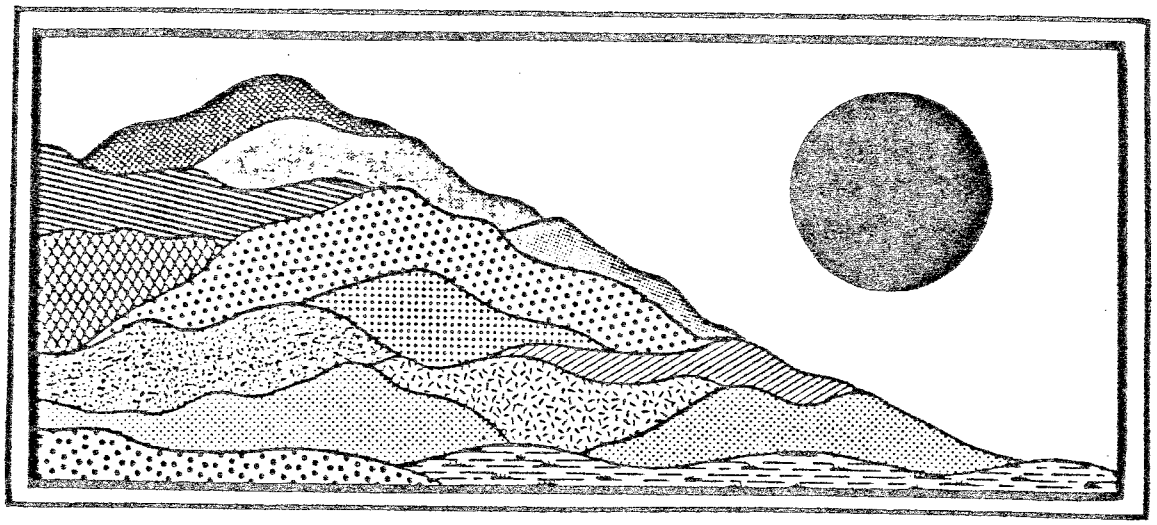
Sun Valley Resort

Stafford, Connecticut

April 1987



ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Sun Valley Resort

Stafford, Connecticut

Review Date: MARCH 19, 1987

Report Date: APRIL 1987

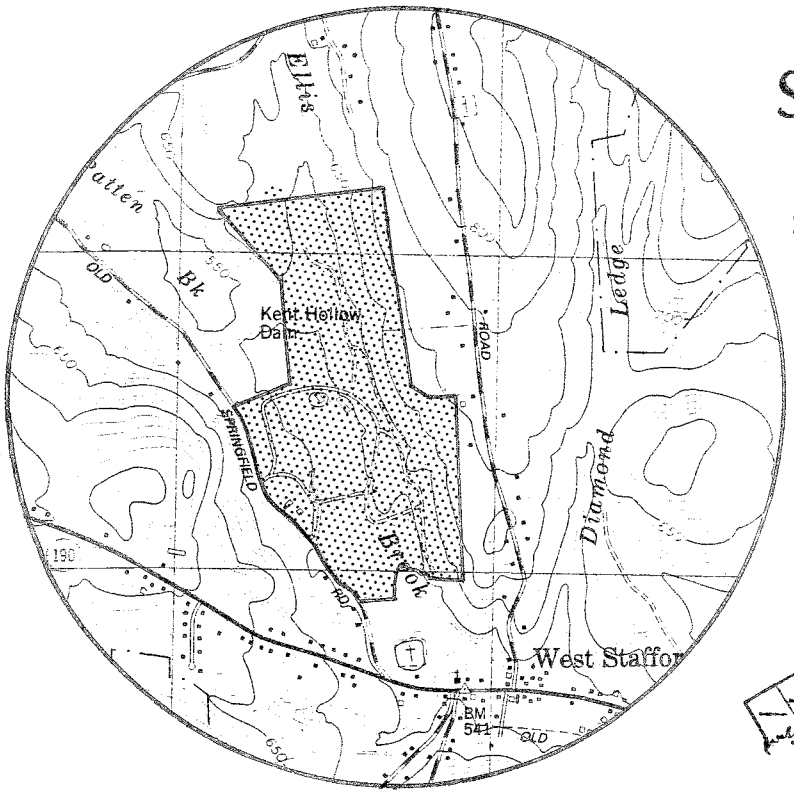
RC&D

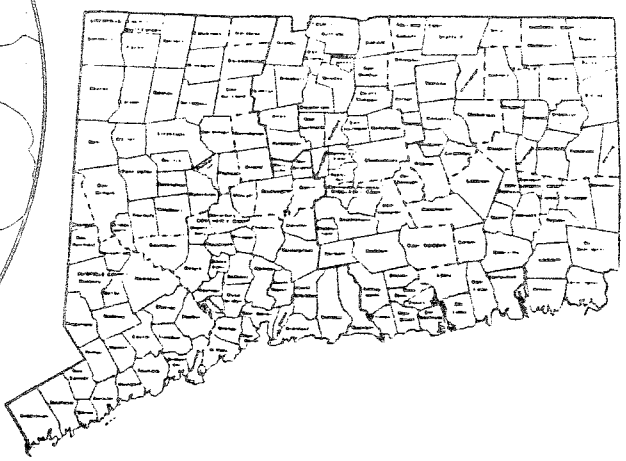
ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

Site Location

SUN VALLEY RESORT EXPANSION

STAFFORD, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

THE SUN VALLEY RESORT EXPANSION

STAFFORD, CONNECTICUT

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

The ERT met and field checked the site on Thursday, March 19, 1987. Team members participating on this review included:

Alan Buzzetti	--Principal Sanitarian Connecticut Department of Health Services
Frank Homiski	--Senior Sanitarian Connecticut Department of Health Services
Gary Leavitt	--Senior Sanitary Engineer Department of Environmental Protection
Joe Neafsey	--District Conservationist U.S.D.A. Soil Conservation Service
James Parda	--Forester DEP - Forestry Bureau
Harry Siebert	--Transportation Planner DOT--Bureau of Planning
Anthony Sullivan	--Planner Connecticut Office of Policy and Management
Elaine Sych	--ERT Coordinator Eastern Connecticut RC&D Area
Bill Warzecha	--Geologist DEP - Natural Resources Center

Prior to the review day, each Team member received a summary of the proposed project, a list of the Town's concerns, a location map, a topographic map and a soils map. During the field review the Team members were given site plans. The Team met with, and were accompanied by the resort owners, and a member of the Planning and Zoning Commission. 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 resort expansion.

