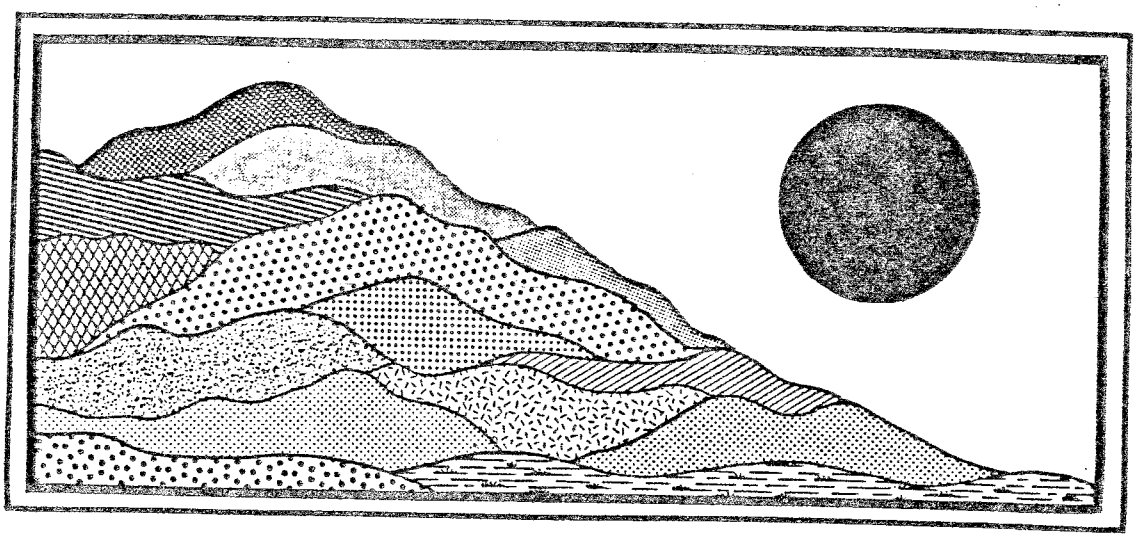
DEER LAKE SUBDIVISION

KILLINGWORTH, CONNECTICUT

JULY 1987



ENVIRONMENTAL REVIEW TEAM REPORT

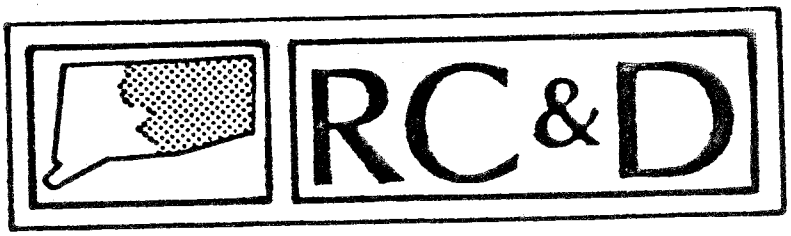
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

DEER LAKE SUBDIVISION

KILLINGWORTH, CONNECTICUT

Review Date: JUNE 2, 1987

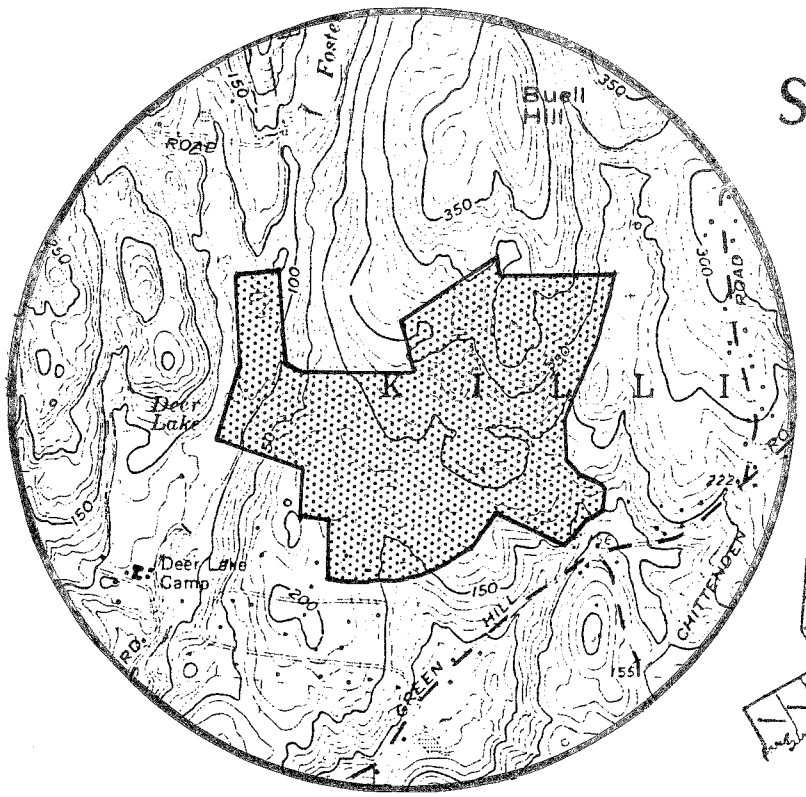
Report Date: JULY 1987

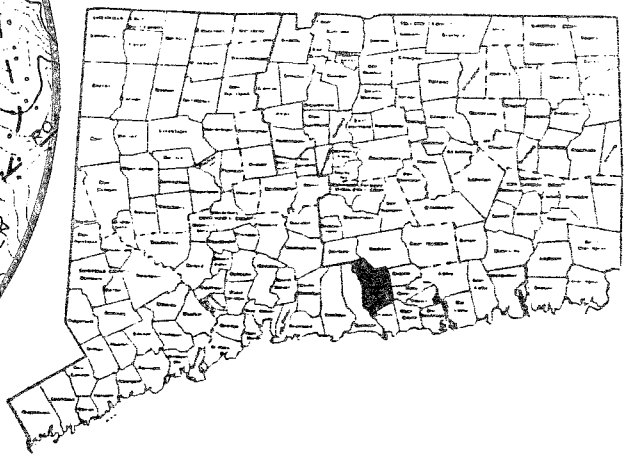


ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

Site Location

DEER LAKE SUBDIVISION
KILLINGWORTH, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

DEER LAKE SUBDIVISION

KILLINGWORTH, CONNECTICUT

This report is an outgrowth of a request from the Killingworth Planning and Zoning 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. The request was approved and the measure reviewed by the Eastern Connecticut Environment Review Team (ERT).

The ERT met and field checked the site on Tuesday, June 2, 1987. Team members participating on this review included:

Emery Gluck	--Forester DEP, Cockaponset Forest
Pat Leavenworth	--District Conservationist U.S.D.A., Soil Conservation Service
Brian Murphy	--Fisheries Biologist DEP, Eastern District Headquarters
Winifred Olson	--Planner CT River Estuary Regional Planning Agency
Elaine Sych	--ERT Coordinator Eastern CT RC&D Area
Bill Warzecha	--Geologist DEP, Natural Resources Center

Prior to the review day, each team member received a summary of the proposed project, a list of the Town's concerns, a location map, a topographic map and a soils map. During the field review the team members were given subdivision plans and additional information such as drainage analysis. The Team met with, and were accompanied by the developer, his engineer and soil scientist. Following the review, reports from each team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project -- all final decisions and conclusions rest with

the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

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

If you require any additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 198
Brooklyn, CT 06234
(203) 774-1253

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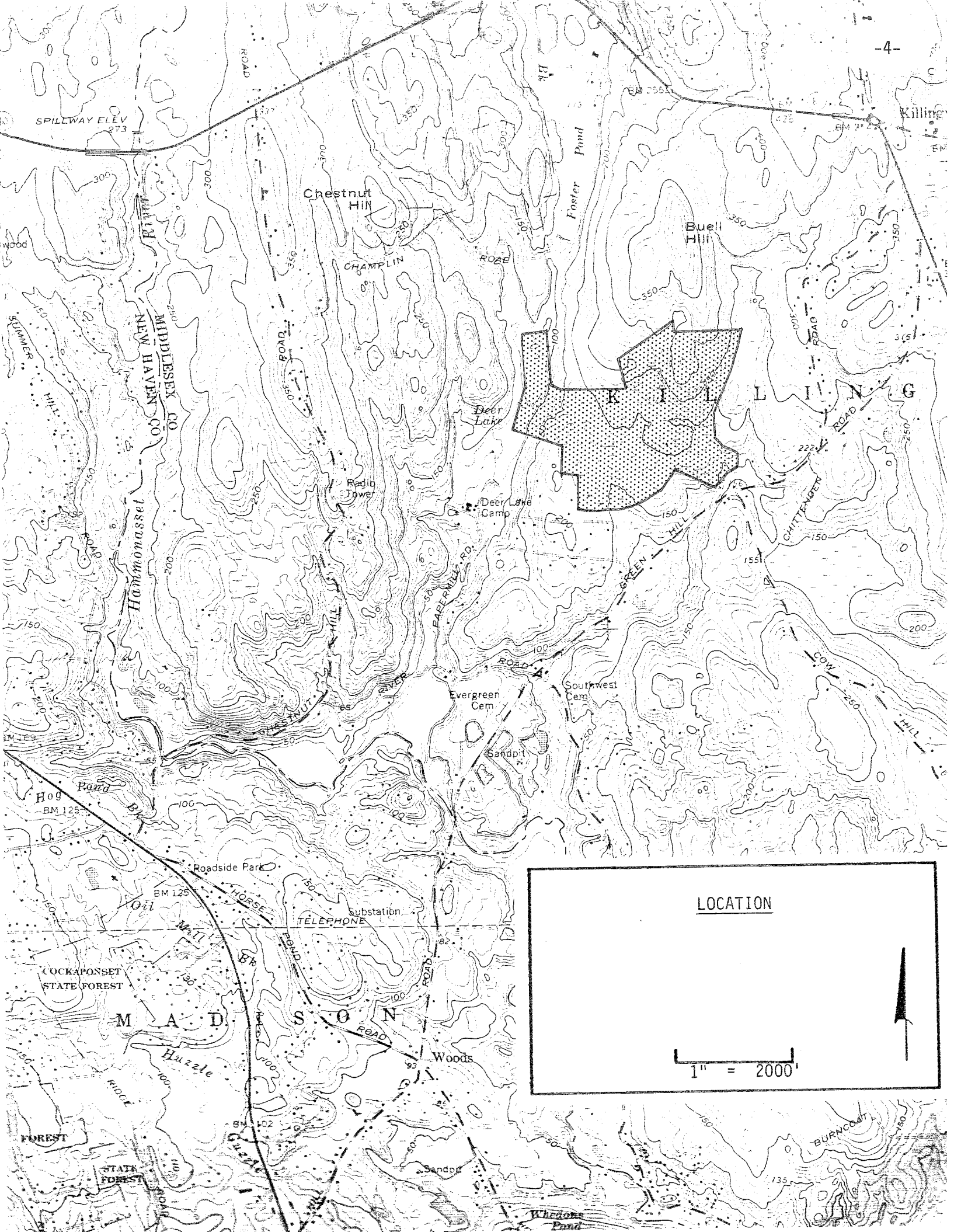

