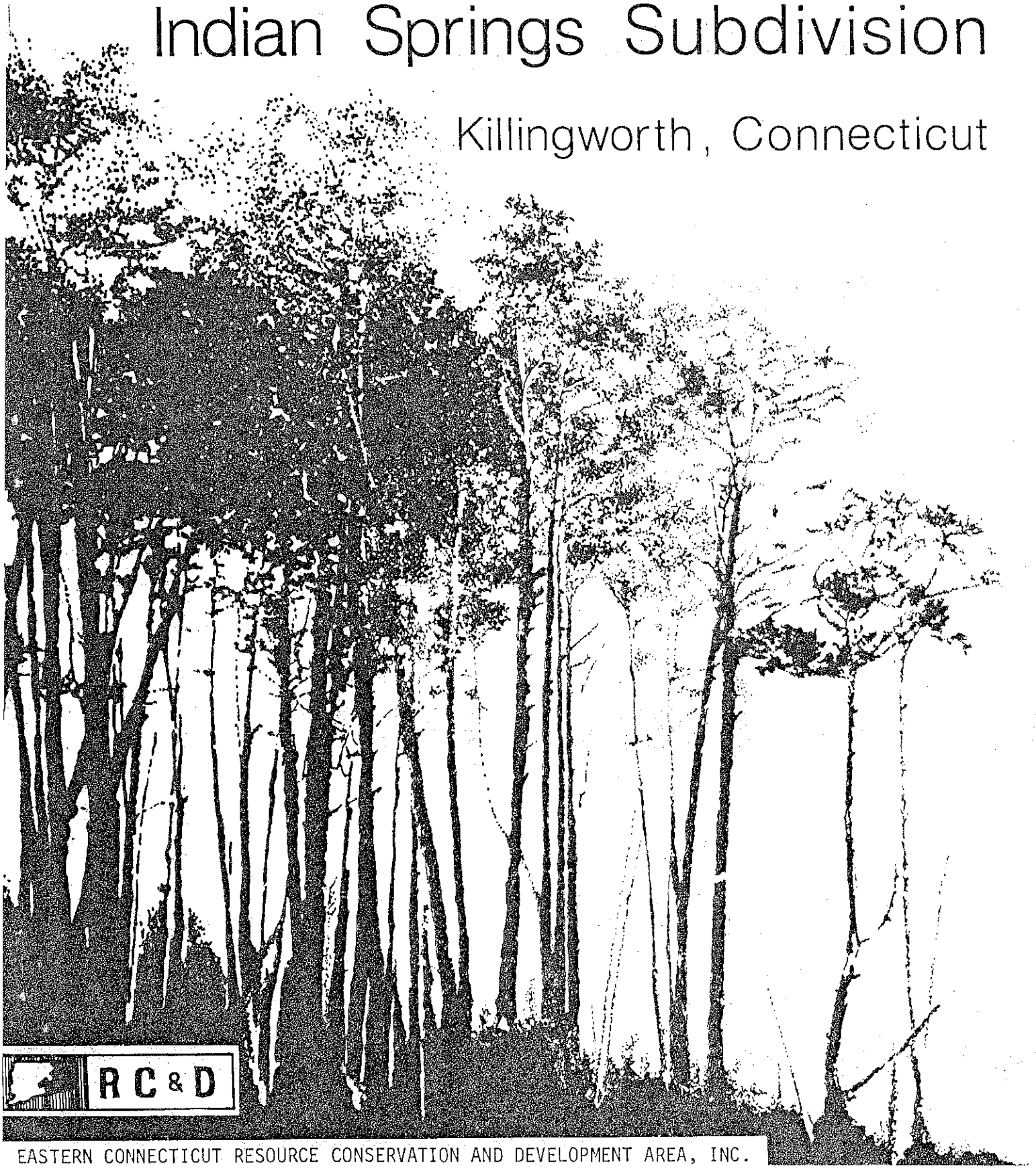
Environmental Review Team Report

Indian Springs Subdivision

Killingworth, Connecticut



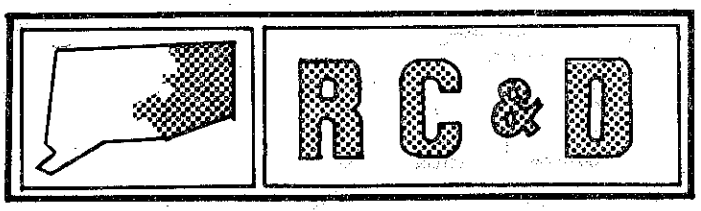
R C & D

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Environmental Review Team Report on Indian Springs Subdivision

Killingworth, Connecticut

June 1980

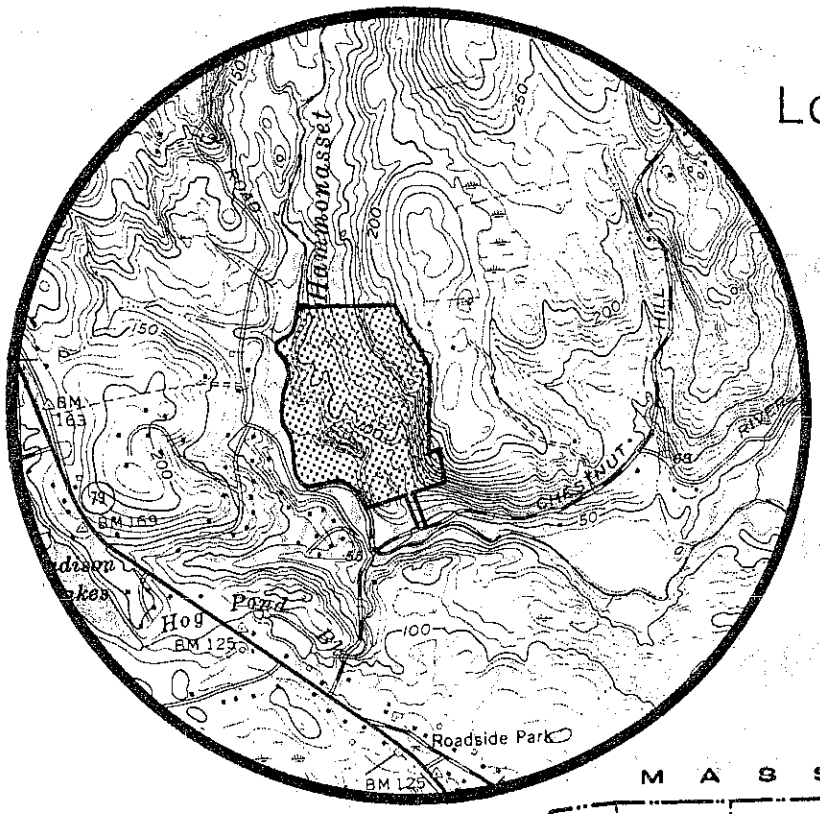


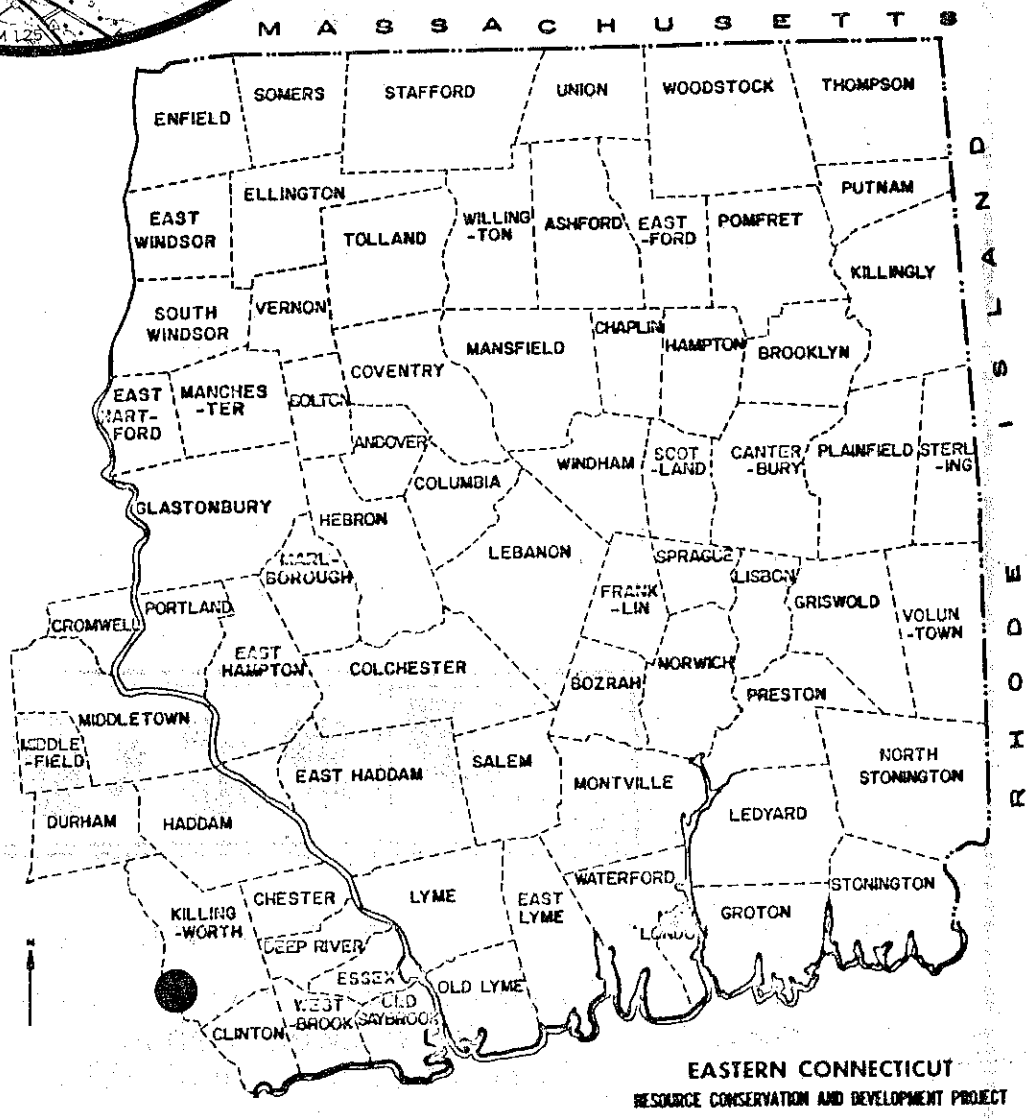
eastern connecticut resource conservation & development area

