RIDGEVIEW ASSOCIATES

Marlborough, Connecticut

AUGUST 1988

ENVIRONMENTAL REVIEW TEAM REPORT

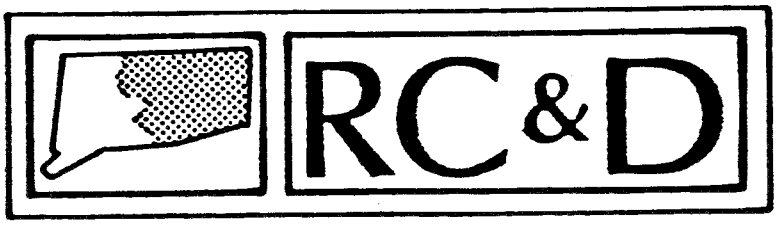
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

RIDGEVIEW ASSOCIATES

Marlborough, Connecticut

Review Date: MAY 24,1988

Report Date: AUGUST 1988



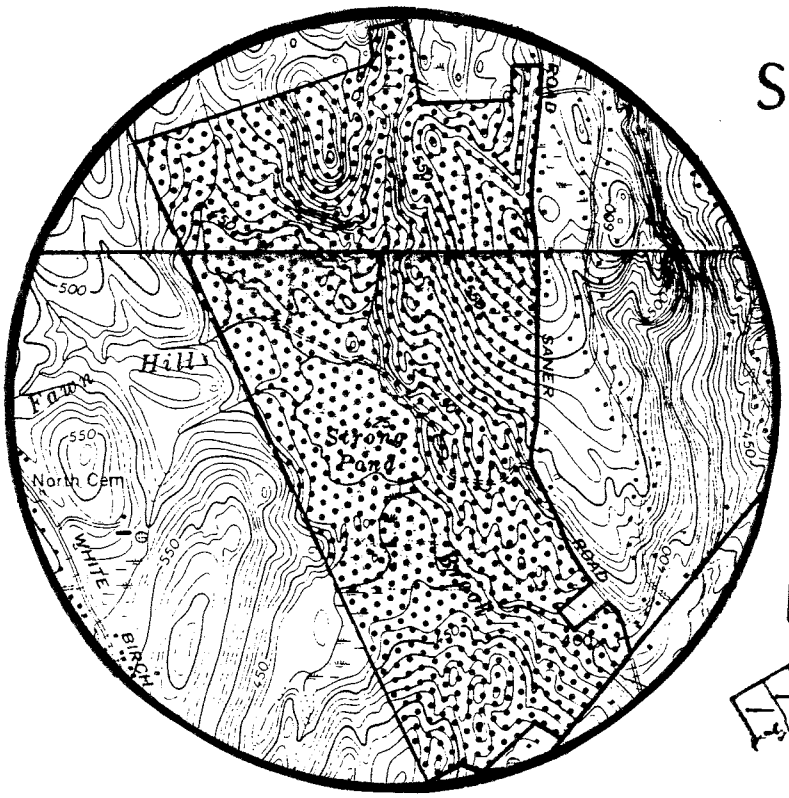
ENVIRONMENTAL REVIEW TEAM

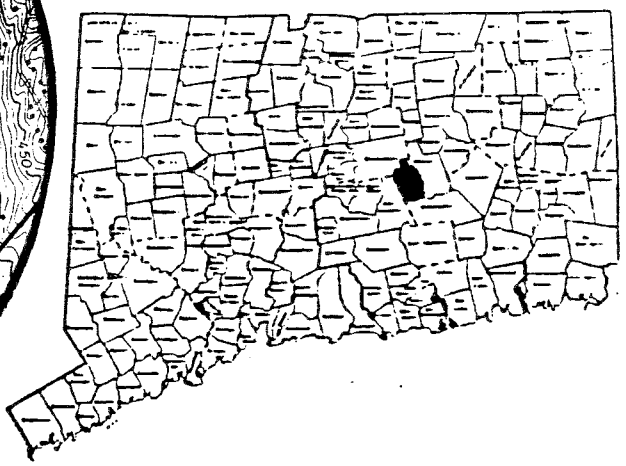
PO BOX 70

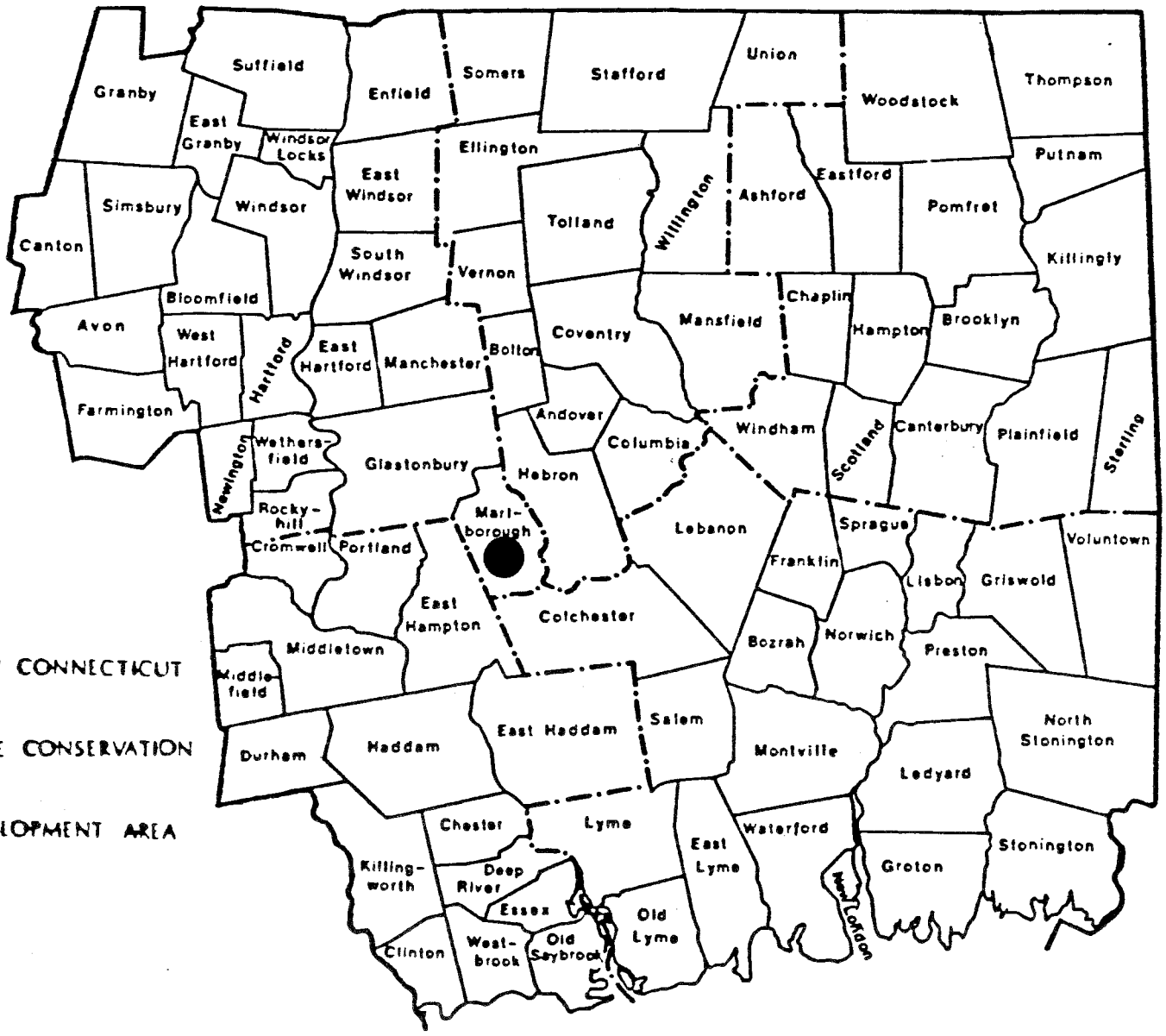
HADDAM, CONNECTICUT 06438

Site Location

RIDGEVIEW ASSOCIATES SUBDIVISION
MARLBOROUGH, CONNECTICUT







EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT
ON
RIDGEVIEW ASSOCIATES SUBDIVISION
MARLBOROUGH, CONNECTICUT

This report is an outgrowth of a request from the Marlborough First Selectman to the Hartford 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 Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The ERT met and field checked the site on Tuesday, May 24, 1988. Team members participating on this review included:

Nicholas Bellatoni	--State Archaeologist - The CT State Museum of Natural History
Kevin DesRoberts	--Wildlife Assistant - DEP, Eastern District
Steve Hill	--Wildlife Biologist - DEP, Eastern District
Kip Kolesinkas	--Soil Resource Specialist - U.S.D.A., Soil Conservation Service
Wesley Marsh	--Sr. Environmental Analyst - DEP - Dam Safety Section
Brian Murphy	--Fisheries Biologist - DEP, Eastern District
James Parda	--Forester - DEP - Eastern District
Stuart Popper	--Senior Planner Capitol Region Council of Governments
J. Eric Scherer	--District Conservationist U.S.D.A., Soil Conservation Service
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, 2 location maps, a topographic map, and a soils map. During the field review the Team members were given preliminary plans. The Team met with, and were accompanied by the Town Planner, representatives of the applicant, their engineer and their environmental/hydrogeologic consultant. 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:

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P. O. Box 70
Haddam, CT 06438
(203) 345-3977

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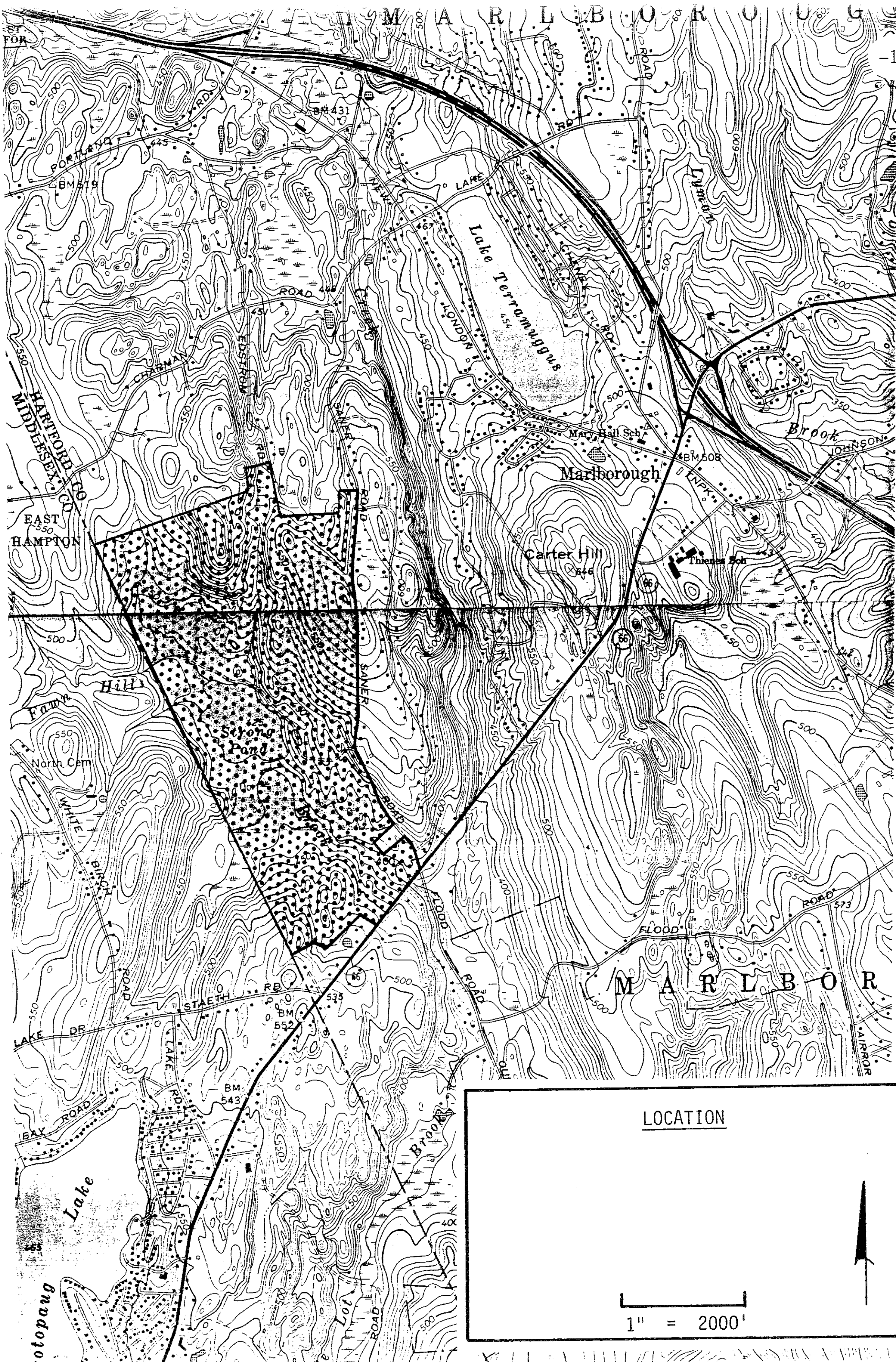