If you require any additional information, please contact:

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

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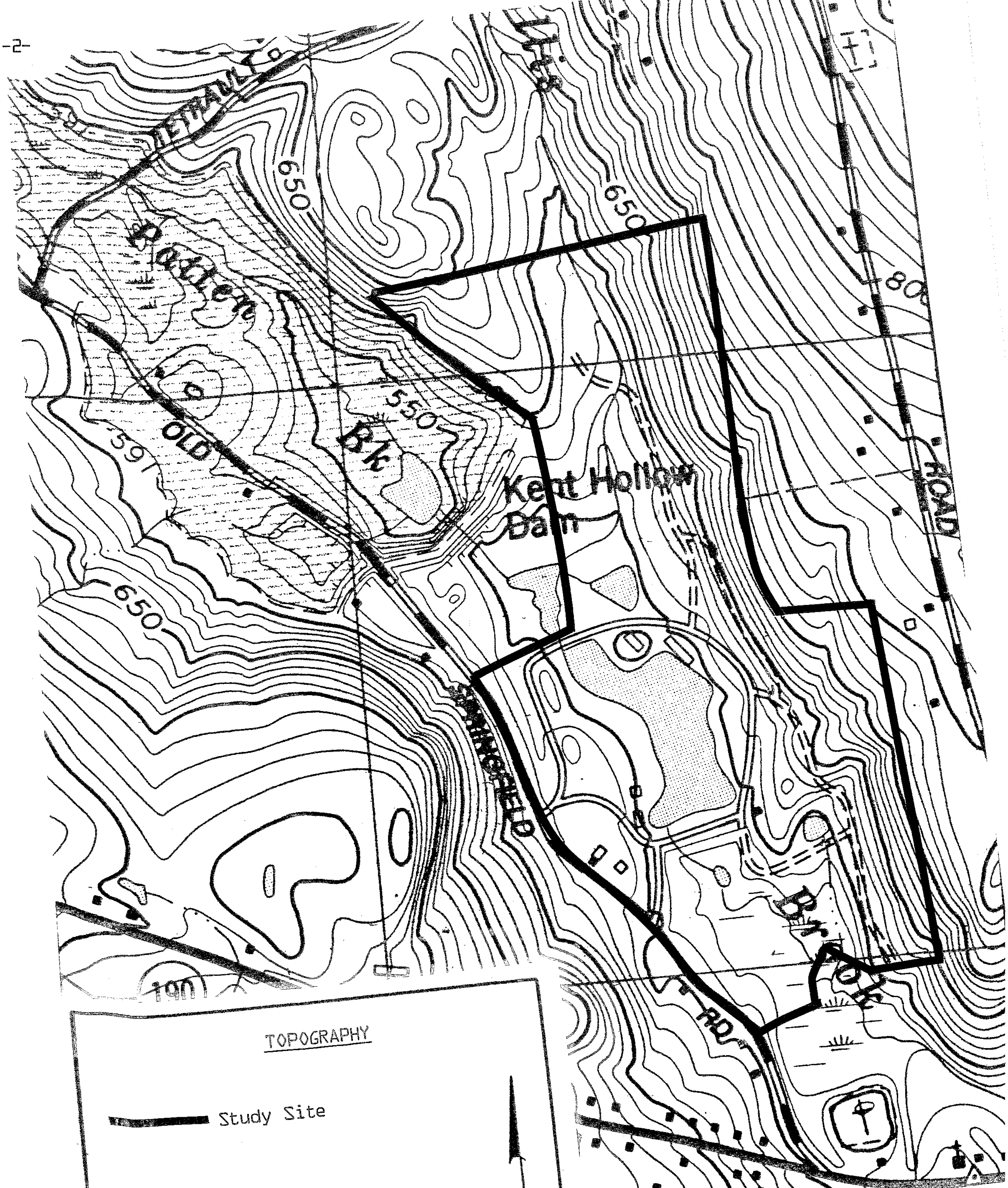
I. INTRODUCTION

The Stafford Planning and Zoning Commission asked for Environmental Review Team assistance in reviewing a proposed campground expansion.

The Sun Valley Resort presently has 251 camp sites with an additional 564 camp sites proposed, for a potential total of 815 camp sites. It is proposed that all camp sites be restricted to self-contained camping vehicles, with each camp site being served by an on-site gray water disposal system for sink and shower wastes only. All septic waste material will be pumped from the holding tank of each camping vehicle and it is proposed that this waste be dumped at the campground's on-site dumping station. In turn, the dumping station will be pumped out as needed with the septage being disposed of at the municipal waste water treatment facility.

Central service buildings with the required numbers of toilet, urinal, lavatory and shower fixtures are proposed to accommodate the additional camp sites. All flush toilet buildings are to be served by on-site subsurface sewage disposal systems and on-site wells.

The Town is concerned with the sites ability to handle a large increase in camp sites. Specific areas of concern addressed are soils, geology, hydrology, wetlands, vegetation, water supply, sewage disposal, traffic access and general planning. Each section of this report contains information, concerns and recommendations, no summary is given so each section should be read in it's entirety.


650
650
650
550
Bk
Kent Hollow
Dam
ROAD
OLD
SPRINGFIELD
RD
Br
190
TOPOGRAPHY
Study Site
1" = 660'

