environmental review team report

SALEM RIDGE

SALEM, CONNECTICUT

RC & D

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES

ENVIRONMENTAL REVIEW TEAM REPORT
ON
SALEM RIDGE
SALEM, CONNECTICUT

NOVEMBER, 1973

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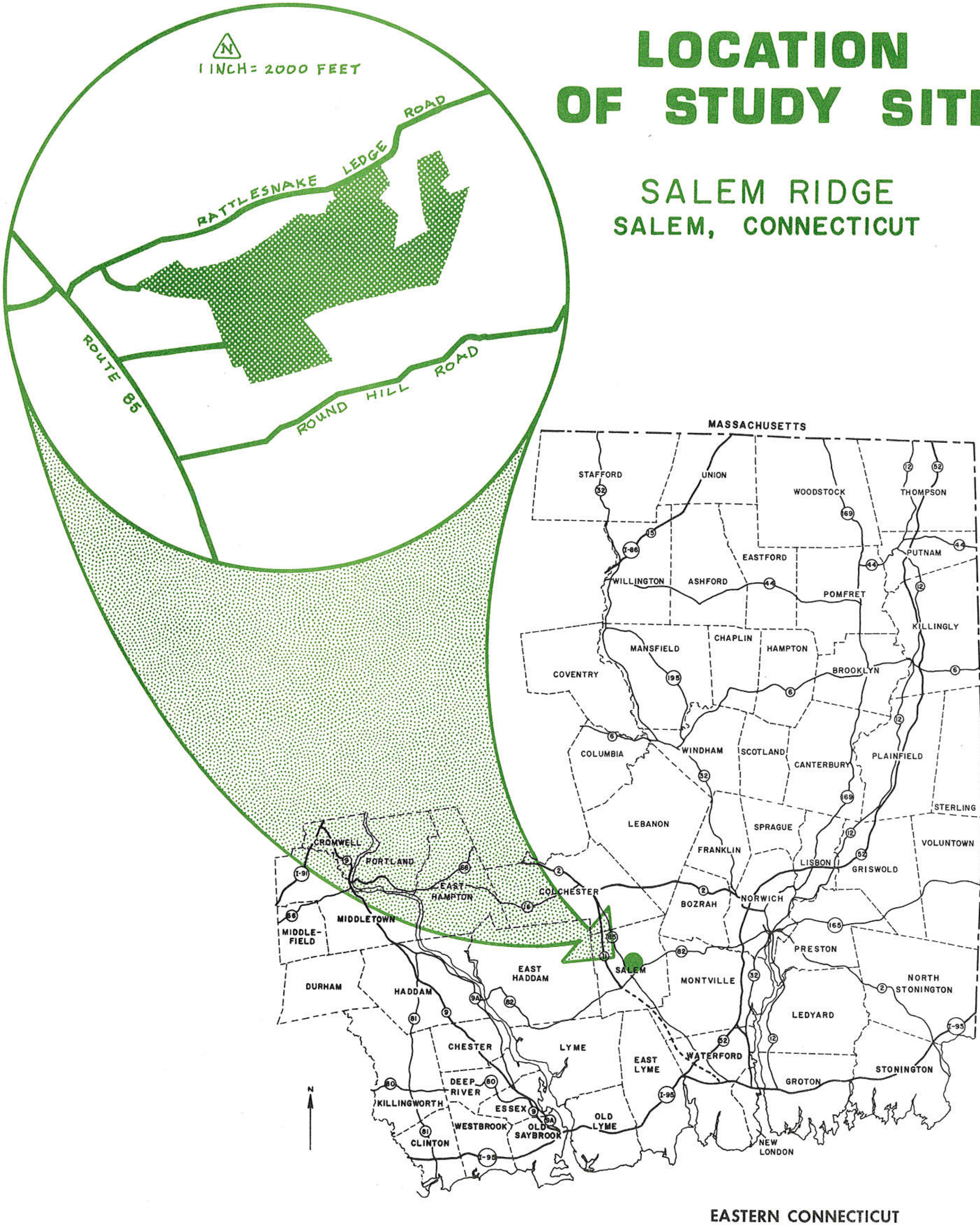
EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE

SALEM RIDGE
SALEM, CONNECTICUT



EASTERN CONNECTICUT

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT ON SALEM RIDGE SALEM, CONNECTICUT

This report is an outgrowth of a request from the Salem Planning and Zoning Commission, with the approval of the owner, Mr. David R. Molumphy, to the New London County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Project Committee for their consideration and approval as a project measure. The request has been approved and the measure reviewed by the Environmental Review Team.

