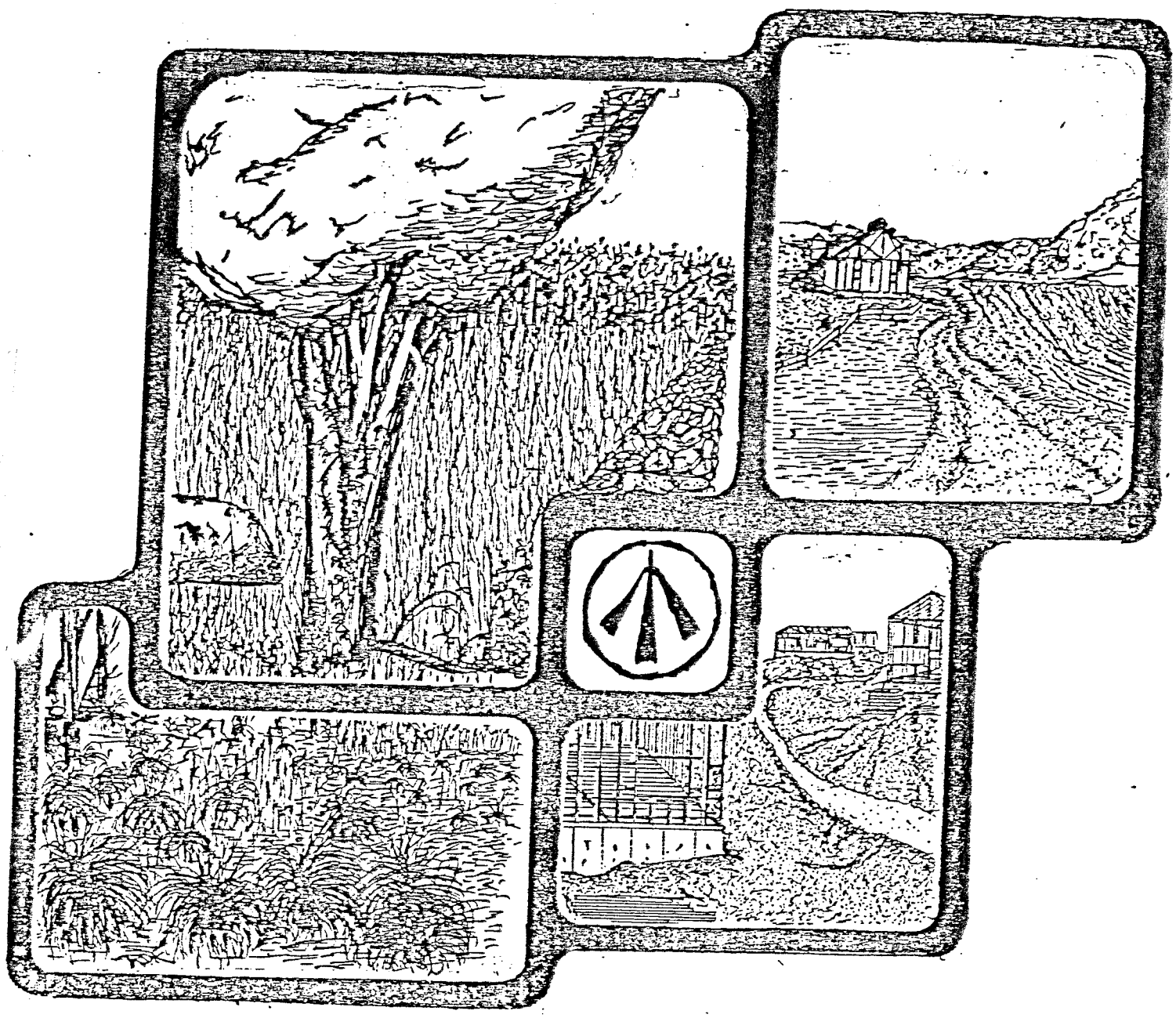
ENVIRONMENTAL REVIEW TEAM REPORT

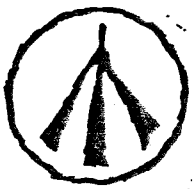


WINCHESTER LAKE SUBDIVISION
NORFOLK AND WINCHESTER

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

WINCHESTER LAKE SUBDIVISION
NORFOLK AND WINCHESTER
JUNE 1984



King's Mark Resource Conservation and Development Area
Environmental Review Team
Sackett Hill Road
Warren, Connecticut 06754

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The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies
U.S.D.A. Soil Conservation Service

State Agencies
Department of Environmental Protection
Department of Health
University of Connecticut Cooperative Extension Service
Department of Transportation

Local Groups and Agencies
Litchfield County Soil and Water Conservation District
New Haven County Soil and Water Conservation District
Hartford County Soil and Water Conservation District
Fairfield County Soil and Water Conservation District
Northwestern Connecticut Regional Planning Agency
Valley Regional Planning Agency
Central Naugatuck Valley Regional Planning Agency
Housatonic Valley Council of Elected Officials
Southwestern Regional Planning Agency
Greater Bridgeport Regional Planning Agency
Regional Planning Agency of South Central Connecticut
Central Connecticut Regional Planning Agency
American Indian Archaeological Institute
Housatonic Valley Association

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Richard Lynn, ERT Coordinator
Jamie Whitman, ERT Cartographer
Jamie Whitman, Secretary

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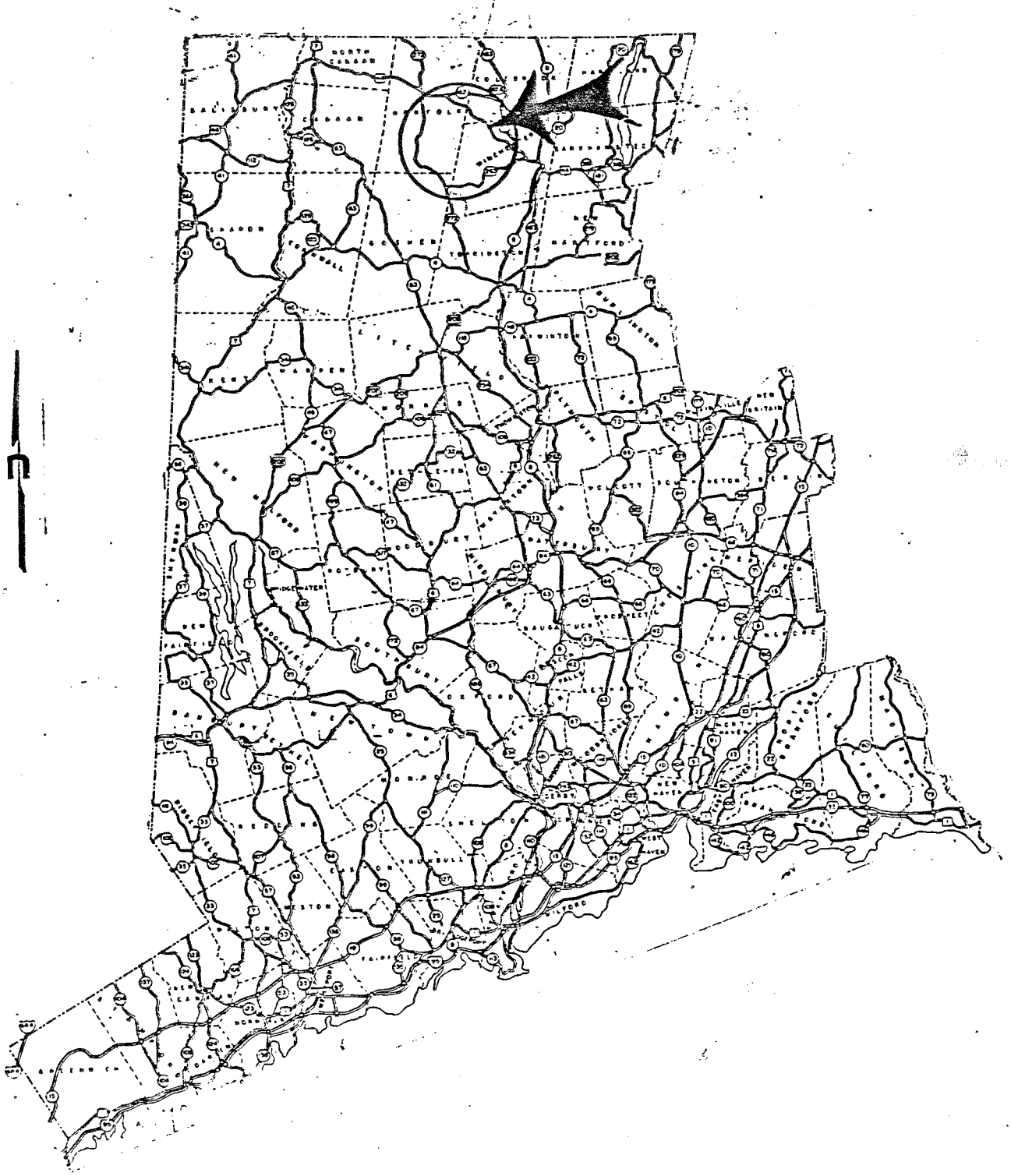

Scale 1" = 10 miles

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ENVIRONMENTAL REVIEW TEAM REPORT
ON
WINCHESTER LAKE SUBDIVISION
NORFOLK AND WINCHESTER, CT

I. INTRODUCTION

The Norfolk and Winchester Planning and Zoning Commissions are considering a proposed plan for subdivision of ± 600 acres to the north and west of Lake Winchester.

As shown in Figure 1, the subject site is located astride the Norfolk and Winchester town line. The site is mostly wooded and characterized by moderate to steep slopes. Access to the site is available off Winchester Road, which bisects the property, and off Yates Road, which abuts the eastern border of the site.

The proposed project is in the preliminary planning stages and calls for 101 single unit dwellings on-lots ranging in size from 4 to 8 acres (see Figure 2). All lots would be served by individual on site wells and septic systems. There is an estimated 5 miles of road to be constructed under the project which will involve at least two stream crossings.