II. TOPOGRAPHY AND SETTING

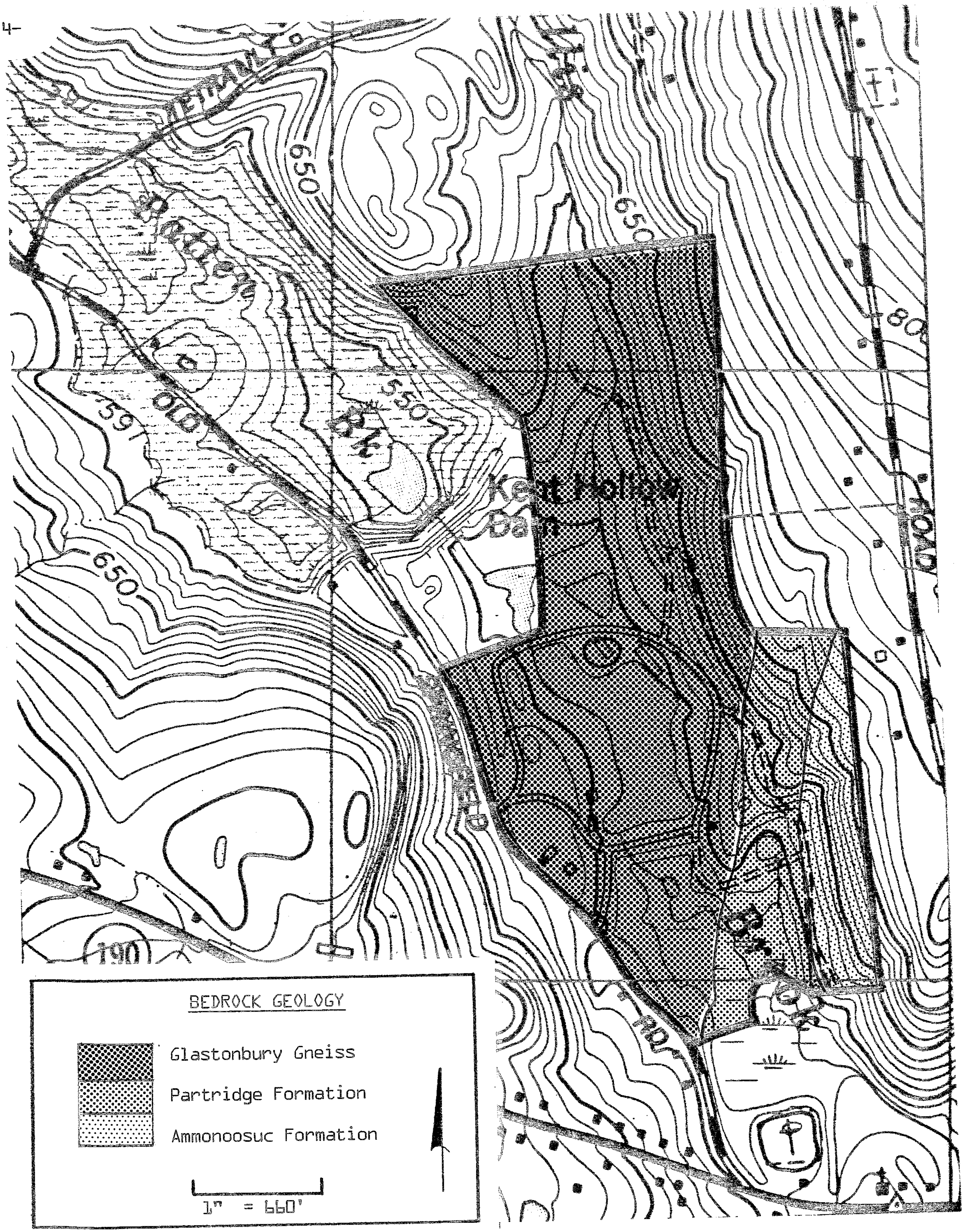
The proposed campsite expansion area for Sun Valley Resort is situated about a half mile northeast of West Stafford via Route 190 and Old Springfield Road. Access to the facility is off of Old Springfield Road. This access road continues through the campground and terminates at its northern extremity. Except for the existing developed portions of Sun Valley in the western parts, the site consists of a wooded hillside that rises moderately to steeply from Patten Brook Valley. This wooded hillside, which has a westerly exposure overlooks Sun Valley.

The parcel consists of two landforms: (1) a moderately to steeply sloping, generally shallow to bedrock hillside in the eastern and northern parts and (2) the Patten Brook Valley, which consist predominantly of sand and gravel. The latter area was mined for sand and gravel prior to the construction of Sun Valley Resort.

The hillside, which flanks the southern extent of Chestnut Hill is a mixture of gentle to steep slopes that contains sparse areas of single rock outcrops. Flat to gently rolling terrain characterizes Patten Brook Valley.

The difference in elevation from the eastern property boundary, which would be the highest point on the site, to the lowest point, along Patten Brook in the southern parts, is 170 feet.

All runoff from the parcel flows directly to Patten and Ellis Brooks via several intermittent streams.


BEDROCK GEOLOGY
Glastonbury Gneiss
Partridge Formation
Ammonoosuc Formation
1" = 660'
650
550
Kent Hollow

III. GEOLOGY

Sun Valley Resort is located in the Stafford Springs topographic quadrangle. The United States Geological Survey has published a surficial geologic map (GQ-1216, by Maurice Pease, 1975) for the quadrangle. An open-filed map of the bedrock geology of the Stafford Springs quadrangle is available for review purposes at the Natural Resources Center of the Department of Environmental Protection in Hartford.

A. BEDROCK GEOLOGY

Three major formations, Glastonbury Gneiss, the Partridge Formation and the Ammonoosuc Formation comprise the bedrock beneath the site. The majority of the site is underlain by Glastonbury Gneiss. It is described as a medium to coarse grained, medium to light gray foliated orthogneiss composed of the minerals, quartz, plagioclase, and biotite.