The soils of the site were mapped by a soil scientist of the USDA Soil Conservation Service. Reproductions of the soil survey and a table of limitations for urban development were forwarded to all members of the Team prior to their review of the site.

The Team that reviewed the proposed development consisted of the following personnel: Sherman C. Chase, District Conservationist, Soil Conservation Service (SCS); Edwin L. Minnick, Engineering Specialist, SCS; Richard Hyde, Geologist, Natural Resource Center, State of Connecticut Department of Environmental Protection (DEP); Huber R. Hurlock, Forester, DEP; T.E. Linkkila, Wildlife Biologist, DEP; Charles L. Phillips, Fishery Biologist, DEP; Donald Capellaro, Principal Sanitarian, State of Connecticut Department of Health; David R. Miller, Climatologist, Connecticut Cooperative Extension Service (EXT); Rudy J. Favretti, Landscape Architect, EXT; Thomas H. Seidel, Community Planner, Southeastern Connecticut Regional Planning Agency; William Lucas, Project Coordinator, Eastern Connecticut RC&D Project; Barbara Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on October 18, 1973. Reports from each Team Member were sent to the Team Coordinator for review and summarization.

This report is not meant to compete with private consultants by supplying site designs 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 both the Town of Salem and the developer. 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 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: Miss Barbara A. Hermann, (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Project, 139 Boswell Avenue, Norwich, Connecticut 06360.

INTRODUCTION

The proposed Salem Ridge subdivision is located on a 109 acre parcel of land east of Route 85 and south of Rattlesnake Ledge Road in the Town of Salem. Two small subdivisions with single-family homes abut the property. The Environmental Review Team was requested to evaluate the site for various possible uses, which include single-family homes on one-acre lots, cluster development, multi-family dwellings, and seasonal campsites.

For purposes of evaluation within this report, the site has been divided into three areas, based on their soil types; wetlands, loose upland till soils, and ledgy soils. These areas are shown on the map on page 7. As defined by the Inland Wetlands Act, the wetlands category includes all poorly and very poorly drained soils which are generally unsuitable for development. The loose upland till soils are the most suitable soils for development on the site, though slopes over 15 percent will impose difficulties in design and construction. The ledgy soils are generally shallow to bedrock with steep slopes and have severe limitations for development, though pockets of deeper soils can exist within the area which are suitable for development.

The following report will present a more detailed description of the soils and geology of the Salem Ridge property, followed by an evaluation of the different aspects of development as they relate to the natural resources. Recommendations will generally vary according to the three areas described above. Consideration will also be given to the compatibility and suitability of the site for various potential land uses.