SPILLWAY ELEV 273
Chestnut Hill
Foster Pond
Buell Hill
CHAMPLIN ROAD
Deer Lake
K I L L I N G
Radio Tower
Deer Lake Camp
CHITTENDEN HILL ROAD
GREEN HILL ROAD
FARRELL RD.
Hammonasset
NEW HAVEN CO
MIDDLESEX CO
SUMMER HILL ROAD
CHESTNUT HILL ROAD
RIVER ROAD
Evergreen Cem
Southwest Cem
Sandpit
COW HILL
Hog Pond
BM 125
Roadside Park
Oil
Substation
TELEPHONE
HORSE POND ROAD
COCKAPONSET STATE FOREST
M A D I S O N
Woods
Huzzle Ridge
FOREST
STATE FOREST
Sandpit
Whedons Pond
BURNCOAT
LOCATION
1" = 2000'

1. INTRODUCTION

The Eastern Connecticut Environmental Review Team has been asked to review the proposed 50 lot Deer Lake Subdivision.

The Planning and Zoning Commission requested information and recommendations regarding the feasibility and impact of the septic systems, and especially the impact of this development on Deer Lake. Another area of special concern is the access to the subdivision and the impact of new traffic generated by the development.

The following sections 2-10 contain natural resource information, highlight areas of concern and includes recommendations to mitigate negative impacts.

2. TOPOGRAPHY AND SETTING

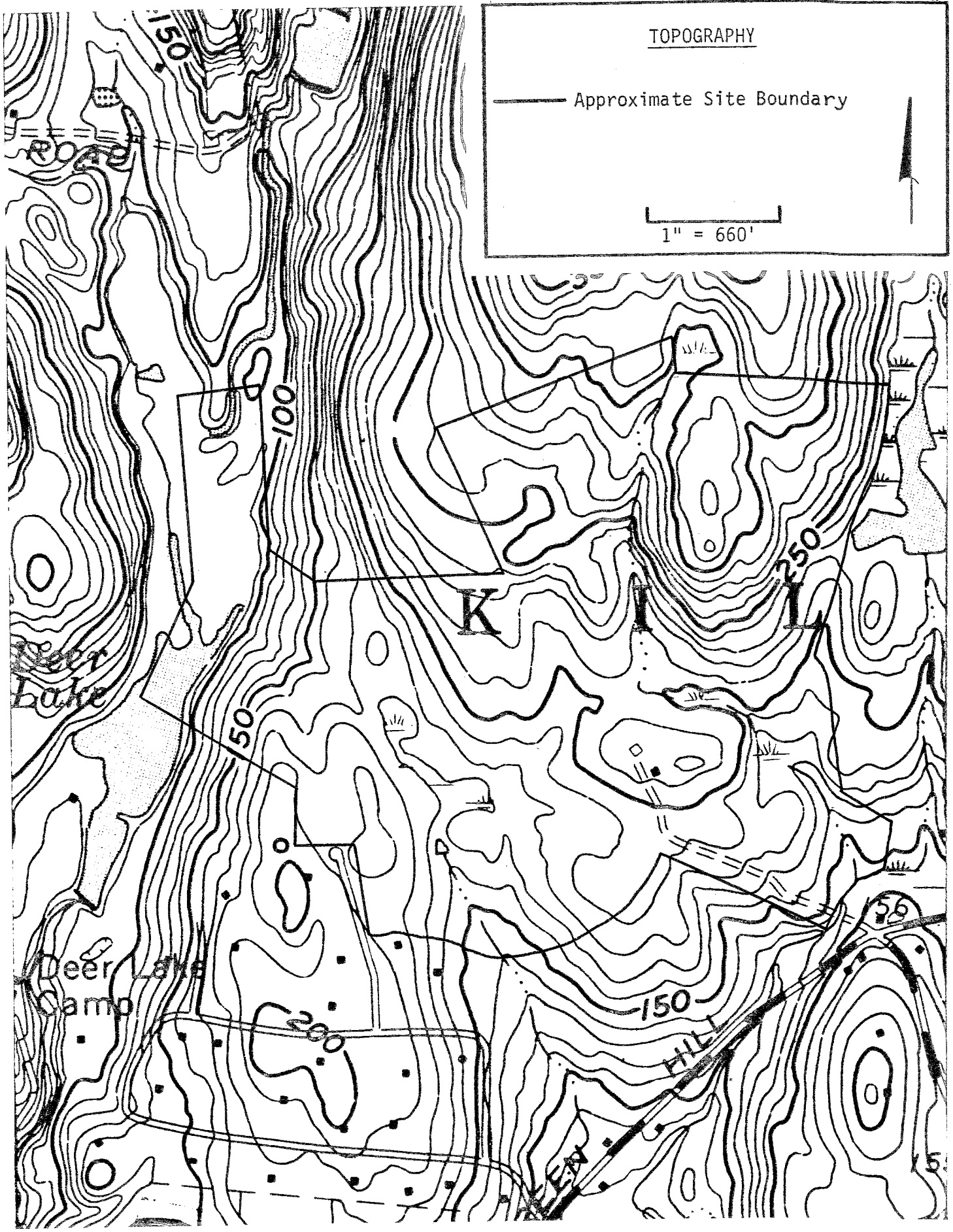
The proposed ± 170 acre Deer Lake subdivision is located southwest of Killingworth Center. It is presently accessed by Coughlin Road, an unimproved Town road.

The site contains slopes that range from gentle to steep. The steepest slopes on the site are in the northeast corner, where the bedrock surface controls the topography to a great extent. Bedrock is at or near ground surface throughout this area. There are also some shallow to bedrock soils along the steep west-facing slopes near Deer Lake. Gentle to moderate slopes characterize the remainder of the site, where unconsolidated materials are much thicker (perhaps 10 feet or more).

The on-site test hole work has demonstrated that the bedrock surface exceeded 6 to 8 feet in some parts of the site.

The site contains numerous seasonal drainageways that ultimately transport water to Hammonasset River. These drainageways generally flow in a southerly direction. The major streamcourse flows through the southeast corner under Coughlin Road. A few drainageways flow down the steep slopes at the western limits to Deer Lake.

The site is entirely wooded except for some small open areas around the existing farmhouse. Based on a 1934 air photo of the area, several large open fields surrounded the farmhouse.


TOPOGRAPHY
Approximate Site Boundary
1" = 660'
150
ROAD
100
K
I
L
250
Deer Lake
150
Deer Lake Camp
200
150
HILL

Also, numerous beautifully constructed stonewalls, which reflect the site's agricultural past, transect the parcel throughout. Every effort should be made to conserve and protect these stonewalls.