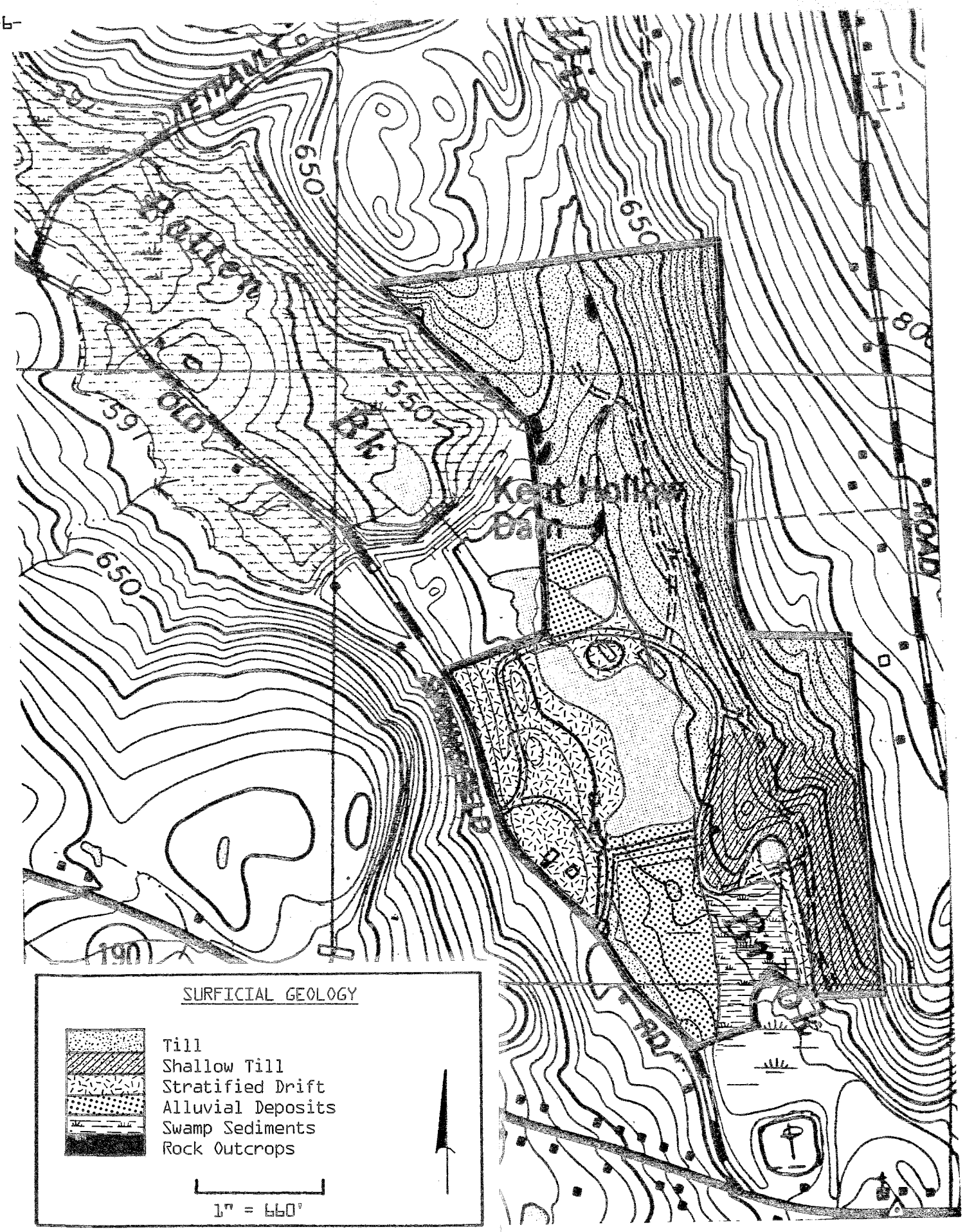
The east central parts of the site are underlain by the Partridge Formation. This rock unit consists of interlayered gray sulfide-graphite bearing granular schist and thinly layered fine-grained, dark gray, sulfide bearing quartz-feldspar gneiss. The rock characteristically weathers to a rusty moderate reddish brown.

Finally, the eastern parts of the site are underlain by the Ammonoosuc Formation. It is described as a light to medium gray felsic (term used to describe light colored minerals such as quartz, feldspar and muscovite in a rock) gneiss.

The term gneiss, used above, indicates that the rock is metamorphic (has been altered by tremendous heat and pressure within the earth's crust) and that it contains alternating bands of elongated minerals and rounded minerals. "Schists" are also metamorphic rocks, but they are characterized by platy, flaky or elongated minerals that have become aligned to form surfaces of relatively easy parting. The term "orthogneiss", also used earlier in this section denotes a gneiss that was derived from an igneous (formed from molten magma) rock.

The bedrock beneath the site probably originated as oceanic sediment or molten material (magma). The Glastonbury Gneiss and Ammonoosuc Formation rocks on the site probably began as igneous rocks (rocks formed from molten material). The Partridge Formation rocks originally were oceanic sediments that contained high organic material. All three rock formations were deposited or emplaced during the Ordivician-Silurian geologic periods (408 to 505 million years ago).

Metamorphism of the rocks occurred during a series of crustal movements known collectively as the Acadian Orogeny. This series of events culminated about 330 million years ago. Further deformation and faulting (fracturing of the bedrock) occurred during the Allegheny Orogeny, which ended about 260 million years ago.


650
650
650
650
590
610
190
Kent Homes
Dam
SURFICIAL GEOLOGY
Till
Shallow Till
Stratified Drift
Alluvial Deposits
Swamp Sediments
Rock Outcrops
1" = 660'

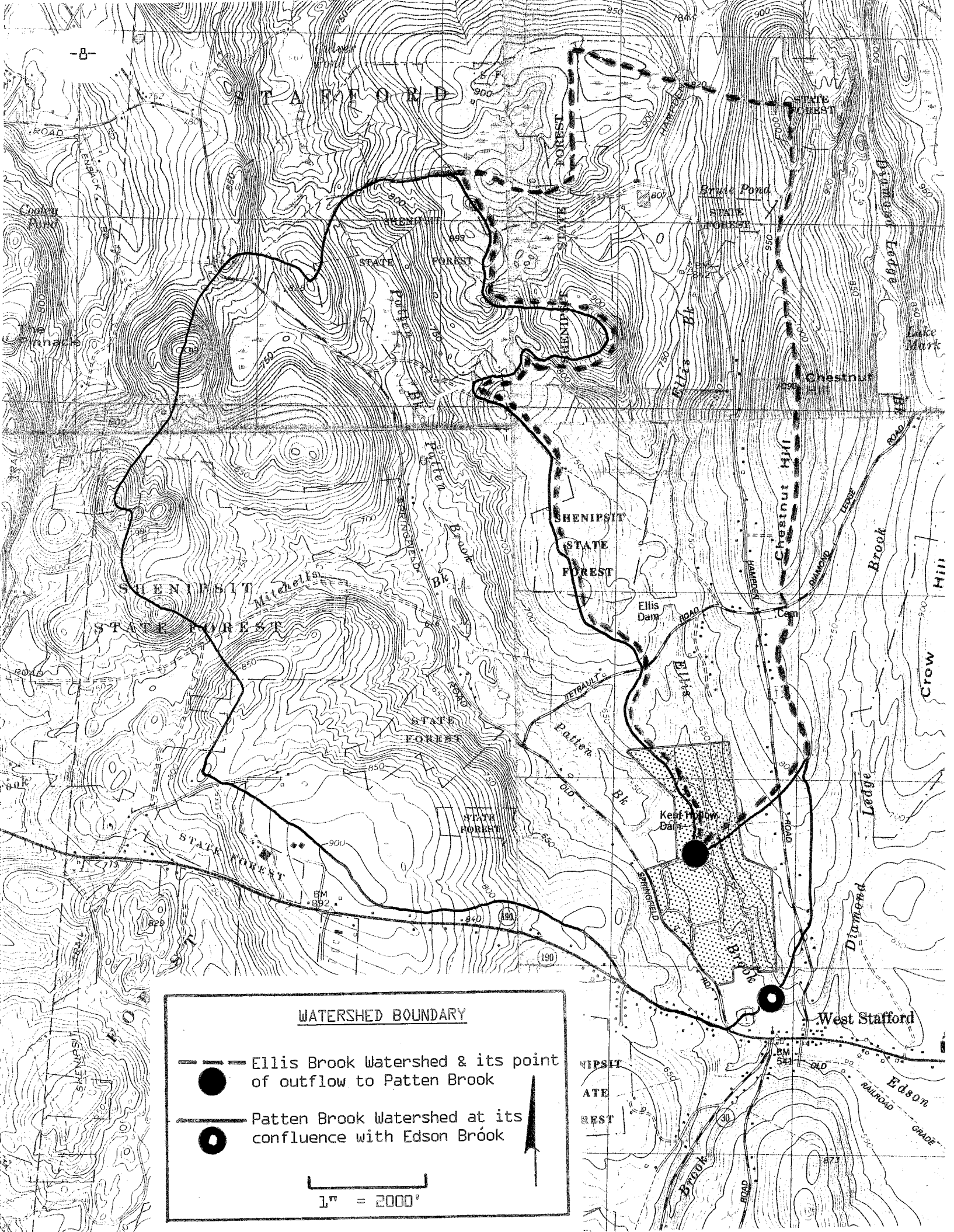
A detailed description of the rock types underlying the site was done mainly for thoroughness of this report. The differences in mineralogy, texture, etc. should have little effect on the proposed campground expansion. However, because new wells will probably need to rely on the underlying bedrock as a source, the bedrock should have at least some impact on water quality and quantity.