EVALUATION

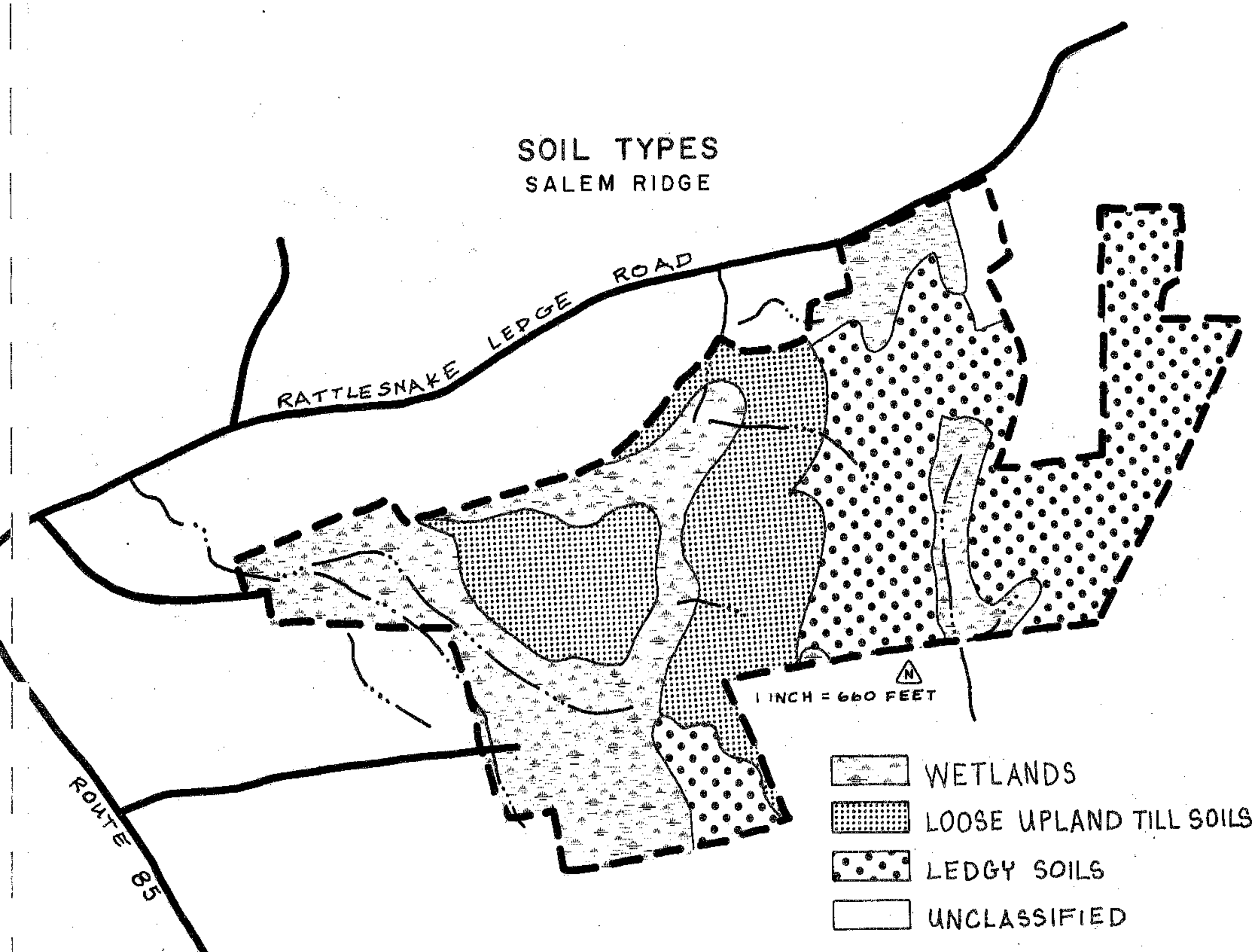
SOILS AND GEOLOGY

The types of bedrock found in this area consist of two NE by SW trending bands which meet generally along the small brook in the eastern portion of the property. West of this line is the Hebron Formation, an interbedded quartz-biotite-plagioclase schist and calcic silicate gneiss. To the east is the Canterbury Gneiss, a biotite-bearing quartz feldspar gneiss. Both of these bands dip to the northwest about 20°. From the statistical analysis of thousands of driller well completion reports, the average yield of bedrock wells placed into both of these rock types is less than 5 gallons per minute. The Hebron Formation generally yields slightly more water than the Canterbury rocks, but its iron content is higher, thus making the water of a poorer quality.

The unconsolidated glacial material found on top of the bedrock in this area is principally classified as a till. Till is a predominantly non-sorted, non-stratified material deposited directly when local glacial ice melted. It consists of varying mixtures of boulders, gravel, sand, silt, and clay. The till thickness varies from place to place throughout the site depending on the bedrock slope and relief, and the amount of erosion that has occurred since the till was deposited. In general the thicker till deposits are more than likely to be found on the lower half of ridge slopes and knolls. Within most of these eastern uplands the thicker till deposits probably average between 10 and 15 feet while considerably smaller thicknesses, as is evidenced by the bedrock outcrops, can be expected on the tops of hills and ridges.