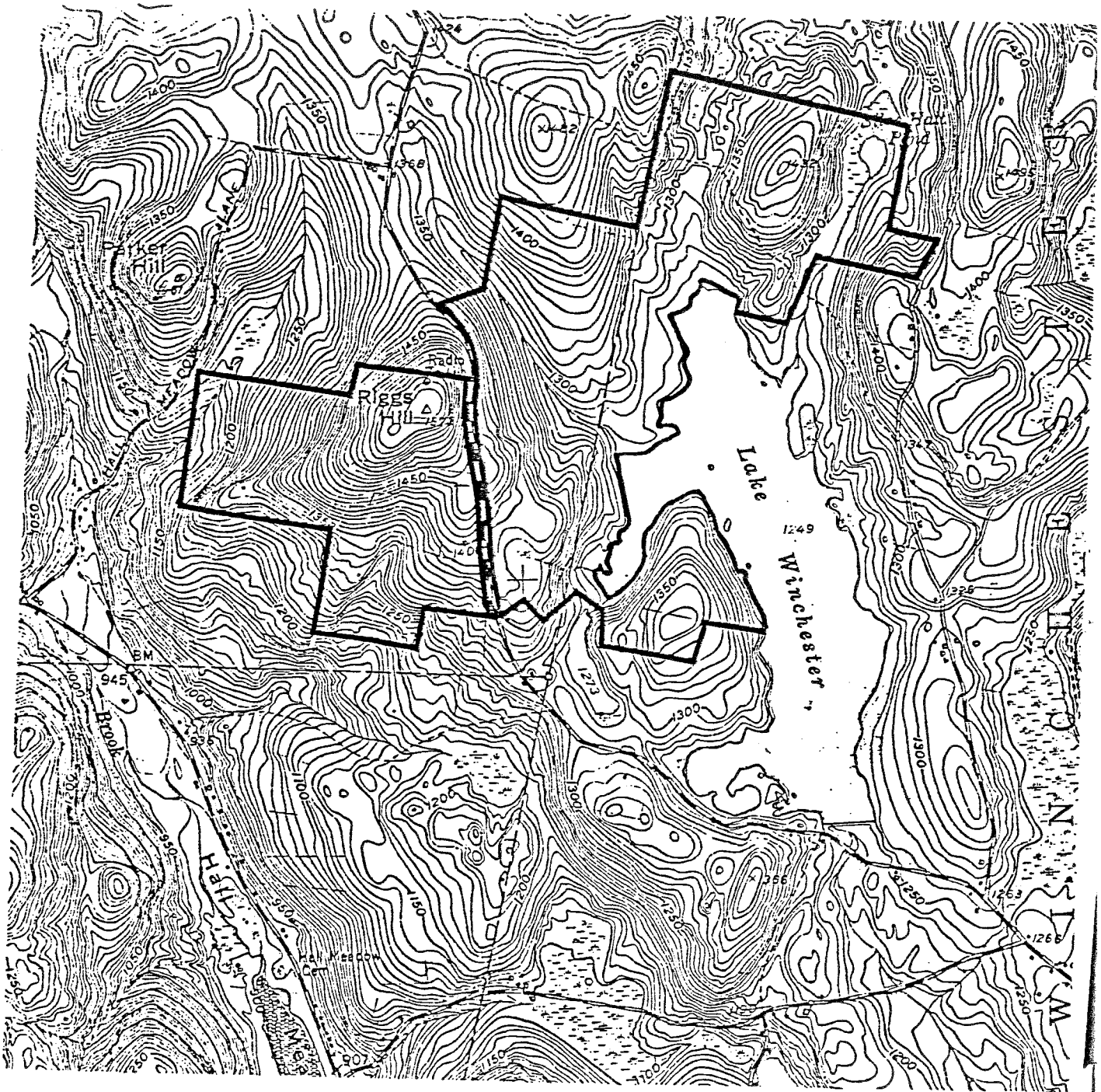
The Planning and Zoning Commissions from Norfolk and Winchester requested this ERT study to assist them in reviewing the proposed project. The ERT was requested to identify the natural resource base of the subject site and to discuss opportunities and limitations for the proposed project. Of particular concern to the Commissions is: 1) the environmental impact of the project on Lake Winchester; 2) the impact on stormwater drainage; 3) suitability of on-site soils for subsurface sewage disposal; 4) probability of adequate well yields; 5) traffic impact; 6) impact of project on fire, police, and other municipal services; and 7) erosion and sediment control.

The King's Mark Executive Committee considered Norfolk's and Winchester's request for an ERT study and approved the project for review by the Team.

The ERT met and field reviewed the site on April 25, 1984. Team members participating on this project included:

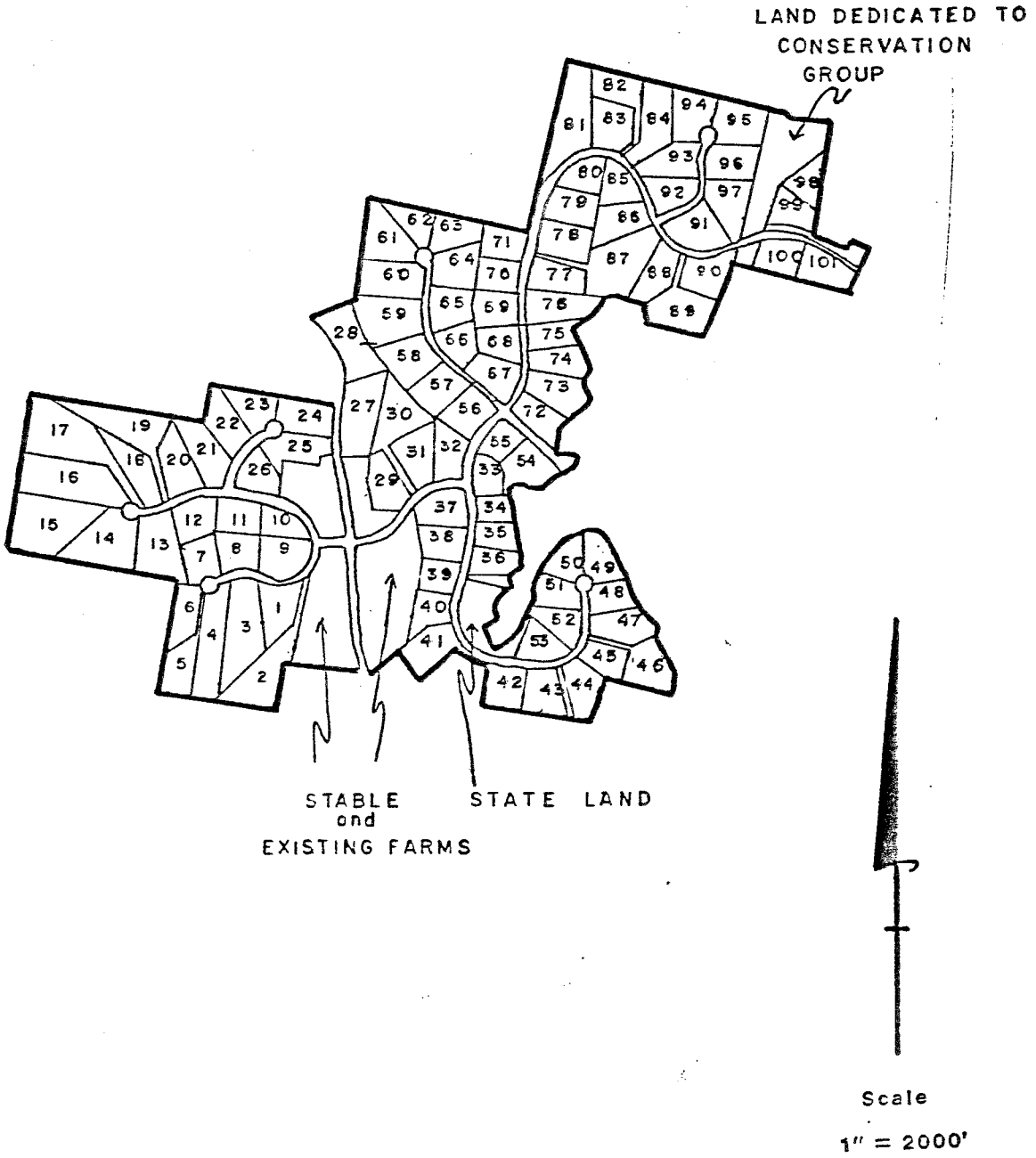
Art Cross	District Conservationist	U.S.D.A. Soil Conservation Service
William Hyatt	Fishery Biologist	CT Department of Environmental Protection
Larry Johnson	Planner	CT Office of Policy and Management
Paul Rothbart	Wildlife Biologist	CT Office of Policy and Management
Ralph Scarpino	Forester	CT Department of Environmental Protection

FIGURE 1
TOPOGRAPHIC MAP



Scale 1"=

FIGURE 2
SIMPLIFIED SITE PLAN



Frank Schaub.....Sanitary Engineer.....CT Department of Health

William Warzecha.....Geohydrologist.....CT Department of Environmental Protection

Prior to the review day, each team member was provided with a summary of the proposed project, a checklist of concerns to address, a topographic map, a soils map, and a soils limitation chart. During the ERT's field review, team members met with representatives from the Towns of Winchester and Norfolk and the landowner/developer and walked the property. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the Team's findings. The report identifies the natural resource base of the subject site and discusses opportunities and limitations for the proposed project. It is hoped the information contained in this report will assist the towns of Norfolk and Winchester and the landowner/developer in making environmentally sound decisions.

If any additional information is required, please contact Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, Sackett Hill Road, Warren, Connecticut, 06754.