M A R L B O R O U G
PORTLAND RD
BM 519
BM 431
CHARMAN
EDSTROM RD
SANER ROAD
LAKE
NEW LONDON TNPK
Lake Terramuggus
Mary Hall Sch
Marlborough
BM 508
Brook
JOHNSON
Lyman
Carter Hill
646
Thienes Sch
HARTFORD CO
MIDDLESEX CO
EAST HAMPTON
Fawn Hill
North Cem
Strong Pond
Brook
WHITE BIRCH ROAD
FLOOD ROAD
FLOOD
ROAD
573
M A R L B O R
STAETH RD
BM 552
535
LAKE DR
LAKE RD
BAY ROAD
BM 543
Lake
Lot Brook
AIRPORT
LOCATION
1" = 2000'

1. INTRODUCTION

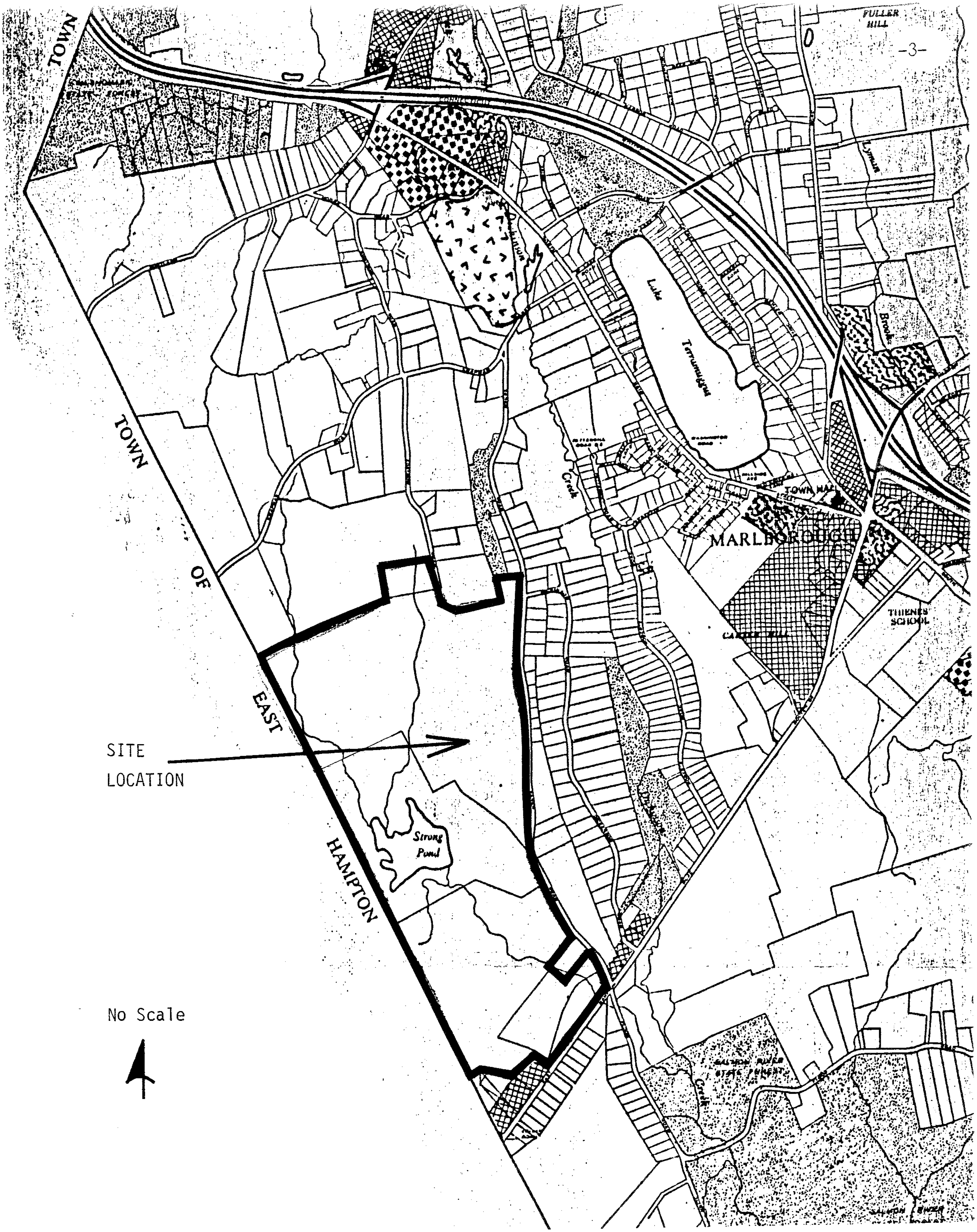
The Eastern Connecticut Environmental Review Team has been asked to review and evaluate the proposed **Ridgeview Associates Subdivision** (Kimco Builders/Conneq Real Estate Corp.). Preliminary plans were used by the Team members to prepare their reports. The following sections include information concerning the natural resource base of the site, highlights areas of concern, and discusses impacts and mitigating measures. It is hoped that this report will be useful to the Town and developer in determining appropriate development of this site.

A. Setting and Topography

The proposed subdivision site, about 467 acres in size, is located at the western town limits of Marlborough. The East Hampton town line forms the western boundary of the parcel. Other boundaries for the site include Route 66 on the south, Saner Road on the east and private, undeveloped land on the north. Edstrom Road, a dead end road off Chapman Road terminates at the northern boundary of the site. The interior road system will access the site via Route 66, Edstrom Road and Saner Road.

It should be noted that the major topographical feature of the site is Strong Pond. The pond was created by impounding Fawn Hill Brook prior to 1934. At some point between 1965 and 1970, Strong Pond was breached and a sand and gravel removal operation commenced. This area was extensively disturbed by the operation and retains features resulting from the excavation. These include bermed areas, ponds, gravel dikes, areas where large boulders have been stock-piled, and poorly drained depressions. As a result of this activity, the natural drainage in the area has been disrupted. Fawn Hill Brook, the major streamcourse on the site bisects this area in a southerly direction enroute to Dickinson Creek.

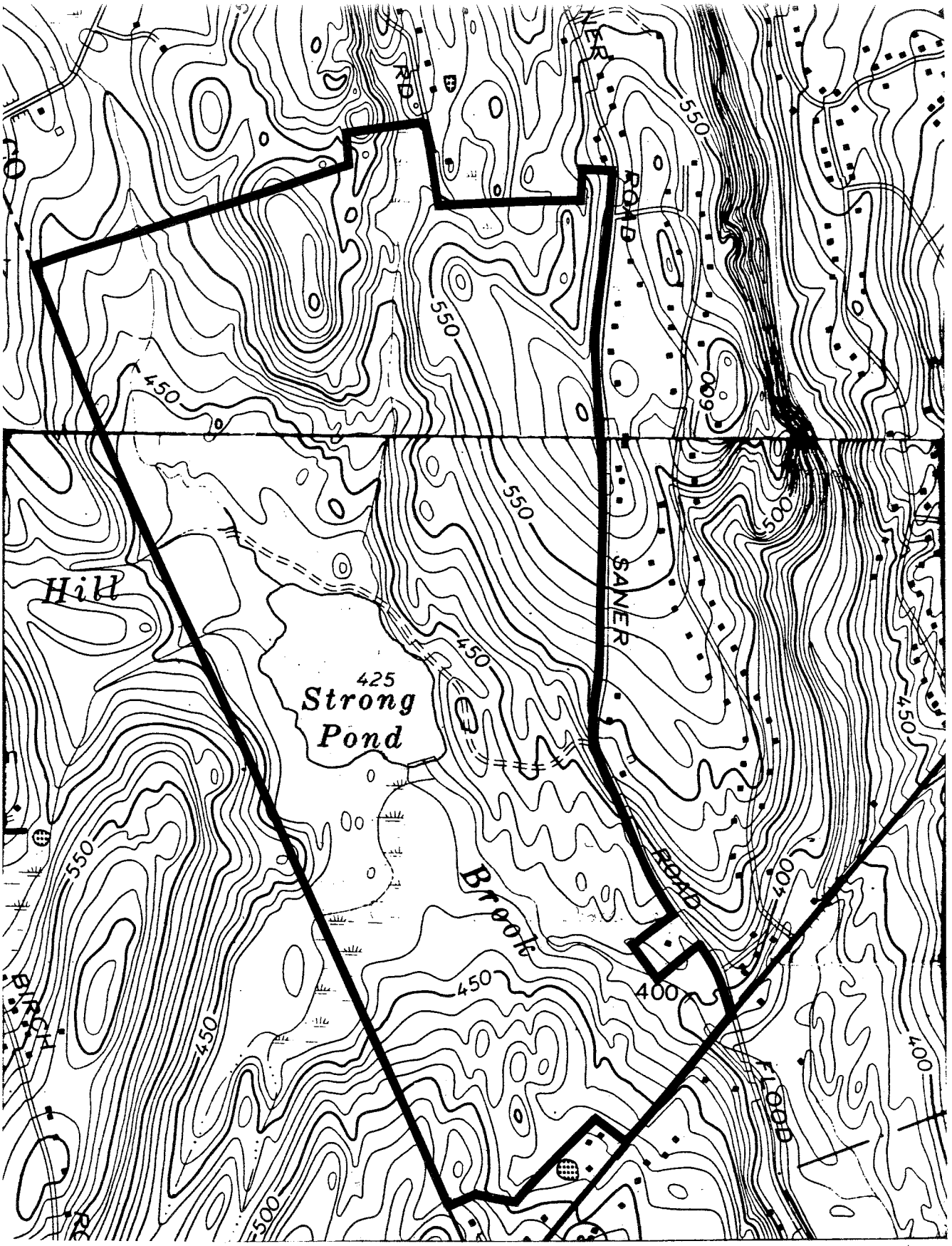
The site is located entirely in an area which is zoned for 2 acre (80,000 square feet) lots if unsewered, and 3/4 acre (30,000 square feet) lots if sewered. It is understood that the applicant wishes to construct 241 residential lots with an average lot size of 30,000 square feet. As a result, the subdivision will need to be served by a municipal sewer line. Present plans are to extend a municipal sewer line from East


FULLER HILL
TOWN OF EAST HAMPTON
Lake Terramuggus
Creek
Brook
MARLBOROUGH
TOWN HALL
THIENES SCHOOL
Strong Pond
SITE LOCATION
No Scale

Hampton to serve the project. Each of the 241 lots would be served by a private, individual on-site well that will probably tap the underlying bedrock.

Except for the formerly mined areas surrounding Strong Pond, the site is entirely wooded. Based on a 1986 air photo of the area, land use in the area is low to medium density residential with scattered agricultural uses.

The central and westcentral parts of the site comprise the Fawn Hill Brook Valley. Slopes in this area, which are mostly gentle, are controlled by the sand and gravel deposits that overlie the bedrock. The upland areas that flank the valley are controlled by the underlying bedrock. Slopes in these areas range from gentle to moderately steep. The bedrock is at or near ground surface in much of these areas. The steepest slopes are associated with the rocky knoll at the northern limits.



TOPOGRAPHY

SCALE 1" = 1000' Approximate Site Boundary

2. GEOLOGY

Most of the site (central and southern parts) is encompassed by the Moodus topographical quadrangle. The northern part of the parcel is located in the Marlborough topographical quadrangle.

A surficial geologic map (GQ-1205, by D. W. O'Leary) and a bedrock geologic map, (QR-27 by L. Lundgren, L. Ashmead and G. Snyder) have been published for the Moodus quadrangle. A surficial geologic map (GQ-1504, by D. W. O'Leary) and a bedrock geologic map (GQ-791, by G. Snyder) have been published for the Marlborough topographic quadrangle. All of the above maps may be purchased at the DEP's Natural Resources Center in Hartford.