No commercial value can be ascribed to the rocks underlying the site, although all may have been used locally as building stone for foundations, stonewalls, etc.

Depth to bedrock in the area proposed for camp-site expansion probably does not exceed much more than ten (10) feet. It is shallowest in the northern parts along Ellis brook and in the southeast corner. (See Geologic Development Concerns)

B. SURFICIAL GEOLOGY

Overlying bedrock on most of the site is a blanket of unconsolidated sediments of glacial origin. As ice advanced over Connecticut one or more times during the last million years or more, it scraped and chipped bedrock outcrops and bulldozed pre-existing soils, incorporating the rock particles into the ice mass. These particles were later plastered against bedrock ridges and knobs by the ice as it continued its advance, or were let down gently from the ice as it began to waste away. The nonsorted accumulation of rock fragments that resulted contains a wide range of sizes and shapes and is known as till. This deposit covers most of the upland areas of the campground. Closer to Patten Brook hummocky deposits of sand and cobble gravel were laid down. These materials known as stratified drift, were washed out of and away from the receding ice sheet by meltwater streams. The recreational area and campground buildings in the western parts of the site are situated on these deposits.


STAFFORD
Culver
Cooley Pond
The Pinnacle
Bruce Pond
STATE FORREST
SHENIPSIT STATE FORREST
Patten Bk
Ellis Bk
Chestnut Hill
Lake Mark
Diamond Ledge
Crow Hill
Brook
Ellis Dam
Kent Hollow Dam
Mitchells
TETRAULT
SPRINGFIELD
HAMPDEN
DIAMOND
LEDGE
ROAD
TRAIL
BM 892
BM 541
West Stafford
Edson
RAILROAD GRADE
WATERSHED BOUNDARY
Ellis Brook Watershed & its point of outflow to Patten Brook
Patten Brook Watershed at its confluence with Edson Brook
1" = 2000'

IV. HYDROLOGY

Two major streamcourses flow through the property; Patten Brook and Ellis Brook. Ellis Brook, which flows through the northern section in a southerly direction, merges with Patten Brook in the central parts. Patten Brook continues to flow southerly through a series of man-made ponds on the site enroute to Edson Brook. The Ellis Brook watershed as depicted by the accompanying watershed boundary map drains an area of about 1187 acres. Surface runoff originating from the northern parts of the site flow into Ellis Brook. The Patten Brook watershed, including the Ellis Brook watershed area mentioned above, drains a total area of 3310 acres at its confluence with Edson Brook. Both streamcourses are attractive features of the campground. Perhaps narrow paths for hiking could be established along sections of the streamcourses.

Because of steep slopes and shallow to bedrock soils, some parts of the site, particularly along the eastern hillside do not hold high potential for campsites. Based on present plans, campsites are shown throughout these areas. It seems likely that a reduction in the number of potential campsites in these areas would not be unreasonable. Because these areas are not likely to have a significant adverse effect on passive recreational potential, they should be investigated for this purpose. It should be pointed out that hiking trails on steep slopes can create erosion problems if not properly constructed and maintained.