* * * * * *

II. HIGHLIGHTS

1. *In terms of the proposed subdivision development, the main geological limitations found on the parcel include: (1) areas where bedrock is at or near the surface of the ground; (2) areas of moderate to steep slopes; (3) the compact nature of some of the till soils, which commonly results in elevated ground water tables, and (4) wetland soils. Due to the large lot sizes proposed, in many cases these limitations can be overcome through good site planning and design. (p. 12)*

2. *It appears that domestic wells would have to tap the underlying bedrock aquifer. Wells drilled in bedrock generally supply small but reliable yields of groundwater. A well yield of 3 gallons per minute is generally satisfactory for most domestic uses. Well completion data for seven wells tapping bedrock in the vicinity of the property showed the yields of wells ranged between 2.5 gallons per minute and 15 gallons per minute at depths varying from 120 feet to 220 feet. The natural quality of ground water should be satisfactory. (p. 13)*

3. *Development of the property as planned will lead to increases in the amount of surface runoff produced during periods of precipitation. This increase should not have a significant effect on peak flows in nearby streams. However, because much of the runoff from the site takes the form of sheet flow and because of the moderate to steep slopes on the site, this increase in runoff could have a significant impact on erosion and sedimentation. For this reason, it is recommended that a detailed erosion and sediment control plan be formulated and followed prior to any development. (p. 14)*

4. *The wetland soils, the bog, streams and the lakeshore are proposed to be protected by means of setbacks. If the Soil Conservation Service criteria is, in fact, to be used as indicated the day of the ERT's field review, the setbacks should be considered according to the SCS booklet "A Guide for Streambelts". The setbacks in this booklet are a minimum 150 feet back from the bank of perennial streams and lakeshores or from wetlands directly adjacent to the perennial streams or lakeshores. Actual setbacks, according to SCS criteria, will vary in distance depending upon soil types (e.g., drainage, slopes, bedrock, etc.). (p. 19)*

5. *A review of the soil classification information and preliminary lot layout indicates on-site sewage disposal should be feasible on a large percentage of proposed lots. It is reasonable to assume a leaching area approximately 100 foot square will be identified with little difficulty on most of the lots. The steep and moderate slopes promote rapid runoff of storm drainage and also facilitate installation of ground water control drains where conditions warrant. The more difficult lots are those located closest to the wetlands and Lake Winchester where the gradient flattens out causing a high ground water problem. Proposed lots 72 through 80 may fall within this category. In order to overcome site limitations, it may be necessary to shift houses closer to the proposed roads to take advantage of drainage improvements and provide sufficient gradient for footing drain and curtain drain discharge lines. (p. 20)*

6. *The discharge of approximately 300 to 500 gallons a day of domestic sewage from each of the proposed lots should not adversely affect water*

quality in nearby streams or the lake itself. It is more probable that fertilizers applied to individual lawn areas and road salt typically used during the winter months will impact water quality more than the combined effects of properly constructed septic systems. (p. 20)

7. *The forest resource on this site could be improved by the removal of cull trees in all of the wooded sections. All of the proposed lots will encompass at least some wooded land with the potential for providing firewood for house heating. With the large lots proposed (4-8 acres), it should be possible for homeowners to acquire a major portion of their annual firewood needs if so desired. A public service forester or private forester may be of assistance in developing a management plan for the individual lots. (p. 23)*

8. *The proposed subdivision plan indicates that Silas Hall Pond and a ± 150 foot buffer area will be dedicated to a conservation group. Due to the uniqueness of this natural area, this is an important attribute of the plan and will serve to help protect the area. With the Nature Conservancy owning the abutting land to the north, the Conservancy would seem to be a logical group to receive the dedication and manage the land. In the opinion of the Team's planner, however, consideration should be given to expanding the area proposed for dedication to ensure protection of the Silas Hall Pond area. In particular, the drainage area feeding this Pond would be desirable to protect. At a minimum, consideration should be given to including the steep slopes to the west of the Pond in the Conservation area and also lots 98 and 99. (p. 24)*

9. *The Winchester Lake Property may be divided into five major wildlife types. These include mixed hardwoods, conifers, wetlands, open water, and open land. The proposed project will negatively impact existing wildlife populations. However, the project can be expected to attract more urban adapted wildlife species to the property (i.e., robins, house sparrows, raccoons, skunks). As discussed in the text of this report, a number of measures can be implemented to minimize the adverse impact of the project on wildlife. (p. 24)*

10. *Winchester Lake is an artificially impounded body of water covering a surface area of 229 acres and having a maximum depth of 16 feet. The lake is inhabited by bluegill, brown bullhead, calico bass, pumpkinseed sunfish, golden shiner, chain pickerel, yellow perch and largemouth bass. In its present condition Winchester Lake provides excellent fishing for the skilled angler. Fish are plentiful throughout the abundance of stumps, trees, brush and other submerged vegetation and fishing among these obstructions is a challenge. If development of the Winchester Lake subdivision is to occur, it is important from a fisheries standpoint that 1) measures be taken to minimize any increase in the nutrients entering the lake, 2) the submerged stumps and trees be allowed to remain in the lake (as opposed to their being removed to increase boating opportunities), and 3) the shoreline brush and habitat be left undisturbed. (p. 27)*

11. *The long culde sacs proposed under this project are inconsistent with the town's requirements and represent a safety hazard. Consideration should be given to re-designing the interior road network to mitigate this concern. (p. 29)*

12. *If the project were to develop 5 trips per day per unit, 505 trips would be generated by the development, most of which would probably use Winchester Road. This should not exceed its capacity, although it will be a noticeable change from present conditions. (p. 30)*

III. TOPOGRAPHY AND GEOLOGY

Topographic relief of the tract is diverse and varies from gentle to steep slopes. The steepest slopes appear to be west of Winchester Road on Riggs Hill (lots 1-26) and in areas on the east side of Winchester Road in the central portions of the site (lots 27-32). Gentle slopes occur mainly in the north central parts of the property (lots 54-78). Nearly flat slopes are found mainly on the plateaus of bedrock-cored hills within the site. Minimum and maximum elevations on the site are 1,300 feet and 1,573 feet above mean sea level, respectively.

At least three perennial streams, all of which are unnamed, traverse the subject parcel. All but one of these watercourses are feeder streams to Winchester Lake. Nearly 11,000 feet of the eastern property line borders the high-water mark of Winchester Lake. Winchester Lake is an artificial impoundment (earthen and masonary dam construction), which has a surface area of ± 229 acres, a maximum depth of ± 16 feet and an average depth of 13 feet. The only surface water body found within the parcel is Silas Hall Pond, which has a surface area of ± 4 acres and which is located in the northeastern corner of the site (see Figure 1).

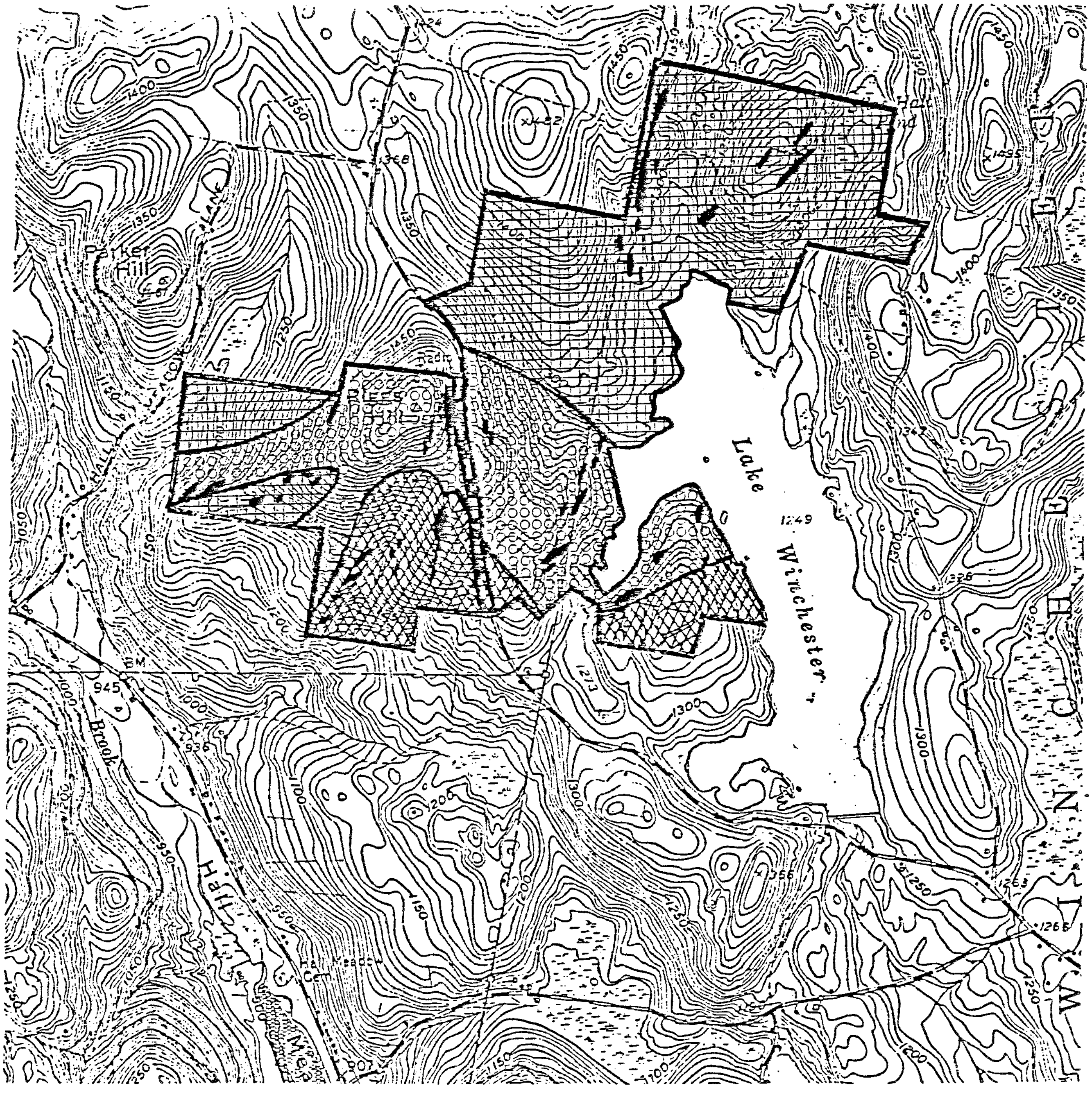
The parcel lies within the Norfolk topographic quadrangle. Bedrock and surficial geologic maps of the quadrangle have been published by the U.S. Geological Survey (respectively Map GQ-1518 by David S. Harwood and Map GQ-983 by Charles R. Warren). Numerous bedrock outcrops are visible on the property in the following areas:(1) west of Winchester Road on the slopes rising to Riggs Hill, (2) between Winchester Road and Winchester Lake in the southern parts of the site including the area comprising Lots 42-53, (3) just east of the Winchester-Norfolk town line in the northern limits of the property and (4) on the slopes of the hill which rises westward from Silas Hall Pond. Areas designated by HrE and HxC on the Soils Map (see Appendix) identify areas where bedrock is at or near ground level. The outcrops, as well as the bedrock underlying the site, consists of various types of gneisses which have undergone much deformation (folding and faulting).