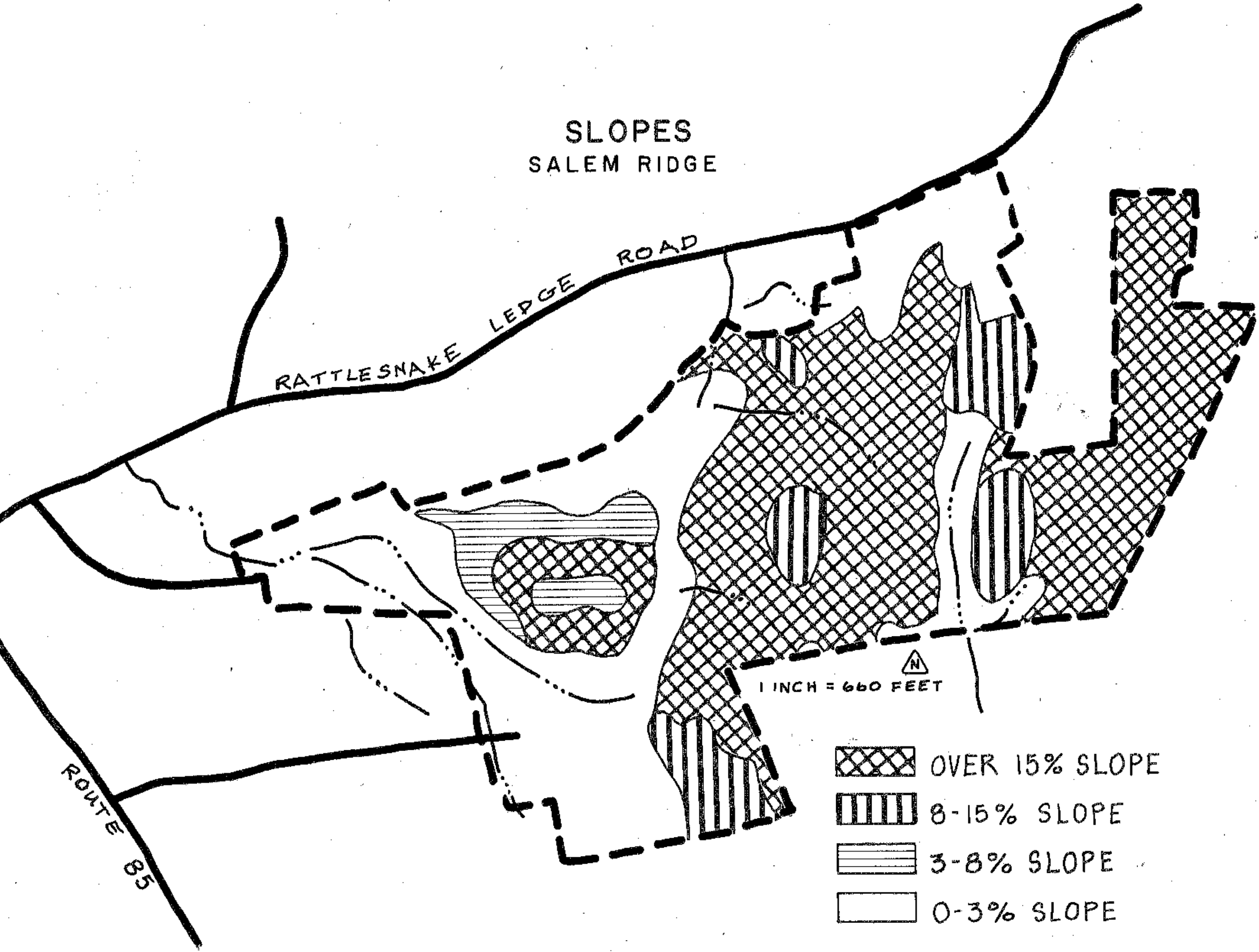
The physical characteristics of a site together with the natural processes operating within an area, create situations which can be beneficial or problematic to a proposed development. In addition to the geologic data, soil classifications provide a good indicator of the suitability of an area for development. For purposes of discussion and evaluation, this site has been divided into three areas on the basis of soil types and related characteristics. These areas are shown on the map on the next page. A more detailed soil survey of the site is presented in the Appendix of this report.

The first area consists of 41.9 acres of poorly and very poorly drained soils which are defined by P.A. 155 as inland wetlands. Typically, these soils develop where the topography is low and relatively flat as compared to the surrounding land, and water sits on the surface or drains through from higher land to some lower area. With the poorly drained soils (43X, 98X, and 464 on detailed map in Appendix), the water table is usually within 5 feet of the surface and is within 6 inches during the wettest parts of the year. With very poorly drained soils (50X, 75, 91, 92, and 291 on detailed map), the water table is usually within 3 feet of the surface and exhibits ponding during part of the winter and spring.



The 29.7 acres of loose upland till soils (6B, 6C, 6XC, 6D, and 6XD on detailed map) are the best suited for development of the soils on this site. These soils develop on the thicker upland tills generally found on hillsides and sometimes on hilltops. Development problems in this area can be related to slope, especially where it exceeds 15 percent (21.3 of the 29.7 acres). The map on the next page breaks the site into several slope categories. The water table is not high during any part of the year in these soils and permeability ranges from moderate to rapid.