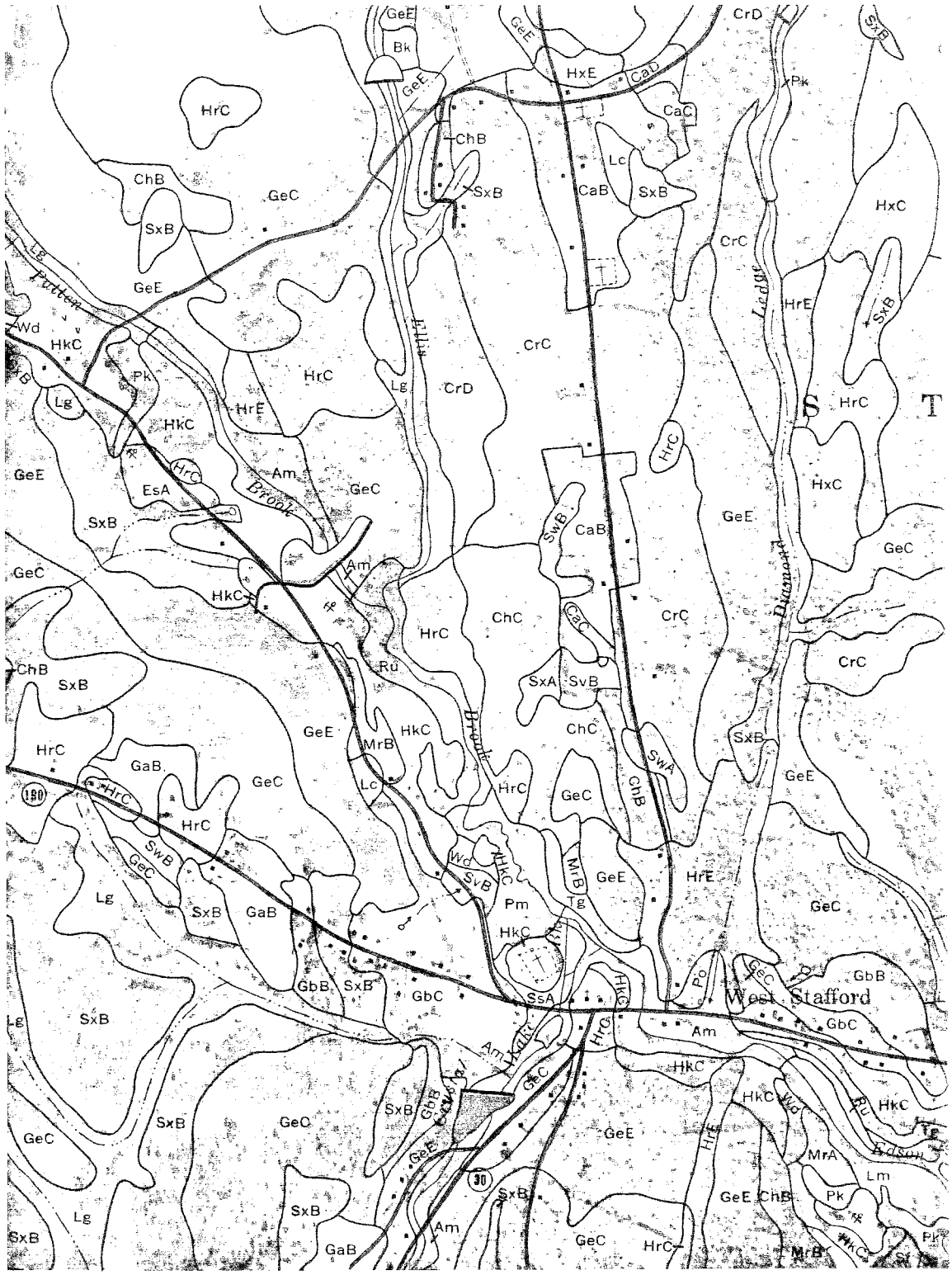
As mentioned earlier, the terrain in the eastern half of the site includes slopes that range from moderate to steep. For this reason, every effort should be made to prevent potential erosion and siltation problems, particularly to Patten Brook and the surface water bodies on the site. These problems would most likely occur during road construction periods. In this regard, it is strongly recommended that a comprehensive erosion and sediment control plan be developed covering each stage of the campground expansion. Increases in runoff from disturbed areas could cause streambank erosion and gullying, and ultimately cause siltation problems. Distrubed areas should be kept to a minimum under such a plan. The erosion and sediment control measures called for under the plan should be shown on the plan.

United States Department of Agriculture

Soil Conservation Service

Tolland County USDA-SCS
24 Hyde Avenue
Rockville, CT 06066
875-3881

Scale 1"=1320' Tolland County Soil Survey Sheet #3



V. SOILS

The following comments are provided as the result of a field examination of the site by the team on March 19, 1987, and subsequent visits.

A. EROSION AND SEDIMENT CONTROL

Since the total disturbed area for the project is greater than 1/2 acre, the applicant should prepare and summit a detailed soil erosion and sediment control plan for review and certification.

B. WETLANDS

The field review revealed that there are at least three watercourses with adjacent wetlands that are not shown on the site plans. The wetland boundaries that are shown were delineated by the applicant's surveyor who is not a soil scientist. All wetland boundaries should be flagged in the field by a consulting soil scientist and numbered sequentially. This information should then be transferred to the plan map. The soil scientist should then examine the information and sign the map and date it to certify it as substantially correct. This makes the verification process easier. Without this information, we are not able to verify wetland boundaries.

The Stafford Inland Wetlands Commission should be aware of the need to request detailed information on site plans prior to issuing a permit. The official wetlands map should be used as for information purposes only. It should not be used to determine the presence or absence of regulated areas on a parcel of land. This information can be provided only by having a more detailed survey done by a qualified soil scientist. It is the responsibility of the Commission to request this information, it is the responsibility of the applicant to provide the information to the Commission.

The applicant revealed that his plans include construction of a pond near proposed campsite #499. The plan includes diverting water from an existing watercourse into the proposed pond and pumping water from Ellis Brook into the pond during periods of low flow. The site is located in an area of deep well drained soils and will require careful site work and sealing of the bottom to acheive a successful pond. This work and the proposed diversion of water is a regulated activity and the Commission should require the applicant to submit detailed plans in addition to an application for a permit.

C. SOILS INTERPRETATIONS

The information provided by the Soil Survey of Tolland County appears to be adequate for the site. Interpretations of those soils is found on the following pages.

Lg - Ridgebury, Leicester, and Whitman soils, extremely stony - This mapping unit consits of nearly level, poorly drained, and very poorly drained soils in depressions and drainageways of glacial till uplands. The areas are mostly long and narrow or irregular in shape. Slopes range from 0 to 3 percent and are mainly 100 to 300 feet long. Stones cover 8 to 25 percent of the surface. About 40 percent of this unit is Ridgebury soils, 25 percent is Leicester soils, 15 percent is Whitman soils, and 10 percent is other soils. Some areas of this unit will consist of one of these soils, and other areas will consist of two or three. The soils of this unit were mapped together because they have no significant difference in use and management.

The Ridgebury soils have a seasonal high water table at a depth of about 10 inches from fall through spring. The permeability of the soils is moderate to moderately rapid in the surface layer and the subsoil and slow to very slow in the substratum. Runoff is slow. The Ridgebury soils have a moderate available water capacity.

The Leicester soils have a seasonal high water table at a depth of about 10 inches from fall through spring. The permeability of the soils is moderate or moderately rapid throughout. Runoff is slow. The Leicester soils have a moderate available water capacity.

The Whitman soils have a seasonal high water table at or near the surface from fall through spring. The permeability of the soils is moderate or moderately rapid in the surface layer and subsoil and slow to very slow in the substratum. Runoff is slow. The Whitman soils have a moderate available water capacity.