Bedrock underlying or cropping out in the northern portion, as well as in some areas in the western limits of the site, consists of a fine-to-medium grained light and dark gray biotite-rich gneiss composed mainly of the minerals quartz, plagioclase, biotite, sphene, zircon, magnetite, and apatite (see Figure 3). Minor minerals in the rock include hornblende, microcline and monazite rimmed with epidote.

Bedrock underlying or cropping out in the central and southcentral parts of the site is comprised of a well layered, medium-to-coarse grained gneiss composed of the minerals hornblende, plagioclase, quartz, biotite, epidote, sphene, magnetite, apatite, zircon and locally garnet.

The third variety of gneiss rock underlying or cropping out on the site is a granitic gneiss. It is a pinkish-gray, medium-to-coarse grained granitic rock composed of nearly equal amounts of quartz, microcline, and sodic plagioclase with lesser amounts of biotite, muscovite, apatite, zircon and magnetite. The adjactive "granitic" mentioned above refers to rocks which have a granite composition (i.e., feldspar (orthoclase), quartz, muscovite and/or biotite minerals).

FIGURE 3
BEDROCK GEOLOGIC MAP



Legend

Biotite-Quartz-Plagioclase Gneiss

Hornblende-Biotite Gneiss

Granitic Gneiss

Rock Outcrops

Scal

1" = 20

See text for rock descriptions

"Gneisses" are metamorphic rocks (rocks altered by great heat and pressure deep within the earth's crust) in which thin bands of aligned elongate or flaky minerals alternate with layers of more rounded mineral grains.

The above mentioned rock types have been discussed for the purpose of thoroughness in the natural resources inventory. The differences of the three should have little if any influence on the proposed subdivision.

Gneisses, particularly the granitic gneiss variety, have been used as building stones and for other structural purposes.

The surficial geologic materials overlying bedrock throughout the property consist predominantly of till and swamp deposits (see Figure 4). Although map GQ-983 does not identify any stratified drift deposits (sand and gravel) on the site, the soil survey for Litchfield County does show a small area of ± 11 acres in the northern limits which is covered by stratified drift. These materials are delineated by the symbol My (Merrimac soils) on the accompanying soils map (see Appendix).

Till, which covers most of the site, consists of rock particles of varied shapes and sizes. These particles were deposited directly from glacier ice without being reworked by meltwater streams emanating from the glacier ice. In the first few feet, the till is often relatively sandy and friable, with moderate permeability. Stoniness is also characteristic of this zone. At depths between 3 to 5 feet and greater, the till commonly becomes silty, very compact, and only slightly permeable. Since groundwater tends to travel slowly through this compact zone, an elevated (peaked) groundwater table often results.

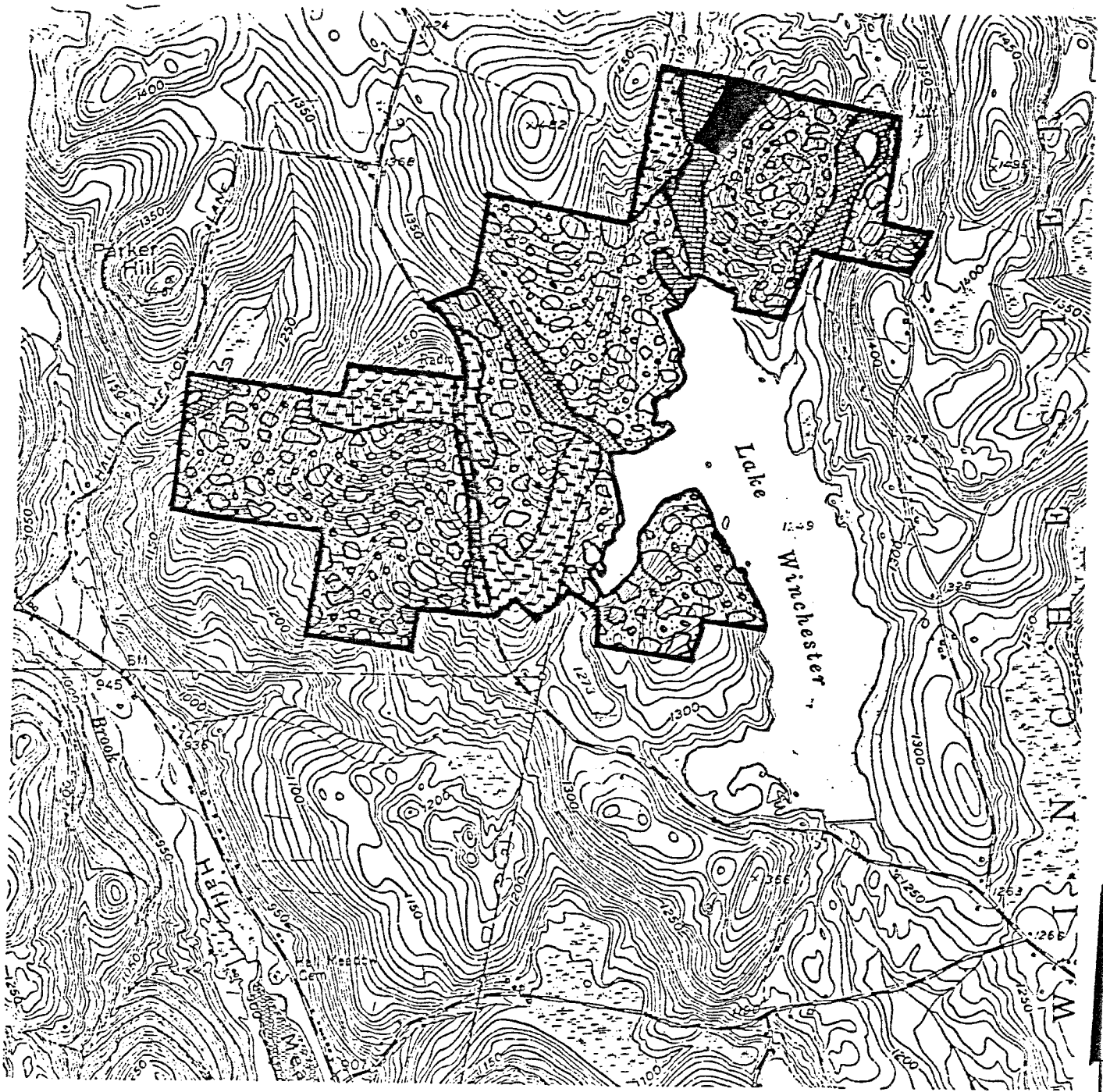
The thickness of the till is generally shallow throughout the site ranging between zero, where rock outcrops occur, to probably not much more than 10 feet at various points in between outcrops.

Overlying till, primarily along watercourses and intermittent drainage channels, in the west central and northern parts of the site are wetland (swampy) soils. They are designated by the symbol Lg (Leicester, Ridgebury and Whitman soils) on the accompanying soils map. Swamp sediments consist of poorly to very poorly drained mineral soils which are nearly level and very stony. These areas are typically seasonally wet.

The areas designated as Pk (Peat and Muck) on the soils map consist primarily of decayed organic matter which in places is interlayered with sand, silt and clay particles. These areas are found in the northern parts of the site around Silas Hall Pond and in a small portion in the western part. The ground water table is at or near the surface of the ground throughout most of the year in these soil areas. According to the preliminary site plans, a setback distance of 150 feet from wetlands surrounding Silas Hall Pond will be maintained by the developer. Development in areas covered by other regulated wetland soil types (e.g. Lg) should also be avoided if possible.

Overlying till and/or bedrock in the northern limits of the site is a surficial deposit referred to as stratified drift (see Figure 4). Stratified drift is composed of rock materials that were washed by meltwater streams from a mass of stagnant glacier ice. Because the materials were transported and deposited by water, they commonly are well-sorted by grain size and are

FIGURE 4
SURFICIAL GEOLOGIC MAP



Legend

- Till
- Stratified Drift
- Swamp Deposits and Seasonally Wet Areas
- Areas of Abundant Bedrock Outcrops

Scale

1" = 200

*Adapted from Soils Survey for Litchfield County

layered (stratified). Sand and gravel are the main components of stratified drift. The exact thickness of the stratified drift is not known, but it is probably not much more than 10 feet.

Geologic Development Concerns

In terms of the proposed subdivision development, the main geological limitations found on the parcel include: (1) areas where bedrock is at or near the surface of the ground; (2) areas of moderate to steep slopes; (3) the compact nature of some of the till soils, which commonly results in elevated ground water tables and which also makes excavation with hand tools difficult; (4) areas of seasonal wetness (delineated as Lg soils on the soils map); and (5) more permanently wet soil areas (designated by the sumbol Pk (Peat and Muck) on the Soils Map).