The ledgy soils (17LC, 17LD on detailed map) comprise the largest area with 46.8 acres. These soils are underlain by bedrock less than 2 feet below the land surface with an occasional barren rock outcrop protruding above the soil layer. Within this region it should be understood there can be pockets of thick soil which, if found, can be acceptable locations for development. However, these pockets tend to be few and widely spaced and to find them requires extensive and careful subsurface exploration. This region also contains areas of steep slope and irregular topography.



These three areas will provide a useful basis for discussion in the remainder of the report. However, the soils map in the Appendix provides a more detailed picture of the site. A table of limitations of each of the soils for on-site sewage, basements, streets and parking, and landscaping, is also given in the Appendix. It is the intention of the table to call to the attention of the user probable limitations associated with each soil type and the principal limiting factors. However, limitations, even though very severe, do not always preclude the use of the land for development. If economics permit greater expenditures for land development and the intended objective is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used.

WATER SUPPLY

Water supply for the proposed development will have to be derived on-site from private wells and/or a community system. In general, wells can be established in either surficial or bedrock materials. Till, as is present on this site, usually is not thick enough to yield an adequate water supply for a community system, though it might support an individual home in the form of a dug well. However, thick saturated sections of till still may not provide sufficient quantities of water because the high silt and clay content tends to retard the passage of ground water into the well, and thus, withdrawal rates may exceed the well's recovery capability.

As mentioned earlier, wells in the type of bedrock found on this site generally yield less than 5 gallons per minute. One factor must be kept in mind when searching for water supplies in bedrock is how the water gets to the well. Bedrock wells are only as good as the number and size of the fractures in the bedrock in which water below the water table can pass through to reach the well. The more numerous and larger the size of the fractures and openings in the rock, the more water a well will be able to receive in the shortest period of time, and thus be capable of yielding to the user.

Except for fault zones which may extend deep into the bedrock, the amount of fracturing a particular rock type has will be mainly confined to that portion which is closest to the land surface. In other words, fractures, joints, and openings in bedrock decrease in size and number rapidly with depth. As a rule, then, the capacity for rock to produce water declines with depth. From records of existing wells in Hebron Formation and Canterbury Gneiss, it is evident that wells drilled to a 200 foot depth produce proportionately more water per foot drilled than a well sunk to 400 feet. Therefore, the cost would exceed the benefits from drilling a well deeper than 200 feet.

Large quantity wells in both the Hebron Formation and Canterbury Gneiss are a rarity, but they do occur in areas where faulting or large scale rock movements result in the crushing and disruption of the consolidated state. In this area there is a fault contact separating the two rock types, but it is difficult to tell how much disruption has occurred. This fault zone, based on surface outcrop measurements, dips to the northwest at an angle into the earth of approximately 20°. As one moves more to the west of the surface contact of this fault it will be found at deeper and deeper depths below the land.

It appears that individual bedrock wells are most feasible for the site in question. However, if a well(s) with adequate yield is located, a community system would allow more flexibility as regards on-site sewage disposal. The main considerations for such a system would be the proper location and protection of the well(s) from possible sources of contamination, adequate yield for the project, and water of a safe, suitable quality.

Individual wells must comply with the provisions of Public Health Code regulation 19-13-B51a-1. A community system would have to be approved by the State Department of Health under provisions of Section 25-33 of the General Statutes and Section 19-13-B50 of the Public Health Code.

WASTE DISPOSAL

Waste disposal for this development will have to be on-site since no public sewer system exists in Salem. Based on visual observations, topography, and the soil survey, it must be concluded that in general the major portion of the property is unsuitable or poorly suited for on-site sewage disposal due to ledge rock, steep slopes, or high water table. The loose upland till soils provide the best areas for the installation of septic systems. The permeability of these soils is favorable for sewage disposal systems. However, on slopes greater than 8 percent (6C, 6XC) and particularly on slopes greater than 15 percent (6D, 6XD), the design and site selection for filter fields will require special considerations.

The ledgy soils can be used for on-site sewage systems where test holes indicate an adequate depth and area and all Public Health Code criteria can be met. The operation of leaching fields to attenuate the septic effluent and to dispose of the volume of liquid in these soils must also be evaluated so premature failure of a system does not occur.

The wetlands are entirely unsuitable for the location of sewage disposal systems due to the high water table.