environmental review team
139 boswell avenue
norwich, connecticut 06360

Location of Study Site

INDIAN SPRINGS SUBDIVISION
KILLINGWORTH, CONNECTICUT





EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
INDIAN SPRINGS SUBDIVISION, SECTION I
KILLINGWORTH, CONNECTICUT

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

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

The ERT that field-checked the site consisted of the following personnel: Barry Cavanna, District Conservationist, SCS; Mike Zizka, Geologist, Connecticut Department of Environmental Protection (DEP); Charles Phillips, Fisheries Biologist, DEP; Rob Rocks, Forester, DEP; Donald Capellaro, Sanitarian, Connecticut Department of Health; Ed Meehan, Regional Planner, Connecticut River Estuary Regional Planning Agency (CRERPA); Bob Knowlton, Engineer, DEP; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

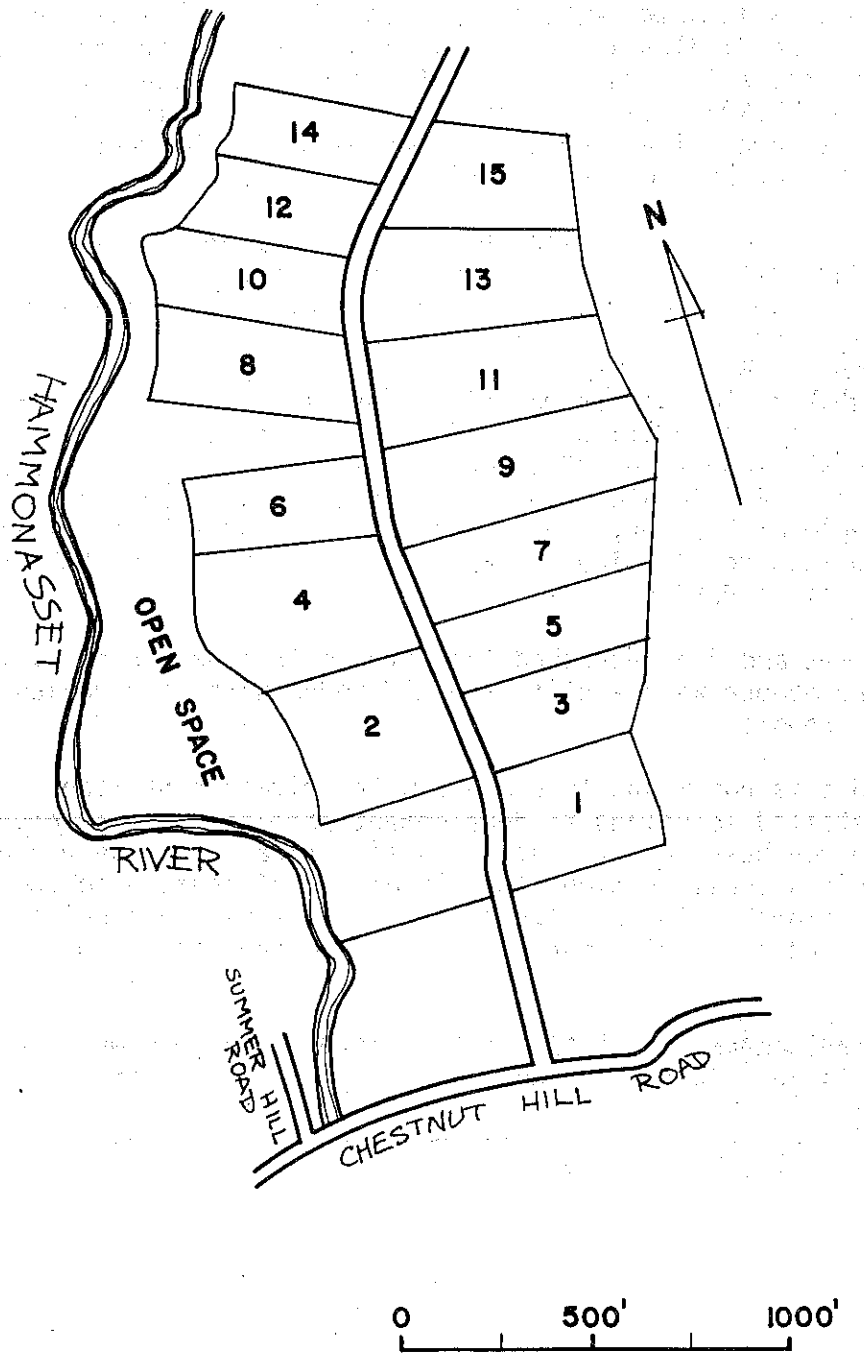
The Team met and field-checked the site on Thursday, April 17, 1980. Reports from each Team member were went to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the developer and the Town of Killingworth. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

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

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360, 889-2324.

PROPOSED PLAN
INDIAN SPRINGS
SUBDIVISION
SECTION I



INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment for a proposed subdivision in Killingworth. The proposal, to be known as Indian Springs Subdivision, is approximately 190 acres in size. This acreage has been divided into several sections for development purposes. The Team was asked to comment on the proposal for Section I; no other areas were reviewed at this time. The site is located on Chestnut Hill Road, east of the Hamonasset River. The property is presently in the private ownership of Par Developers, Ltd., of Madison. Preliminary subdivision plans have been prepared by Anthony V. Giordano Associates, a New Haven consulting engineering firm.

As shown in preliminary plans, Section I is approximately 45 acres in size. Fifteen lots of two or more acres each are planned for this area. These lots will be served by on-site wells and on-site septic systems. Access to the site will be provided by a single access road extending north from Chestnut Hill Road through the proposed subdivision and exiting onto Chestnut Hill Road. A 24± acre area near the Hammonassett River has been designated as permanent open space.

The site was once used for sand and gravel excavation as well as the town sanitary landfill. Topography of the project area is relatively steep. A large area in the southern section of the site used for the gravel excavation and landfill is presently unvegetated. The remainder of the site is forested with a mixture of hardwoods and hemlocks. Many small intermittent and perenial streams lace the site, all draining to the Hammonasset River. Several small wetlands were also located on the site, which do not appear on the soils map shown in the Appendix to this report.

The Team is concerned with the effect of this proposal on the natural resource base of this site. Although many development limitations can be overcome with proper engineering techniques, these measures can become costly, making a project financially unfeasible for a developer. In this proposal, extensive site alterations will be necessary to transform a major section of the site into saleable and buildable lots.

Team concerns relate primarily to the limitations imposed on the developer by the natural features of this site. These include shallow depth of soil to bedrock, extreme slope, flooding, and seasonal high water table. Man-made limitations relate to the existance of the landfill, its potential for contaminating the water supply, and its potential for producing methane gas which can be highly explosive.

Plans which were reviewed by the Team appeared to be very general. Minor drainageways had not been considered in the planning process, also details for stabilization of relocated streams had not been addressed. A detailed sediment and erosion control plan, to be implemented during construction, should also be submitted with final plans.