3. GEOLOGY

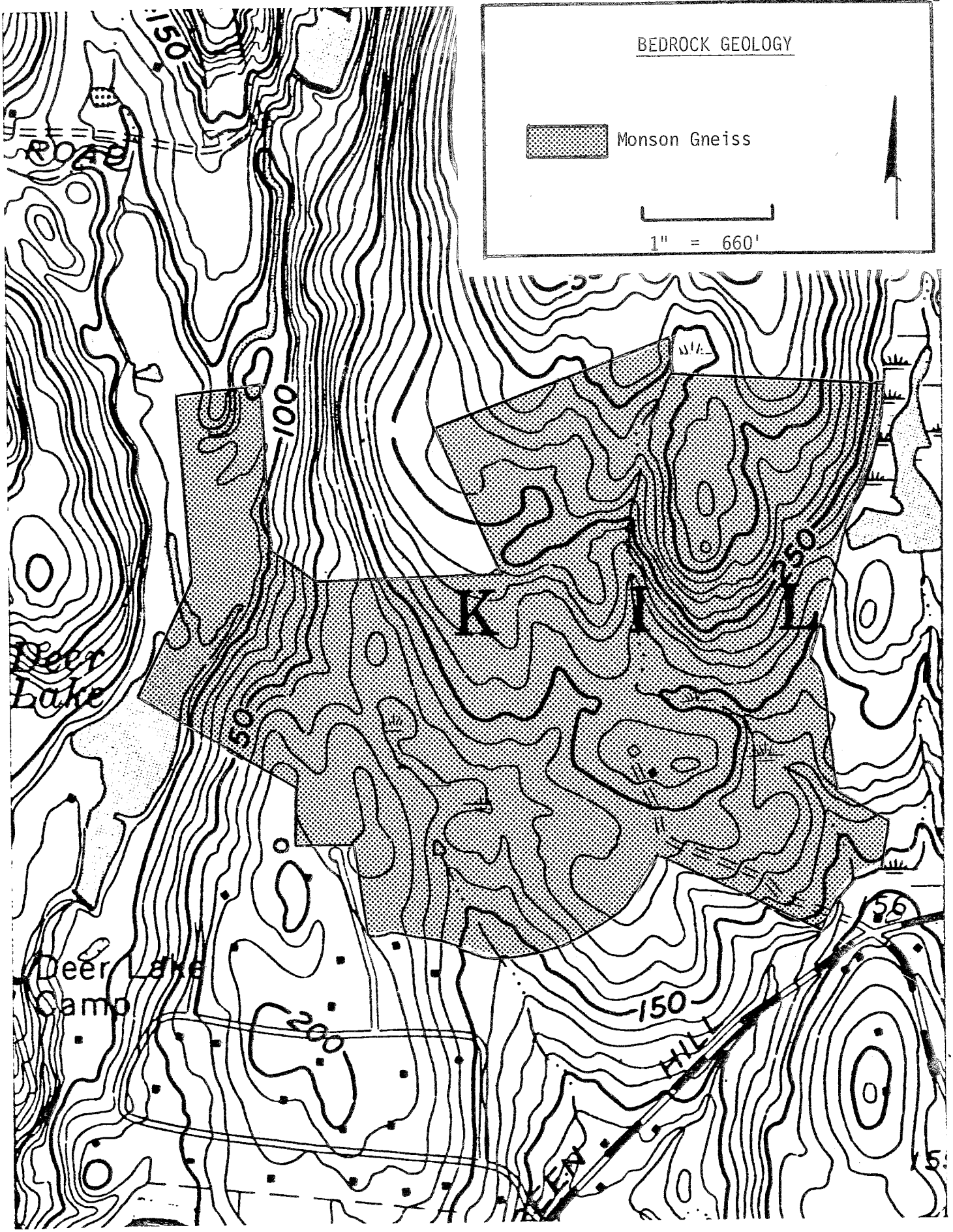
The site lies entirely within the Clinton topographic quadrangle. A bedrock geologic map QR-29, by L. Lundren, Jr. and R. F. Thurrel, 1969-70) and a surficial geologic map (QR-28 by R. F. Flint, 1968-69) for the quadrangle was published by the Connecticut Geological and Natural History Survey.

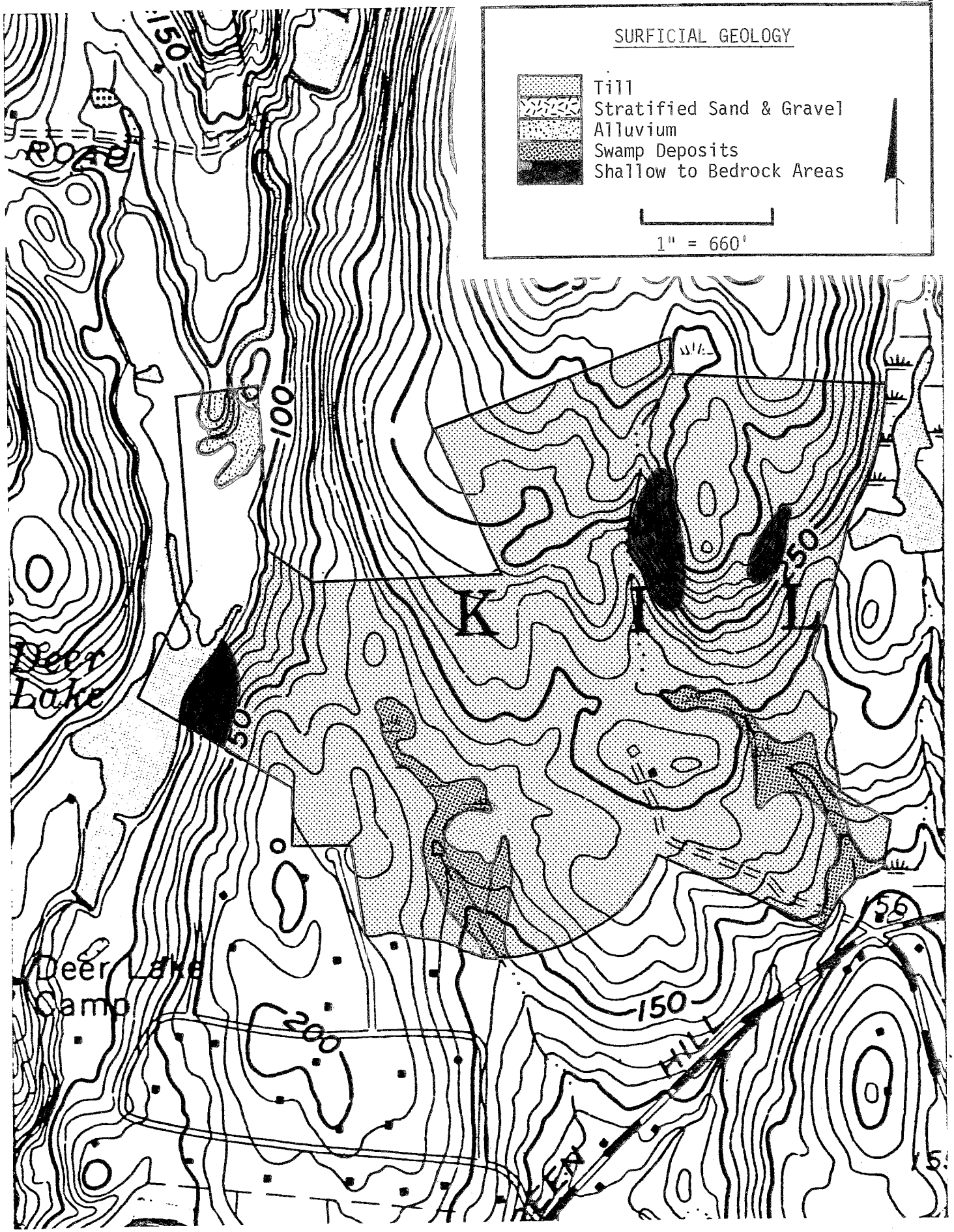
Bedrock is at or near ground surface mainly in the northeast corner of the parcel. It is also relatively close to the surface on the west-facing slopes near Deer Lake. Lundgren and Thurrel have identified the bedrock underlying the entire site as Monson Gneiss. The rock is described as light to dark gray gneiss comprised of the minerals quartz, plagioclase and biotite. There are also layers of black amphibolite in the rock.

The water supply for each lot of the proposed subdivision would be derived from drilled wells, cased with steel pipe firmly into the Monson Gneiss. As such, the bedrock will have at least some impact on the quantity and quality of water withdrawn from fractures and seams in the bedrock (See Water Supply section).

Except for a small area of stratified sand and gravel in the extreme northwest corner of the site, the bedrock surface is covered by a glacial sediment called till.

Till consists of rock particles of widely ranging sizes (from clay to large boulders), and shapes (from flat to angular to rounded). Most of this sediment was deposited by lodgement beneath the former ice sheet, but some may have been let down from within or from the surface of the ice as it was wasting during the period of glacial retreat. As a result of these different processes, the upper 2 to 3 feet of the till are commonly sandy and loose while the lower portion is silty to clayey, platey and compact. Where compact till is encountered, it is commonly called "hardpan". This material is very slowly permeable, so that an intense or extended rain may quickly saturate the upper soil levels. This typically results in a seasonally high water table. According to deep test hole information supplied by the project engineer, this condition (high water table) was found throughout most of the site. The sandy, loose variety of till was encountered mainly in the shallow to bedrock areas.


BEDROCK GEOLOGY
Monson Gneiss
1" = 660'
ROAD
150
100
50
250
K
I
L
Deer Lake
Deer Lake Camp
200
150
56
HILL


SURFICIAL GEOLOGY
Till
Stratified Sand & Gravel
Alluvium
Swamp Deposits
Shallow to Bedrock Areas
1" = 660'
ROAD
150
100
K
L
150
50
Deer Lake
Deer Lake Camp
200
150
TRAIL

The intermittent drainageways on the site are paralleled by regulated inland wetland soils. These post-glacial deposits are identified as LG (Leicester, Ridgebury and Whitman, extremely stony, fine, sandy loams) on the accompanying soils map.