Because of so much unsatisfactory and/or questionable areas, it may be more feasible to consider the possibility of a public sewerage system on the better soils with the dwellings located above on the ledgy soils.* It has been the experience of the State Health Department that facilities of this type should be owned and operated by a municipality, public sewer authority, or sewer district rather than by a private developer or a homeowners' association.

In lieu of a public sewerage system, it would appear necessary to restrict development on the marginal portions of the property to a density lower than one dwelling unit per acre. A detailed engineering study would no doubt be needed of the marginal land in order to locate possible house sites, with specific design of the sewage disposal systems which would service these sites.

* Such a facility would have to meet the criteria of and be approved by the Water Compliance Section of the State Department of Environmental Protection.

A careful review of such plans should be made for compliance with provisions of the Public Health Code governing private subsurface sewage disposal.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

The loose upland till soils are generally favorable for homes with basements, though slopes over 8 percent add difficulty to site preparation. The steeper slopes, however, may present a wide range of opportunities for architectural design. If not severely disturbed by grading, these soils provide for good lawns and are favorable for planting trees and shrubs.

The ledgy soils can cause costly problems for the installation of pipe lines, basements, wells, and sewage facilities. Careful planning can help avoid some of these problems.

The wetlands have very severe limitations for urban development. However, they do offer opportunities for pond construction as follows:

1. A two or three acre dug-out type pond could be constructed and stocked with warm water fish. These cost presently around $6,000 to $10,000 per acre.

2. A shallow skating pond could be constructed by excavating from one to three feet. The cost could range from $1,000 to $3,000, depending on the size.

3. A fire hole could be constructed at about the same cost as the skating pond depending on the size.

Generally, due to the organic material in the soils, ponds can become tea colored and also are usually acid. Therefore, ponds in these soils are not usually considered desirable for swimming or stocking with trout, although this has been done.

In developing any site, erosion is present and can develop into severe problems if adequate preventive and control measures are not taken. Disturbed steep slopes are greatly susceptible to erosion problems. By developing at high densities on these areas, the accumulation and drainage of rainwater from buildings and paved surfaces will significantly increase the potential for erosion, siltation, and sedimentation to occur. Even at low housing densities erosion can be a problem in these areas.

The erosion of upper slope soils scar the land which then requires the developer to initiate costly stablization and landscaping procedures and measures. Eroded materials are carried to local brook and swamp systems as a result of the land disruption and increased runoff. These forces cause the natural drainage equilibrium to become upset resulting in an increase of the average flood peak levels of the watercourse during storm periods and a decrease in the low flow between storms.

As a watercourse's average flood peak increases, its channel stability is upset and the channel must enlarge, causing unstable and unvegetated banks to form, scoured and/or muddy channel beds to appear, unusual amounts of debris to accumulate, and an increase in the sediment load carried and redeposited in lower basin regions. Without the control, retardation and dissipation of surface runoff from impermeable surfaces, flood, erosion, and siltation problems become acute until a new balance is established.

To minimize soil erosion and sedimentation, the removal of surface vegetation should be kept at a minimum and restricted to the immediate construction sites. Clearing should not take place until construction is ready to begin at a particular site. The Erosion and Sediment Control Handbook for Connecticut (available from the Soil Conservation Service) provides the standards and specifications for numerous vegetative and mechanical measures for the prevention and control of erosion. It is highly recommended that an erosion control plan be drawn up prior to site development.

ROADS AND UTILITIES

With the loose upland till soils, the only major restriction for road construction are the steep slopes. In these areas, the roads should follow the topographic contours as close as possible. The varying depths to bedrock in the ledgy soils will present additional difficulties. To construct roads on the wetland soils, any muck should be removed to a firm base and filled back in with suitable gravel. Otherwise, the gravel will displace the muck and the road will settle. The same is true for the installation of culverts.

Access to the site from Rattlesnake Ridge at the eastern end of the property could be developed, thus avoiding construction of a road in the wetlands. If the present access road through the wetlands is to be used, it should follow the recommendations above for establishment of a firm base and should have adequate culverts to permit the normal flow of drainage across the wetlands.

HAZARDS

Erosion is a major man-made hazard which can be controlled with proper planning and control measures. The dangers inherent in erosion and sedimentation and the means for control were described previously under Foundations and Graded Conditions.

Maintaining vegetation on top of the north-south ridges will help protect the development from winter winds. Locating the housing on west facing slopes will also give warming sun exposure in the afternoon. These measures will have the effect of saving fuel and increasing human comfort.