During the field review, Team members expressed concern that the proposed road layout did not seem to follow the site's better terrain, but rather crossed the former landfill area, over several ledge outcrops, up the steeper slopes and through the best area of tree cover. The proposed road does not follow the site's general contour or the existing unpaved road which runs parallel to the river along the site's

flat terrain. Location of this road will cause major disruption on the site and in the landfill, which must be partially excavated before construction. Of additional concern is the future location of driveways on lots 8-15 which may require steep access ways.

Water supply is a major concern in this proposal, primarily because on-site wells will be used to produce water for the proposed lots and there is a strong possibility of groundwater contamination from the former landfill. Proposed Lot #2 would be subject to a high risk of leachate pollution. A more detailed explanation of potential ground water problems is found in the Water Supply section of this report. Septic system installation and proper functioning is also questionable in some areas of this site.

Due to the number of questions which have arisen in response to development of Section I of the proposed Indian Springs subdivision, town commissions may wish to require the developer to prove that a potable water supply is available on the lots in question. The location and extent of the former landfill should be on all maps of record for this section of the development.

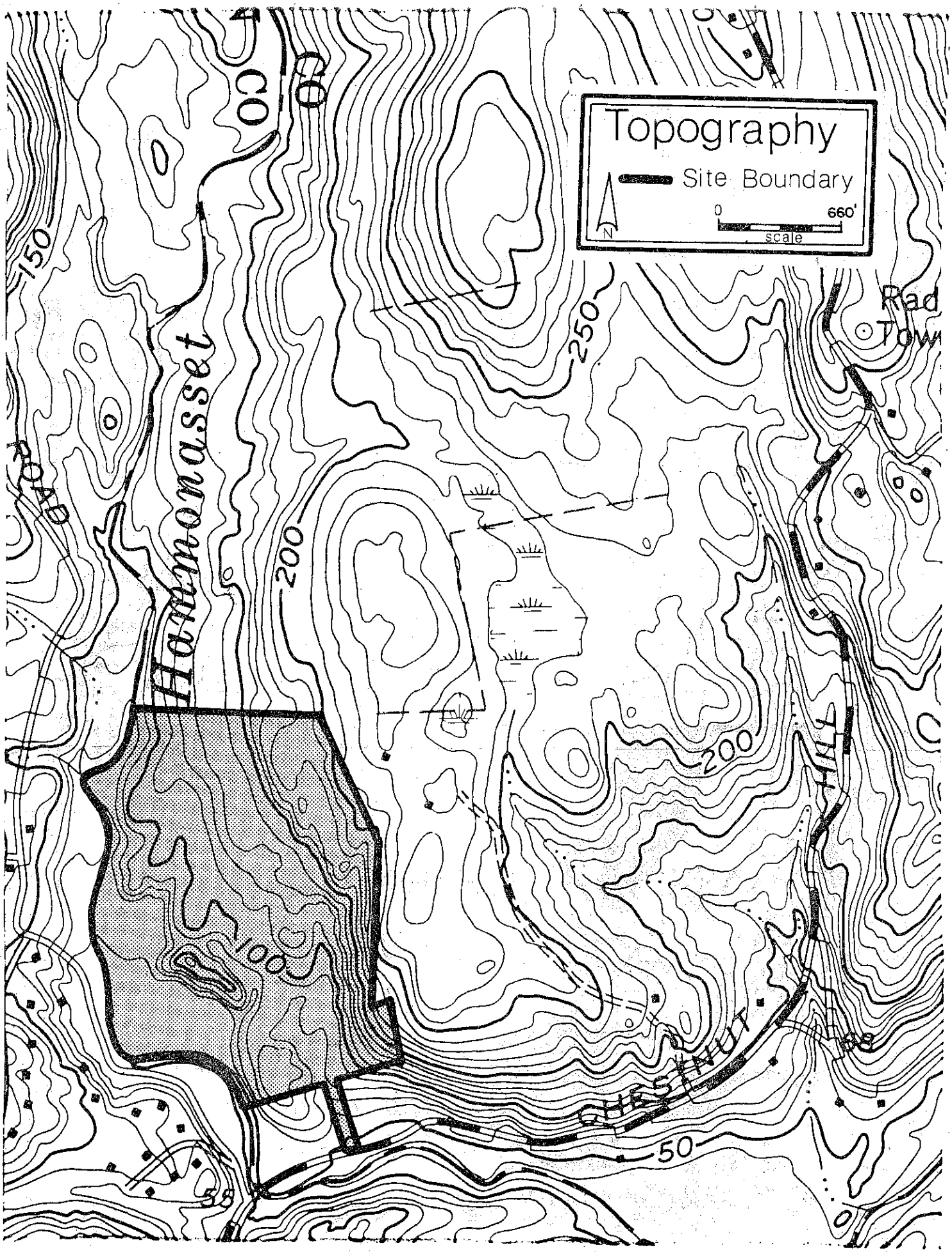
ENVIRONMENTAL ASSESSMENT

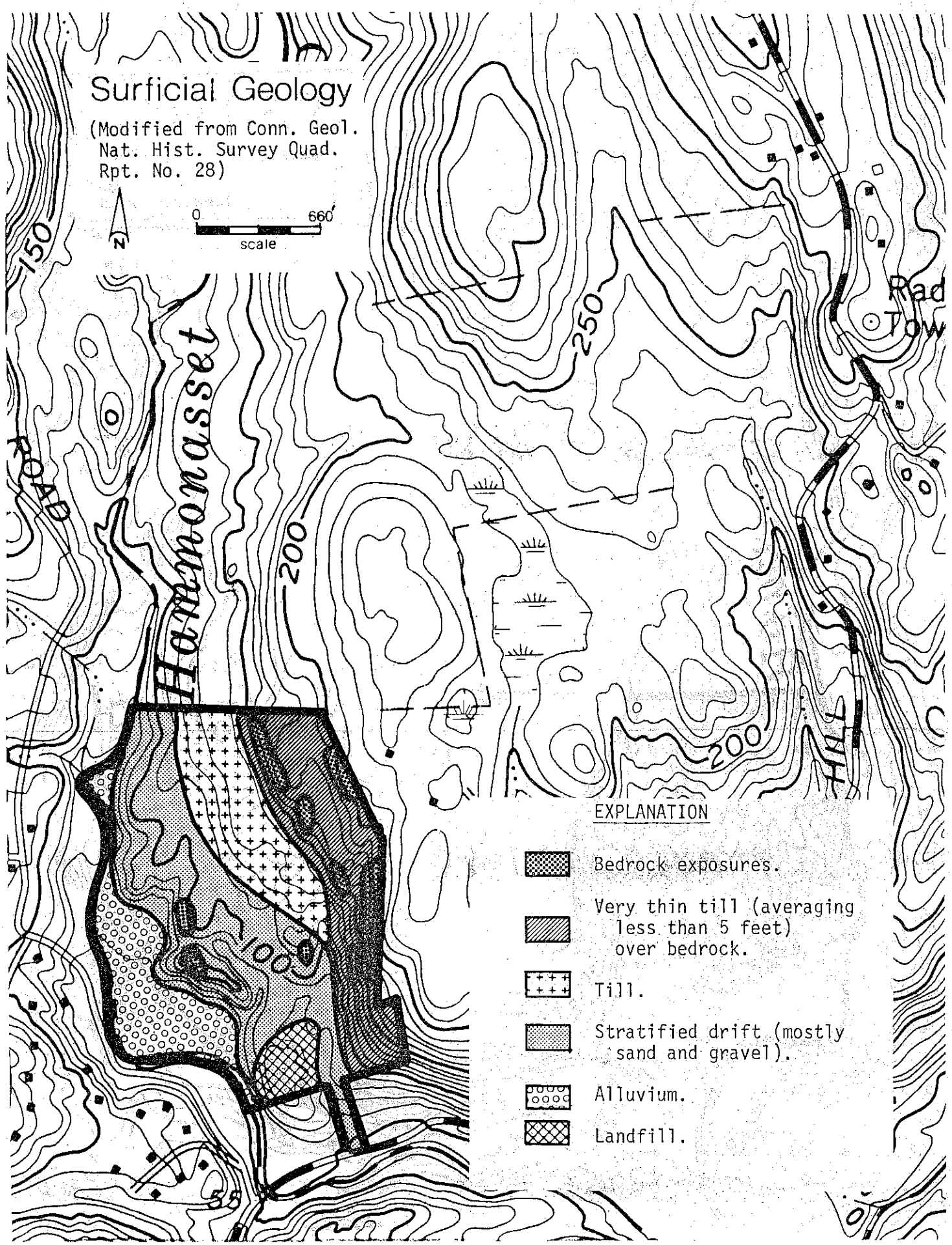
GEOLOGY

The Indian Springs site is located within the Clinton topographic quadrangle. Bedrock and surficial geologic maps of that quadrangle have been published by the Connecticut Geological and Natural History Survey: These are, respectively, Quadrangle Report No. 29, by L. Lundgren, Jr. and R.F. Thurrell (1973); and Quadrangle Report No. 28, by R.F. Flint (1971).