These geologic limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems serving homes constructed in the subdivision, since public sewers are not available. In many cases, proper planning and engineering can overcome some of these limitations. Because of the large lot sizes (4-8 acres) proposed, it seems likely that this would allow the applicant greater flexibility for finding a suitable area for a sewage disposal system than, for instance, would be possible with a one or two acre lot. However, if some of the geologic limitations mentioned above predominate on a particular lot, finding a suitable area for the installation of a sewage disposal system may still be problematic.

Once septic systems are engineered and approved by the proper authorities (i.e., state, local or district health department), it is important that the systems be installed properly according to design specifications and also be properly maintained (e.g., pumped regularly (3-5 years) by the homeowner).

Interior roads or house foundations constructed in shallow bedrock areas (HxC or HcE on Soils Map) may require some blasting. In view of the moderate to steep slopes found in these areas and the chance of blasting, there is a potential for erosion and sedimentation. For this reason, it is recommended that a detailed erosion/sediment control plan be formulated and implemented prior to any development.

Based on the subdivision plan, it appears interior roads will cross some of the wetland areas within the parcel. Wetland crossings are generally feasible provided they are properly designed (e.g., culverts are properly sized and installed, 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. 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 any proposed road crossings through wetlands should first be submitted to the proper Town authorities and commissions for their review, comment and final approval prior to beginning any construction.

IV. WATER SUPPLY

Since there are no public water supply lines accessible to the parcel, it seems likely the proposed subdivision would be served by individual on-site

water supply wells. Due to the lack of a suitable stratified drift (sand and gravel) aquifer on-site, which, depending upon certain hydrogeologic characteristics of a particular area may produce a high yielding well, it appears wells would have to tap the underlying bedrock aquifer. Wells drilled in bedrock generally supply small but reliable yields of groundwater. However, since the yield of a given well depends upon the number and size of water bearing fractures that it intersects, and since the distribution of fractures in bedrock is irregular, there is no practical way, outside of expensive geophysical testing, of predicting the yield of a well drilled in a specific location. Because fractures in the rock generally occur within the first 100 to 150 feet of the surface, it has been shown that the probability of increasing the yield of a well decreases with depth below this level.

Each well should ideally be located on a relatively high portion of a 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 ground water movement. Of particular concern in some portions of the site are areas having shallow depths to bedrock and moderate to steep slopes. These adverse conditions can allow for the rapid movement and wide dispersal of sewage effluent through fractures in the bedrock without providing adequate filtration and renovation of the sewage effluent. As a result, there is a potential for wells, which may also derive their source of water from the same rock formation, to be subjected to septic effluent contamination.

In areas where a number of wells are drilled relatively close together, there is a chance of well interference (that is, the yield of one well detracting from the yield of another). As a result, it is advisable to space wells at least 250 to 300 feet apart if possible to minimize the risks of mutual interference. Due to the large lot sizes proposed, it seems likely the suggested separating distances could be maintained without too much difficulty.

In the lower Housatonic River basin, 294 wells tapping crystalline bedrock (i.e., gneisses, schists, etc.) were surveyed for Connecticut Water Resources Bulletin No. 19. Of these, approximately 77 percent yielded 3 gallons per minute or more, while 30 percent yielded 9 gallons per minute or more. A well yield of 3 gallons is generally satisfactory for most domestic uses.

The team's geohydrologist reviewed well completion data for seven wells tapping bedrock on Winchester Road, Hall Meadow Road and School House Road, all of which are in the vicinity of the property. It is presumed these wells tap a rock unit which is the same as, or at least similar to, the rock units underlying the site. These data showed the yields of wells ranged between 2.5 gallons per minute and 15 gallons per minute at depths varying from 120 feet to 220 feet.

The natural quality of ground water should be satisfactory. In some rock units, there may be sufficient amounts of iron and/or manganese minerals to lower the overall quality. If elevated iron and/or manganese levels are present in the water, it may be necessary to provide suitable treatment filters.

V. HYDROLOGY

As shown in Figure 5, most of the subject site east of Winchester Road drains into Winchester Lake. At the outlet point of Winchester Lake, the watershed drains an area of approximately 1,455 acres or about 2.8 square miles.

Most of the property west of Winchester Road lies in the watershed of Hall Meadow Brook. Surface runoff in the northwest portion drains mainly by sheet flow into an unnamed tributary of Hall Meadow Brook. The southwest part of the parcel drains southerly by sheet flow until intercepted by intermittent drainage channels and/or perennial streams en route to Hall Meadow Brook.

As shown in Figure 5, a small 35 acre portion of the property in the northern limits of the site drains northerly into a wetland, which forms the headwaters for an unnamed feeder stream. This stream ultimately drains into Grant Swamp, north of the site. Surface runoff throughout the property is controlled by the underlying bedrock.

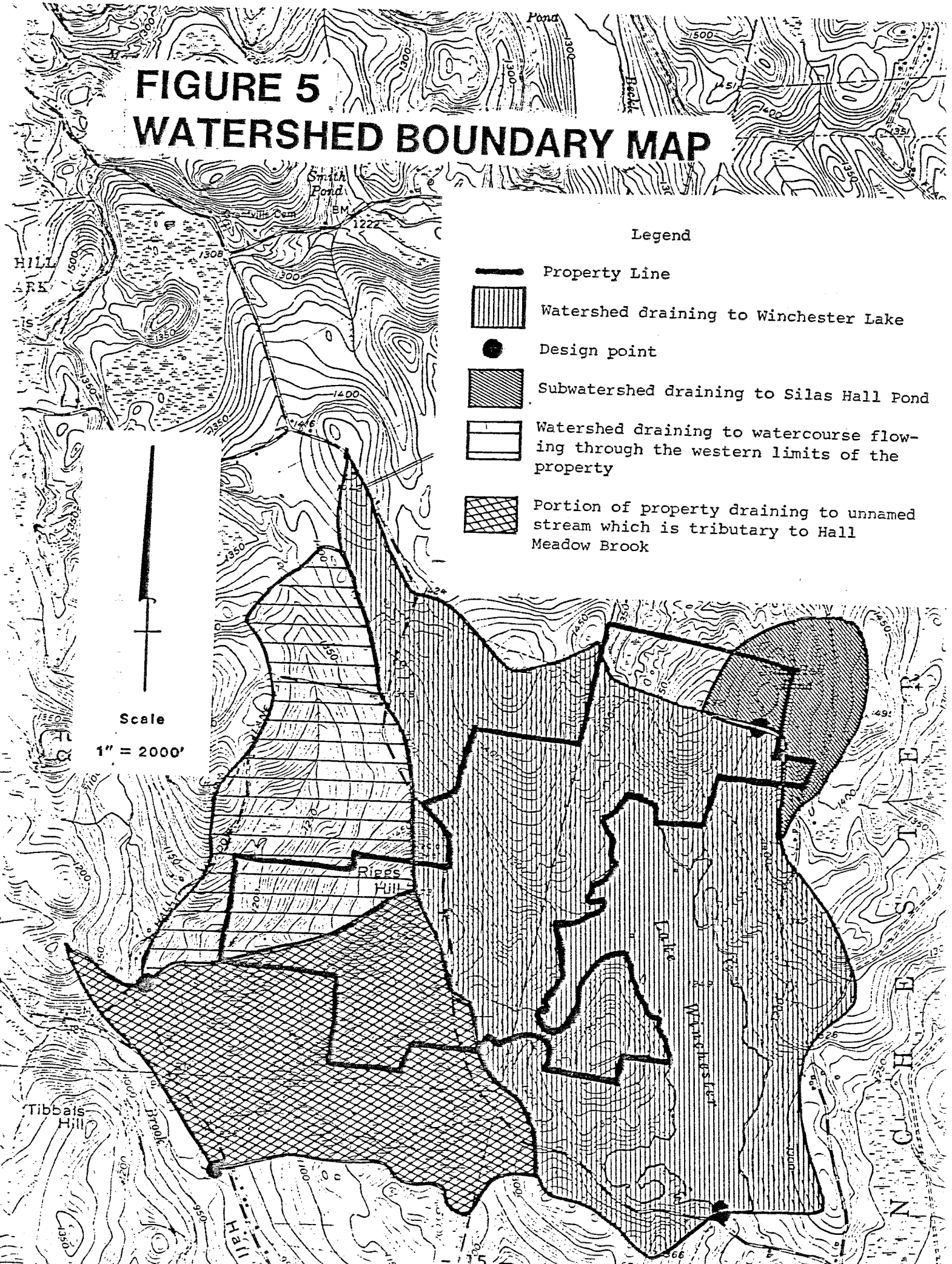
Development of the property as planned will lead to increases in the amount of surface runoff produced during periods of precipitation. These increases will arise primarily from the conversion of pervious soils to impervious surfaces (such as roofs, paved roads and driveways), compaction of soils during the construction phase, and from the removal of vegetation.

Although the subdivision plan was not, by itself, sufficient to assess peak-flow-changes to watercourses as a result of post development conditions, an estimate may be made of the runoff change likely to occur on a typical six acre parcel, an average lot size for the proposed development. The method involves the determination of runoff curve numbers, which relate amount of precipitation to amount of runoff. A higher curve number indicates that a greater volume of runoff would occur following a given amount of rainfall. It should be pointed out that the actual rise in peak flow for a specific stream depends upon the lay out of artificial drainage channels, amount of paved road surface and other man-made features, as well as upon many more subtle topographic and geologic characteristics of the property.

Runoff estimates were made with the assumption all soils are in the "B" hydrologic class (soils having moderate infiltration rate when thoroughly wetted) and that approximately a quarter of an acre of impervious surfaces would be created on a typical lot.

Under these conditions, it is estimated development would increase the curve number on a six acre parcel, typical of the subdivision, by 2 (from 55 to 57). During a 25 year storm event, the runoff depth would increase from 1.23 inches to 1.37 inches, an increase of about 11%. This increase should not have a significant effect on peak flows in nearby streams. However, because much of the runoff from the site takes the form of sheet flow and because of the moderate to steep slopes on the site, this increase in runoff could have a significant impact on erosion and sedimentation. For this reason, it is recommended that a detailed erosion and sediment control plan be formulated and followed prior to any development. Also, as a matter of policy, a stormwater management plan for the pre- and post-development runoff from the site should be prepared by the applicant and included with the final

FIGURE 5
WATERSHED BOUNDARY MAP



subdivision proposal. Downstream culverts and/or flood prone areas should be considered in the preparation of this plan.