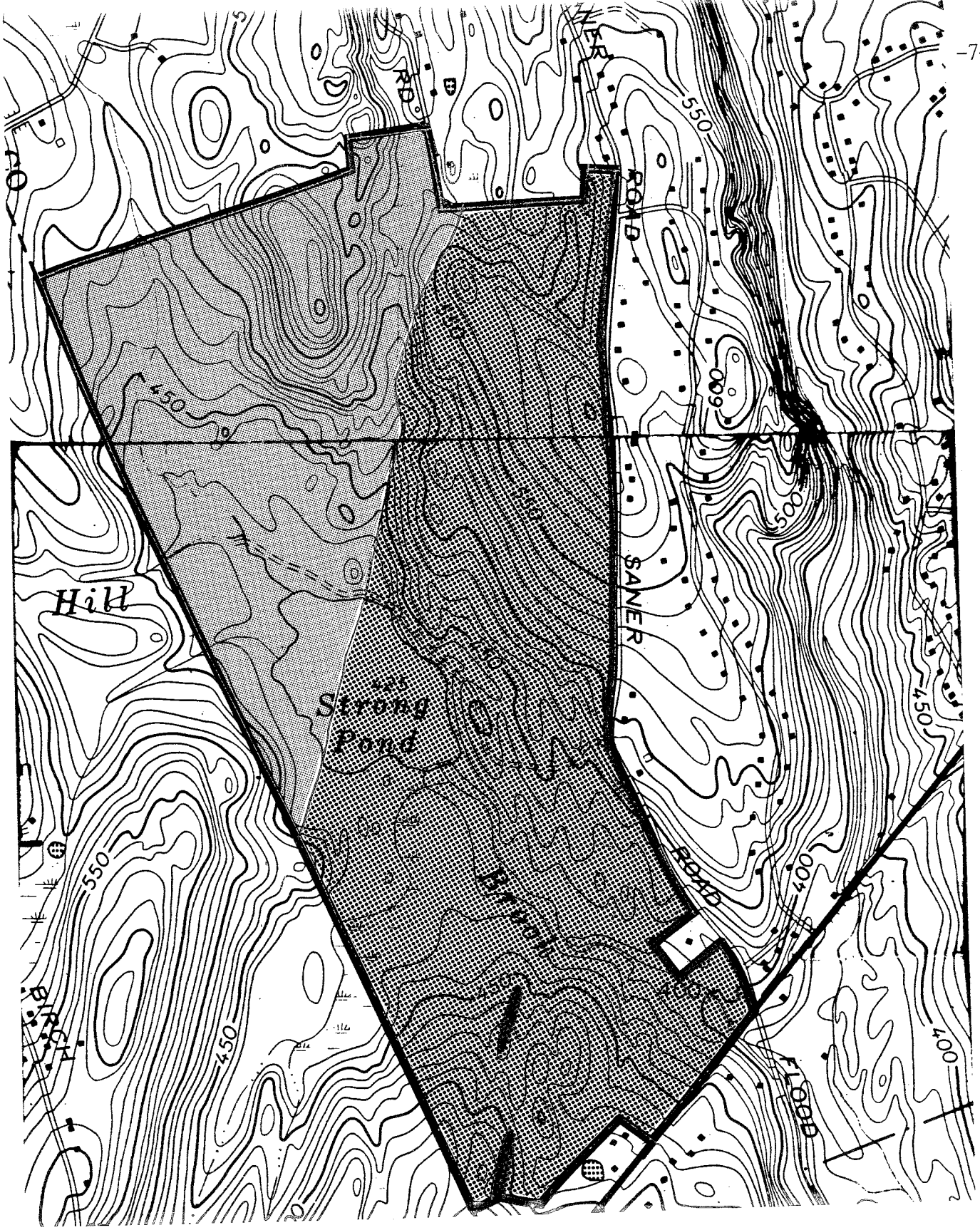
A. Bedrock Geology

In general, bedrock in the vicinity of the site consists of a light to dark, medium coarse grained gneiss known as Monson Gneiss and a gray, rusty-weathering, medium to coarse grained interlayered schist and gneiss known as Brimfield Schist. The latter rock type underlies the southern half of the parcel while Monson Gneiss underlies the northern half of the parcel. It should be noted that there are inclusions or lenses of a hornblende-plagioclase amphibolite in the Brimfield Schist.

The schists, gneisses and amphibolites mentioned above comprise complex, crystalline metamorphic rocks. The rocks, which are from the Ordovician geologic period (505-538 million years old), have been subjected to the heat and pressure of mountain building (metamorphism).

They are greatly changed since their deposition as mud, silt, sand or volcanic material. Foliation (layering of minerals) has developed as micas, and other platy minerals that grew along preferred directions in response to heat and pressure. "Gneisses" are characterized by light and dark colored minerals arranged in layers with a banded, streaky or speckled appearance. "Schists" are generally cleavable rocks with layers defined by a parallel arrangement of platy or flaky minerals. Finally, "amphibolites" are dark, metamorphic rocks, chiefly composed of the minerals hornblende and plagioclase feldspar.

Based on interpretation of bedrock geologic mapping data by the Team's Geologist, it appears that the site is crossed by northwest/southeast and northeast/southwest trending regional faults. The latter is aligned with the contact between Monson Gneiss and Brimfield Schist, while the former aligns with Fawn Hill Brook. As a result, it may be expected that the upper few hundred feet of the bedrock surface is possibly fractured and weathered. The faults mentioned above would have formed during the geologic past but are no longer experiencing active movements.



BEDROCK GEOLOGY

Monson Gneiss
Brimfield Schist
Amphibolite Inclusions

Scale 1" = 1000'

B. Surficial Geology

Based on surficial geologic and soil mapping data, the unconsolidated materials overlying bedrock on the site consist of glacial till and stratified drift. The till was plastered onto the metamorphic bedrock underlying the site by moving glacial ice. It consists of ground up rock material which may range in size from clay to boulders or any combination of these intermediate sizes. Because the ice moved the particles without regard to their sizes or shapes, till textures may be locally quite variable. Two types of till have been identified in Connecticut. One is fairly loose and sandy, while the other is typically silty, crudely layered and compact. Based on discussion with the Team's Soil Scientist and reviewing soil mapping data, it appears that the sandier, looser variety of till covers most of the site. The siltier, compact variety of till is found mainly along Saner Road in the eastern part. A firm or compact soil zone has developed in the till deposit about 2.5 to 3.5 feet below ground surface. The presence of this firm layer could impede the downward movement of water resulting in a seasonally high water table. This would occur mainly during the wet months of the year when the upper, more permeable soil zones become saturated.

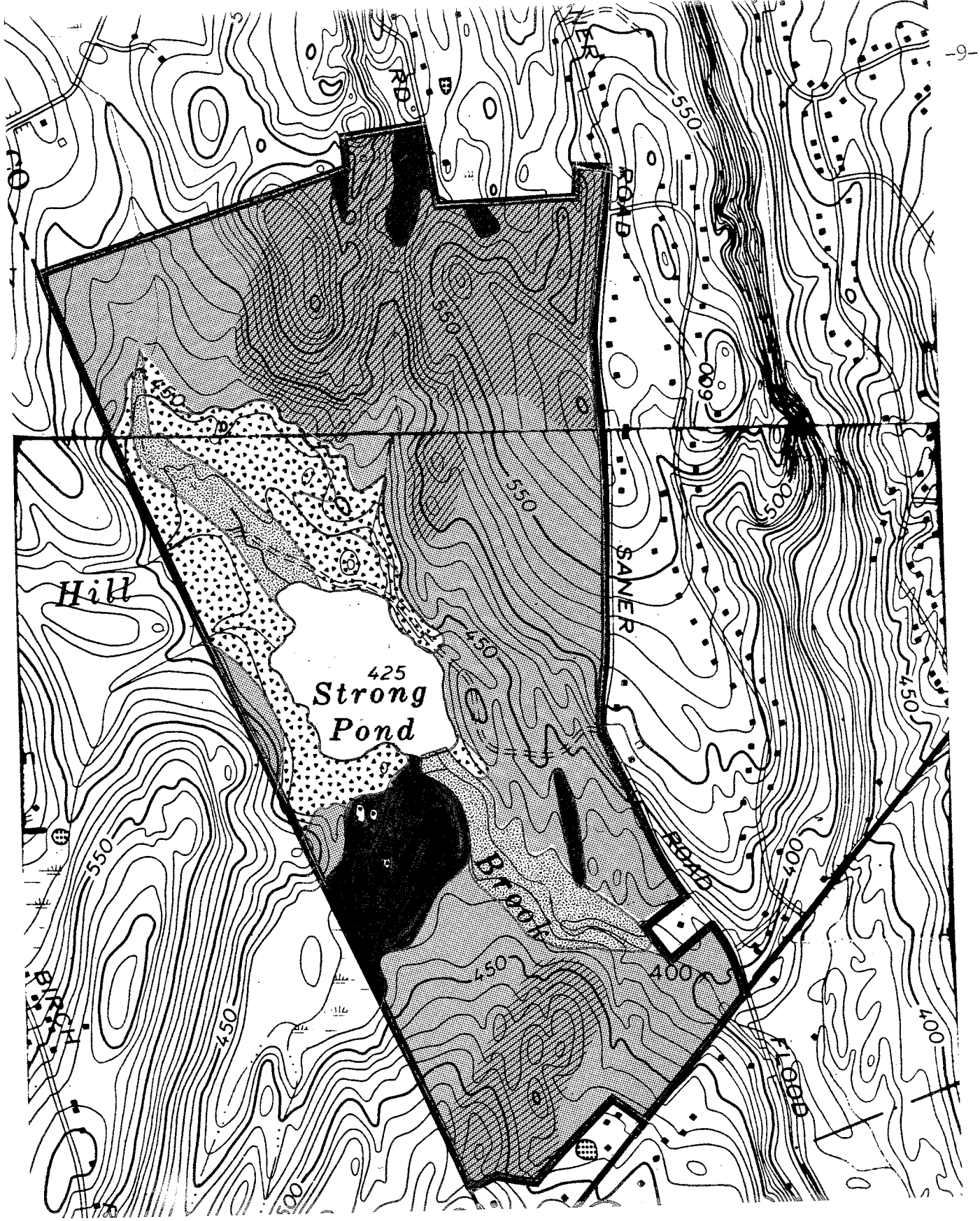
Based on the subdivision plan submitted to Team members, regulated inland-wetland soils have been mapped throughout the site. They were field checked by a certified soil scientist and their boundaries superimposed onto the subdivision plan. The wetland soils generally parallel the perennial and seasonal watercourses (i.e., Fawn Hill Brook and its tributaries) throughout the site. Also, there are a few small to medium sized wetland pockets scattered throughout the site. The soils comprising these areas range from poorly to very poorly drained and are found mainly in drainageways and depressionals features on the upland till soils, respectively.

Because seasonally high water tables and frequent flooding (mid-November to mid-April and following major storm events) characterize these areas, they hold very low potential for development purposes.

Another post glacial sediment, occurring mainly along Fawn Hill Brook, is alluvium. It consists of silt, sand and gravel that have been recently deposited on the Fawn Hill Brook floodplain.

It seems that the flood control attributes and sediment retention capabilities of the wetlands are good. The best areas are those which have gradients that are flat and relatively wide. The drainageways, which have steep gradients serve as conduits for surface runoff to adjacent, larger streamcourses or wetland areas.

All areas identified as wetland soils are considered "regulated areas" under Chapter 440 of the Connecticut General Statutes. It is understood that the Town's Inland-Wetland Commission regulates an area of 150 feet from the wetland boundary. This boundary has also been shown on



SURFICIAL GEOLOGY

Till
Stratified Drift
Swamp Sediments
Alluvium
Areas where bedrock is at or near ground surface

Scale 1" = 1000'

the subdivision plan. Any proposed activity such as grading, filling or modifications that impacts regulated areas are subject to aproval by the Marlborough Inland-Wetland Commission. In reviewing a proposal, the Commission needs to determine the impact that the proposed activity will have on the wetland. If the Commission feels that the regulated areas are serving an important hydrologic or ecologic function and that the impact of the proposed activity will be severe, they may deny the activity altogether, or at least require measures that would minimize the impact. (See GEOLOGIC DEVELOPMENT CONCERNS).