Bedrock cropping out on and underlying the site is composed primarily of gneisses. The term "gneiss" refers to metamorphic rocks in which elongate minerals and more rounded minerals alternate in thin bands. The elongate minerals are commonly dark-colored while the more rounded minerals are light, giving the rock a streaky, salt-and-pepper appearance. On this site, the principal mineral components of the gneisses are quartz, feldspar, biotite, and hornblende, with occasional minor minerals including garnet and sillimanite. The lineation is very distinct in these rocks and is typically contorted into intricate fold patterns. Bedrock is prominently exposed in a ridge that parallels the southeastern boundary of the site, and it appears in scattered exposures within the gravel pit, particularly in one knoll in the area of proposed lot number 4.

Four major surficial geologic materials are found on the site: till, stratified drift, artificial fill, and alluvium. The approximate distribution of these materials is shown in an accompanying illustration. Till, which is found primarily in the eastern half of the property, consists of a nonsorted mixture of rock particles of widely varying sizes and shapes. These particles were accumulated and transported by glacier ice, and were redeposited directly from the ice without substantial resorting by meltwater. The texture of the till is commonly sandy, stony, and relatively loose in the upper few feet, but it is often siltier and compact at greater depths. In a 200-foot to 400-foot wide strip along the eastern boundary of the site,


Topography
Site Boundary
0
660'
scale
N
Hammonasset
ROAD
150
100
200
250
50
CHESTNUT


Surficial Geology
(Modified from Conn. Geol. Nat. Hist. Survey Quad. Rpt. No. 28)
N
0
660'
scale
150
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200
200
Hammonasset
ROAD
Rad
Tow
EXPLANATION
Bedrock exposures.
Very thin till (averaging less than 5 feet) over bedrock.
Till.
Stratified drift (mostly sand and gravel).
Alluvium.
Landfill.

bedrock crops out conspicuously, suggesting that the average thickness of the till is less than 5 feet. To the west of that strip, northeast of the gravel pit, the average till thickness probably is greater than 5 feet.

Stratified drift is a glacial sediment composed largely of sand and gravel, which were deposited by meltwater flowing from a wasting body of ice. Most of the stratified drift on the site has been excavated, leaving a large open pit in the central section. The area designated as artificial fill on the accompanying geologic map is largely composed of material excavated from this pit. The remainder of the fill is solid waste dumped by the town in previous years.

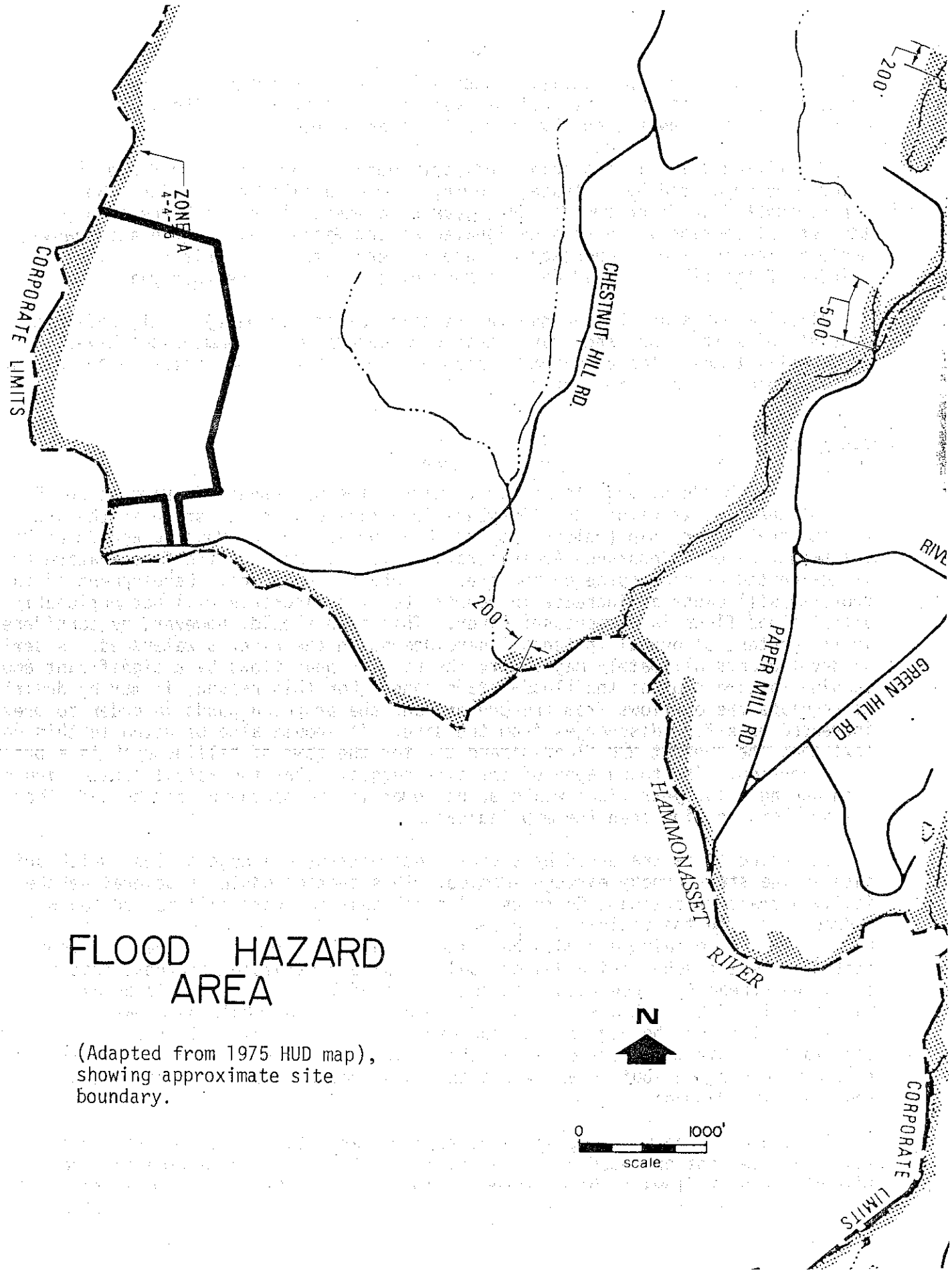
Alluvium makes up the southwestern section of the property. This sediment consists of silt, sand, and gravel that were deposited by Hammonasset River in postglacial times. The alluvium is probably less than 5 feet thick on the average, and it presumably overlies stratified drift.

HYDROLOGY

The site borders, and lies entirely within the watershed of, Hammonasset River. Part of the site is within the 100-year-flood hazard zone, as shown in the accompanying preliminary map (released by the U.S. Department of Housing and Urban Development, Federal Insurance Administration, 1975). Most of the flood-hazard area is designated as open space on the present subdivision plans. Development of the property will cause an increase in runoff, but this increase will not noticeably affect flood flows in Hammonasset River. This plan should, however, be considered in the context of overall potential development in the river's watershed. A series of developments ultimately may add to the river's peak flows by a significant amount, causing an expansion of the flood-hazard zone. For this reason, it may be desirable to regulate the outflows from the present and the proposed ponds in order to prevent increased peak-flow discharges from the site. It should also be noted in this context that the present HUD flood-hazard map for the town of Killingworth is a preliminary version. The topography of the site suggests that the actual zone of inundation during a 100-year flood would be narrower in the northern section and wider in the southern section than the map indicates.

The property is traversed by several intermittent drainage swales, which originate in the steep, rocky eastern section. This section contains several aesthetically attractive drainage features. A small seasonal waterfall may be found on the bedrock ridge in the vicinity of proposed lots 3 and 5. A boulder covered swale in proposed lot 7 contains a hidden but clearly audible stream. It does not appear that the present subdivision design would require destruction of these features. However, the stream that now passes through proposed lots 1 and 3 would be diverted westward from lot 3 through a swale in lots 2 and 4. A pond would be created in the latter two lots on the edge of the open-space area. The overall effect of this diversion would be minimal. The curve at the diversion point should be lined with stones to minimize erosion, but in any event the pond probably will prevent most sediment from reaching Hammonasset River.

The present subdivision plan shows four culverts to be used to pass drainage westward under the proposed road. Hydrologic calculations were made to give an idea of the peak flows to be expected at the inlets of two of the culverts (those at lots 3 and 9) for the 25-year, 50-year, and 100-year storms. The results are



FLOOD HAZARD AREA

(Adapted from 1975 HUD map), showing approximate site boundary.

given in the table below. The figures shown are merely estimates: the actual peak flows may be greater or less. Nevertheless, it is hoped the figures will be helpful in deciding upon the size of the culverts.