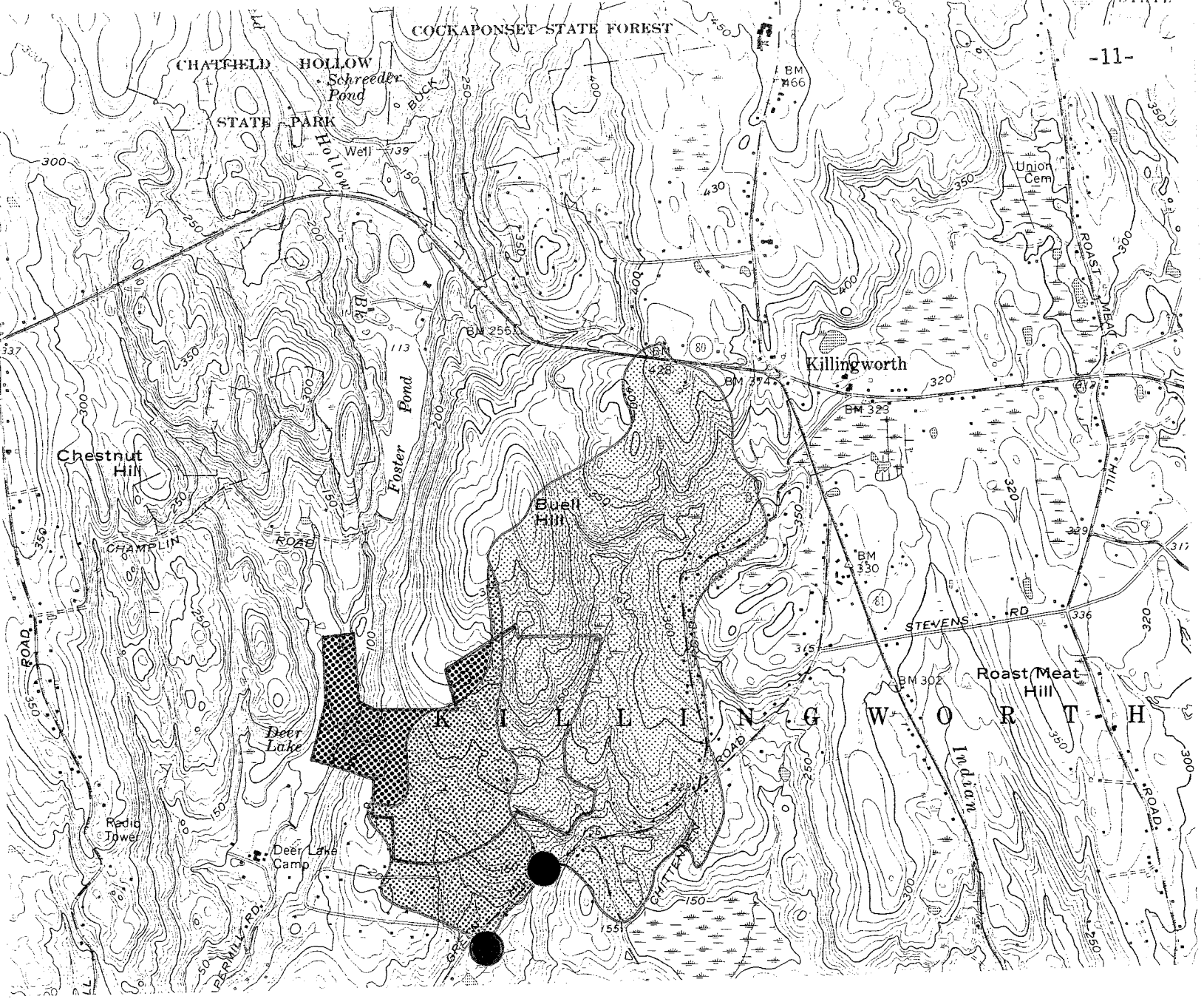
4. HYDROLOGY

Surface runoff within the site can be divided into three subdrainage areas. Drainage arising in the eastern part of the site flows downslope to the intermittent streamcourses which ultimately pass under Coughlin, Green Hill, and River Roads enroute to the Hammonasset River. Drainage arising in the central part flows downslope to the small pond located in the southwest corner of the site. The outlet stream for this pond merges with the streamcourse mentioned above south of Green Hill Road. Finally, surface water in the western limits flows downslope to Deer Lake. (See accompanying Watershed Boundary Map).

Deer Lake is an impoundment on Chatfield Hollow Brook and currently serves as a recreational facility for the Boy Scouts of America located at the southern end. The surface water of Deer Lake is classified by the DEP as "A". The "A" classification means that the surface water may be suitable for all other uses including bathing; character uniformly excellent, may be subject to absolute restriction on the discharge of pollutants.

Development of the site for residential use would be expected to lead to some increases in the amount of runoff shed from the parcel. The amount of increases will depend upon the extent of development, the impervious surfaces created, and the amount of vegetation removed or preserved. It seems likely that increased runoff would be naturally detained in; (1) Deer Lake in the western part of the site; (2) the small pond and wetland system in the central part; and (3) two small ponds and the wetland system in the eastern part. Because of these natural detention areas, and because the density of residents in each subwatershed is relatively small, it may not be necessary for on-site detention basins. However, in order to ensure that flooding problems do not occur, the applicant's engineer should submit for Town review a stormwater management plan for the project that includes detailed drainage calculations. Close examiniation of all downstream culverts particularly under Coughlin Road and Green Hill Road is warranted. Drainage pipes and culverts will need to be properly sized.

The other concern related to increases in runoff from the site is the potential for erosion. The presence of moderate to steep slopes on the site warrants the need for a sound erosion and sediment control plan. All erosion and sediment control measure should be shown on the subdivision site plan.



WATERSHED BOUNDARY

- Approximate Property Boundary
- Design Points
- Area of Site which drains directly to Deer Lake
- Watershed Boundary for the seasonal streamcourse in the central parts at its intersection with Green Hill Rd.
- Watershed Boundary for the seasonal streamcourse in the eastern parts at its intersection with Green Hill Rd.

1" = 2000'

Once the control devices have been installed, Town officials or designated person should inspect them for proper installation and effectiveness. (Please see Part 5 for more detailed information).

In order to protect the high quality of water in Deer Lake and in drainageways on the site, consideration should be given to the installation of a temporary sediment pool(s) during construction phases. If the sediment pool is constructed, it should be located on upland soils rather than wetland soils. This will help to minimize wetland disturbances. Perhaps a conservation easement of 100 feet or more for buildins, tree cutting and septic systems from the high water mark of Deer Lake could be maintained on the lots that abut it. This buffer would help to protect water quality in Deer Lake. If adopted, the boundary should be superimposed on the site plan.

5. SOILS AND SEDIMENT AND EROSION CONTROL

Soils on the property were mapped by the USDA Soil Conservation Service, and a detailed soils map is included in this report. Mapping resolution for the soils information is about 2.5 to 3.0 acres, so soil units of smaller areas would not be delineated on the map. Soil boundary lines are not absolute and should be used merely as guidelines to the distribution of soil types on the site.

The development site is mainly composed of soils developed from glacial till deposits.

CcB* --Canton and Charlton very stony fine sandy loams. These are well drained soils on hills and ridges of glacial till plains. These soils were mapped together because they have no significant differences that affect use and management.

The soils have a moderate erosion hazard and a very high potential rating for septic tank absorption fields.

CdC, CdD --Canton and Charlton extremely stony fine sandy loams. These are well drained soils on hills and ridges of glacial till plains. These soils have moderate to severe erosion hazard. On slopes up to 25% the soils have a very high potential rating for septic tank absorption fields. On slopes greater than 25% this potential rating may be significantly lower.

CrC --Charlton-Hollis very stony fine sandy loams. This complex consists of gently sloping, well drained and somewhat excessively drained soils on

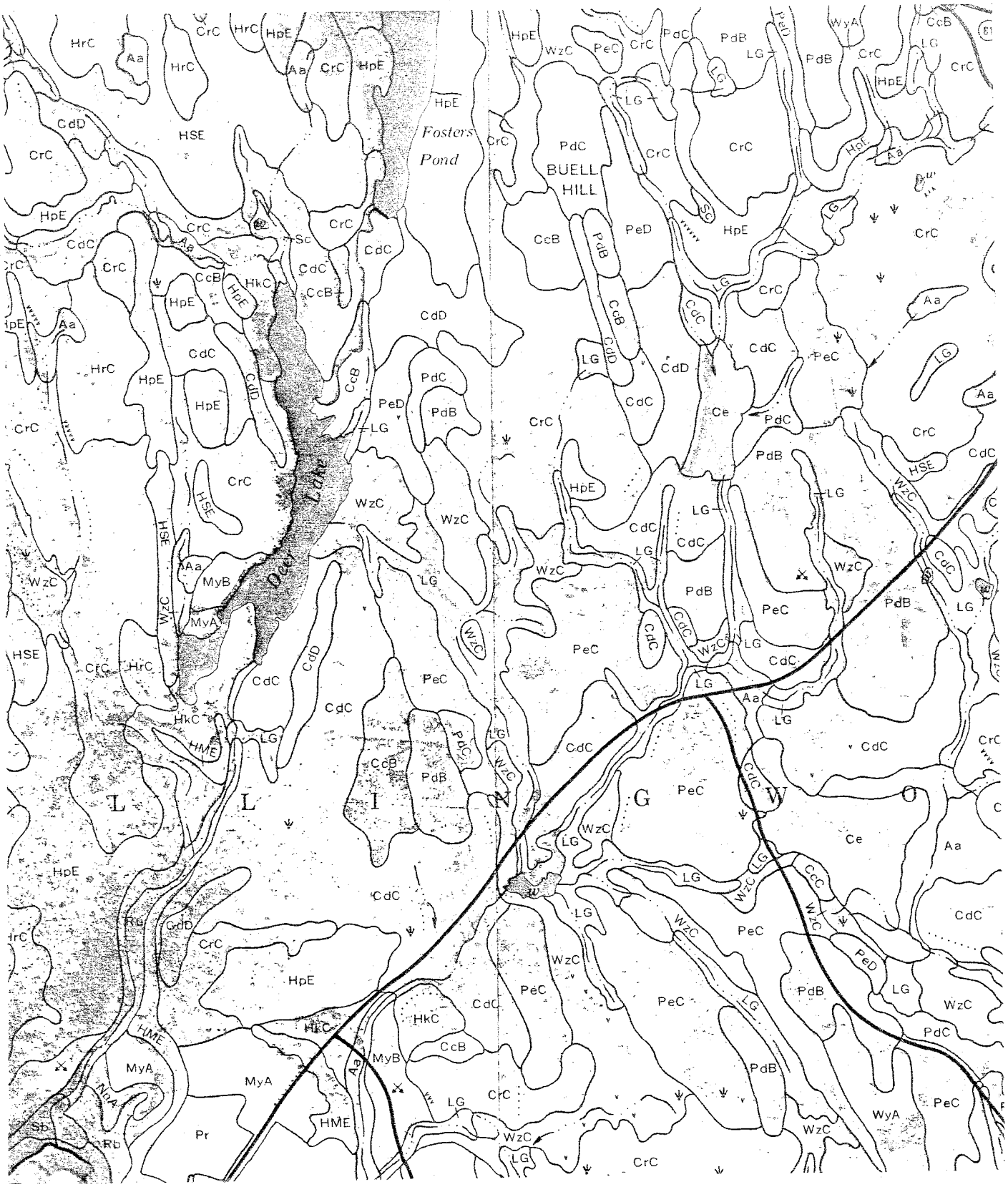
*Slope ranges: A = 0 to 3 percent; B = 3 to 8 percent; C = 8 to 15 percent; D = 15 to 25 percent