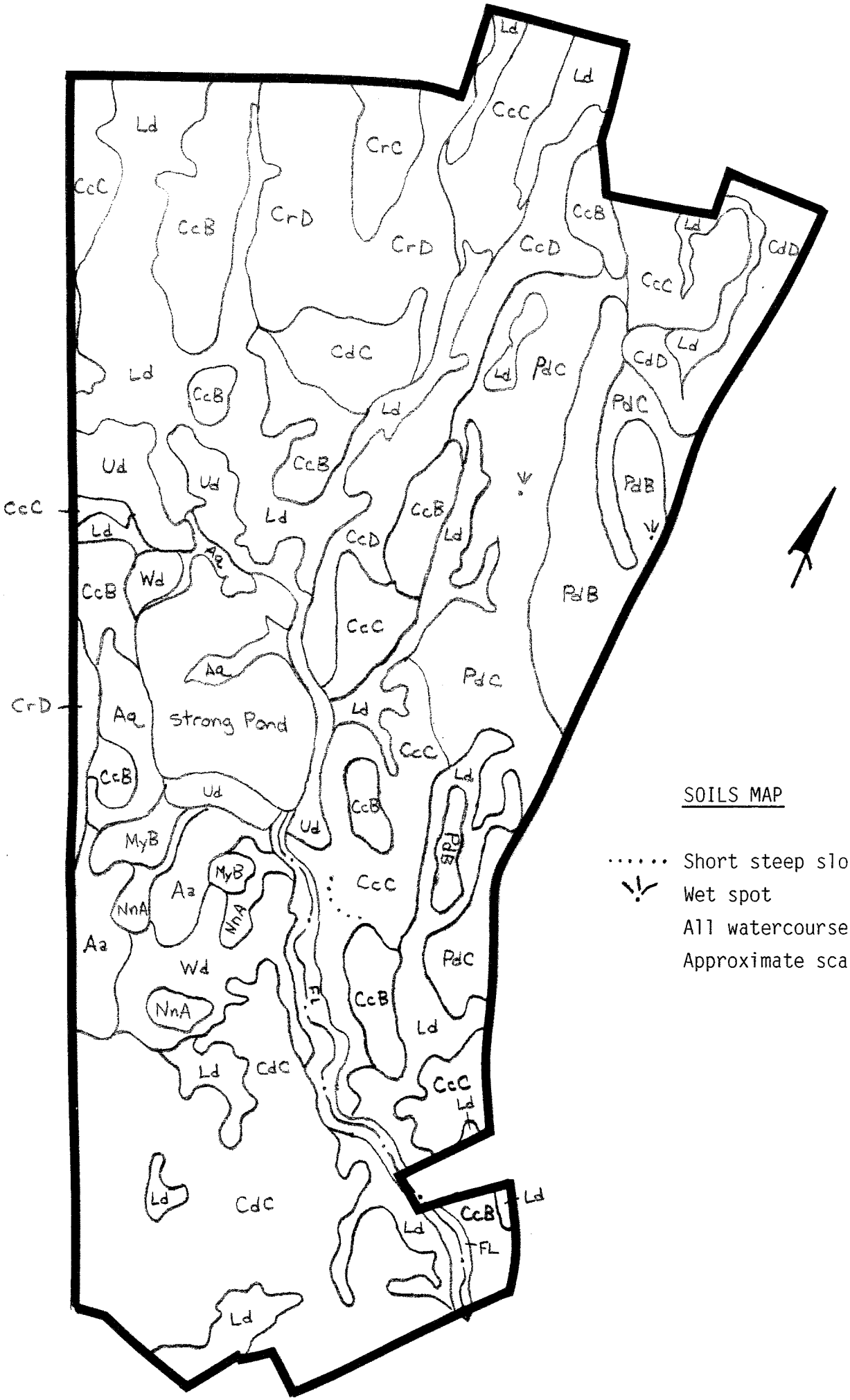
3. SOIL RESOURCES

A. Major Landforms

The Ridgeview Associates property is dominated by three major landforms. The eastern landform along Saner Road is dominated by deep, gently to strongly sloping, glacial till soils with a firm, dense substratum (hardpan) at about a two foot depth. The lower sideslopes, and landforms both north and south of Strong Pond are dominated by loose, "water-worked" glacial till soils formed in loamy to loamy over sandy or gravelly materials. Small undisturbed areas of glacial outwash soils occur in the general vicinity of Stong Pond. The soils on the till landforms range from well drained to very poorly drained. The lowest part of the landscape is dominated by the narrow floodplains associated with Fawn Hill Brook and other tributary watercourses, and areas of shallow organic (muck) soils just south of the Pond.

B. Soils Map and Interpretations

The soil map included with this report has been created from on-site investigation, air photo interpretation, and information provided by Soil Science and Environmental Services. This map can be used for a general discussion of soil limitations on this parcel. All discussions about inland wetland locations and boundaries should refer to the wetlands boundaries mapped by Soil Science and Environmental Services. A chart of important soil features and interpretations has also been prepared. The legend and map unit symbols used in this report are unique, and cannot be used with other soil surveys.



SOILS MAP

····· Short steep slope

Wet spot

All watercourses not shown

Approximate scale 1" = 750'

MAP UNIT NAME	GENERAL SOIL PROPERTIES	DRAINAGE CLASS AND DEPTH TO SEASONAL HIGH WATER TABLE	MAJOR LIMITATIONS TO THE DEVELOPMENT OF: HOMES WITH BASEMENTS	HOMES WITHOUT BASEMENTS	ON-SITE SEPTIC SYSTEMS	ROADS AND STREETS
Aa-Adrian Muck	Soils formed in organic materials over sand or sand and gravel.	Very poorly drained +1 - 1. ft.	Wetness, subsides	Wetness, subsides	Wetness, subsides	Wetness, subsides, subject to frost action
Aq-Aquents, smoothed	Soils disturbed by cutting and filling in loamy to gravelly materials.	Poorly drained to very poorly drained +1 - 1. ft.	Wetness, Flooding	Wetness Flooding	Wetness Flooding	Wetness, Flooding
CcB-Canton and Charlton very stony fine sandy loams, 3-8% slopes	Glacial till soils formed in loose, loamy or loamy over sandy materials.	Well drained >4 ft.	None	None	None	None
CcC-Canton and Charlton very stony fine sandy loams, 8-15% slopes	Glacial till soils formed in loose, loamy or loamy over sandy materials.	Well drained >4 ft.	None	None	None	None
CdC-Canton and Charlton extremely stony fine sandy loams, 3-15% slopes	Glacial till soils formed in loose, loamy or loamy over sandy materials.	Well drained >4 ft.	None	None	None	None
CdD-Canton and Charlton extremely stony fine sandy loams, 15-35% slopes	Glacial till soils formed in loose, loamy over sandy materials.	Well drained >4 ft.	Slope	Slope	Slope	Slope
CrC-Charlton-Hollis complex, very rocky 3-15% slopes	Glacial till soils from deep to shallow over bedrock. Formed in loamy materials.	Well drained to excessively drained >4 ft.	Variable depth to bedrock	Variable depth to bedrock	Variable depth to bedrock	Variable depth to bedrock
CrD-Charlton-Hollis Rock outcrop complex 15-25% slopes	Glacial till soils from deep to shallow over bedrock. Formed in loamy materials.	Well drained to excessively drained >4 ft.	Depth to bedrock, slope	Depth to bedrock, slope	Depth to bedrock, slope	Depth to bedrock, slope
Fl-Fluvents-Fluvaquents complex	Alluvial soils formed in loamy to gravelly materials.	Variable	Flooding	Flooding	Flooding	Flooding

MAP UNIT NAME	GENERAL SOIL PROPERTIES	DRAINAGE CLASS AND DEPTH TO SEASONAL HIGH WATER TABLE	MAJOR LIMITATIONS TO THE DEVELOPMENT OF: HOMES WITH BASEMENTS	HOMES WITHOUT BASEMENTS	ON-SITE SEPTIC SYSTEMS	ROADS AND STREETS
LG-Leicester, Ridgebury, and Whitman extremely stony fine sand loams	Undifferentiated unit of glacial till soils formed in loose to dense loamy materials	Poorly to very poorly drained Ø-1.5 ft.	Wetness	Wetness	Wetness, substratum precs slowly	Wetness, subject to frost action
MyB-Merrimac sandy loam, 3-10% slopes	Glacial outwash soils formed in sandy over sandy and gravelly materials.	Somewhat excessively drained >4 ft.	None	None	Substratum is a poor filter	None
NnA-Ninigret fine sandy loam, Ø-5% slopes	Glacial outwash soils formed in loamy over sandy and gravelly materials.	Moderately well drained 1.5-2.5 ft.	Wetness	None	Substratum is a poor filter	Subject to frost action
PdB-Paxton very stony fine sandy loam, 3-8% slopes	Glacial till soils formed in dense loamy materials.	Well drained 1.5-2.5 ft.	Seasonal wetness	None	Substratum percs slowly	None
PdC-Paxton very stony fine sandy loam, 8-15% slopes	Glacial till soils formed in dense loamy materials.	Well drained 1.5-2.5 ft.	Seasonal wetness	None	Substratum percs slowly	None
Ud-Udorthents, smoothed	Soils disturbed by cutting and filling in loamy to gravelly materials.	Excessively drained to moderately well drained 1.5 ft.->6 ft.	Variable	Variable	Variable	Variable
Wd-Walpole sandy loam	Glacial outwash soils formed in loamy over sandy and gravelly materials.	Poorly drained Ø-1. ft.	Wetness	Wetness	Wetness	Wetness, subject to frost action

C. INFORMATION AND CONCERNS

1. Included in areas mapped CcB and CcC are small areas of glacial outwash soils and till soils underlain by stratified sand and gravel. These areas are in the near vicinity of Strong Pond. Also included in mapping are areas with a firm dense substratum (Paxton soils).

2. Included in areas mapped CdC and CcD are areas of soils less than 40 inches to bedrock, and small areas of exposed bedrock.

3. Included in areas mapped Lg are small areas of poorly drained glacial outwash soils and narrow areas of alluvial soils.

4. As currently proposed, even with public sewer, many lots would not be suitable; they are dominated by wetlands, i.e., 15, 209, 88, steep to very steep slopes, i.e., 120, 121, 100, 119, or both, i.e., 198, 216, 104.

5. High intensity mapping of the non-wetland soils would provide valuable information for determining feasibility and costs for developing homes with basements, on-site septic systems, and roads and streets. This kind of detailed mapping supplemented with selected deep test pits would better define areas of soils shallow to moderately deep to bedrock, and soils with a firm dense substratum (hardpan).

6. The proposed road extensions shown along the northern property line, could, if extended, impact wetland systems to the north. If the developer has any serious intentions, soils/wetlands information should be gathered and evaluated to determine if roads entering from the south should be realigned to lessen the impacts on the northern parcel.

4. HYDROLOGY

A. Watershed Area

The ± 467 acre site drains to Fawn Hill Brook, which bisects the central parts of the site. There are several unnamed streamcourses and drainageways on the site that feed Fawn Hill Brook and Strong Pond. At its point of outflow to Dickinson Creek just south of the site, Fawn Hill Brook comprises a watershed area of about 4.02 square miles or 2,573 acres. The site, therefore represents about 18% of the total watershed area.

Based on review of recent air photos of the watershed area, land-use is characterized mostly low to moderate density residential with scattered agricultural fields. Most of the land-cover is wooded. Mean annual precipitation in the Marlborough area is about 47 inches per year.* The portion of annual precipitation that infiltrates into the underlying bedrock on most of the site is estimated to be about 8 to 9 inches. The remainder of the precipitation runs off into surface streams or is lost to evapo-transpiration. Fawn Hill Brook, Strong Pond and unnamed drainageways feeding them are classified as A by DEP. A class A surface waterbody means that the surface waters may be suitable for drinking water supply and that compatible discharges to the waters include treated backwash/drinking water treatment facilities and minor cooling or clean water.

B. Runoff and Storm Drainage

Converting the wooded land on the site to a residential subdivision at proposed densities would be expected to increase the amount of runoff shed from the site. Increased runoff would result from soil compaction, removal of vegetation and placement of impervious surfaces (roof tops, roads, driveways, etc.) over otherwise pervious soils.

Because plans are preliminary, it is not known how storm drainage will be handled from individual lots or what the hydrologic impacts will be once they are developed. The latter will depend upon the ultimate density of the subdivision and the amount of impervious surfaces created. It is expected that stormwater arising from roads and driveways would be artificially collected in catch basins and routed at various points to the streamcourses on the site or to Strong Pond, the proposed detention site area. Strong Pond is in a hydrologic position to handle post-development runoff increases from about half of the site. It

*The Climate of Connecticut by Joseph J. Brumbach, 1965, Bulletin #99, pg. 76

appears that the capacity of the Strong Pond detention basins must be designed so that it compensates for runoff from the developed land on the site (southern half) which cannot be captured by Strong Pond. The design engineer should reference Chapters 8 and 9 of Connecticut's **Guidelines for Soil Erosion and Sediment Control** for the design of the detention basins(s). Close examination of all downstream culverts is warranted particularly the one passing under Route 66. Once, the stormwater drainage plans and computation have been finalized, the Town's engineer should carefully review the plan and calculations.