AESTHETICS AND PRESERVATION

This site offers interesting design possibilities with development on the well-drained upland soils and open space in the wet areas. An aesthetically pleasing development is possible by maintaining specimen trees, stone walls, ledges, and views. As many trees as possible should be left to tie the homes into the landscape. Roads should follow appropriate contours and blend with the landscape.

Forestry. The existing trees on the wet sections of the property have no commercial value. The higher parts of these wet areas could be planted to white cedar at a spacing of 10 feet by 10 feet (436 trees per acre). Conifers would, over time, provide year round cover for wildlife and a visual and noise buffer.

On the drier sites with shallow soils the existing trees are also of no commercial value. Almost all trees over 10 inches in diameter have rot or seams which would prevent them from having commercial value. However, on these drier sites, the trees should survive some construction activity and continue to live on the house lots. Some specimen oaks, beeches, and cedars are present which should be preserved if possible.

Wildlife. The area is a mixture of very wet red maple swamps, wet red maple-alder swamps, old fields, and mixed hardwood upland. The swampy areas contain valuable wildlife and herbaceous shrubs. The mixed hardwood uplands have a light understory of wildlife shrubs. The wildlife food and cover plant species on both the swamps and upland are of poor vigor making the overall value of the area fair for wildlife. Development of the area, following sound planning and with protection of the wetlands, will increase the overall value for songbirds and small mammals.

Fish. The area has no direct value from a fishery standpoint.

SERVICES TO SUPPORT DEVELOPMENT

Services required of the town will be essentially external to the development in terms of school facilities, police and fire protection, and expanded use and wear on town roads. The burden to which the town is placed will depend on the speed with which the homes are built.

COMPATIBILITY WITH SURROUNDING LAND USES

Immediate surrounding land uses are residential and undeveloped. A town fire house is located just north of the intersection of Rattlesnake Ridge Road and Route 85. The Salem Town Park is about 1/2 mile south of the proposed development along Round Hill Road. Based on these uses residential development would be compatible on a land use basis.

ALTERNATIVE LAND USES FOR THE AREA

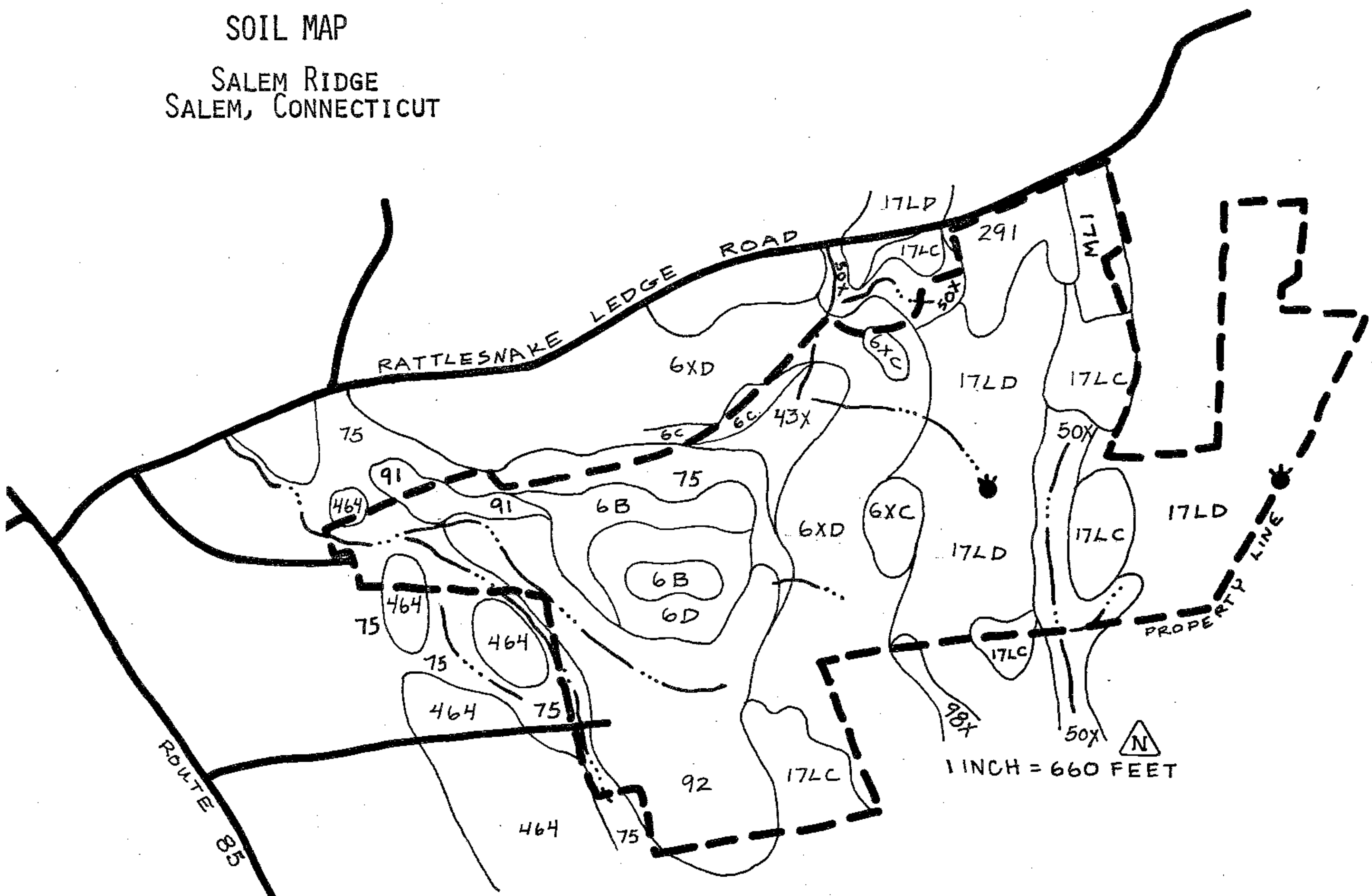
Feasible land use alternatives appear to be residential and undeveloped. Because of the soil types and terrain, agriculture and sand and gravel excavation do not appear to be feasible alternatives. Because of lack of access to expressways or major arterials, surrounding land uses, and site topography, commercial or industrial uses do not appear to be viable alternatives. Because of the close proximity to existing residential development, a campground operation would not be desirable.

