledge rock, and relatively impervious or slowly drained soils. This is not to imply, however, that some areas of the site with proper planning, investigation and design could not satisfactorily support sewage disposal systems. The more suitable area would appear to be in the higher and less steep terrain from about contour 450 and up.

Of course, adequate on-site testing would be very necessary to define the more suitable areas. In general, there is indication that shallow bedrock or a more impervious soil underlies the better drained surface layers. In the latter situation, the area may be subject to a seasonal high groundwater condition, in which case groundwater control drains may also be needed. Surface stones and boulders would add further development difficulties. Where bedrock is present, it must be at least 4 feet below the bottom area of any sewage leaching system. Generally, this means that rock should not normally be within 7 feet of ground surface.

Because of the many restrictions and limitations, all or most sewage disposal systems would warrant carefully engineered designs. No doubt considerable site improvements would also be necessary.

Where property has a number of particularly adverse site conditions, 2 acre or even larger size building lots would probably be needed in order to provide for both on-site sewage disposal and water supply. The area would also remain as part of the watershed of a public water supply.

PLANNING CONCERNS

The parcel of land currently owned by the South Central Connecticut Water Authority lies in the northwest quadrant of the Town of Killingworth. It is included in the rural residence district under Killingworth's zoning regulations, as is most of the rest of the Town's land area.

The principal uses to which the parcel could legitimately be put in the future under the existing zoning rules as a matter of right include one-family dwellings; two-family dwellings; customary home occupations involving no more than two non-residents of the premises that do not "noticeably change the apparent residential character of the premises"; municipal offices, firehouses, public schools, colleges and camps owned and operated by a governmental unit; churches, parish houses, convents and similar religious buildings; boarding houses; agricultural and related animal-raising pursuits, except the commercial raising of fur-bearing animals or swine; vegetable stands; parks, playgrounds and similar open reservations maintained by either governmental units or non-profit

organization, including "game raising, hunting and other conservation activities carried on under private or public ownerships."

In addition to the above list, certain other uses may be established by special exception granted by the Killingworth Planning and Zoning Commission. These include private schools and colleges, clubs, libraries, museums, auditoriums, community houses and public health nursing service facilities; hospitals or convalescent homes, provided the site meets space requirements (8000 sq. ft. per patient); veterinary hospitals on 3 acres or more; livery, boarding or riding stables on seven acres or more; commercial greenhouses on 3 acres or more; and cemeteries.

The minimum lot area required in a rural residence district for residential use by one family is two acres. Hence, a two-family dwelling would require four acres of land.