C. Dam Safety

Due to the anticipated modifications to the outlet for Strong Pond and the proposed stormwater detention function of Strong Pond, it seems likely that the applicant will need to secure permits from DEP's Water Resources Unit. The Dam Safety Unit (566-7245) and Diversion Permit Unit (566-7160) should be contracted to discuss the proposed activity. A field visit by staff from the DEP-Dam Safety Section revealed that the dam is in a breached condition, and subsequently, offers no downstream hazard. Should the site be used as a detention storage facility, the reconstruction of the dam/pond must be permitted through the DEP, Dam Safety and Diversion Programs.

It is important to note that much of the Fawn Hill Brook Watershed is undeveloped. Each developer will need to do his or her part to control post-development runoff increases from their respective developments. The cumulative affect of uncontrolled runoff from developments could cause significant flooding and erosion problems in the area.

5. GEOLOGIC DEVELOPMENT CONCERNS

A. Principal Concerns

Based on available geologic maps, soil mapping data and observation made during the fieldwalk, the Team geologist's principal hydrogelogic concerns with respect to the proposed subdivision include the following:

1. the presence of shallow to bedrock conditions, which are primarily located at the northern limits, central and southern parts of the site and, if encountered, may require blasting for the placement of house foundation, roads, utility lines, etc.;

2. the presence of "hardpan" soils (along Saner Road in the eastern part), which will result in seasonally high water tables;

3. the presence of moderately steep slopes;

4. the presence of regulated wetland and alluvial soils.

The availability of a municipal sewer line helps to soften the principal hydrogeologic concerns that generally accompany most types of development where on-site septic systems need to be relied on. The applicant should be required to secure letters of confirmation from the East Hampton Sewer Authority that the development can be served without overtaxing the utility.

B. Bedrock and Blasting

As mentioned earlier, bedrock is at or near ground surface at various points throughout the site. This suggests the need for possible blasting, particularly with respect to the placement of utility lines, roads/driveways and house foundations.

Any blasting that takes place on the site should be done only under the strict supervision of persons familiar with the latest blasting techniques. Only then will the environmental effects of blasting be kept to a minimum. For the most part, these concerns inlcude flyrock; ground vibrations, airblast and dust and gases. Of special concern, with respect to the above is the moderate density of residential homes east of the site. It is strongly suggested that the blaster be required to conduct a pre-blast survey in the area. A thorough blasting record should accompany the survey. There are several methods that can be

employed which will help reduce the potential environmental effects mentioned. These include; (1) blasting to an open face; (2) multiple small-charge blasting and (3) use of millisecond delay between detonations. This will, of course, depend on the blasting requirements of the site.

C. Seasonally High Water Table

As mentioned earlier, "hardpan" soils, which are characterized by seasonally high water tables occur at the eastern limits of the site along Saner Road. The presence of these soils suggests that building footing drains should be installed around houses to protect them from groundwater infiltration. This will hopefully keep basements dry. The discharge points for drains should be properly outletted so that they do not cause water problems to adjoining properties.

D. Steep Slopes and Silty Soils

Because of the moderately steep slopes (northern parts) and the presence of till soils which may be silty, the chance for erosion/siltation problems becomes apparent. The Connecticut Soil Erosion and Sediment Control Act (Public Act, Number 83-388), which became fully effective July 1, 1985 requires a detailed erosion sediment control plan for the project. The erosion and sediment control plan should be properly enforced by the Town. Disturbed areas should be kept to a minimum under such a plan and all erosion and sediment measures called for should be shown on the subdivision plan. Every effort should be made to protect Strong Pond and Fawn Hill Brook and its tributaries from silt accumulation.

E. Wetlands

Based on the site plan distributed to Team members, approximately 550 feet of road will need to cross regulated wetland and alluvial soils. This does not include possible driveway crossings. Although undesirable, wetland road crossings are feasible provided they are properly engineered. These roads need to be constructed adequately above the surface elevation of the wetland. This will permit better drainage of the road and also decrease the frost heaving potential. Roadbed preparation needs to include removal of all organic material before the fill material is placed. In cut areas, underdrains should be installed on either side 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. Culverts should be properly sized and located so as not to alter the water levels in the wetland or cause flooding problems.

The applicant's engineer should quantify the amount of fill to be placed over regulated soils and delineate the fill lines on the subdivision plan. This will also greatly help local decision makers during their review of the plan.

Several building lots, which contain a high percentage of wetland soils occur in the subdivision. Experience has shown that when most of a lot is wetland, gradual filling by a homeowner often occurs in order to expand lawn and garden areas. Such action can be subtle and difficult to regulate. Over a period of time, it can result in significant destruction of the wetlands. Also, such activity on the part of a landowner often creates drainage problems on neighboring properties. Since the average lot size in the subdivision is only about three quarter's (3/4) of an acre, it seems likely that the potential for the filling of regulated wetland areas by homeowners in order to create more dry land would be high. The Town may want to consider having a percent buildable area requirement for lots to assure suitable room for usable outdoor living space.

6. SITE APPRAISAL OF PRELIMINARY PLAN

A site appraisal was made of the proposal. A preview of the proposal was made by project consultants and the developer and a site plan was available, scale 1" = 200', dated February 1988 for review.

A. Comments for Consideration

Relative to the comments received by the site developer and consultants and a review of the site the following comments are offered for consideration:

— A preliminary inventory and evaluation has been made of the natural resources for the site. The site does offer some important natural features including the open water habitat, the contiguous stream corridors and associated upland areas. Wildlife appeared to be plentiful with several songbird species observed during the review (Northern Oriole and Scarlet Tanager).

— Although there have been provisions made to leave open space (110 acres out of 467 acres), the site will receive considerable development pressure. Most of the smaller wetland corridors in upland areas will be either crossed or incorporated into backyards.

— In order to reduce impacts to wetlands and other sensitive areas it is important to limit the number of wetland crossings, when possible, and keep the overall integrity of all watercourses intact.

— All watercourses and drainage ways should be shown on site plans, as these are regulated areas under state and local statutes.

— To fully evaluate the impact of this or other proposals, off-site resources should be shown on plans, including natural features (wetlands) and other physical features.

— Using Planned Residential Development (PRD) at this site would greatly reduce impacts to wetlands at the site. PRD could include clustered single family homes on short road links. This type of development disturbs less land, keeps development away from sensitive areas and reduces road crossings and retains the hydraulic nature of the site more than a proposal presented. Cluster development would allow for more open space and provide for a more reasonable approach to developing this site.

7. WATER SUPPLY

A. Aquifer Potentials

The applicant's engineer (FGA Services, Inc.) has investigated and prepared a report entitled **Groundwater Study of the Saner Road Subdivision, Marlborough, Connecticut.** The main purpose of the report was to determine the potential of the sand and gravel (unconsolidated) and bedrock (consolidated) aquifers on the site to supply domestic water to homes in the proposed subdivision. The Team's geologist generally concurs with the contents of this report.

Because of the small extent of sand and gravel deposits in the central part and because of its limited thickness, it does not appear that the sand and gravel aquifer on the site would be favorable for serving the subdivision. It could probably serve those homes located along either side of Fawn Hill Brook, where the deposits are believed to be most thick. As noted in the FGA Services, Inc. report, saturated thicknesses of the sand and gravel aquifer on the site averages only 10 feet. This will obviously be a major limitation for the development of sand and gravel wells. Another concern would be the sanitary protection of shallow or dug wells, particularly where the surrounding deposits are highly permeable.

B. Bedrock Wells

Although not a prolific aquifer, the underlying metamorphic bedrock would also be capable of supplying the proposed homes with groundwater, particularly if the upper few hundred feet of the bedrock contain interconnected fractures. As mentioned in the GEOLOGY SECTION of this report, the presence of possible faults across the site, especially in Fawn Hill Brook Valley suggests that bedrock may be fractured. A drilled well cased firmly with steel pipe into the underlying metamorphic rock would be expected to afford better protection from a sanitary standpoint than a shallow well in unconsolidated materials.

Obtaining water from any given bedrock well is dependent upon the number and size of water bearing fractures that are encountered by the well. Since fractures in bedrock are irregular there is no practical way of predicting the yield of a bedrock well drilled in a specific location. Even with geophysical exploration, it is extremely difficult to predict such yields. As such, the yield of a well tapping crystalline rock cannot be estimated with any certainty before drilling. As indicated by

the FGA Services, Inc. report, well completion reports of properties in the vicinity of the subject site ranged between 2 to 40 gallons per minute. Generally speaking, a yield of three (3) gallons per minute is desirable for domestic purposes.

The metamorphic rocks underlying the site respond to geologic forces by fracturing and forming distinct open joints. If the underlying rock contains continuous and interconnected fractures and joints, then the availability of groundwater for domestic uses should be good provided the well intersects these zones. In the lower Connecticut River basin (the site is encompassed by this area), numerous wells were surveyed for Connecticut Resources Bulletin No. 21. Of all the wells, (314) surveyed that tapped a type of bedrock similar to that underlying the subdivision site, 80 percent yielded 3 gallons per minute or more and 90 percent yielded about two (2) gallons per minute.

In general, wells should be located toward the high side of lots in a direction away from the normal expected flow of groundwater from any source of subsurface pollution. They must be properly separated from on-site sewage disposal systems and other potential source of pollution which could affect the safety and quality of the water. In housing developments, in addition to sewage, particular concern must be given for any buried fuel storage tanks and on-site disposal for any waste water associated with water softening equipment utilizing salt.

Proper well construction and separating distances in accordance with State Public Health Code, Connecticut Well Drilling Board and Town regulations will allow for adequate protection of the quality of the bedrock aquifer.

Properly constructed drilled wells generally afford the greatest degree of protection against possible sources of pollution. They will also usually allow for more flexibility in actual site placement. All types of wells are to be constructed by persons who are state licensed for this profession. Proposed well sites should be inspected by the Town sanitarian or appropriate sanitation official before the issuance of a permit of approval to actually construct such wells. The sanitation or health official must generally insure that provisions of the State Public Health Code, State Well Drilling Board and local ordinances have been followed.

C. Well Interference

A concern not addressed by the applicant's engineer is whether or not there will be any interference of neighboring wells during pumping periods, especially in view of the small sized lots and the density of houses proposed. This is a very difficult issue to address since drawdown calculations are very difficult, if not impossible to scientifically predict for individual well yields or specific interferences in fractured bedrock aquifers.

According to Water Resources Bulletin #15, a rough rule-of-thumb is that the distance between crystalline bedrock wells should be at least twice the thickness of the aquifer (any geologic water bearing part of bedrock is ordinarily about 100 to 150 feet thick) suggesting a minimum separation of 200 to 300 feet between wells if they penetrate average bedrock, or if evidence to the contrary is lacking. Because lots are relatively small, spacing wells 200 to 300 feet apart may not be easily accomplished. It should be noted that adequate spacing between wells does not guarantee that they will yield enough water, but it safeguards whatever yields are obtainable. In addition, the preceding discussion does not take into consideration the loss of recharge of domestic waste to the proposed municipal sewer line. In unsewered areas, renovated septic effluent would be available as recharge to the underlying bedrock aquifer. Although this may sound distasteful, renovated septic effluent plays an important role in the groundwater supply budget.

D. Aquifer Recharge

The above discussion raises yet another water-related concern that needs to be carefully addressed by the applicant's engineer as well as Town officials.

As mentioned earlier, municipal sewers will serve the proposed subdivision. Since on-site septic systems will not be used, renovated effluent from septic systems will not be available as recharge to the bedrock aquifer. If one assumes that a person uses 75 gallons of water per day and that four (4) persons per single family residence is used, then the predicted water use at the site is about 72,000 gallons per day or 26 million gallons per year. On the other hand, if one assumes that about 8" of precipitation per year is available for recharge for the upland site (may be higher in the valley) and that 420 acres (less 10% due to impervious surface) of the site remains pervious, then one could expect that about 250,000 gallons per day or 91,300,000 gallons per year of groundwater recharge would be available to the site. Based on the above, groundwater recharge is about 3.5 times gross water demand. However, the question that needs to be answered is whether or not the loss of available recharge by domestic wastes to the municipal sewer line will adversely effect the ability of proposed on-site bedrock wells, particularly for low yielding wells, during droughty periods and/or over long periods of time. Another concern that should be addressed is the possible impacts to the local water table, streamcourses and wetlands. Since there is much undeveloped land in the vicinity of the site and sewers will be available to the areas once the line is extended, the question of groundwater recharge becomes apparent. One then begins to see the importance of sewer avoidance particularly when municipal water mains are not in the vicinity.