Flood Prone Areas

A map showing special flood hazard areas has been prepared by the Department of Housing and Urban Development (Federal Insurance Administration) for the town of Norfolk. Based on this map, no flood hazard areas have been identified on that portion of the subject site which lies in the town of Norfolk. Nevertheless, there may be swampy or topographical low depressions within this portion of the property that may be subject to wetness and perhaps some flooding during periods of particularly heavy rain.

A Flood Boundary and Floodway Map for the town of Winchester has also been prepared by the Department of Housing and Urban Development (Federal Insurance Administration). This study includes maps which identify areas throughout the town that are subject to flooding during the 100 and 500 year storms. A '100' year flood is a flood with a one chance in 100 or 1% chance that it will happen in any year. A '500' year flood would have a one chance in 500 or 0.2% chance of occurring in any given year. It should be pointed out that this does not mean a flood of the magnitude mentioned above will occur only once in a 100 or 500 year period. The probability of occurences remain the same each year regardless of what happened the year before.

According to the map, the '100' year flood boundary consists of a ± 30 foot band lying around Winchester Lake. There are no other areas identified within this part of the site which would be subject to flooding during the 100 or 500 year flood. However, as mentioned earlier, there may be swampy or topographically low-lying areas within the site that may be subject to wetness and perhaps flooding during periods of particularly heavy rain. One such area, observed the day of the ERT's field review, is located around Silas Hall Pond in the area identified as Pk on the soils map. Other areas which may be subject to limited flooding include those areas designated as Lg (Leicester, Whitman, and Ridgebury) on the soil map.

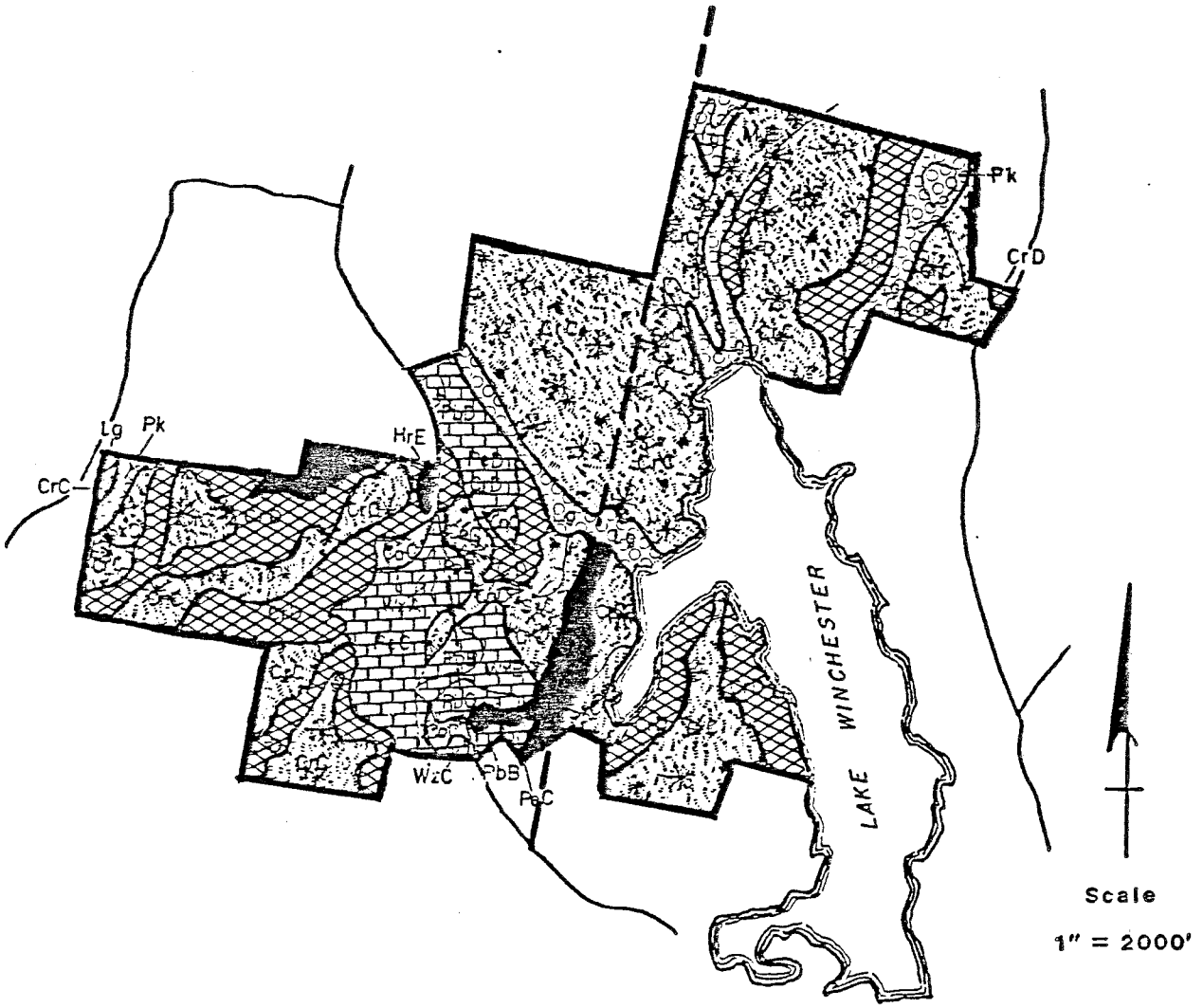
Some wetland areas, like the one designated Pk, perform important positive hydrological functions such as: (1) serving as a flood and stormwater retention area, which reduces downstream flood flows during periods of heavy precipitation; (2) improving surface water quality through various biochemical processes; and (3) trapping sediments from upstream areas. For these reasons, it is recommended that disturbance of wetland areas be avoided, if possible.

VI. SOILS

A soils map of the subject site is presented in the Appendix of this report together with a Soils Limitation Chart. The Soils Map identifies the geographic location of the various soil types which have been identified in this area. The Soils Limitation Chart identifies the major limiting factors with regard to alternate uses of the various soil types. By comparing the Soils Map with the Soils Limitation Chart, the general suitability of various soil areas for alternate land uses can be assessed.

Figure 6 summarizes the major soil characteristics of the site. A more detailed discussion of the various soil types is available in the Soil Survey of Litchfield County, available at the Litchfield County Conservation District (567-8288).

FIGURE 6
MAJOR SOIL CHARACTERISTICS



Legend

- Shallow to bedrock soils on moderate to steep slopes
- Inland wetland soils
- Deep soils on steep slopes (>15%)
- Deep soils on slight to moderate slopes
- Hardpan soils on moderate to steep slopes

The vast majority of the proposed homesites have been proposed on four major soil types. The suitability of each of these soil types for homesite construction is discussed below.

(1) Charlton very stony fine sandy loam on slopes of 3-15% (soil map symbol CrC). This soil comprises ± 232 acres and ± 39 percent of the proposed lots on the 600 acre site.

This soil is deep and well drained. Limitations for all urban uses are caused by slope and stoniness and are rated moderate. The severity of the limitation increases as slopes approach 15% and as the amount and size of stones increases. Care in selecting homesite location on individual lots can reduce the amount of earthmoving and stone removal needed for basements and drives.

For septic systems, management practices which can be used to overcome slope and stoniness soil limitations are: 1) land shaping and/or stone removal, 2) enlarging the leaching area, and 3) serial tile distribution. Construction of leaching fields should be avoided when the soil is wet so as to prevent soil smearing of leaching field trenches.

(2) ± 29 acres on the westside of Winchester Road south of Riggs Hill is mapped as Paxton very stony fine sandy loam on slopes of 3-15%. (Soil map symbol PeC). This soil, although well drained, has a slowly permeable hardpan at about 2 feet.

For septic systems, management practices which can be used to overcome soil limitations caused by the hardpan layer are: 1) percolation testing at the wettest time of the year, 2) use of interceptor drains over the hardpan, 3) use of large field, sand filter, or mound system, 4) land shaping and/or stone removal, 5) avoiding construction when wet to prevent soil smearing, and 6) use of serial tile distribution.

For homes with basements, footing drains can prevent water from entering the foundation walls.

For roads and drives, adequate drainage of road subgrade is needed to prevent frost heaving.

(3) Adjacent to the lake and the two perennial streams entering the lake, are 30 acres of soil areas mapped as Sutton very stony fine sandy loam on slopes of 3-15%. (Soil map symbol SxC). The Sutton soils have a seasonal high water table from late in fall to early in spring.

For septic systems, management practices which can be used to overcome soil limitations caused by the seasonal high water table are: 1) percolation testing at the wettest time of the year, 2) regional drainage, 3) enlarging the leaching area, 4) land shaping and/or stone removal, and 5) serial tile distribution.

(4) In the northernmost portion of the property, west of Silas Hall Pond, is located ± 15 acres of Merrimac sandy loam on slopes of 3-8%. (Soil map symbol MyB). This soil is somewhat excessively well drained and is underlain with layers of sand and gravel at a depth of about 2 feet.

For septic systems, this soil may have a severe limitation due to the poor filtering capacity of the underlying layers of sand and gravel. Pollution of wells may be a hazard. Therefore, the septic systems and wells should be located with greater separating distances than normally required.

The Merrimac soil is a good source of sand and gravel which may be suitable for road subgrades.

On the following soil areas, the conceptual plan generally indicates that no houses would be erected:

(1) + 157 acres or + 26 percent of the site consists of Charlton very stony fine sandy loam on slopes of 15-35%. (Soil map symbol CrD). Limitations are severe for all urban uses primarily because of the steepness of slopes.