United States Department of Agriculture

Soil Conservation Service

Middlesex County USDA-SCS
Middlesex County Extension Center
Haddam, CT 06438
345-3219

Scale 1"=1320'



ridges where the relief is affected by the underlying bedrock and on glacial till plains. Soils of this complex are in such an intricate pattern that it was not practical to map them separately.

The complex has a moderate to severe erosion hazard. The soil potential rating for septic tank absorption fields is very high for the Charlton and extremely low for the Hollis. Depth to bedrock is the major concern in this complex. A permit to install an absorption field cannot be issued if the depth to bedrock of the naturally occurring soil is less than 24 inches. A feasibility study should be conducted to verify depth to bedrock.

HpE --Hollis-Charlton extremely stony fine sandy loams on 15 to 40 percent slopes. This complex consists of moderately steep to very steep, somewhat excessively drained and well drained soils on ridges where the relief is affected by the underlying bedrock on upland glacial till plains. The soils in this complex are in such an intricate pattern that it was not possible to map them separately. The erosion hazard is severe and soil potential rating for septic tank absorption fields is extremely low for Hollis and high for Charlton.

LG --Leicester, Ridgebury and Whitman extremely stony fine sandy loams. These are nearly level to gently sloping, poorly drained and very poorly drained soils in drainageways and depressions of glacial till uplands. These are inland wetland soils regulated under Public Act 155.

PdC --Paxton and Montauk very stony fine sandy loams. These are gently sloping to sloping, well drained soils on drumlins and glacial till plains of glaciated uplands. These soils were mapped together because there is no significant difference that affects their use and management. The mapped acreage of this unit is about 50% Paxton soils, 40% Montauk soils, and 20% other soils.

The hazard of erosion is severe and the soils have medium potential for septic tank absorption fields on slopes up to 25%. The soils have a slow perc rate and a seasonally high water table between February and May (April for Montauk). The soils are identified as areas of special concern by state regulations governing on-site sewage disposal. Depending on the perc rate measured on-site the area could be identified as unsuitable in its natural condition and an engineer's evaluation would be necessary to determine whether an absorption field can be built.

PeC, PeD --Paxton and Montauk extremely stony fine sandy loams are similar to PdC, differing in degree of stoniness. On slopes greater than 25% the soil potential rating for septic tank absorption fields may be significantly lower.

WzC --Woodbridge extremely stony fine sandy loam. This is a gently sloping and sloping, moderately well drained soil on side slopes of drumlins and glacial till uplands.

The soil has a seasonally high water table at a depth of 1.5 to 2.5 feet between November and May.

It has a low soil potential rating due to slow perc rate and shallow depth to water table. State regulations identify the soil as an area of special concern requiring an engineer's design. Depending on the rate measured on-site, the area could be identified as unsuitable in its natural condition and an engineer's evaluation would be necessary to determine whether an absorption field can be built.

Significant areas of lots 22, 26, 27, 42, 46 and 47 contain wetlands and are of concern. Driveway wetland crossings may exist on lots 2, 27 and 48 (see 1" = 2,000 feet plat map where wetlands extend across lot 48). Wetland boundaries were checked in the field. Only one intermittent watercourse needed delineation.

The sediment and erosion control plan for Deer Lake is good but some improvement recommendations are as follows:

1. The site is divided into four (4) construction phases which should be clearly shown. The sediment and erosion control plan is the same for each phase. Will each phase be completed and stabilized before another area is opened up?

2. Soil erosion and sediment control measures should be shown everywhere where needed on the map. A legend for the site development plan should be provided.

3. A detail for the riprap pads at the outlets for the storm sewers should be provided. Riprap should be properly sized and bedded. The inlet and the outlet to the stream crossing should be armored with riprap.

4. A construction entrance should be provided to minimize off-site tracking of materials.

5. A typical sediment and erosion control plan for individual lot development should be provided.

6. The detention pond should be properly sized and designed, and preferably located out of the regulated wetland area. Access and assignment of the proposed fire ponds should be provided.

8. The location and method of stabilization of topsoil stockpiles should be noted. They should be located so that natural drainage is not obstructed.

9. A conservation easement on land extending to the top of the slope along Deer Lake would help to prevent indiscriminate alteration of this sensitive area.

10. A note should be included providing for changes in sediment and erosion controls to suit site needs as development progresses.

11. The name and phone number of a person responsible for maintaining sediment and erosion control measures should be provided.

12. Properly stabilized outlets for footing drains should be provided.

13. For utilities and pipelines, the trench excavation, placement and backfill should be planned so no more than 20 feet of open trench is left at the end of a work day.

14. Dewatering operations should outlet into temporary sediment basins placed in upland areas.

6. DEVELOPMENT CONCERNS FROM A GEOLOGIC PERSPECTIVE

Based on visual observations, the most recent deep test hole information provided by the project engineer and available surficial, bedrock and soil mapping, the major geological limitations which may pose constraints with respect to the proposed subdivision include: 1) areas of the site where bedrock is at or near the ground surface, and 2) the presence of till-based soils (Paxton and Woodbridge soils) on the site which have slow percolation rates and seasonally high groundwater conditions because of the compact zone associated with them. It should be pointed out that some areas of the site have a combination of high groundwater tables and shallow depths to bedrock. In addition, the wetland areas on the site hold little potential for development.

These geologic limitations will weigh heaviest in the potential for installation of on-site subsurface sewage disposal systems. According to the engineering report made available to Team members, all lots except 26, 29 and 33 will require specially designed (engineered) septic systems. These limitations will also pose constraints in terms of foundation placement, and road and driveway construction.

In terms of subsurface sewage disposal systems, properly engineered and installed septic systems may be able to surmount the above mentioned limitations in many instances. Careful planning and testing is imperative on each lot, however, most septic system problems can be avoided. In areas where rock outcrops extensively and/or shallow depths to bedrock are present, there is concern for having a sufficiently large, suitable area for on-site septic systems. In order to accurately assess that such an area would be available, a sufficient number of deep test pits are needed on each lot to establish a bedrock profile. Based on the Connecticut Public Health Code, ledge rock would need to be at least 4 feet below the bottom area of any leaching system. Because depth to bedrock is highly variable in the northeast corner and western limits of the site, it is likely that leaching systems will need to be kept shallow and spread out over a comparatively wide area.

Lots which have soils with a seasonal high groundwater table will also need to be carefully planned. Leaching systems should be kept elevated and spread out when seasonally high groundwater tables are encountered. In some cases, it may be necessary to install a curtain drain and/or place proper fill material in the leaching system areas in order to overcome high groundwater table conditions. Because percolation rates are slow (13-20 minutes/inch) in at least 25% of the percolation tests conducted on the site, septic systems will undoubtedly need to be relatively large. In areas where a lot of fill is required, these septic systems could be quite costly.

Because lots are at least 2 acres in size, the project engineer will have some flexibility when searching for favorable leaching field areas. However, it should be noted, that there may be a particular lot or lots whereby a suitable area for the leaching system cannot be located due to any or a combination of a geologic limitation mentioned above.

Another concern with shallow bedrock conditions is the need for blasting. In areas where bedrock is at or near the ground surface, it may be necessary to blast in order to construct access roads and/or place house foundations. Since the steepest slopes on the site are associated with these areas, it is recommended that a detailed erosion and sediment control plan be formulated and followed very closely with implementation of the project. Blasting should be conducted under the strict supervision of persons familiar with the most recent blasting technology.

Based on the site plan submitted to Team members on the review day, inland-wetland soils will need to be crossed in order to construct the proposed interior road system and/or driveways. Although undesirable, wetland road crossings are feasible provided they are properly engineered. The road should be constructed adequately above the surface elevation of the wetlands. This will allow for better drainage of the road and also decrease the frost heaving potential of the road. Road construction through wetlands should

preferably be done during the dry time of the year and should include provisions for effective erosion and sediment control. Any unstable organic or mucky material should be removed and replaced with a permeable road base material. Based soils mapping data and causeway observations during the field reviews, the wetland soils on the site appear to have a mineral texture rather than mucky. Finally, culvert(s) should be properly sized and located so as not to alter the water levels in the wetland or cause flooding problems.