E. Water Quality

The natural quality of groundwater should be good. However, in many locations certain rock formations alter the quality of water coming in contact with such. Two of the most common components produced are elevated levels of iron and/or manganese which may affect water quality. Experience has shown that Brimfield Schist is plagued by elevated iron/iron sulfide levels and is often accompanied by a rotten egg odor. As a result it may be necessary to install appropriate water treatment systems in order to reduce concentration to non-objectionable levels.

Groundwater in the area is classified by the DEP as GA, which means that it is suitable for private drinking water supplies without treatment.

8. VEGETATION

The tract proposed for subdivision is predominantly mixed hardwood forest in a healthy condition from past silvicultural treatments. Trees on the property generally display good form, full spreading crowns and steady growth. Species diversity varies with available soil moisture and soil type. This ranges from a very well-drained upland site at the north end of the property where trees are predominantly oaks to the pond area which is mostly hardwood swamp. In this small watershed, which is a part of the layer Dickinson Creek-Salmon River watershed, the healthy forest is providing a protective influence on soil stability and water quality. Forest land reduces erosion, siltation and flooding, and contributes little or no sediment to streams.

A. Type Descriptions

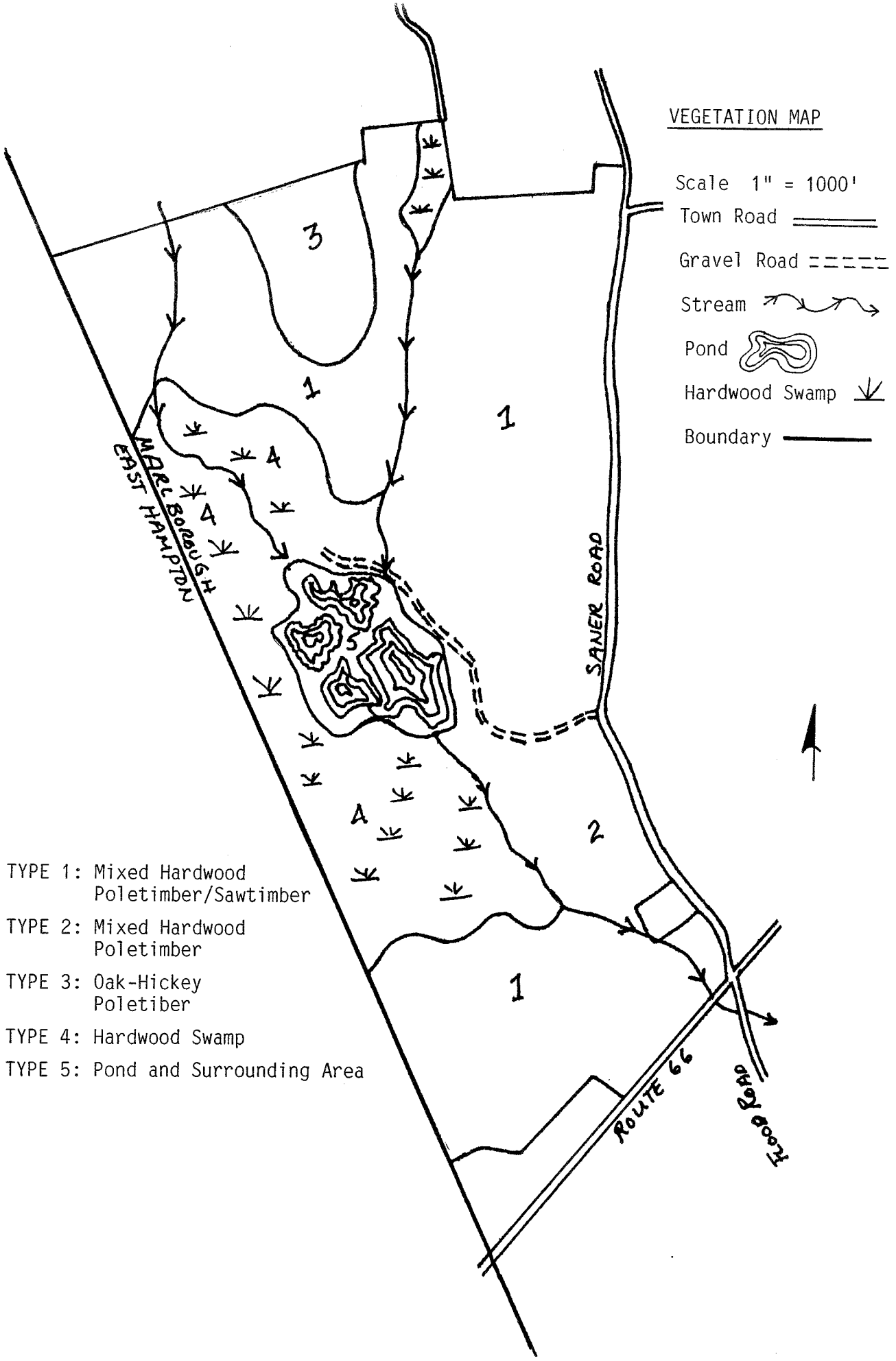
TYPE 1: Mixed hardwood, 281 acres on gently sloping, well drained soil. The species composition is red oak, black oak, white oak, scarlet oak, red maple, black and yellow birch, pignut and shagbank hickory, white ash, sugar maple, tulip poplar, quaking and bigtooth aspen. Understory vegetation includes hophornbeam, bluebeech, maple leaf viburnum, occasional mountain laurel, fern.

TYPE 2: Mixed hardwood, 35 acres on a poorly drained site where the trees have shallow roots over a high water table. The species include red maple, yellow birch, elm, white ash and oaks. The understory is azalea, spicebush, witch hazel, a variety of wildflowers like trillium and jack-in-the-pulpit, poison ivy and fern.

TYPE 3: Oak-Hickory, 24 acres on a very well-drained upland site where the overstory trees are black, red, white and scarlet oaks with occasional hickory. The trees are mostly poletimber size class (6"-11" d.b.h.-diameter breast height- $4\frac{1}{2}$ feet above ground).

TYPE 4: Hardwood swamp, 100 acres. This area north, west, and south of the pond is mostly hardwood swamp with some small areas of higher ground where vegetation compares with **TYPE 2.** However, the dominant type is composed of red maple, white ash, elm and yellow birch. There is spicebush, azalea, highbush blueberry, witch hazel as a shrub understory with fern, poison ivy, skunk cabbage on the forest floor.

TYPE 5: Pond, 27 acres. Water makes up 23 or 24 acres with 3 or 4 acres of exposed sand and gravel along the waters edge. Vegetation ranges from speckled alder and grasses at the water's edge to sweet fern, poverty grass, steeplebush, aspen, gray birch, and other stunted hardwoods trying to grow in the dry, hard, infertile soil.



TYPE 1: Mixed Hardwood Poletimber/Sawtimber

TYPE 2: Mixed Hardwood Poletimber

TYPE 3: Oak-Hickey Poletiber

TYPE 4: Hardwood Swamp

TYPE 5: Pond and Surrounding Area

B. Aesthetic Considerations

Trees are very sensitive to the condition of the soil within the entire area under their crowns. Development practices near trees such as excavation, filling and grading for road building and structures and compaction from equipment usage disturbs the balance between soil aeration, soil moisture level, and soil composition. Disturbances to soil near trees can cause a decline in tree health and vigor and result in mortality in three to five years.

Cutting or bruising roots with machinery creates breeding areas for root rot fungi which can kill a tree. Trees with cut root systems do not have proper soil holding capacity, wind firmness or water and nutrient absorption ability which results in decline in vigor and opens the tree for insect and/or disease attack. Older trees and/or larger trees are more readily affected by the negative impact of construction and related activities. Mechanical injury to trees can also cause mortality. Dead trees reduce the aesthetic quality of an area and may become hazardous and expensive to remove when near roads, buildings or utility lines.

The largest, healthiest, most aesthetically pleasing trees occur in **TYPE 1** on this property. They include sugar maple, tulip poplar, red oak, and white oak. Specimens of these trees can be selected for retention and worked into a final site plan for the development. Sugar maples provide excellent fall color and shade in yards. Oaks would provide acorns (mast) for a wide variety of birds and mammals as a food source. Research has shown that trees on a houselot may enhance the value of that houselot. In general, favor healthy, high vigor trees in the species previously mentioned. Trees selected for retention near houses should be away from the house at least the distance of the height of the tree. Construction equipment should not operate and excavation should not occur in the sensitive area under the crown of the tree. For trees greater than or equal to 16 inches diameter (at $4\frac{1}{2}$ feet above ground line) equipment and excavation or filling should not take place within two times the radial spread distance of the crown. This would be approximately 40-60 feet away from the base of the sugar maples and oaks and involve not disturbing a fifth (1/5) acre of area near and around the trees chosen for retention on site. In the case of smaller diameter trees in **TYPE 3** and in the wetter areas of **TYPE 1** and **2** trees can be retained in groups or "islands" to reduce the impact of soil disturbance and mechanical injury. These individual trees and "islands" can be designated for retention with flagging so as to be avoided during construction.

C. Limiting Conditions and Potential Hazards

Wind throw and/or tree breakage (from ice, snow, wind) is a potential hazard in **TYPE 1** on lower slopes and in **TYPE 2** in the wetter soils with shallow rooted trees. Trees which grow in forested conditions rely on each other for stability and side support. Openings which allow wind to pass through, rather than over, the trees will result in uprooting shallow rooted trees and breakage of weaker trees such as tulip poplar. Also, one should not mistake bigtooth and quaking aspen, commonly called "poplar", for tulip poplar. The silvical characteristics of the trees are radically different. The bigtooth and quaking aspen occur in several small clones throughout **TYPE 1** and are not good trees to retain because they are short lived and weak structurally.

Alterations in wetland areas which permanently raise or lower the water table can have a negative effect on vegetation in **TYPE 4**. Raising the water table in a wetland due to increased overland flow as a result of having less forested acreage in a watershed and more open land in houselots and roads may suffocate tree roots covered with water and kill trees and shrubs. Draining wetlands can also kill vegetation. Construction in, near, or through wetlands is not recommended.

Several trees in **TYPE 1**, north of Strong Pond, were damaged in a forest fire about 50 years ago. This damage has caused hollow trees today that have no external evidence of this condition. These hollow trees present a higher than average blow down and breakage hazard. Trees chosen for retention in this area must be carefully selected and kept back from homes.

D. Management Considerations

In **TYPE 5** on the 3 to 4 acres of exposed sand and gravel a combination of conservation mix grass and conifer trees (white pine and larch) could be planted. The grass would provide quick soil holding protection and the trees long term soil holding protection as well as wildlife habitat improvement. Planting 700 trees per acre (8'x8' spacing) in a 3:1 ratio of white pine: larch is recommended.

It is also possible to consult a private sector forester to advise on a final site plan for vegetation. A private forester would be essential to evaluate tree health and vigor, insect and disease problems, species longevity and potential mortality, pre-construction improvement thinnings and the management of open space for recreational opportunities and wildlife habitat.

9. WILDLIFE HABITAT

A. Habitat Description

The area of the proposed subdivision currently offers a high diversity of wildlife habitat. Mixed hardwoods and wetland/riparian areas are the major habitat types and provide a variety of cover types that are essential for a number of wildlife species.

Mixed hardwoods occur in the area north and south of Strong Pond. The overstory consists primarily of oak, red maple, and ash. The understory is dominated by swamp azaela, witch hazel, low bush blueberry, spirea, black cherry, beech, red maple, and sweet pepperbush. Various species of ferns and grasses occupy the area at ground level.

Wetland/riparian areas include Strong Pond, Fawn Hill Brook, and areas associated with these water courses. The banks of Strong Pond are dominated by speckled alder and a good diversity of aquatic vegetation exists in shallow water areas. Vegetation on small islands in the pond consist of speckled alder and grass species which provide important nesting habitat for a variety of waterfowl and songbirds. An open water swamp located in the north end of the pond consists of a diversity of aquatic and terrestrial vegetation. Reverting areas adjacent to Strong Pond and Fawn Hill Brook are dominated by spirea, quaking aspen, white birch, and red maple. Wetland areas adjacent to Fawn Hill Brook consist of a mixed hardwood overstory, with sweet pepperbush dominating the understory.

B. Wildlife Species

Bird species inhabiting the area include ruffed grouse, wild turkeys, red-winged blackbirds, common grackel, killdeer, morning doves, flycatchers, robins, sparrows, and a variety of other songbirds and waterfowl. A nesting pair of mallards were observed in the marsh area north of Strong Pond.

Mammalian species consist of white-tailed deer, beaver, muskrat, cottontails, gray squirrels, and a variety of other mammals.