Table 1. Estimated peak flows in cubic feet per second at culvert inlets on proposed lots 3 and 9.

	Lot 3 Culvert	Lot 9 Culvert
25-year storm	52	27
50-year storm	69	36
100-year storm	85	45

VEGETATION

The 45± acre parcel proposed for the Indian Springs subdivision may be divided into four vegetation types and one disturbed or open area. The vegetation types present include a mixed hardwood area, a hemlock area, a softwood/hardwood area and a hardwood swamp area. (See Vegetation type map and Vegetation type description chart.)

Retention of the large healthy trees and flowering shrubs, will aid in preserving the aesthetic quality of the wooded area.

Windthrow is a potential hazard in the mixed hardwood stand because of shallow to bedrock soils and in the hemlock stand due to the hemlock's shallow rooted nature.

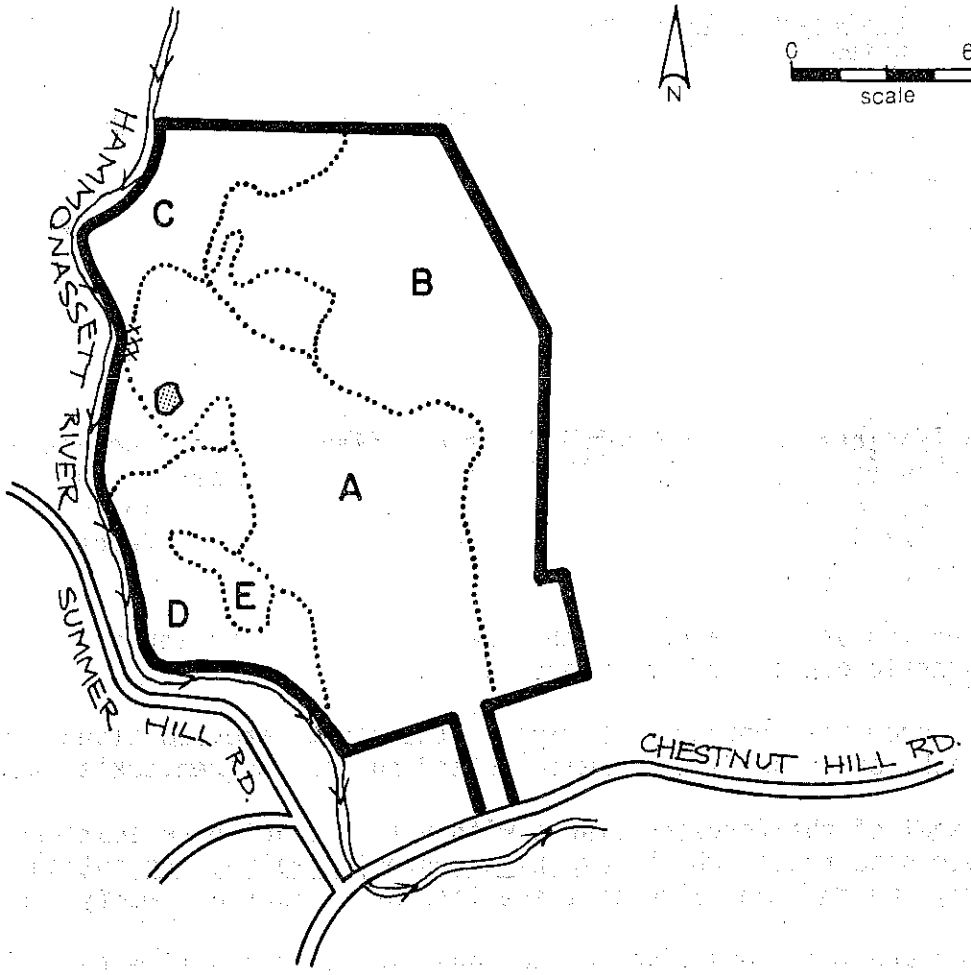
Several of the forested stands within this tract have scattered high quality sawtimber size trees, which have high aesthetic value. Retention of many of these trees may enhance the value of these lots by as much as twenty percent.

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

Care should be taken during the construction period, not to disturb the trees that are to be retained. Special care should be taken near hemlock trees, because of their shallow root systems. In general, healthy and high vigor trees should be favored over unhealthy trees because they are usually more resistant to the environmental stresses brought about by construction.

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

Vegetation



LEGEND

- Roads
- Property Boundary
- Vegetation Type Boundary
- River
- Pond
- xXx Planting Area

VEGETATION TYPE DESCRIPTIONS

TYPE A	Disturbed Area, 22 acres.
TYPE B	Mixed hardwoods, 21 acres, fully stocked, pole to sawtimber-size.
TYPE C	Hemlock, 9 acres, fully stocked, pole with scattered sawtimber-size.
TYPE D	Softwood/hardwood, 7 acres, fully stocked, pole to sawtimber-size.
TYPE E	Hardwood swamp, 1 acre, stocking variable, sapling-size.

VEGETATION TYPE DESCRIPTIONS

TYPE	ACRES	MAIN STAND SIZE CLASS	STOCKING LEVEL	MAIN STAND QUALITY	MAJOR COMPONENTS OF: OVERSTORY	UNDERSTORY	GROUND COVER
A. Disturbed Area/open area	22	seedling			scattered gray birch, blackcherry and quaking aspen	Scattered smooth sumac, staghorn sumac, highbush blueberry	grasses, sweet fern, colts foot, goldenrod and assorted wasteland weeds and wild flowers.
B. Mixed Hardwoods	21	pole to small sawtimber size	fully-stocked	Good. Trees are healthy and growing vigorously.	Red oak, black oak, white oak, sugar maple, shagbark hickory, pignut hickory, black birch and American beech with occasional tuliptree	Hardwood tree seedlings, hemlock seedlings, flowering dogwood, blue-beech, mapleleaved viburnum and localized patches of spice bush and Mountain laurel	grasses, club moss, Canada Mqyflower, roundlobed hepatica, pipsissewa, rattlesnake plantain with skunk cabbage, trout lilly and Jack-in-the pulpit near the samll streams and seeps.
C. Hemlock	9	pole with scattered sawtimber size	fully-stocked	Medium	Eastern hemlock with scattered white oak, black birch and American beech.	occasional patches of mountain laurel	club moss and patches of pink lady slipper
D. Softwoods/ Hardwoods	7	pole to sawtimber size	Fully-stocked	Medium. some poor quality trees and some mortality in hardwood species	Eastern hemlock, sugar maple, yellow birch, black birch, red maple and American beech	Mountain laurel and hardwood tree seedlings.	Club moss, and grasses
E. Hardwood Swamp	1	sapling with occasional pole size	variable from understocked to overstocked	Medium. However, many trees have small crowns.	Red maple	Spicebush, highbush blueberry	skunk cabbage, horse tails, sedges, moss, trillum, Jack-in-the-pulpit and Solomon's Seal.

Seedling size - Trees less than 1 inch in diameter at 4½ feet above the ground (d.b.h.)
Sapling size - Trees 1 to 5 inches in d.b.h.
Pole size - Trees 5 to 11 inches in d.b.h.
Sawtimber size- Trees 11 inches and greater in d.b.h.

The flowering shrubs which are present in stands B, C and D, including flowering dogwood and mountain laurel have high aesthetic value and should be retained to the greatest extent possible. The flowering of these shrubs may be stimulated by allowing direct sunlight to reach them. This may be accomplished by complete or partial removal of the overstory trees over these shrubs.

Windthrow is a potential hazard in stand type B (Mixed hardwoods). The trees in this stand are unable to become securely anchored in the shallow to bedrock soils present. In some places the steep slopes intensify this hazard. If the underlying bedrock is highly fractured, the windthrow hazard will be lessened because tree roots may be able to penetrate deeper for more stability. Clearing operations in this stand should be limited, because large clearings may allow wind to pass through rather than over this stand, increasing the already high windthrow potential.

It should be noted that a sudden exposure to direct sunlight and the increased soil temperatures caused by clearing may injure or cause mortality in the residual hemlock trees in stand types C and D. Once again hemlock, because of their shallow and sensitive root systems are very susceptable not only to windthrow but also to damage caused by changes in micro-climate brought about by clearing for construction.

Suggested Management Techniques and Utilization

Trees which are removed during construction of houses, septic systems and driveways should be utilized as fuelwood. The dead and severely damaged trees present in stand type D (softwoods/hardwoods) could be removed for and utilized for fuelwood prior to subdivision or after the subdivision by individual lot owners.

The other forest stands are for the most part healthy and need not receive forest management at present.

Planting several rows of hemlock in the area designated on the Vegetation type map, would eventually help to shade the Hammonasset River, protecting it from the direct sunlight which it is receiving at present. These trees should be planted approximately ten feet apart in two or three staggered rows.