Because these soils are classified as inland-wetland soils in Connecticut they are regulated under Public Act 155. Any activity which involves modification, filling, removal of soils, etc., will require a permit and ultimate approval by the Town's Inland Wetland Commission. In reviewing a proposal, the Commission needs to determine the impact that the proposed activity will have on the wetlands. If the Commission determines that the wetland's serving an important hydrological or ecological function and that the impact of the proposed activity will be significant, they may deny the activity altogether or, at least, require measures that would minimize the impact.

7. WATER SUPPLY

Since public water is not available to this site, individual on-site wells will need to be developed on each lot of the subdivision. Crystalline bedrock wells can generally yield quantities of water adequate for most domestic uses. The exact yield of a bedrock-based well is a function of many hydrogeologic factors including the number and size of fractures present in the bedrock. Because the fractures are unevenly spaced throughout the rock, there is no practical way, short of expensive geophysical tests, to assess the potential of any particular site for a satisfactory well.

An assessment of 314 presently installed bedrock based wells has been conducted for the lower Connecticut River basin which includes the subject site (Source: Connecticut Resources Bulletin No. 31, Lower Connecticut River Basin). This assessment allows one to predict the chances for any new well to achieve certain minimum yields. According to Connecticut Water Resources Bulletin No. 331, 80 percent of the bedrock-based wells analyzed in the basin areas which tapped the type of rock underlying the site, yield about 3 gallons per minute (GPM) or more; 50 percent yielded 6.5 gpm or more; and only 10 percent yielded 18 gpm or more. A well yielding 3 gpm should adequately meet the needs of most domestic households.

A survey of well completion reports for 8 bedrock wells serving residences on Fawn Hill Road, Cow Pen Hill Road, Cooke's Lane to the southeast, reported yields ranging between 5 gallons per minute and 15 gallons per minute. All of

these wells tap the same type of rock underlying the proposed subdivision site.

According to DEP's Water Quality Classification Map for the South Central Coast Basin, groundwater in the area is suitable for private drinking water supplies without treatment. As such, the quality of the groundwater is expected to be good. However, there is a chance that water produced from wells tapping the underlying bedrock may be mineralized with elevated iron or manganese.

8. VEGETAION

The vegetation of the woodland is typical of the central hardwood zone that occurs in southern Connecticut. The property can be divided into six (6) vegetation types or forest stands. Included are three mixed hardwood stands, a hardwood swamp, an old field and softwood-hardwood stand.

Vegetation Type Description

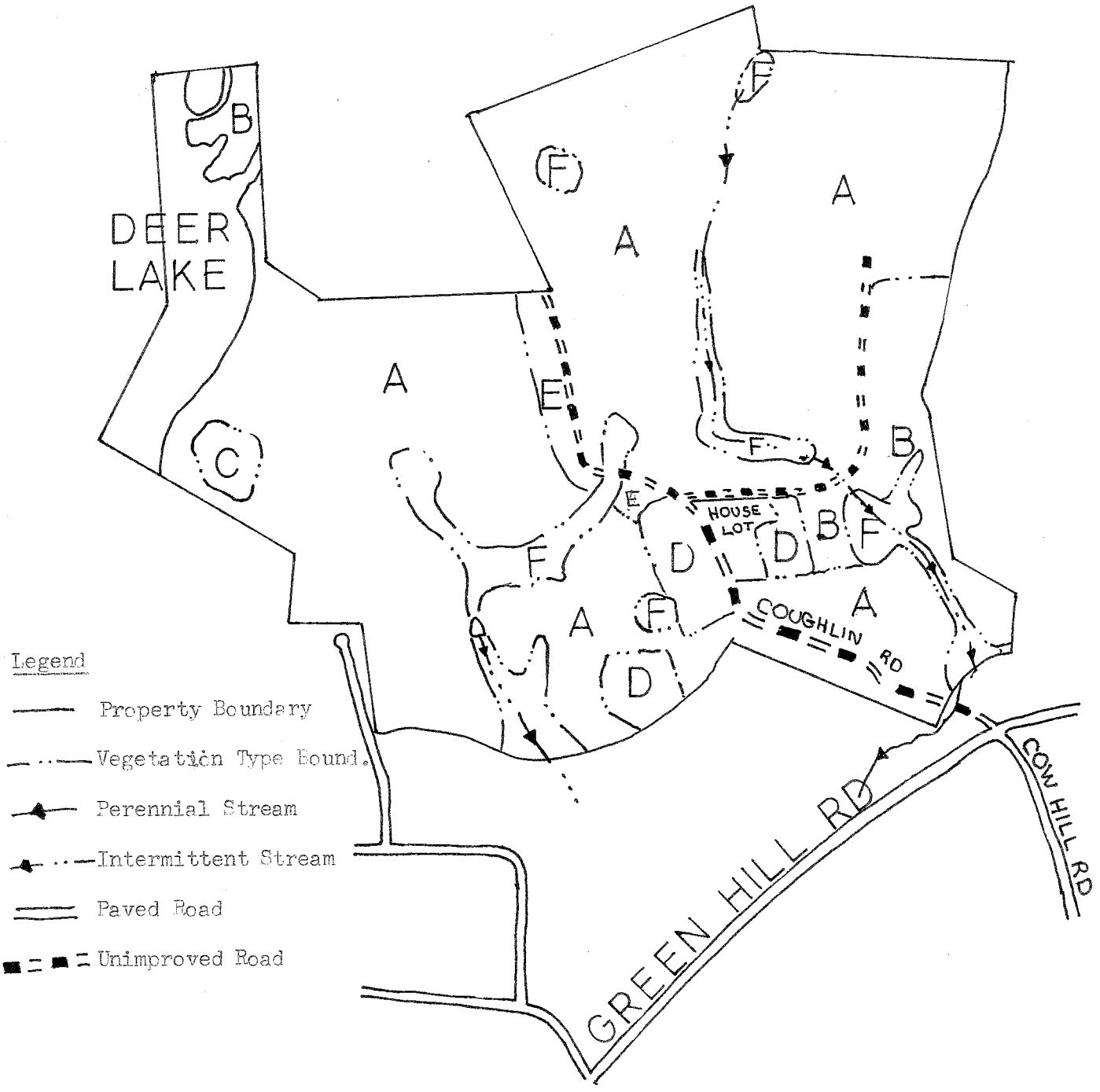
TYPE A (Mixed hardwoods) This understocked stand (125 + acres) is predominately composed of poor and medium quality sawtimber (trees 11.1" in diameter at breast height and larger) and poles (trees 6.1" to 11" DBH). The tree species include shag-bark hickory, red oak, black oak, white oak, chestnut oak, red maple, sugar maple, black birch, yellow birch, tulip poplar, hemlock and American beech. The shrub layer consists of flowering dogwood, spicebush, sweet pepperbush, swamp azalea, highbush blueberry, mapleleaf viburnum, greenbriar, Virginia creeper, grape, witch hazel, blackberry and hophornbeam.

The lesser vegetation includes Canadian mayflower, poison ivy, club moss, jack-in-the-pulpit, sensitive fern, jewelweed, wild sarsaparilla and Solomon's seal.

The recent harvest has left the stocking level (i.e., relative number and density of the trees in a forest stand) varying from adequately stocked to severely understocked. Most of the remaining overstory trees appear to be healthy. The overstory trees vary from 65 years old to 110 years old and average approximately 85 years old. The stand is located on an average site for growing quality hardwoods.

TYPE B (Mixed hardwoods) This is a 11+ acres fully stocked stand predominately composed of low and medium quality poles and sawtimber. White oak, black oak, American beech, red maple, sugar maple, tulip poplar, yellow birch, black birch, and chestnut are the tree species present. The shrub layer consists of spicebush, mapleleaf viburnum, grape and lowbush blueberry.

VEGETATION


DEER LAKE
HOUSE LOT
COUGHLIN RD
GREEN HILL RD
COW HILL RD
Legend
Property Boundary
Vegetation Type Bound.
Perennial Stream
Intermittent Stream
Paved Road
Unimproved Road

Lesser vegetation includes poison ivy, wild sarsaparilla, beech drop, Christmas fern and bracken fern. The overstory trees are approximately 85 years old and most of them appear healthy. The area represents an average site for growing hardwoods.

TYPE C (Softwoods/hardwoods) This 7± acre pole stand is understocked. The tree species that are present includes hemlock, black birch, American beech, black oak and red oak. The lesser vegetation consists of club moss, Canadian mayflower and New York fern. Most of the hemlock that occurs in the understory is approximately 80 years old. This is an average site for growing softwoods and hardwoods.

TYPE D (Old field) This pole and sapling (trees 1.1" to 6" DBH) stand (7± acres) seeded in naturally when the grazing of livestock in the area ceased. Red cedar, white ash, black oak, red maple and sugar maple, black cherry, tulip poplar, sassafras and hickory are present. Sweet fern, hornbeam, poison ivy, dogwood, Canadian mayflower and sweet fern are among the lesser vegetation and shrub species. The stand is immature.

TYPE E (Mixed hardwoods) This adequately stocked pole stand (3± acres) contains red oak, sugar maple, black birch, and red maple. The shrub layer consists of greenbriars, barberry, spicebush and flowering dogwood. The lesser vegetation includes wild geranium and jack-in-the-pulpit. The well drained loam soils provide an average growing site for hardwoods. The overstory trees appear immature.