The Salem Town Development Plan recommends mixed residential (single and multi-family) uses and low intensity uses for the project area. Single and/or multi-family housing in the higher areas of the ledgy soils with a community sewerage system in the lower areas of the loose upland till soils could possibly cut down on road construction in hilly, ledgy areas, but the design, operation, and responsibility of the sewerage system might be a problem. With individual sewage systems, the dwelling units will have to be placed only where suitable soils exist, which would most likely result in a considerably lower density.

APPENDIX

SOIL MAP

SALEM RIDGE
SALEM, CONNECTICUT



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE,
Soil Conservation Service.

ADVANCE COPY, SUBJECT TO CHANGE. *OCTOBER, 1973*

SOILS LIMITATIONS CHART

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For: ** On-Site Sewage	Base-ments	Land-scaping	Streets and Parking	Principal Limiting Factor
B-1a	6B	5.3	4.4	1	1	1	2	Slope 3-8%
B-1b	6C, 6XC	3.1	2.6	2	1	2	3	Slope 8-15%
B-1d	6D, 6XD	21.3	17.7	3	2	3	3	Slope over 15%
B-3a	43X	3.3	2.7	3	3	3	3	High water table
C-3a	98X	.1	.1	3	3	3	3	High water table
C-3b	50X	5.1	4.2	4	4	4	4	High water table, stoniness
D-1	17LC	10.3	8.6	3	3	3	3	Shallow to bedrock, slope 8-15%
D-2	17LD	36.5	30.3	3	3	3	3	Shallow to bedrock, slope over 15%
F-1	92	19.5	16.2	4	4	4	4	High water table
G-3a	464	.5	.4	3	3	3	3	High water table
G-3b	91, 291, 75	13.4	11.1	4	4	4	4	High water table
Not classified	ML-1	2.0	1.7	This is an area of excavation. Suitability can only be determined by on-site investigation.				
		120.4	100.0					

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups.

** Limitations: 1-slight; 2-moderate; 3-severe; 4-very severe.

ACREAGE SUMMARY OF SOILS LIMITATIONS

	Slight		Moderate		Severe		Very Severe	
	Acres	%	Acres	%	Acres	%	Acres	%
On-Site Sewage	5.3	4.4	3.1	2.6	72.0	59.8	38.0	31.5
Basements	8.4	7.0	21.3	17.7	50.7	42.1	38.0	31.5
Landscaping	5.3	4.4	3.1	2.6	72.0	59.8	38.0	31.5
Streets and Parking	-	-	5.3	4.4	75.1	62.4	38.0	31.5