This area also provides habitat for a variety of amphibian and reptilian species.

C. Effect of Proposed Activity

Development of this area will reduce wildlife habitat, which will in turn reduce species diversity and richness. The majority of proposed development will occur in mixed hardwood habitat. Interior sensitive species that require large tracts of undisturbed forest such as wild turkey, ruffed grouse, veeries, ovenbirds, and scarlet tenagers will no longer occupy this area. Species that are intolerable to man will be forced to emigrate from the area into adjacent habitats. Species dispersion into adjacent habitats may result in competition with species already occupying the area. Many species will also be forced to inhabit less desirable habitat, decreasing survivability. Species more tolerable to man such as house sparrows, cottontails, and raccoons may increase in number and become a nuisance to residents.

There should be minimal impact on wetland areas including Strong Pond and Fawn Hill Brook since these areas have been designated as open space. However, several lots do contain wetlands. The owners of these lots should be discouraged from any removal of vegetation. The proposed conservation easements would not be acceptable because owners may adversely affect the diversity of vegetation in wetlands by cutting and removing brush.

D. Mitigation of Impacts

Several measures can be taken to minimize the affect of development on wildlife species. Reverting areas adjacent to Strong Pond and Fawn Hill Brook should be left in their present condition. No vegetation removal should take place in wetland areas. If plans to landscape around Strong Pond and create islands are carried out the potential to support wildlife will be enchanced. Landscaping should be done on the sandy banks of the pond where vegetation growth is sparse. The application of topsoil and planting of a conservation mix of grasses and wildlife tree species would benefit wildlife, reduce soil erosion, and be more aesthetically pleasing. The forming of islands in the pond would provide additional nesting habitat for songbirds and waterfowl. Vegetation on islands should be maintained with periodic cutting to maintain suitable nesting habitat for waterfowl.

If the proposed building lots are 1 to 3 acres in size, as much of the lots as possible should be left as wooded area. Not only will this benefit wildlife, but also be more aesthetically pleasing for the residents of the development. Residents should also be encouraged to plant ornamental shrubs and trees that are resistant to browsing by deer.

10. FISH RESOURCES

A. Site Description

The proposed development will border Fawn Hill Brook and Strong Pond (an impoundment of the brook) which are the main hydrological features of fisheries concern in the area. The current subdivision proposal calls for a total of 244 building lots (minimum size 30,000') to be served by on-site water supply wells. There is a possibility that the lots will be served by public sewers through a connection with the Town of East Hampton. If public sewers are not developed, the developer plans to use on-site septic systems and increase minimum lot size to two acres. The proposed road network will involve crossing Fawn Hill Brook at two locations.

Strong Pond has been divided into five (5) separate basins due to past mining activities for sand and gravel. It appears that all basins are hydrologically connected. The dam of Strong Pond has been breached; thus, flow through the pond is unrestricted. The exact morphometric character of each basin is unknown; however, most shorelines are gently sloping extending far offshore where basin slopes drop-off steeply. The shallow shoreline areas contained moderate amounts of filamentous algae. Waters in several basins were slight to moderately turbid. Water turbidity is most likely due to resuspension of fine materials such as clays on the pond bottom.

The main channel of Fawn Hill Brook above Strong Pond ranges from 5 to 10 feet in width. Stream waters are relatively clear and free of aquatic vegetation. A sand and gravel bottom substrate predominates. Alternating "pool" and "riffle" habitat was observed. Pools are areas where fish seek cover as opposed to faster moving riffles which are primarily used for feeding. Alternating pool and riffle habitat at a 1 :1 ratio which was observed at this location is considered optimum for fish production and survival. The stream is prone to periodic flood events. Streambank erosion was also evident at various locations. The brook flows into a wetland area before emptying into Strong Pond.

Fawn Hill Brook immediately below Strong Pond is comprised of slow moving water and deep pools due to small changes in streambed elevation. Stream gradient increases in the stretch above Route 66. Waters are tea-stained due to humic and tannic acids drainage from adjacent wetlands. Fawn Hill Brook flows into Dickinson Creek, an important tributary stream of the Salmon River. The DEP Bureau of Fisheries in cooperation with local State and Federal fisheries agencies are involved in intensive efforts to restore Atlantic Salmon to the Salmon River and other vital tributaries of the Connecticut River including Dickinson Creek and Fawn Hill Brook.

B. Fish Population

Juvenile Atlantic Salmon have been documented in lower reaches of Fawn Hill Brook above Route 66. These fish have penetrated the brook from stocked regions of Dickinson Creek. Dickinson Creek has been stocked with juvenile Atlantic Salmon for several years. It is considered one of the most important nursery habitats for juvenile Atlantic Salmon in the entire Salmon River watershed.

Fawn Hill Brook is not stocked with trout by the Bureau of Fisheries. However, it does support a native brook trout population. Several brook trout were documented during the field review. Other fish expected to inhabit this brook are: blacknose dace, longnose dace, fallfish, white sucker, and tesselated darter.

The exact fish assemblage and population structure of Strong Pond is not known. On the day of the field review, the following species of fish were observed in Strong Pond: largemouth bass, bluegill sunfish, and pumpkinseed sunfish.

Surface waters of Fawn Hill Brook and Strong Pond are classified by the DEP as "Class A". Designated uses for this classification are as follows: potential drinking water supply, fish and wildlife habitat; recreational use; and industrial and agricultural supply.

C. Impacts

The following impacts on Strong Pond and Fawn Hill Brook can be expected if proper mitigation controls are not implemented:

1. Construction site soil erosion and sedimentation through increased runoff from unvegetated areas - erosion and sedimentation due to construction has long been regarded as a major stimulus in the lake eutrophication (aging) process. Serious stream habitat degradation can also occur. In particular, silt deposition will:

* Adversely affect "gill" function and impair feeding activities - studies have documented that high sediment concentrations and turbidity will disturb fish respiration and gill function. Fish will be forced to disperse to more desirable environments.

* Reduce fish egg survival - adequate water flow, free of sediment particles is required for egg respiration (biological process of extrating oxygen from water) and successful hatching. Silt will smother eggs.

* Reduce aquatic insect production - sediment free water is also required for successful aquatic insect egg respiration and hatching. Aquatic insects are important food items in fish diets. Reduced insect levels will adversely effect fish growth and survival since excessive energy demands are required to locate preferred aquatic insects when population levels are low.

* Reduce stream pool depth and pond water depth - pools provide cover, shelter, and resting areas for fish in streams whereas spawning or other types of valuable habitats can be adversely affected in pond environments.

* Contribute to the depletion of oxygen - organic matter associated with soil particles is decomposed by micro-organisms contributing to the depletion of oxygen in waters overlying sediments.

2. Stream sedimentation due to road crossing construction activities - Fawn Hill Brook will be crossed at two separate locations. If proper precautions are not undertaken, stream sedimentation events are likely. The detrimental effects of sedimentation were previously discussed. Since development plans are preliminary at this point, no specific informatin was available concerning whether the brook would be crossed by culverts or spanned by bridges.

3. Degradation of wetland habitat - proposed building lots north of Strong Pond will be constructed on important wetland habitat. This wetland is beneficial in many ways. It serves to: (1) control flood waters by acting as a water storage basin, (2) traps sediment from natural and man-made sources of erosion, and (3) helps filter out pollutants from runoff before they enter Fawn Hill Brook and Strong Pond. Any filling or partial destruction of natural wetland habitat may hinder its filtration function.

4. Loss of streambelt or riparian vegetation along streams due to building lot development and road crossings - the boundary lines for some building lots either border or include the waters of Fawn Hill Brook. Important riparian resources can be either altered or permanently eliminated. Well developed riparian zones

protect stream environments by filtering-out various types of surface and subsurface runoff, maintaining stream hydrology, and stabilizing stream banks. Additionally, overhead vegetative canopy provides invaluable shading and cooling of stream waters. Without a suitable amount of riparian habitat, streams become extremely susceptible to any type of runoff. Fish survival can be reduced in streams with poorly vegetated or disturbed riparian zones.

5. Aquatic habitat degradation due to the influx of stormwater drainage - waters that contain pollutants such as salt, gasoline, oil, and other pollutants that may be spilled on impervious surfaces can be quickly introduced into Strong Pond or Fawn Hill Brook and cause water quality and aquatic habitat degradation. Fine silts in stormwaters that remain in suspension for prolonged periods of time cannot be effectively removed from stormwaters. Stormwater runoff will eventually fertilize stream waters and result in overall water quality degradation. Spilled petroleum based chemicals or other toxicants can result in partial or complete fish kills.

6. Transport of lawn fertilizers and chemicals to streams - runoff and leaching of nutrients from lawn fertilizers will stimulate filamentous algae growth in streams and degrade water quality. Introduction of lawn herbicides may result in "fish kill" and water quality degradation.

7. Percolation of septic effluent into streams - if public sewage lines are not developed for this parcel, individual septic systems will have to be placed on each building lot. Individual septic systems can be potentially dangerous to stream and pond environments. Nutrients and assorted chemicals that may be placed in septic systems could enter aquatic environments in the event of a failure or infiltrate the groundwater during the spring when water tables are close to the surface. The introduction of septic effluent could result in a major threat to fish habitat, public health, and overall water quality conditions. Effluent will also stimulate the growth of nuisance aquatic vegetation and algae.

8. Impacts to downstream environments - any water quality problems and habitat degradation that directly occurs within these streams will eventually be observed in downstream areas of the Dickinson Creek. The survival of juvenile salmon are contingent upon the maintenance of existing water quality standards and instream habitat conditions. If realized, the aforementioned impacts would have a severe, adverse effect upon the Salmon River watershed. Degradation of water quality and fish habitat could jeopardize Atlantic Salmon restoration efforts. Beyond these considerations, the Salmon River Task Force of the Department of Environmental Protection is embarking upon a program of erosion and sedimentation management in this watershed in concert with volunteer organizations and municipalities. These organizations have stressed the need for careful residential housing development.

D. Recommendations

The wide ranging impacts on Fawn Hill Brook and Strong Pond may be somewhat minimized by implementing the following suggested recommendations:

1. Develop an aggressive and effective erosion and sediment control plan - install and maintain proper erosion and sedimentation controls during both road crossing and site construction activities. This includes such mitigative measures as filter fabric barrier fences, staked hay bales, and catch basins. Land disturbance and clearing should be kept to a minimum and all disturbed areas should be restabilized as soon as possible. Exposed, unvegetated areas should be protected from storm events. The Town of Marlborough should have an appointed official that would be responsible for checking this development on a periodic basis to ensure that contractors have complied with all stipulated mitigation devices. Past stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

2. Avoid building on the wetland area north of Strong Pond - these wetlands are critical to the maintenance of existing water quality conditions and help regulate flood control. Thus, building lots north and west of Strong Pond (numbers 58-65) should be eliminated from subdivision plans.

3. Maintain at the **minimum** a **100 foot** open space **buffer zone** along the edges of Fawn Hill Brook - no construction and alteration of riparian resources shall take place in this zone. Research has shown that 100 foot buffer zones will help prevent surface runoff and other pollutants from entering streams (USFWS 1984; USFWS 1986; ODFW 1985). This natural streamside filter can be one of the most effective measures to mitigate the adverse impacts of residential housing development

4. The proposed road crossing over Fawn Hill Brook south of Strong Hill Pond should be accomplished by a spanned bridge rather than through the use of culverts. Culverts are not preferred since they can prevent fish passage by increasing stream water velocities or creating shallow water conditions. Fawn Hill Brook should be crossed with culverts only as a last resort. In this case, culverts should be installed at least 6 inches below the existing stream bed elevation to allow for unobstructed fish passage and to allow for the natural accumulation of streambed material within the culvert. A detailed erosion and sediment plan should accompany any road crossing plans. Any instream work should take place in the summer. Reduce streamflows and rainfall in the summer provides the least hazardous conditions in which to work near sensitive aquatic environments. Efforts should be expended to replace riparian zone vegetation as soon as possible. In particular, trees that provide good overhead canopy closure and streamside shading such as white pine, willows, and American Larch should be planted.

5. If public sewer lines cannot be connected to this development, all individual septic systems should be properly located and designed - the addition of septic effluent to these streams can be one of the greatest threats to stream ecology. Septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure. The use of non-phosphate laundry detergents should be encouraged.