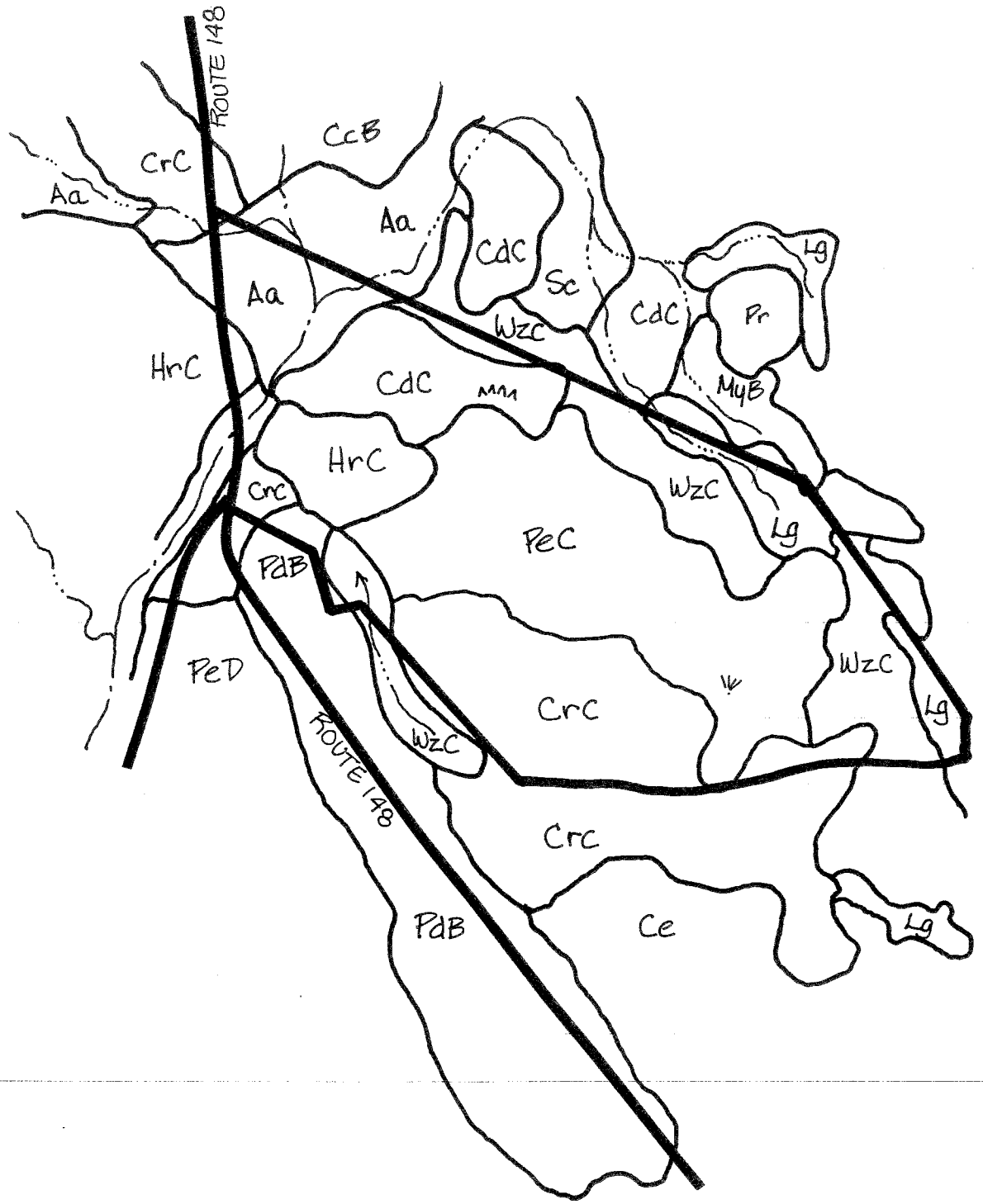
As the foregoing indicates, the typical regularly permitted uses are low-intensity ones in keeping with the rural character of the community. These would be the sort of uses to which the water company land is most likely to be put. The northwest section is one of the least populated areas of town, but both parcels do front on a state highway (Route 148), making them prime candidates for potential future development as Killingworth has been growing recently at a faster rate than the rest of the towns of the Estuary Regional Planning Area. There is, on the other hand, no central public water supply system nor sewerage system anywhere in Killingworth to influence one way or another the value or the timing of development of these parcels compared to any other parcels which may be on the market elsewhere in Town at the same time.

Should the parcel become the subject of a special exception application for any of the previously mentioned potential uses, the planning and zoning commission must consider the probable effect of such use on the enjoyment, usefulness and value of premises in the general neighborhood; the pattern, flow, intensity or character of traffic and the degree of traffic congestion produced thereby; the degree of population concentration and building density resulting from such use and the availability of necessary public facilities and services required by it; and its effect on the natural, scenic or historic environment immediately surrounding it.

From a general planning point of view, the parcel does not stand out as a unique parcel performing any special natural function for the Town if left in an undisturbed state. It has site constraints typical of most Killingworth land. It will most likely be sold eventually for private development, at which time any localized natural or man-made features worthy of protection or preservation should be considered as part of the site planning process.

Appendix

Soils


ROUTE 148
CcB
CrC
Aa
Aa
Aa
CdC
Sc
Lg
Pr
CdC
WzC
HrC
CdC
MyB
HrC
CrC
WzC
Lg
PeC
PdB
PeD
WzC
Lg
CrC
WzC
ROUTE 148
CrC
PdB
Ce
Lg