The high water table and slow to very slow permeability are major limitations of the soils of these areas for community development. Steep slopes of excavations in these soils slump when saturated. The stones on the surface restrict landscaping, and lawns are soggy most of the year.

ChB - Canton and Charlton soils, 3 to 8 percent slopes, very stony. This mapping unit consists of gently sloping well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly rectangular or irregular in shape. Slopes are generally smooth and convex and less than 200 feet long. About 45 percent of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. In some areas, this unit will consist almost entirely of Canton soils or almost entirely of Charlton soils. The soils were mapped together because they have no significant differences in use and management. Stones cover 1 to 8 percent of the soil surface.

Typically, the Canton soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil is yellowish brown fine sandy loam, gravelly fine sandy loam, and gravelly sand loam 21 inches thick. The substratum is pale brown gravelly loamy sand to a depth of 60 inches or more.

Typically, the Charlton soils have a surface layer of dark yellowish brown fine sandy loam 5 inches thick. The subsoil is yellowish brown fine sandy loam and sandy loam 20 inches thick. The substratum is light yellowish brown and light brownish gray sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of somewhat excessively drained Gloucester and Hollis soils; well drained Paxton soils; and moderately well drained Sutton soils. Also included are a few areas that have a compact substratum at a depth of 40 to 50 inches.

The water table in these soils is commonly at a depth of more than six feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have medium to rapid runoff, and have moderate available water capacity.

Instability of some excavations in the Canton soils is the main limitation for community development.

SxA - Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony -

This nearly level to gently sloping, moderately well drained soil is on upland glacial till plains, hills, and ridges. Stones and boulders cover 8 to 25 percent of the surface. Areas are dominantly irregular in shape.

Typically, this Sutton soil has a very dark grayish brown, fine sandy loam surface layer 4 inches thick. The subsoil is yellowish brown, dark brown, mottled fine sandy loam and sandy loam 29 inches thick. The substratum is olive brown, mottled sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Canton and Charlton soils; moderately well drained Woodbridge soils; and poorly drained Leicester soils. Included areas make up about 10 percent of this map unit.

The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring.

The major limiting factor for community development is the seasonal high water table. On-site septic systems need special design and installation to prevent effluent from seeping to the surface. Foundation drains help to prevent wet basements. Stones and boulders need to be removed for landscaping. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help control erosion during construction.

ChC - Canton and Charlton soils, 8 to 15 percent slopes, very stony.

This mapping unit consists of sloping, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly rectangular or irregular in shape. Slopes are generally smooth and convex and less than 200 feet long. About 45 percent of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. In some areas, this unit will consist almost entirely

of Canton soils or almost entirely of Charlton soils. The soils were mapped together because they have no significant differences in use and management. Stones cover 1 to 8 percent of the soil surface.

Typically, the Canton soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil is yellowish brown fine sandy loam, gravelly fine sandy loam, and gravelly sand loam 21 inches thick. The substratum is pale brown gravelly loam sand to a depth of 60 inches or more.

Typically, the Charlton soils have a surface layer of dark yellowish brown fine sandy loam 5 inches thick. The subsoil is yellowish brown fine sandy loam and sandy loam 20 inches thick. The substratum is light yellowish brown and light brownish gray sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of somewhat excessively drained Gloucester and Hollis soils; well drained Paxton soils; and moderately well drained Sutton soils. Also included are a few areas that have a compact substratum at a depth of 40 to 50 inches.

The water table in these soils is commonly at a depth of more than six feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have medium to rapid runoff, and have moderate available water capacity.

Instability of some excavations in the Canton soils is the main limitation for community development.

GeC - Canton and Charlton soils, 3 to 15 percent slopes, extremely stony -

This mapping unit consists of gently sloping to sloping, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are oval or irregular in shape. Slopes are mostly smooth and convex and are 100 to 600 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. Some areas of this unit consist almost entirely of Canton soils, some almost entirely of Charlton soils, and some of both. The soils were mapped together because they have no significant differences in use and management.

Typically, the Canton soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil is yellowish brown fine sandy loam, gravelly fine sandy loam, and gravelly sandy loam 21 inches thick. The substratum is pale brown gravelly loamy sand to a depth of 60 inches or more.

Typically, the Charlton soils have a surface layer of dark yellowish brown fine sandy loam 5 inches thick. The subsoil is yellowish brown fine sandy loam and sandy loam 20 inches thick. The substratum is light yellowish brown and light brownish gray sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of somewhat excessively drained Gloucester and Hollis soils, well drained Paxton soils, and moderately well drained Sutton soils. Also included are a few nearly level areas and a few areas that have a compact substratum at a depth of 40 to 50 inches.

The water table in these Canton and Charlton soils is commonly at a depth of more than 6 feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have moderate available water capacity and medium to rapid runoff.

Slope is the main limitation of these soils for community development, especially for on-site septic systems. Slopes of excavations in these soils are unstable. The stones on the surface hinder landscaping.

CrD - Canton and Charlton soils, 15 to 35 percent slopes, extremely stony -

This mapping unit consists of moderately steep to steep, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly long and narrow. Slopes are smooth and convex and are mainly less than 200 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of this unit is Canton soils, 40 percent is Charlton soils, and some of both. The soils were mapped together because they have no significant differences in use and management.

Typically, the Canton soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil is yellowish brown fine sandy loam, gravelly fine sandy loam, and gravelly sandy loam 21 inches thick. The substratum is pale brown gravelly loamy sand to a depth of 60 inches or more.

Typically, the Charlton soils have a surface layer of dark yellowish brown fine sandy loam 5 inches thick. The subsoil is yellowish brown fine sandy loam 20 inches thick. The substratum is light yellowish brown and light brownish gray sandy loam to a depth of 60 inches.

Included with these soils in mapping are small areas of somewhat excessively drained Gloucester and Hollis soils and well drained Paxton soils. Also included are a few large areas where stones cover less than 8 percent of the surface and areas with a compact substratum at a depth of 40 to 50 inches.

The water table in these Canton and Charlton soils is commonly at a depth of more than 6 feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of

the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have moderate available water capacity and rapid runoff.

Slope limits the soils of this unit for community development, especially for on-site septic systems. Slopes of excavations in the soils are unstable and the stones on the surface hinder landscaping.