6. Design an effective stormwater management plan - properly design, locate, and maintain roadway catch basins to ensure the proper management of stormwaters. Maintenance is very critical. The Town of Marlborough should regularly maintain all catch basins to minimize adverse impacts to aquatic environments. Street sweeping should occur in the spring to clean away road sands and other debris. One of the eastern basins in Strong Pond could be engineered as a stormwater detention basin/pond to collect stormwaters before eventual release into Fawn Hill Brook. Roadway catch basins and a stormwater detention pond should trap most sediments reducing the likelihood of excessive stream sedimentation; however,

waters that contain pollutants such as salts and even small amounts of fine enriched sediments will eventually cause water quality and aquatic habitat degradation. This impact cannot be prevented.

7. Limit liming, fertilization, and the introduction of chemicals to subdivision building lots next to aquatic environments - this will help abate the amount of additional nutrients to the streams. Non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

8. Selected basins within Strong Pond can be rehabilitated to create more suitable conditions for pond species of fish. Littoral zone areas that presently do not exist can be created. The littoral zone is the shallow interface region between land (pond's edge) and the open water region of the pond. Banks along the pond shoreline should be regraded to a 3:1 slope (3 feet horizontal for each one foot vertical). This will provide desirable fish habitat and discourage over abundant nuisance aquatic vegetation growth. Fish habitat improvement structures of various designs could be strategically placed in the pond to provide cover for pond fishes. Technical assistance concerning pond imrovement structures can be obtained by contacting the Team's fisheries biologist at 295-9523.

E. Bibliography

ODFW (Oregon Department of Fish and Wildlife) 1985. The Effects of Stream Alterations on Salmon and Trout Habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon. 70 pp.

USFWS (United States Fish and Wildlife Service) 1984. Habitat Suitability Information: Rainbow Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82(10.124). 64 pp.

USFWS (United States Fish and Wildlife Service) 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82/(10.60). 65 pp.

11. PLANNING REVIEW

The proposed subdivision consists of a semi-rectangular shapped parcel of ± 467 acres located off of Route 66 and Saner Road in the northwestern corner of Marlborough. Due east of the site is Saner road, while to the south is Route 66 and to the west is the East Hampton Town line. The site is bordered on the north by a parcel of undeveloped land.

This section of the report will address the following issues:

1. Traffic and Access;
2. Land Use, Site Design Compatibility;
3. Recreation and Open Space;
4. Impact of Sewers and Development in General.

A. Traffic and Access

A road network meanders through the subdivision connecting Saner Road with Route 66. There are two proposed accessways to the site off of Sander Road and one off of Route 66. Since one of the proposed accessways to the site is located off of a state highway the State Department of Transportation will more than likely require a traffic study to assure that the sight distances from the entranceway onto Route 66 from the site and from Saner Road are consistent with the probable amount and speed of traffic, terrain and road alignments. In addition, the following DOT permits will be required:

1. A State Traffic Certificate from the State Traffic Commission is required for any site abutting or adjoining a state highway and containing more than 200 parking spaces or over 100,000 square feet of space.
2. A DOT Highway Encroachment permit is required for any work that will take place within the state highway right-of-way.

The CROCG Traffic Engineer has recommended that the Town require the developer to conduct a traffic study on Route 66 to determine if access to the site would generate the need for some form of traffic control device on Route 66 and additional turning lanes for east and westbound traffic. The Traffic Engtineer has also recommended that a detailed study be conducted to determine if Saner Road will have to be upgraded to handle the additional traffic generated by this new development.

After the developer has conducted a traffic study, the Town of Marlborough should submit the study to the CRCOG Traffic Engineer for his review and comment.

B. Land Use and Site Design Compatibility

The proposed subdivision contains 241 lots with an average size of 30,000 square feet. The areas north, south and east, and the site, itself are all zoned Residential (80,000 square foot lots if unsewered, 30,000 square foot lots if sewered). The area to the west across the Town line in East Hampton is zoned Rural Residence 2 (RU-2, 60,000 s.f. unsewered and 40,000 s.f. sewered). To the southwest and southeast of the site on Route 66 are two small areas of land zoned General Commercial (GC). The use of this site for residential development is compatible with the surrounding uses.

Public utility electric and telephone service are currently available along both Route 66 and Saner Road. The developer is proposing to construct pump stations and sewer lines to connect the site to the Town of East Hampton sewer system. The use of sewers on this site would result in the construction of about 240 houses.

The proposed subdivision design makes little effort to relate to the unique natural features present at the site. The developer has attempted to get the maximum number of lots with minimal regard for the extensive amount of wetlands present at the site and the topography of the site. The Town should recommend that the developer make more of an effort to relate the design of the subdivision to the existing features of the site. In particular, a large number of the proposed lots contain extensive areas of wetlands.

The proposed road design will require numerous wetland crossings. The Town should suggest to the developer that the road be redesigned to limit the number of wetland crossings.

C. Recreation and Open Space

Section 1.2.1 E of the Town of Marlborough Subdivision Regulations states, "Upon consideration of the particular type of development proposed and determination of the needs created by such a development, the Commission may require that up to, but no more than, 10 percent of the total area of a subdivision be so reserved". The Commission may require that up to 46.7 acres of land be set aside for open space from the proposed subdivision.

Some communities require that Department of Parks and Recreation and/or the Board of Education review proposed developments to determine if a need exists for recreation facilities within a proposed development. The decision is usually based upon a written policy of the community, i.e. the Town plan. It can also be based upon a review of existing recreation facilities, the type of market being built for and the proximity of existing facilities.

Town officials have indicated that the Town Plan of Development is curently being revised. The committee in charge of revising the plan should be contacted to discuss what recommendations have or will be made regarding future open space and recreational facilities for the area of Town where the proposed subdivision is to be located.

The developer has indicated that a number of options exist regarding the preservation and development of Strong Pond as a public recreation area. The developer has also pointed out the possibility of preserving some of the valuable wetland areas as open space to be used for hiking and passive recreation. These are all good ideas and should be considered by the Town. Due to the size of the proposal and its potential impact on the use of existing Town facilities, the Town should consider asking the developer to dedicate land for development of more active recreational facilities, i.e. ball fields, tennis courts and soccer fields. It may be possible to construct these facilities adjacent to the proposed Strong Pond recreation area.

D. Impact of Sewers and Development in General

The Town of Marlborough is very concerned about the impact the development of a subdivision of this size will have on the community in general and municipal services in particular. Town officials have estimated that the development of just 200 homes at this site will have the following impact:

1. Increase the total number of homes in Town by 13%;
2. Increase the miles of Town roads by almost 10%;
3. Increase Town population by 10%;
4. Generate an additional 420 tons of refuse per year.

In addition, the proposed expansion of the sewer lines to Marlborough for the development of this site could possibly impact the future development of another 293 acres of residentially zoned land located nearby on Route 66. It is important that the Town consider the impact of this development and proposed construction of the sewer lines and plan accordingly.

12. ARCHAEOLOGICAL REVIEW

A. Connecticut's Archaeological Site Files and Maps

A review of the State of Connecticut's Archaeological Site Files and Maps show one prehistoric occupation near the Saner Road boundary to the east of Strong Pond. Two additional prehistoric archaeological sites are located immediately off the project area across Route 66 to the southeast. All of these sites are located at or above the 400 foot contour level along moderate slopes overlooking wetlands. The prehistoric campsite adjacent to Saner Road is approximately 4,000 years old and has provided evidence for extended hunting and gathering activities.

B. On-Site Inspection

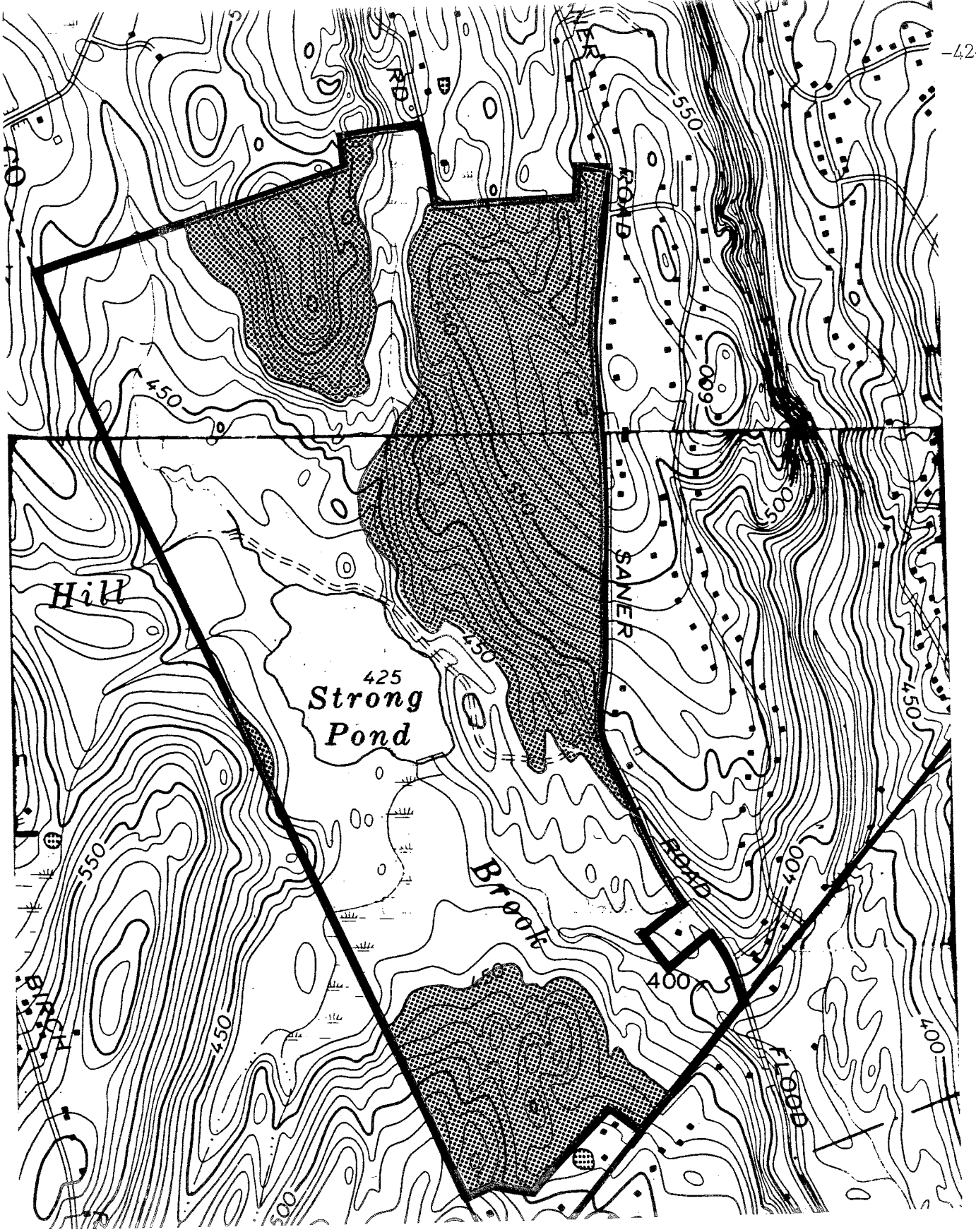
On-site inspection located one area on a small knoll immediately east of Strong Pond where two pieces of quartz lithic debitage were recovered. The quartz flakes may represent the waste products from the stone tool manufacturing process. This knoll should be submitted to subsurface testing procedures to better understand the nature of the recovered artifacts and activities at the site.

C. The Dam

In addition, the historic dam on the south side of Strong Pond should be maintained as part of the development design. Some of the earliest mill sites and road systems in East Hampton-Marlborough were constructed in and around the project area. While no mills were located in the walk over, the dam should be preserved as part of the historic landscape of the region.

D. Impact of Development

The proposed devleopment project would adversely impact the prehistoric cultural resources mentioned above. Based on known site information and predictive models of archaeological site surveys conducted in upland regions of Connecticut, the impact area is regarded as having a high potential for prehistoric and historic cultural land use.



AREAS OF HIGH ARCHAEOLOGICAL POTENTIAL

Scale 1" = 1000'

A professional archaeological reconnaissance survey is highly recommended in order to locate and identify all prehistoric and historic resources that might exist in the project area. Survey should especially proceed upland from the 450 foot contour level adjacent to wetlands. These topographic features are most prominent to the north and east of Strong Pond and to the south along Fawn Hill Brook. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources.**

E. Summary

In summary, the project area is located in a critical area of importance to prehistoric and historic land use activities. It is highly recommended that all feasible efforts be undertaken to identify and ensure the preservation and conservation of these cultural resources. Areas of highest potential are located above the 450 foot contour along moderate slopes adjacent to lower wetlands.

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, soil specialsits, 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 region.

The services of the Team are 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, landfills, commercial and industrial developments, sand and gravel excavations, 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 official 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 and the ERT Coordinator. A request form should be completely filled out and should include the required materials. 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 and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.