Retention of the 100 feet vegetated buffer strip or open space area along the Hammonasset River will help to preserve water quality. The proper sediment and runoff retention techniques as described by the Soil Conservation Service, should be utilized during construction to avoid excess erosion and subsequent degradation of water quality.

FISH RESOURCES

The property borders the Hammonasset River, a class A trout stream, with high aesthetic and recreational values. In addition, this river is one of the test streams for the State's sea run brown trout program.

The proposed 100 foot buffer strip for open space will adequately protect the river if the following measures can be instituted:

1. A 100 foot buffer strip should be planted with shade trees (perhaps red maple and hemlock) along the streambank adjacent to the existing gravel pit.

2. Stormwater retention areas must be properly maintained.

3. Drainage planning over and above retention areas will require great care to avoid erosion and sedimentation in the Hammonasset River.

Protection of this high value recreational fishing area is critical. This is particularly pertinent since the Hammonasset River is near a major Connecticut population center, New Haven, and provides a quality recreational experience for many people from the greater New Haven area. The river is important enough to merit a 10,000 trout stocking annually in addition to 20,000 to 50,000 sea run brown trouts fry.

SOILS

A detailed soils map of this site is included in the Appendix to this report, accompanied by a chart which indicates soil limitations for various urban uses. As the soil map is an enlargement from the original 1,320 feet/inch scale to 660 feet/inch, the soil boundary lines should not be viewed as absolute boundaries, but as guidelines to the distribution of soil types on the site. The soil limitation chart indicates the probable limitations for each of the soils for on-site sewerage, buildings with basements, buildings without basements, streets and parking, and landscaping. However, limitations, even though severe, do not preclude the use of the land for development. If economics permit large expenditures for land development and the intended objective is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used. The soils map, with the publication Special Soils Report, Connecticut River Estuary Planning Region, can aid in the identification and interpretation of soils and their uses on this site. Know Your Land: Natural Soil Groups for Connecticut can also give insight to the development potentials of the soils and their relationship to the surficial geology of the site.

Soil series typical of this site include the Agawam series, the Canton-Charlton series, the Charlton-Hollis series, the Hollis-Charlton series, the Paxton-Montauk series, the Woodbridge series and the Udorthents series or man-made land. Development limitations inherent to these soils range from slight to severe. Most limitations on this site are related to extreme slope, shallow depth of soil to bedrock, seasonal high water table and flooding.

The Agawam series consists of deep, well drained soils on outwash plains and stream terraces. They formed in water deposited sands. Typically these soils have a very dark grayish brown fine sandy loam surface layer 10 inches thick. The subsoil from 10 to 25 inches is yellowish brown fine sandy loam. The substratum from 25 to 30 inches is light olive brown loamy fine sand and from 30 to 40 inches is olive fine sand. Slopes range from 0 to 35 percent.

Canton series consists of deep, well-drained soils on uplands. They formed in a fine sandy loam mantle underlain by gravelly sandy glacial till, derived mainly from granite and gneiss. Typically, these soils have a dark brown fine sandy loam

surface layer, 2 inches thick. The subsoil, between 2 and 22 inches is very friable yellowish-brown and light yellowish-brown fine sandy loam. The substratum, from 22 to 60 inches is friable light olive gray and olive gray gravelly loamy sand. Slopes range from 0 to more than 35 percent.

The Charlton series consists of deep, well drained soils on uplands. They formed in glacial till derived mainly from Schist and Gneiss. Typically these soils have a dark brown fine sandy loam surface layer 6 inches thick. The subsoil from 6 to 26 inches is yellowish-brown and light olive brown fine sandy loam. The substratum from 26 to 60 inches is grayish brown gravelly fine sandy loam. Slopes range from 0 to 45 percent.

The Hollis series consists of shallow, well drained and somewhat excessively drained soils on uplands. They formed in acid glacial till derived mainly from schist and gneiss. Typically these soils have a very dark grayish brown fine sandy loam surface layer 2 inches thick. The subsoil between 2 inches and 15 inches is dark yellowish brown and yellowish brown friable fine sandy loam and gravelly fine sandy loam which overlies schist bedrock. Slopes range from 0 to 45 percent.

The Montauk series consists of deep, well drained soils on glacial moraines. They formed in glacio-fluvial or ablation deposits underlain by firm sandy till. Typically these soils in a wooded area have a dark brown sandy loam surface layer 2 inches thick. The subsoil from 2 to 27 inches is yellowish brown fine sandy loam. The substratum from 27 to 60 inches is a firm and brittle fragipan that is dark brown sandy loam and reddish brown loamy sand. Slopes range from 0 to 40 percent.

The Paxton series consists of deep, well-drained soils that occupy drumlins or rounded hills of uplands. They formed in compact glacial till derived mainly from mica schist and granite. Typically these soils have a very dark grayish-brown fine sandy loam surface layer about 8 inches thick. The subsoil extending to 22 inches is yellowish-brown fine sandy loam in the upper part and light olive brown fine sandy loam in the lower part. The underlying pan layer to a depth of 41 inches is grayish brown, platy, very firm fine sandy loam. Slopes range from 0 to 35 percent.

Woodbridge series consists of deep, moderately well drained soils on uplands. They formed in glacial till. Typically these soils have a dark brown fine sandy loam surface layer 7 inches thick. The fine sandy loam subsoil from 7 to 18 inches is dark yellowish brown in the upper part and yellowish brown in the lower part. A layer of olive sandy loam is at 18 to 21 inches. The substratum from 21 to 26 inches is olive fine sandy loam. From 26 to 42 inches is a very firm fragipan that is olive gravelly fine sandy loam. Slopes range from 0 to 35 percent.

A detailed sediment and erosion control plan on a lot by lot basis is recommended for inclusion with final plans for this project. Many drainage details appear to have been omitted from plans which the Team reviewed. Minor drainageways have been overlooked, as well as details for stabilizing relocated streams proposed for elimination. Storm water diversions will also be needed on lots east of the proposed road to protect homes from surface runoff. The Soil Conservation Service field office in Haddam can provide further assistance in developing a sediment and erosion control plan and stormwater management plan for this site.

WATER SUPPLY

Water is proposed to be supplied to lots in the subdivision by individual on-site wells. The major concern regarding such supply is the possibility of groundwater contamination from the old town landfill, which is located immediately west of lot 1 and south of lot 2. On the basis of test well data submitted to Paul Marin, a senior environmental analyst with the Department of Environmental Protection, Mr. Marin drew a line on a map of the site that was intended to separate areas where leachate contamination of well water was likely from areas where the risk of such contamination was small. A reproduction of the pertinent portion of that map is included in this report. Mr. Marin stipulated that some wells drilled in the putatively safe zone might still be subject to leachate contamination since the directions of groundwater flow in the bedrock underlying the site could not be conclusively determined. Part of the "unknown quantity" was the orientation of fractures within the rock. A study of bedrock outcrops suggests that the principal orientation of fractures is east-southeast. Nevertheless, crosscutting fractures oriented in opposing directions probably exist, though not in the same concentration as the principal fractures.