TYPE F (Hardwood swamp) This pole and sawtimber stand (15± acres) is adequately stocked. Red maple, American elm, black gum, white ash and yellow birch are present. The shrub layer consists of sweet pepper bush, greenbriars and highbush blueberry. Skunk cabbage, cinnamon fern, false hellabore, and sensitive fern make up the lesser vegetation.

Limiting Conditions/Potential Hazards

The overall condition of the trees on this property is acceptable. There are only a few trees that have advanced decay or other signs of potential hazard. Some of the black birch is affected with nectia canker. The formation of cankers on the trunks of these trees structurally weakens the trees and makes them more susceptible to breakage. The number of oaks experiencing oak decline and subsequent mortality should be expected to increase as the trees age in Types A and B.

Windthrow is a potential hazard in Vegetation Type F. Tree root depth is restricted by saturated soils. Saturated soils are more pliable. Shallow root systems and saturated soils make wetlands very susceptible to windthrow. Heavy harvesting of trees that produce openings in the forest canopy should be avoided in areas with saturated soils since trees rely on each other for support.

Construction activities within wetlands which impede the natural drainage and raise water tables may have adverse effects on the forest vegetation. Trees will decline in health and may eventually die if the water table is raised substantially. Adequately sized and placed culverts should be installed where the proposed road and driveways cross any drainage.

Aesthetic Considerations

This forested parcel of land offers many of the rural amenities that prospective homeowners are interested in. The larger size of the proposed house lots will allow the possiblity of leaving much of the forest intact. A continuous forest would offer good screening effect and privacy between house lots. Also, a forested parcel gives the appearance of being larger than an open lot of the same size.

Large, healthy trees are usually considered aesthetically pleasing. The retention of these trees could add a considerable amount of aesthetic and shade value to the residential area. The healthy overstory trees have the most potential to increase rapidly in size and should be retained where possible. Most of the healthy dominant red oak, tulip poplar, and beech should be able to grow to 20" to 26" in diameter.

Construction activities should be planned and conducted to minimize disturbances around the trees and in sections of the forest that are to be saved. Road building, filling, excavation and soil compaction (from heavy machine use) may adversely affect the moisture and aeration balance within the soil. This could lead to the decline in tree health and vigor and may eventually lead to the death of the tree within three to five years. Physical damage to the root system and trunk of the tree by machinery may also result in the decline of individual trees.

Management Considerations

The maintenance and development of healthy, vigorous trees should be a major concern in the development of the tract. Low vigor trees are more susceptible to insect and disease problems and therefore have a high mortality rate.

Management in Type A should concentrate on aiding the development of tree seedlings in the understory in those sections of the stand which were heavily harvested. The seedlings could eventually replace the trees harvested and those that will die in the future. Approximately half of the acreage in Type A reseeded itself naturally after the harvest. But most of the seedlings will eventually die since they are being shaded. Sugar maple seedlings have the best chance of living since they can tolerate a lot of shade. Most tree

seedlings would benefit if overtopping brush and unhealthy trees were removed. Tree seedlings have failed to become established in some areas of Type A because of the heavy undergrowth of sweet pepperbush. The chemical or mechanical control of sweet pepperbush should allow the natural germination of tree seedlings.

None of the other vegetation types need any treatment at this time. Future management should include a thinning in vegetation Type B. The thinning should remove the poorest overstory trees that are competing with the healthiest overstory trees for growing space. The thinning should remove no more than one third (1/3) of the trees. The harvest could concentrate on reducing the proportion of black and white oak in order to reduce the susceptibility of the stand to gypsy moth defoliation.

9. FISH RESOURCES

Site and Watershed Descriptions

The proposed Deer Lake subdivision borders approximately 60% of the lake's eastern shoreline. Deer Lake is a shallow, nutrient enriched warmwater lake with a maximum depth of six feet. A major inlet (overflow from Foster Pond) is located on the northeast corner of the lake. Deer Lake's outlet drains into the Hammonasset River.

Unlike many Connecticut lakes and ponds, little development has occurred on its shoreline. At present, the only shoreline development is a Boy Scouts of America camp located on the southern end of the lake. Campers utilize the lake and surrounding shoreline for various outdoor activities such as hiking, environmental education, canoeing, swimming, and fishing. The proposed Deer Lake subdivision will abut this camp.

Four (4) lakefront building lots (numbers 32-35) are planned for this development. Topography of lakefront property is characterized by moderate slopes; however, land gradient dramatically increases within 100 feet of the lake. One intermittent (seasonal) watercourse flows through the proposed development and into the lake. The lake below the proposed building lots is extremely shallow; less than 1' in depth. It contains an extensive region of emergent aquatic vegetation.

Fish Population

Deer Lake supports a healthy and diverse warmwater fish population. Fish which presently inhabit the lake are: largemouth bass, chain pickerel, bluegill sunfish, pumpkinseed sunfish, brown bullheads, and several species of shiners. In particular, Deer Lake supports and excellent chain pickerel fishery. Additionally, the Boy Scout camp stocks the lake each year with over 1,000 rainbow and brook trout. Fishing pressure appears to be light due to limited access. The public is permitted to fish in the area along the camp. The intermittent stream that flows through the lakefront property does not support a permanent fish pouplation.

Impacts

The following impacts of development on the Deer Lake watershed can be expected if the development is constructed as proposed:

1. Construction site soil erosion and sedimentation of the lake through increased runoff from unvegetated areas. Erosion and sedimentation due to construction has long been regarded as a major stimulus in the lake eutrophication or aging process. Accelerated lake fertilization brought on by development would reduce water depth, encourage the growth of additional emergent aquatic plans, potentially precipitate dense algae blooms and significantly contribute to the depletion of oxygen during the winter in waters overlying decaying lake sediments. The shoreline is already shallow and heavily vegetated. Additional siltation will compound the present situation.

2. Percolation of septic system leachate into the lake. Proposed septic systems on lakefront lots are within 100 feet of the lake and are thus potentially dangerous to the lake ecosystem. Woodbridge soils that dominate Deer Lake lots are comprised of fine, highly permeable sandy loam with a seasonally high water table allowing easy transport of leachate from shoreline septic tanks to the lake. The presence of ledge beneath the Woodbridge soil increases the potential for subsurface leachate movement to the lake. The introduction of septic effluent to Deer Lake would not only accelerate eutrophication but could result in a major threat to fish and public health.

3. Transport of lawn fertilizer to the lake. Runoff and leaching of nutrients from fertilizers could provide added nutrients further stimulating lake eutrophication.

4. Water quality degradation in the Hammonasset River. Since the Deer Lake outlet drains into the river, any water quality problems that develop in Deer Lake will ultimately be passed onto downstream areas. The Hammonasset River is a major Connecticut trout stream. More than 8,500 brook, brown and rainbow trout are stocked annually by the State Department of Environmental Protection.

The aforementioned impacts would have a severe, adverse effect upon the Deer lake watershed. Degradation of water quality and fish habitat may ultimately render Deer Lake undesirable for recreational activities.

Recommendations

1. Discourage lakefront development. Removal of lakefront building lots from subdivision plans will reduce lake eutrophication and maintain lake integrity. Drain remaining lots to the area downstream of Deer Lake.

2. If lakefront development is allowed, maintain at the minimum a 250 foot open space zone along the lake edge. Disallow liming and fertilization of lawns. Stress the use of low phosphate detergents. These steps will partially mitigate the addition of nutrients to the lake.

3. Install and maintain proper erosion and sedimentation controls during construction such as silt fences, hay bales, and catch basins. Direct all runoff downstream of the lake and maintain catch basins regularly to remove sediment and reduce potential water quality problems in the Hammonasset River.

4. Town officials should regularly monitor lake water quality for public health reasons.

Summary

As proposed the Deer Lake subdivision has the potential to negatively impact the lake and its watershed. Careful control of surface and subsurface water movement will be necessary to mitigate the potential impacts in order to maintain lake water quality and a healthy fish population.

10. PLANNING AND TRAFFIC CONCERNS

Plans of Development

The plan of Development of the Town of Killingworth shows this area as a potential rural residential area. In the "Proposed Land Use Plan to Year 2000", The Connecticut River Estuary Regional Planning Agency recommended that the land immediately surrounding Deer Lake should be considered a Natural Resource Area. The remainder of the parcel is suggested to be Rural Residential. The plan would therefore be in keeping with the Regional Plan of Development with the exception of proposed development of the waterfront.

Flood Hazard Area

The National Flood Insurance Rate Map for the Town of Killingworth, Community-Panel Number 090174 0014A, indicates that the Zone A area of 100-year flood with base flood elevations and flood hazard factors not determined, extends some distance beyond the visually recongnizable shore of the lake. Reference to Section 100 of the Killingworth Zoning Regulations should be considered in relation to the proposed waterfront lots.

Zoning

Section 40H.3 of the Killingworth Zoning Regulations requires that: "Not more than 25 percent of the required lot area may be represented by wetland and/or watercourses." Calculations of lot sizes provided gross measurements only. Technical information should be supplied to enable commission members to verify the percentage of lot represented by wetlands.

Access

It was generally agreed that the intersection of Green Hill, Cow Pen Hill and Coughlin Roads is inadequate for the anticipated traffic. A traffic study referred to by the applicant was not available for review at the ERT meeting nor was the name of the firm that performed the study.