(2) There are also + 18 acres of Paxton fine sandy loam, very stony and non-stony located on slopes of 15-35%. (Soil map symbols PbD, PeD). Although well drained, this soil has a slowly permeable hardpan layers at depths of about 2 feet. Limitations are severe for all urban uses due to slope and the slow permeability of the hardpan.

Any roads or drives should be constructed, as much as possible, on the contour or cross slope rather than up and down hill.

(3) + 25 acres mapped as Hollis very rocky soil, shallow to bedrock on slopes of 3-15% and 15-35%. (Soil map symbols HxC, HrE).

Even though no homes are proposed on these steep slopes and/or shallow to bedrock areas, some sections of roads and drives are proposed on slopes exceeding 10%. Alternate road locations with less steep grades, although desirable, could lead to more interior roads and more lots of smaller sizes than is currently proposed.

(4) Proposed stable area and pastures comprise + 32 acres of prime and important farmland soil areas. (Soil map symbols CaC, PbB, PbC, WxA and WxB). With average management, the acreage can support approximately 1 horse per 2 acres or + 16 horses. With good management, 1 horse per acre or + 32 horses. (Good management = liming and fertilizing pastures according to soil tests, pasture rotation, clipping of pastures, manure at 5-10 tons per acre), Overuse of the pastures can result in soil erosion and possibly undesirable nutrient enrichment of the lake from rainfall runoff.

(5) The wetland soils (i.e.,Soil map symbols Lg and Pk) and the bog, streams and the lakeshore are proposed to be protected by means of setbacks. If the Soil Conservation Service criteria is, in fact, to be used as indicated the day of the ERT's field review, the setbacks should be considered according to the SCS booklet "A Guide for Streambelts". The setbacks in this booklet are a minimum 150 feet back from the bank of perennial streams and lakeshores or from wetlands directly adjacent to the perennial streams or lakeshores. Actual setbacks, according to SCS criteria, will vary in distance depending upon soil types (e.g., drainage, slopes, bedrock, etc.).

The SCS booklet also lists compatible and non-compatible land uses within the setbacks which could be used in developing easements or deed restrictions, etc.

Erosion and Sediment Control

Erosion and sediment controls during construction will be very important so as to prevent sediment from reaching the lake.

The final plan should include the following if erosion and sedimentation is to be kept to a minimum.

1) Construction in phases of designated areas as currently proposed.
2) Land disturbance for roads and homes should be kept to a minimum (Minimum road cuts and fills via proper siting on least sloping areas).
3) Temporary controls within, and on edges of, disturbed areas such as: diversions; hay bale or fabric filter fences and checks in watercourses; timely seeding of temporary vegetative cover if bare soil areas are to be left without cover over winter; mulching.
4) Permanent vegetative cover specifications (liming, fertilizing, seed mixes, mulches.)

The SCS/Conservation District (567-8288) is available to review the E&S plan before approval of the project by the towns. In this regard, it should be noted that by July 1, 1985, the towns in Connecticut will be required by State law to adopt and start enforcing an E&S Control Ordinance on any subdivision disturbing 20,000 sq. ft. or more of land.

VII. ON-SITE SEWAGE DISPOSAL

A review of the soil classification information and preliminary lot layout indicates on-site sewage disposal should be feasible on a large percentage of proposed lots. It is reasonable to assume a leaching area approximately 100 foot square will be identified with little difficulty on most of the lots. The steep and moderate slopes promote rapid runoff of storm drainage and also facilitates installation of ground water control drains where conditions warrant. The more difficult lots are those located closest to the wetlands and Lake Winchester where the gradient flattens out causing a high ground water problem. Proposed lots 72 through 80 may fall within this category. In order to overcome site limitations, it may be necessary to shift houses closer to the proposed roads to take advantage of drainage improvements and provide sufficient gradient for footing drain and curtain drain discharge lines.

The discharge of approximately 300 to 500 gallons a day of domestic sewage from each of the proposed lots should not adversely affect water quality in nearby streams or the lake itself. The proposed density of this development allows for adequate dilution of nitrates and proper construction of individual subsurface sewage disposal systems should provide sufficient treatment for bacteria and virus. Phosphates should also be readily absorbed by the soil. It is more probable that fertilizers applied to individual lawn areas and road salt typically used during the winter months will impact water quality more than the combined effects of properly constructed septic systems.

Individual lot testing will provide local health agencies with the necessary information to determine suitability for leaching purposes. Prior to performing soil testing, the health agencies may require the road and property corners be flagged in order to accurately determine location in the field. If thorough testing of any proposed lot fails to identify a satisfactory leaching area and unsuitable conditions as identified in Section 19-13-B103e (a)(3.) exist, the lot should be combined with adjacent properties or otherwise removed. It is likely that many of the proposed lot lines will require some adjustment prior to forward submission to the Planning and Zoning Commissions. Due to the soil types, steep slopes, and ground water conditions, it is also probable that a high percentage of the proposed lots will require detailed plans prepared by a registered professional engineer.

VIII. VEGETATION

The vegetation for this area can be divided into 4 broad vegetation cover types. Each of these areas is described below under the heading "Vegetative Type Descriptions". In general, most of the property is forested. The exceptions are open fields along the Winchester/Norfolk Road and a swamp/bog type in the far northeastern corner of the property.

A good quantity of commercially valuable sawtimber has been removed from the property. Remaining trees are of common species and include hemlock, beech, red oak, white pine, black birch, red and sugar maple, ash and scattered hickory. Pole timber (trees 4-11 inches at breast height) and small sawtimber (trees 12-16 inches at breast height) dominate most of the parcel. Products remaining consist of sawlogs and fuelwood.

The large expanse of mixed vegetation on the property plays an important role in the aesthetics of the area and in the water storage capacity of the landscape. The forest also provides a rich renewable resource in the form of wood growth and a diversified wildlife habitat.

Vegetation Type Descriptions (see Figure 7)

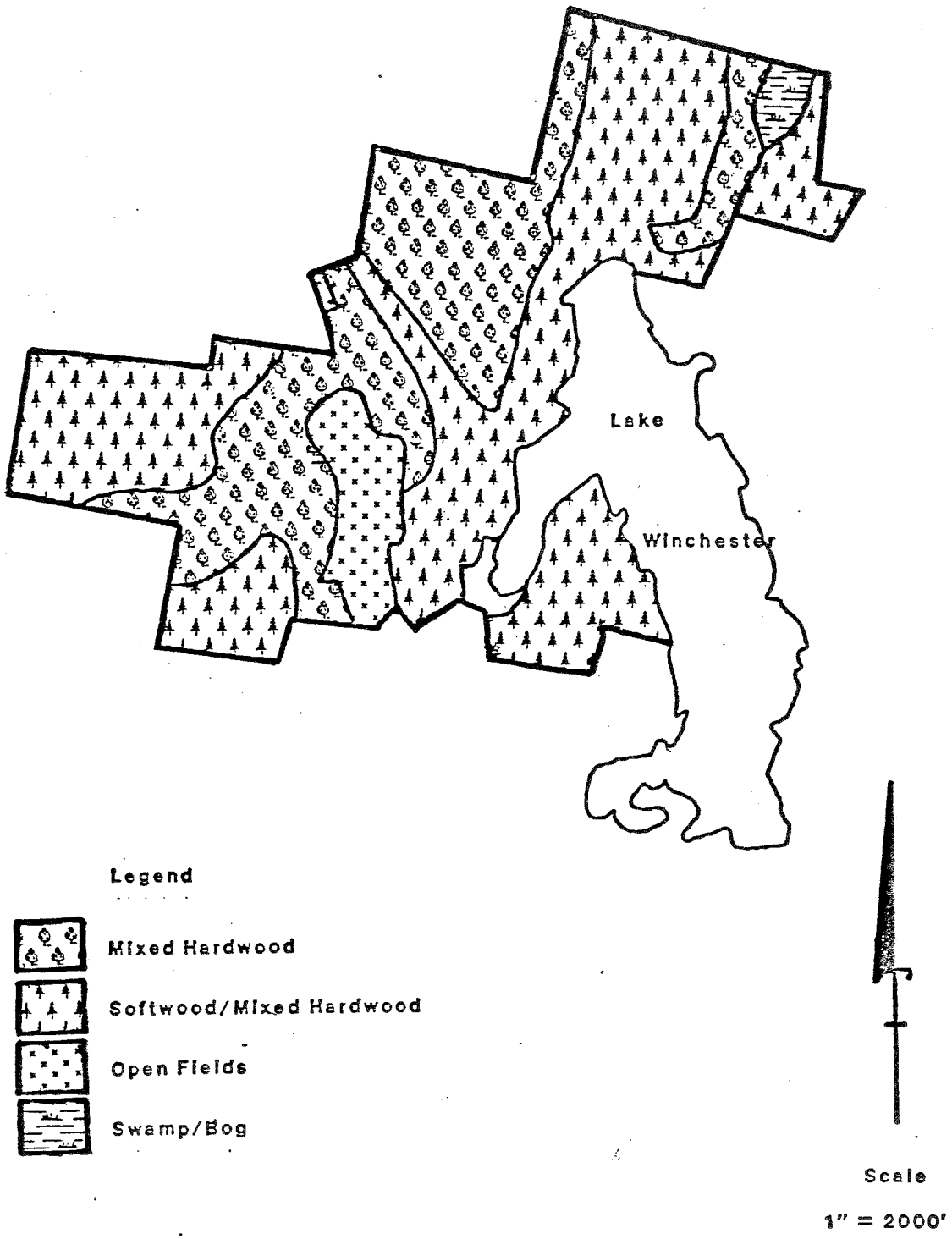
The following is a broad breakdown of vegetation cover types. These types relate pretty closely to either soil conditions, past management of the property, or a combination of both.

Type 1 - Mixed Hardwood - Most of the trees here consist of hardwood species including oak, hickory, beech, birch, ash, and maple. There are also scattered hemlock. Both sawtimber and poletimber are present. On the drier sites the tendency is to find beech, hickory, oak, and birch whereas the moister soils tend to contain a larger percentage of ash, black birch, sugar maple, and red oak. Quality of the stems for lumber production follows soil condition; the deeper, well drained soil tends to produce the better timber.