PRINCIPAL LIMITATIONS AND RATINGS OF SOILS FOR RESIDENTIAL DEVELOPMENT

Central Connecticut Regional Water Authority
Killingworth, Connecticut

Parcel 1

Soil Symbol And Name	Dwellings Without Basements	Dwellings With Basements	Lawns And Landscaping	Septic Tank Absorption Fields	Local Roads And Streets
Aa* Adrian Muck	Severe: Wetness, Floods, Low Strength	→	Severe: Excess Humus, Floods, Wetness	Severe: Wetness, Floods	Severe: Wetness Floods, Low Strength
CdC Canton And Charlton Extremely Stony Fsl's 3-15%	Severe: Large Stones	→	→	→	Moderate: Large Stones
CrC Charlton-Hollis Very Stony Fsl's 3-15%	Charlton → Moderate: Slope, Large Stones Hollis → Severe: Depth To Rock	→	→	→	Charlton → Moderate Slope Hollis → Severe: Depth To Rock
HrC Hollis-Rock Outcrop Complex 3-15%	Severe: Depth To Rock Large Stones	→	→	→	Severe: Depth To Rock
LG* Leicester, Ridgebury-Whitman Extremely Stony Fsl's	Severe: Large Stones Wetness, Frost Action	Severe: Large Stones Wetness	→	All → Severe: Wetness Large Stones Ridgebury And Whitman → Perc Slowly	Severe: Wetness Frost Action
PaB Paxton And Montauk Very Stony Fsl's 3-8%	Moderate: Large Stones, Frost Action	Moderate: Large Stones	→	Severe: Percs Slowly	Moderate: Frost Action
PeC Paxton And Montauk Extremely Stony Fsl's 3-15%	Severe: Large Stones	→	→	Severe: Percs Slowly, Large Stones	Moderate: Slope, Frost Action, Large Stones
PeD Paxton And Montauk Extremely Stony Fsl's 15-35%	Severe: Slope, Large Stones	→	→	Severe: Slope, Large Stones, Percs Slowly	Severe: Slope
WzC Woodbridge Extremely Stony Fsl 3-15%	Severe: Frost Action Large Stones	Severe: Wetness Large Stones	Severe: Large Stones	Severe: Percs Slowly	Severe: Frost Action

* Designated Wetland Soil Regulated Under PA 155

** Prime Farmland Soil

Fsl - Fine Sandy Loam

SOIL INTERPRETATIONS FOR URBAN USES

The ratings of the soils for elements of community and recreational development uses consist of three degrees of "limitations:" slight or no limitations; moderate limitations; and severe limitations. In the interpretive scheme various physical properties are weighed before judging their relative severity of limitations.

The user is cautioned that the suitability ratings, degree of limitations and other interpretations are based on the typical soil in each mapping unit. At any given point the actual conditions may differ from the information presented here because of the inclusion of other soils which were impractical to map separately at the scale of mapping used. On-site investigations are suggested where the proposed soil use involves heavy loads, deep excavations, or high cost. Limitations, even though severe, do not always preclude the use of land for devel opment. If economics permit greater expenditures for land development and the intended land use is consistent with the objectives of local or regional development, many soils and sites with difficult problems can be used.

Slight Limitations

Areas rated as slight have relatively few limitations in terms of soil suitability for a particular use. The degree of suitability is such that a minimum o time or cost would be needed to overcome relatively minor soil limitations.

Moderate Limitations

In areas rated moderate, it is relatively more difficult and more costly to correct the natural limitations of the soil for certain uses than for soils rated as having slight limitations.

Severe Limitations

Areas designated as having severe limitations would require more extensive and more costly measures than soils rated with moderate limitations in order to overcome natural soil limitations. The soil may have more than one limiting characteristic causing it to be rated severe.

Sec. 19-13-B32. **Sanitation of watersheds.** Unless specifically limited, the following regulations apply to land and watercourses tributary to a public water supply including both surface and ground water sources.

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

(b) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located within one hundred feet of the high water mark of any reservoir or within fifty feet of the high water mark of any stream, brook, or watercourse, flowing into any reservoir used for drinking purposes.

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

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

(e) No stable, pigpen, chicken house or other structure where the excrement of animals or fowls is allowed to accumulate shall be located within one hundred feet of the high water mark of a reservoir or within fifty feet of the high water mark of any watercourse as above mentioned, and no such structure shall be located on any watershed unless provision is made in a manner acceptable

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area.

The Team is available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activitis. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.