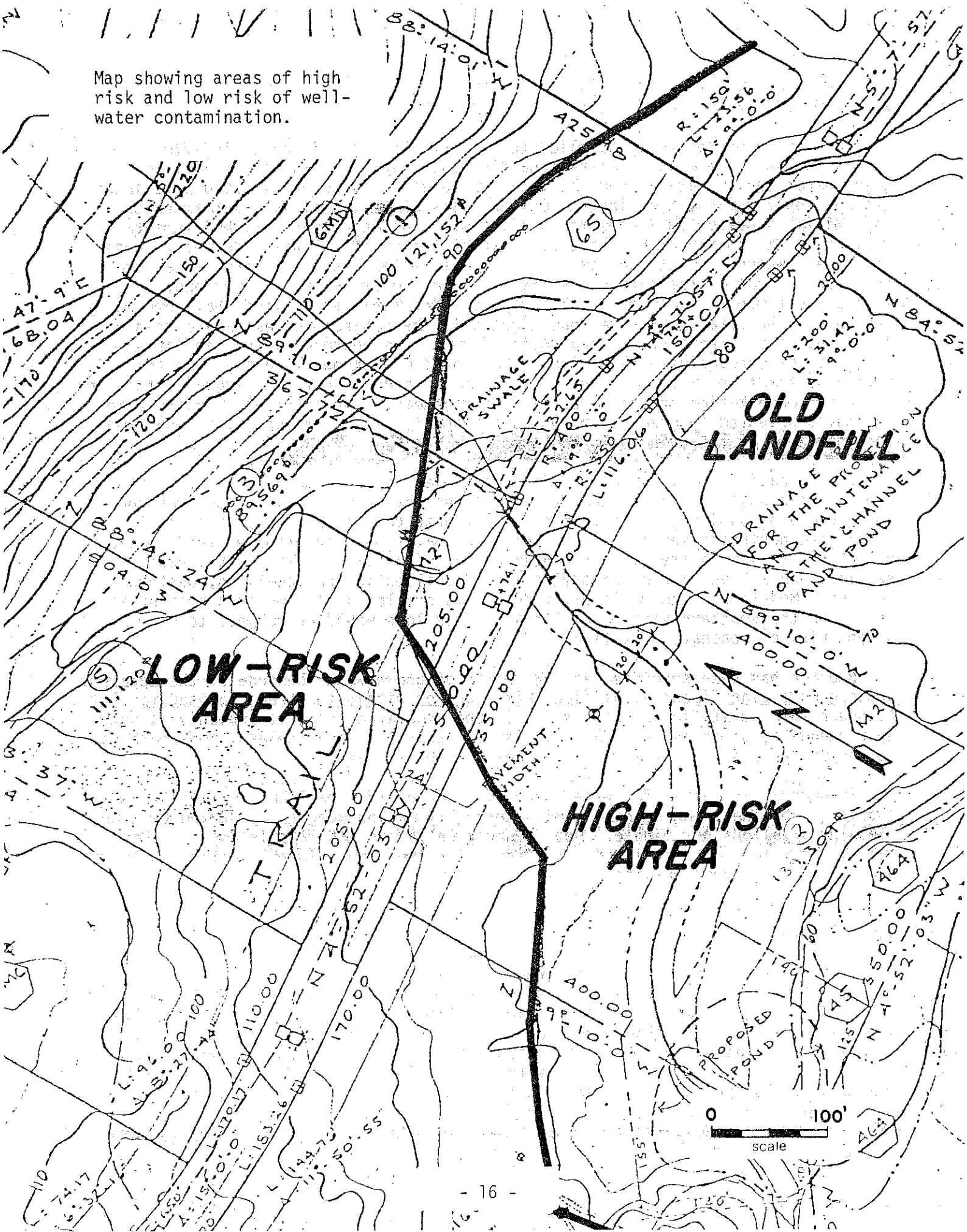
On the basis of Mr. Marin's report and the evidence of major fracture orientations to the east-southeast, the Team concludes that a well drilled on proposed lot 2 would be subject to a high risk of leachate pollution, the risk being lowest in the northeast section of the lot; and that a well on proposed lot 1 would be subject to a moderate risk of contamination if drilled in the rocky, eastern section, and a high risk of contamination if drilled in the low-lying, western section. Moderate risks would exist for wells drilled in the western section of lot 3 and the southern section of lot 4. Other lots would be subject to only a slight risk of leachate pollution.

Bedrock has been specified as the source of groundwater because of the apparent absence of a significant stratified drift aquifer within the area proposed for lots. Although some stratified drift remains in the excavated area, it probably is not deep enough to serve as a useful water-supply source. Nevertheless, some potential may exist for a stratified-drift well in lots 10, 12, and 14.

If bedrock is tapped for water supply, as expected, small but reliable yields should be obtained. An average family generally may be adequately served by a well yielding 3 gallons per minute. Most bedrock wells can supply this amount. No public water supply is available or planned for the site. Potable water supply will have to be taken from on-site well sources.

WASTE DISPOSAL

Sewage disposal for this rural area would depend upon the installation of satisfactory on-site subsurface sewage disposal systems. Visual observations, the review of observation pits, and soil survey mapping information indicates that conditions, particularly in the disturbed areas east of the proposed road is not particularly suitable for sewage disposal. High ground water, underlying shallow bedrock and steep slopes are the major adverse factors. In effect, about half or less of the area of each lot on the east side of the roadway would be severely limited by slope, crossing watercourse(s) or rock. In the disturbed ground, most of the overlying soil has been removed down to or near a base of underlying rock with high seasonal



Map showing areas of high risk and low risk of well-water contamination.

ground water in evidence at or close to the surface. While satisfactory percolation rates may be obtained at a shallow depth (small or very limited portion of a lot may have suitable soil of adequate depth), the more perplexing problem is to clearly determine if there is a sufficiently large, suitable area for sewage disposal purposes. It would therefore seem necessary to have additional soil tests performed on those lots which have severe limitation. In some instances ground water control drains may have to be installed. These drains should be monitored during the wet spring months to determine their effectiveness and the maximum ground water levels in the area.

Two or three acre lots would normally be considered large, leading to a low density development which should be suitable, in most cases, for both on-site water supply and long term sewage disposal. Due to the severe limitations on this site it would be beneficial if the very marginal lots were eliminated or combined with others. The land could then be developed in accordance with the soil's ability to properly treat and dispose of wastes and allow ample location for a water supply well.

No current or future need for sewers are proposed for the review site. The Regional Plan of Development proposes the Hammonasset River corridor for conservation as a natural area because of its public watershed value and because of its susceptibility to flooding. The Valley Shore Facilities Plan (now under consideration by area towns) indicates that the Chestnut Hill/Hammonasset River area has no known waste water disposal problems and that a program of sewer avoidance relying on on-site systems will be adequate for this section of town.

PLANNING CONCERNS

The proposed site has been extensively disturbed by previous sand/gravel removal activity and the past operation of Killingworth's municipal landfill. Of most concern to the Team planner is the fact that on-site water will be drawn from wells which have a close proximity to the abandoned landfill. The applicant should submit documentation that safe drinking water is present, prior to approval of this subdivision. The layout of the proposed road is a second issue which warrants further discussion between the applicant and commission. As stated in the Roads section of this report, the proposed design of the road right-of-way (ROW) does not follow the natural contour of this parcel and will require considerable cut, fill and cost to construct. It would seem to promote better road layout and homesite location that the road should follow the existing dirt road which runs through this site's flatter terrain. Also related to road layout is the design of driveway access. The protection of 24± acres of land along the Hammonasset River is a positive design proposal.

ROADS

The proposed subdivision road, Bar Gate Trail, will interconnect with Chestnut Hill Road. Chestnut Hill Road is a paved town road which is classified in the Town Plan as part of Killingworth's primary system. Chestnut Hill functions as a collector road serving a dual function of providing access to abuting property and connecting secondary residential streets to other collector roads and/or state highways. The Town Plan recognizes that new subdivision activity along Chestnut Hill Road is adding

to its traffic volume. The plan recommends that the dangerous intersection of Chestnut Hill Road and River Road, about 1/2 mile east of the proposed entrance to Bar Gate Trail be improved.

The proposed Site Development Plan and road profiles indicate a local street with a 50' r.o.w. and 24' pavement width. The plan shows this road as a temporary dead end with eventual extension through Sections II and III to Chestnut Hill Road. Maximum grade for a local street as set by Killingworth's road regulations is 10%. The Profile Plan indicates that the area of the temporary turn-around will be 9.5% and topography beyond this point (Section II) rises to the 200' elevation. During the team's field inspection, members expressed concern that the proposed road layout did not seem to follow the site's better terrain but rather crossed the abandoned landfill area, over several ledge outcrops, up the steeper slopes and through the best area of tree cover. The proposed road does not follow the site's general contour or the existing dirt road which runs parallel to the river along the site's flat terrain. Of additional concern is the future location of driveways which on lots 8-15 may require steep accessways.

Major concern was expressed about the road location over the former landfill. As the landfill was probably not sufficiently compacted for this proposed use, sections of the landfill would have to be removed for establishment of the roadway. If excavation of the landfill does not take place and the road is established as planned, the developers run the risk of potential road collapse as the landfill settles with time.

SERVICES TO SUPPORT DEVELOPMENT

No public water or sewer services will be required. Killingworth's General Government services and educational system can adequately accommodate the additional demands generated by this development. The Town will eventually have to improve portions of Chestnut Hill Road and the intersection of Chestnut Hill and River Road as increased use, especially school buses, necessitate wider and safer travelway.

COMPATIBILITY OF SURROUNDING LAND USES

The proposed use of this site for residential purposes is compatible with Killingworth's 2 acre zoning. The protection of the river corridor by the dedication of open space (24+/-acres) achieves a dual purpose of natural resource protection and offers the possibility of passive recreational uses such as fishing and walking trails which could be interconnected with other holdings to form an open space "green belt system" along the river.