Type 2 - Softwood/Mixed Hardwood - These are areas where hemlock and white pine make up a large percentage of the stocking. These softwoods are mixed with the hardwoods mentioned above. Moister sites tend to be dominated by hemlock, whereas the drier sites contain a major white pine component.

Type 3 - Open Fields - These fields are presently being kept open for the production of hay crops.

FIGURE 7
VEGETATION TYPES



Type 4 - Swamp/Bog - This area surrounds the area known as Silas Hall Pond, and consists of scattered red maple and hemlock giving way to grasses, sedges and shrub growth close to the water's edge.. Hummucks exist next to the water.

Limiting Conditions and Potential Hazards

Several factors should be considered in the maintenance of a natural forest stand. Wetland types of soils will have a water table close to the surface of the ground. This allows for shallow root penetration of the trees. Windthrow is a potential hazard in these areas. Light thinnings in these areas may help to improve the tree stability, however, openings and clearings in and along side wetland areas should be avoided if possible. Trees growing in these soils as a whole are more sensitive to disturbance than trees growing in other areas.

Alterations in the wetlands which permanently raise or lower the water table may have a negative impact on the vegetation in the immediate area. Raising the water table may drown root systems causing widespread mortality in the plant community. Lowering the water table, on the other hand, may result in conditions too droughty for the present vegetation species. These types of situations may occur when crossing wet areas with roadways, driveways, etc.

Management Considerations

The forest resource on this site could be improved by the removal of cull trees in all of the wooded sections. These cull trees take up valuable growing space and are in competition with the better growing stock. If a cull harvest is initiated, some of the cull trees should be retained in each area as valuable wildlife trees.

Any cutting which takes place in the development of this parcel should be done to take advantage of the high demand for all wood products. Firewood would probably be the largest by-product of any construction and is highly sought after. The marketing of this product should be a concern and should be planned for.

A public service forester or private forester may be of assistance in either on-the-ground planning or the marketing of the wood products.

Subdivision of the property as planned will clearly complicate the comprehensive forest management potential of the site. With a subdivision of ownership comes various opinions as to the importance of forest management. Also, as smaller parcels of land are created from larger blocks, the opportunities for forest management will diminish: larger blocks of land simply offer more alternatives for economical management of timber resources than smaller blocks.

All of the proposed lots will encompass at least some wooded land with the potential for providing firewood for house heating. With the large lots proposed (4-8 acres), it should be possible for homeowners to acquire a major portion of their annual firewood needs if so desired. Here again, a public service forester or private forester may be of assistance in developing a management plan for the individual lots.

Silas Hall Pond

Located in the northeastern corner of this property is Silas Hall Pond, a ± 4 acre pond worthy of special consideration as a natural area. An extensive file has been prepared on this area by the Nature Conservancy, which owns 94 acres of land just north of the subject site in the Silas Hall Pond area. In this regard, it should be noted that the boundary line between the subject site and the Nature Conservancy's holdings in this area is being disputed. Records at the Nature Conservancy indicate that the Conservancy owns ± 1/2 of Silas Hall Pond; this is not reflected in the preliminary site plan submitted by the applicant.

The Silas Hall Pond area is a unique natural area. It may be described as a bog-pond-upland forest complex affected by beaver action.

The upland forest is a maturing second growth hemlock-hardwood forest (beech, red maple, sugar maple, black birch, yellow birch, paper birch, black cherry) with mountain laurel, arrowwood, striped maple, wild sasparilla, Canada mayflower, whorled wood aster, goldthread, royal fern and hayscented fern. The bog mat is mainly sedge, sphagnum moss, leatherleaf, marsh St. Johnswort and sweet pepperbush with some high bush blueberry. There is arrowhead, water lily and arrow arum growing along the edges of the open water. Several beaver were observed in the Pond the day of the ERT's field review.

The proposed subdivision plan indicates that Silas Hall Pond and a ± 150 foot buffer area will be dedicated to a conservation group. Due to the uniqueness of this natural area, this is an important attribute of the plan and will serve to help protect the area. With the Nature Conservancy owning the abutting land to the north, the Conservancy would seem to be a logical group to receive the dedication and manage the land.

In the opinion of the Team's planner, consideration should be given to expanding the area proposed for dedication to ensure protection of the Silas Hall Pond area. In particular, the drainage area feeding this Pond would be desirable to protect. As shown in Figure 5, about 35 acres of this site drains to Silas Hall Pond. Ideally, all of this land would be desirable to protect in order to preserve views from the Pond and also the water quality entering the Pond. At a minimum, consideration should be given to including the steep slopes to the west of the Pond in the Conservation area and also lots 98 and 99.

IX. WILDLIFE

The Winchester Lake Property may be divided into five major wildlife habitat types. These include mixed hardwoods, conifers, wetlands, open water, and open land.

Mixed Hardwoods

This habitat type is dominated by a beech-maple composition with birch, oak, and ash present. Scattered pockets of hemlock and white pine occur. Understory vegetation is diverse with blueberry, blackberry, grape, grasses, and numerous herbaceous species present.

The area has been cut over several times and generally is a mid-aged stand.

Wildlife typically utilizing such habitat are deer, turkey, rabbits, squirrel, fox, raccoon, and numerous non-game species.

Conifers

This habitat type is dominated by hemlock along with several small scattered pockets of white pine. Hemlock are often associated with the perennial streams traversing the property.

The hemlock understory consists of club moss, mountain laurel, grasses, and various herbaceous species. The pockets of white pine have open understories.

Wildlife utilizing this type include ruffed grouse, woodpeckers, deer, raccoon, and numerous non-game species.

Wetlands

The wetland habitat consists primarily of seasonally flooded hardwood forest. There are also sections of hemlock associated with this type. There are four perennial streams located on the site, two of which are associated with wetlands.

The hardwood type is dominated by birch, ash, and red maple. The understory is diverse with skunk cabbage, spicebush, sweet pepperbush, blueberry, sphagnum moss, ferns and grasses being abundant.

Wildlife frequenting such sites include woodcock, woodpeckers, raccoon, deer, songbirds, and numerous amphibians and reptiles.

Open Water

This type consists of Silas Hall Pond (± 4 acres) and Lake Winchester. The pond is located within the hardwood type and bordered by a variety of shrubs. Sedges, grasses, and various herbaceous species are abundant. Presently there is one active beaver colony located on the site.

Lake Winchester (±229 acres) does not fall within the proposed site boundary but does lie adjacent to a large portion of the property. The lake is a relatively shallow (8-15 feet) open body of water with many hardwood stumps present.

Wildlife utilizing such areas include various waterfowl, raccoon, deer, red-winged blackbirds, beaver, muskrat, amphibians and reptiles, and various other non-game species.

Open Land

This habitat type consists of numerous open fields that serve as pasture and/or hay fields.

SOILS LIMITATION CHART - WINCHESTER LAKE SUBDIVISION - WINCHESTER & NORFOLK, CT

Limitation/Ratings for:

MAP SYMBOL	SOIL NAME	SEPTIC SYSTEMS	HOMESITES W/ BASEMENTS	ROADS & DRIVEWAYS	LANDSCAPING
CaC	Charlton fine sandy loam, 8-15% slopes	Moderate: smears, slope	Slight-Moderate: slope	Slight-Moderate: slope	Slight-Moderate: slope
CrC	Charlton very stony fine sandy loam, 3-15% slopes	Moderate: smears, slope	Moderate: large stones, slope	Slight-Moderate slope	Moderate: large stones
CrD	Charlton very stony fine sandy loam, 15-35% slopes	Severe: slope, smears	Severe: slope	Severe: slope	Severe: slope
HxC	Hollis extremely rocky fine sandy loam, 3-15% slopes	Severe: depth to rock, smears, slope	Severe depth to rock, large stones	Severe: depth to rock	Severe: depth to rock, large stones
HrE	Hollis very rocky fine sandy loam, 15-35% slopes	Severe: depth to rock smears, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope
Lg	Leicester, Ridgebury, & Whitman very stony fine sandy loams	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
MyB	Merrimac sandy loam, 3-8% slopes	Severe: poor filter	Slight	Slight	Slight
PbB	Paxton fine sandy loam, 3-8% slopes	Severe: percs slowly, smears	Moderate: wetness	Moderate: frost action	Moderate: small stones

SOILS LIMITATION CHART - WINCHESTER LAKE SUBDIVISION - WINCHESTER & NORFOLK, CT

Limitation/Ratings for:

AP YMBOL	SOIL NAME	SEPTIC SYSTEMS	HOMESITES W/ BASEMENTS	ROADS & DRIVEWAYS	LANDSCAPING
aC	Charlton fine sandy loam, 8-15% slopes	Moderate: smears, slope	Slight-Moderate: slope	Slight-Moderate: slope	Slight-Moderate: slope
rC	Charlton very stony fine sandy loam, 3-15% slopes	Moderate: smears, slope	Moderate: large stones, slope	Slight-Moderate slope	Moderate: large stones
rD	Charlton very stony fine sandy loam, 15-35% slopes	Severe: slope, smears	Severe: slope	Severe: slope	Severe: slope
xC	Hollis extremely rocky fine sandy loam, 3-15% slopes	Severe: depth to rock, smears, slope	Severe depth to rock, large stones	Severe: depth to rock	Severe: depth to rock, large stones
rE	Hollis very rocky fine sandy loam, 15-35% slopes	Severe: depth to rock smears, slope	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock, slope
g	Leicester, Ridgebury, & Whitman very stony fine sandy loams	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
yB	Merrimac sandy loam, 3-8% slopes	Severe: poor filter	Slight	Slight	Slight
bB	Paxton fine sandy loam, 3-8% slopes	Severe: percs slowly, smears	Moderate: wetness	Moderate: frost action	Moderate: small stones

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, recreation specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - a 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

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 the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

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 an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer 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 King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.