A Transportation Planning Review was previously provided to the Killingworth Planning and zoning Commission by CRERPA. It noted that in addition to the poor vertical alignment of the intersection of Coughlin Road and Green Hill Road, the east-west sight distance on Green Hill Road is poor. To the east, Green Hill Road rises sharply and slopes down again creating a blind spot. To the west, Green Hill Road slopes down grade 160 feet from the intersection. A telephone pole and a tree also hamper vision. The intersection of Cow Pen Hill Road and Green Hill Road is diagionally opposite

Coughlin Road. This sight line is also poor--approximately 90 feet in either direction.

The possibility of additional access through Fawn Hill was discussed. It was agreed that very few trips would be diverted in that direction due to the circuitous route. The prior CRERPA report concurs with this opinion.

Green Hill Road is the major east-west connector. It Provides access to Route 81 in the east and Route 79 in the west.

According to the previous CRERPA transportation study, a 1979 traffic count indicated an Average Daily Traffic (ADT) count of 750 vehicles. It indicates that Green Hill Road should be able to carry an ADT of 1800. It would seem that it could therefore accommodate the anticipated additional traffic, however, Green Hill Road had the highest accident rate of any road in the Town of Killingworth between the years of 1979 and 1983, twenty-four (24) accidents resulting in seventeen (17) injuries. The report states that "The combination of high accident numbers and relatively low ADT is significant. This information indicates that traffic counts (alone) are not an adequate toll in estimating road capacity for level of service..... the influx of additional traffic will only compound this problem." A copy of the Transportation Planning Review is included for reference. (See Appendix)

Proposals for improvements should be available to the Commission for consideration.

NOTE--Cow Pen Hill Road also Known as Cow Hill Road

II. APPENDIX

TRANSPORTATION PLANNING REVIEW

DEER LAKE SUBDIVISION
COUGHLIN ROAD

The Deer Lake subdivision is proposed in five sections totalling 41 lots. The site plan (dated 4/1/86; revised 4/15/86) indicates a staged development as follows:

Section	I	5 lots
Section	II	13 lots
Section	III	6 lots
Section	IV	11 lots
Section	V	6 lots

As such, the estimated cumulative trip generation* from the site would be:

Section #	#Lots	Trips to & From Site per Day	A.M. Peak	P.M. Peak
I	5	45	4	5
II	18	162	13	17
III	24	216	17	23
IV	35	315	25	34
V	41	369	30	40

Initial traffic access will be via Coughlin Road to Green Hill Road.

COUGHLIN ROAD:

Presently Coughlin Road is an unimproved dirt road approximately 12' to 14' wide. There are various vertical and horizontal alignment changes in its run from the area of Section I to Green Hill Road. At present, Coughlin Road is unable to pass two way traffic flow. Of the five lots proposed for Section I, Lot #2 and perhaps #'s 4 and 5 would have poor driveway sight clearance onto Coughlin Road. Road widening and regrading could correct this situation.

COUGHLIN ROAD - GREEN HILL ROAD - COW HILL ROAD INTERSECTION:

Coughlin Road intersects Green Hill Road with poor vertical alignment. The east and west sight distance at this point onto Green Hill Road is poor. Easterly the sight distance is approximately 100' at which point Green Hill Road humps and slopes downgrade and back upgrade and into line of sight after approximately 200'. There is a complete visual dead spot in this area.

*National Cooperative Highway Research Program, Report #187

Westerly the sight distance is approximately 160' at which point Green Hill Road slopes downgrade. This intersections sight clearance is further hampered by a telephone pole on the west and a tree on the east of Coughlin Road at Green Hill.

COW HILL ROAD - GREEN HILL ROAD:

The Cow Hill Road - Green Hill Road intersection located directly across from (south) Coughlin Road also has poor sight distance.

At this intersection westerly sight distance is approximately 150'. A driveway is located on this western corner running parallel with Green Hill Road. With a vehicle parked in the driveway, the westerly sight distance is reduced to approximately 90'.

The easterly sight distance is approximately 90' and further hampered by a sharp southerly curve of Green Hill and embankment on the easterly side of the intersection.

ADDITIONAL ACCESS:

The development of Section II will add a connector road from Coughlin Road to Fawn Hill Road. While this connector will be beneficial for emergency vehicle access, it is unlikely that it will relieve the traffic flow to Green Hill Road via Coughlin Road significantly. This is primarily due to the restrictions that the Fawn Hill-Cow Pen Hill Road network offer in distance and geometrics, and accordingly, time and ease of travel.

COW PEN HILL ROAD NETWORK:

Generally, the Cow Pen Hill road network is of adequate width and condition to handle additional traffic flow. Minor sight distance problems were observed as follows:

Fawn Hill - Cow Pen Hill intersection easterly sight distance is approximately 135' at which point Cow Pen Hill Road slopes downgrade.

Cow Pen Hill at Cow Pen Hill intersection generally has good sight distance with some 250' westerly and 195' easterly. In the easterly direction brush clearing on the south side of the Cow Pen Hill curve would widen the approach view.

Cow Pen Hill - Green Hill Road intersection reflects a similar situation - good sight distance west 300' and east 350' but with brush obstructions on the north side of Green Hill Road in both directions.

GREEN HILL ROAD:

As the major east-west connector of the area, it is likely that the majority of the traffic generated from this site will travel Green Hill Road. It accesses Route 81 in the east and River Road and Route 79 in the west.

The ability of Green Hill Road to handle additional traffic flow is important.

The latest traffic counts available for Green Hill Road are 1979 counts and although dated are useful. These counts were taken east of River Road and show an Average Daily Traffic (ADT) of 750 vehicles.

Since a generalized two-way vehicle capacity for a class of roadway such as Green Hill is approximately 1800 vehicles, the 750 ADT figure would seem to indicate Green Hill Roads capacity to handle the estimated trip generation from the proposed subdivision.

The number of accidents on Green Hill Road seem to dispute this.

Inspection of CONNDOT's local road accident totals for the time period 1979 to 1983 list 24 accidents occurring on Green Hill Road. This number was the highest accident total for any local road in Killingworth during that time period. The 24 accidents resulted in 17 injuries.

Schnoor Road had the second highest number of accidents at 10.

The combination of high accident numbers and relatively low ADT totals is significant. This information indicates that traffic counts are not an adequate tool in estimating road capacity for level of service. The indication is that Green Hill Road is a high hazard roadway and the influx of additional traffic will only compound this problem.

The various vertical and horizontal alignment changes on Green Hill Road undoubtedly constitute these hazards.

CONNDOT's local road accident reports for 1981 through 1984 again show that Green Hill Road had the highest number of accidents with 21. Roast Meat Hill was second with 9 accidents followed by Schnoor with 8.

The 21 Green Hill Road accidents during this time period resulted in 11 injuries with 8 of these accidents and 6 injuries occurring in the vicinity of the Coughlin - Cow Hill - Green Hill Road intersection.

SUMMARY:

Deer Lake Subdivision when completed would generate approximately 369 trips to and from the site per day.

The present condition of Coughlin Road could not handle the traffic generated by Section I without creating a hazardous situation due to its inability to pass two way traffic and poor driveway sight clearance.

The Coughlin - Cow Hill - Green Hill Road intersection represents a hazardous situation due to poor sight distance and alignment. Additional traffic flow would compound this situation.

Section II will add a connector road to Fawn Hill Road but it is unlikely to change the traffic travel pattern to Green Hill via Coughlin Road due to the restrictions of the Cow Pen Hill network.

The Cow Pen Hill network has minor intersection sight distance deficiencies.

The high accident numbers and relatively low ADT figure of Green Hill Road reflect a high hazard roadway. Additional traffic flow will compound this situation.

An engineer should be consulted to review road network deficiencies and possible corrective measures.

RSC/ph

DEER LAKE SUBDIVISION
TRANSPORTATION

SIGHT DISTANCE

DATE: 6/6/86	LOCATION	DIRECTION/DISTANCE West	East	COMMENTS.....COMMENTS
	FAWN HILL @ COW PEN HILL	336ft	135ft	width both=24ft downgrade east
	COW PEN HILL @ COW PEN HILL	250ft	155ft	width =24ft downgrade & south curve east. brush clearing on west side of curve would widen approach view.
	COW PEN HILL @ GREEN HILL	330ft	350ft	width green=20 brush clearance north both directions.
	COUGHLIN @ GREEN HILL	160ft	100ft	width coughlin=12-14ft. east=hear & downgrade,dead spot. west=downgrade.
	COW HILL @ GREEN HILL	150ft	90ft	width cow=22. east=s.e. corner juts out & green curves south, very poor-oncoming fast. west=with vehicle in drive sight=90ft.

Deer Lake Subdivision - Planning review supplement
Accident experience records
April 8, 1987

Review of ConnDOT accident experience records for January 1, 1983 through September 30, 1986 indicate that local roads in Town reported 89 accidents resulting in 28 injuries during that time period. Green Hill Road again reported the highest number of accidents at 12. These 12 accidents resulted in six injuries which also were the highest number reported on local roads.

Five of the 12 accidents and 2 injuries reported on Greene Hill Road occurred within the vicinity of Coughlin and Cow Hill Road.

Roast Meat Hill Road ranked second in number of accident and injuries with 9 accidents and 5 injuries reported. River Road and Iron Works Road both ranked third in accident number with 8. Although the River Road accidents resulted in 1 injury while the Iron Works Road accidents resulted in 3 injuries.

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--an 86 town 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 activities. 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, a statement identifying the specific areas of concern the Team should address, and the time available for completion of the ERT study. 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 Elaine A. Sych (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.