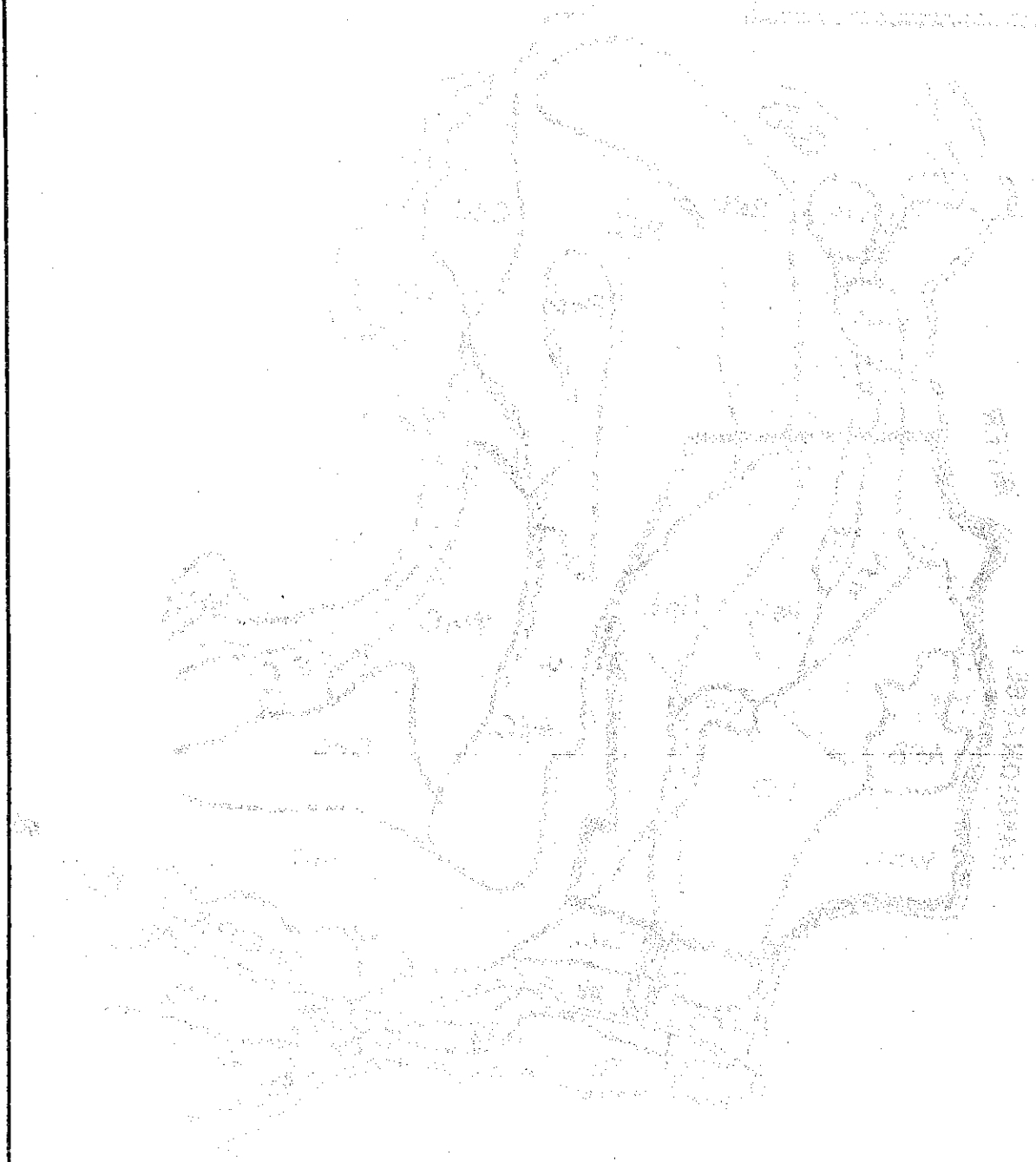
ALTERNATE LAND USES

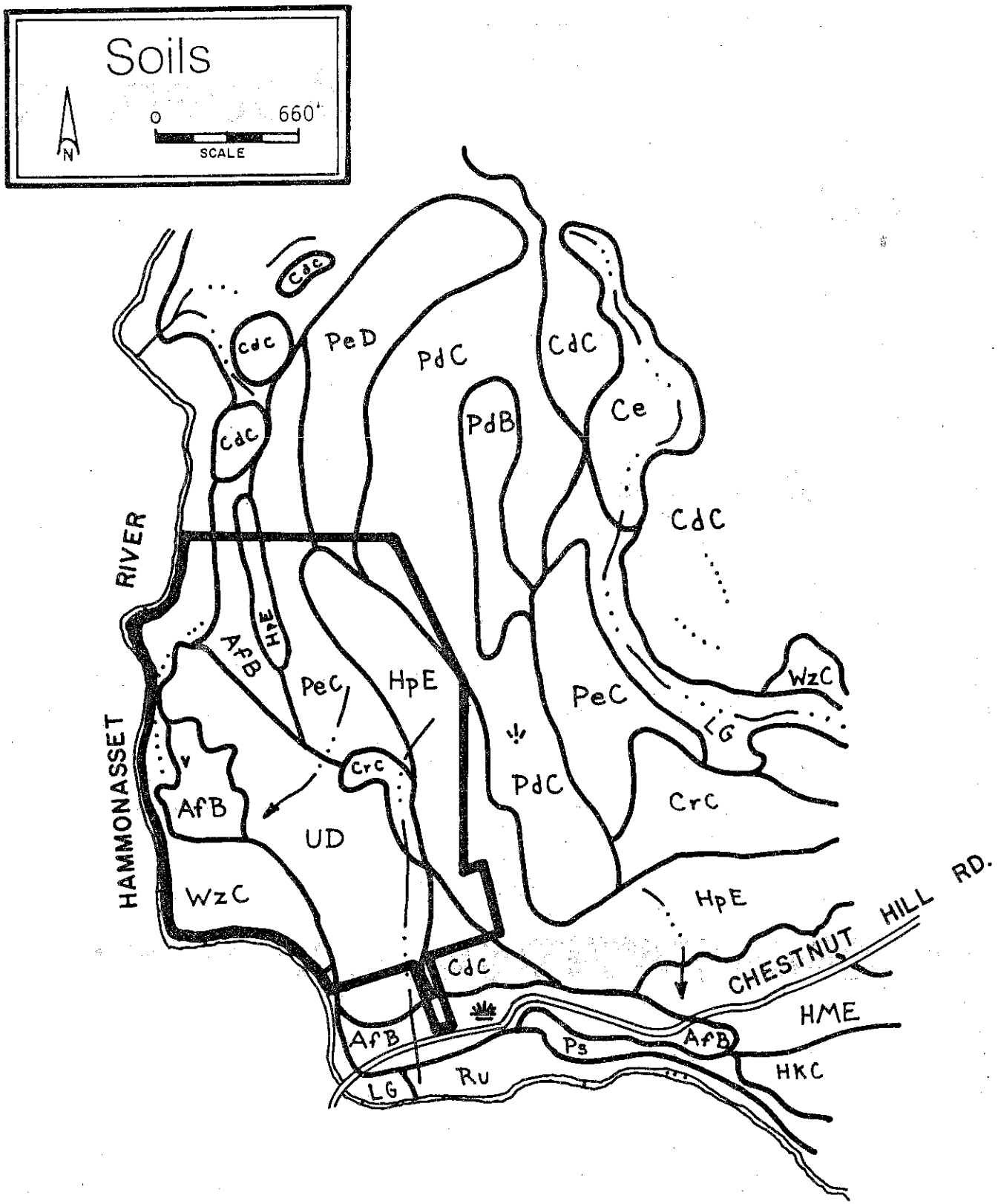
The reservation of the flood prone portions of this site for open space/passive recreational uses has been taken into the site's design plan. Better layout and arrangement of road and lots should be considered.

HAZARDS

The Hammonasset River is identified as having portions within the 100-year flood hazard area. The Subdivision Map indicates that the 100-year flood hazard area has been recognized as part of this parcel site design and will be dedicated to protected open space use along the river corridor.

Appendix

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INDIAN SPRINGS SUBDIVISION
KILLINGWORTH, CONNECTICUT

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Urban Use Limitations*			
					On-Site Sewage	Buildings with Basements	Streets & Parking	Land-Scaping
Agawam	AfB	7	13		1	1	1	1
Canton-Charlton	CdC	2	3	Large stones, Slope	3	3	2	3
Charlton-Hollis								
Charlton Part	CrC	2	3	Large stones, Slope, Depth to rock	2	2	2	2
Hollis Part					3	3	3	3
Hollis-Charlton	HpE	12	20	Slope, Depth to rock, Large stones	3	3	3	3
Paxton-Montauk	PdC	2	3	Large stones, Frost action, Slope	3	3	2	3
	PeC	8	13					
	PeD	2	3					
Woodbridge	WzC	9	15	Wetness, Frost action, Large stones	3	3	3	3
Udorthents	UD	18	30	Limitations Determined On Site				

*Limitations: 1 = slight; 2 = moderate; 3 = severe.
**Inland wetlands soil regulated under P.A. 155.

SOIL INTERPRETATIONS FOR URBAN USES

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

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

Slight Limitations

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

Moderate Limitations

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

Severe Limitations

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

About the Team

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

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

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use 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, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360.