HrC - Charlton-Hollis complex, 3 to 15 percent slopes, very rocky - This complex consists of gently sloping to sloping, somewhat excessively drained and well drained soils on hills and ridges of glacial till uplands. The areas of this unit are mostly irregular in shape. Slopes are mostly complex and are 100 to 200 feet long. Stones cover 1 to 8 percent of the surface.

This unit is about 55 percent Charlton soils, 20 percent Hollis soils, 15 percent other soils, and 10 percent exposed bedrock. The Charlton and Hollis soils are in such a complex pattern that it was not practical to map them separately.

Typically, the Charlton soils have a thick, fine sandy loam topsoil and subsoil over a sandy loam substratum. The soils are commonly deeper than 60 inches.

The Hollis soils have fine sandy loam topsoil and subsoil from 10 to 20 inches thick over hard, unweathered schist bedrock.

Included with these soils in mapping are small areas of well drained Canton and Paxton soils; moderately well drained Sutton and Woodbridge soils; and poorly drained Leicester soils. Also included are small areas with bedrock at a depth of 20 to 40 inches.

The water table of these soils is commonly at a depth of more than 6 feet. The available water capacity is moderate in the Charlton soils and very low to low in the Hollis soils. Both soils have moderate or moderately rapid permeability and medium to rapid runoff.

The areas of exposed rock and the depth to bedrock in the Hollis soils limit the use of these areas for community development, especially as a building site or as a site for on-site septic systems. The stones on the surface restrict landscaping.

Ru - Rippowam fine sandy loam - This nearly level, poorly drained soil is on flood plains of major streams, rivers, and their tributaries. Areas are dominantly long and narrow or irregular in shape.

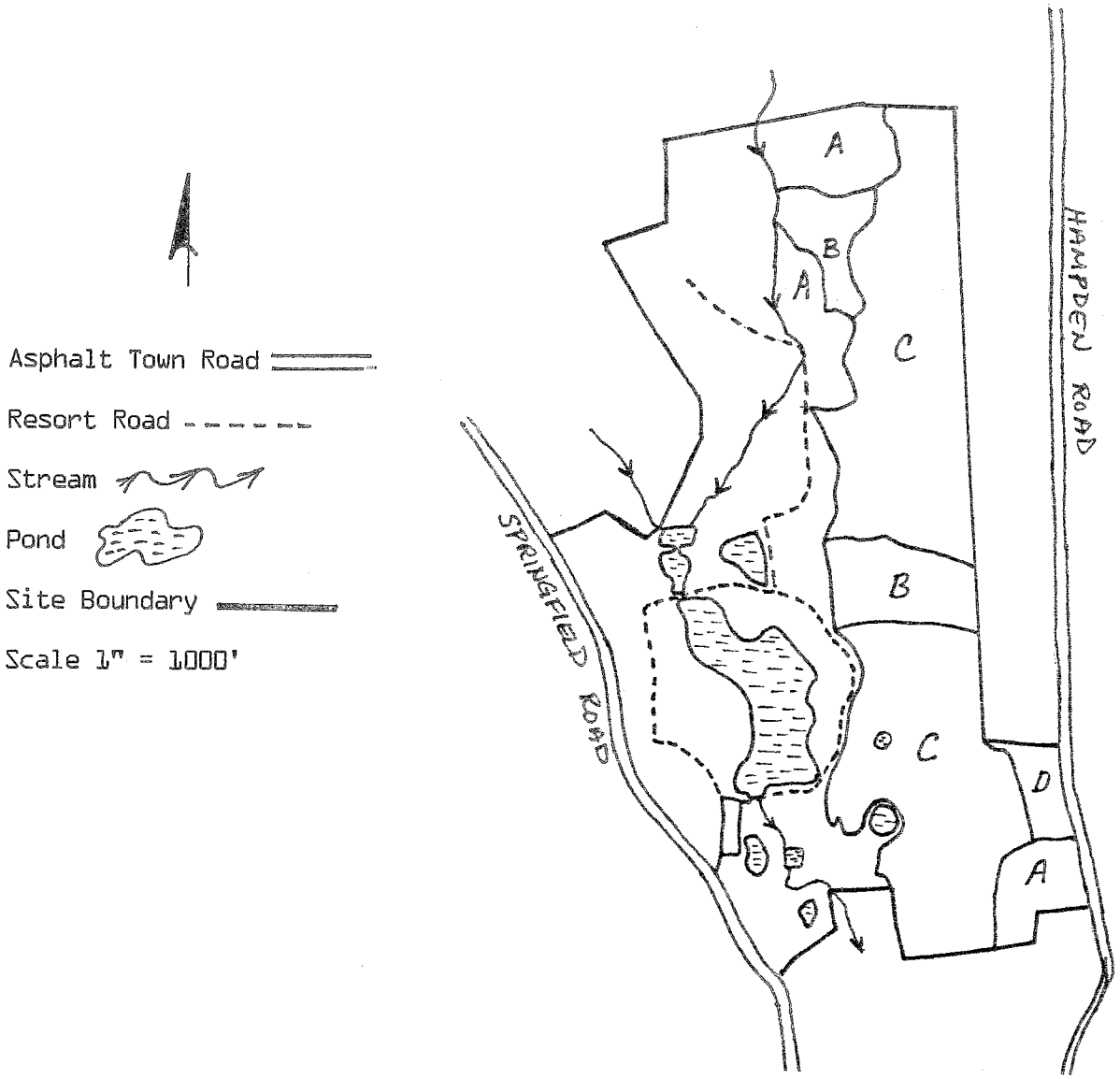
Typically, this Rippowam soil has a black, fine sandy loam surface layer 8 inches thick. The subsoil is dark grayish brown and dark gray, mottled fine sandy loam 27 inches thick. The substratum is dark grayish brown gravelly coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Pootatuck soils and poorly drained Limerick soils. Included areas make up about 20 percent of this map unit.

The Rippowam soil has a seasonal high water table at a depth of about 6 inches. It is subject to frequent flooding. Permeability is moderate or moderately rapid in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is moderate. Runoff is slow. Rippowam soil warms up and dries out slowly in the spring.

This soil is poorly suited to community development because of flooding and the seasonal high water table. Areas used for on-site septic systems require extensive filling, and systems require special design and installation. Areas also need to be protected from flooding. Sediment deposited by flooding will damage lawns. Lawns are wet and soggy in the fall and spring.

VEGETATION TYPE MAP



TYPE A : Softwood (Hemlock-White Pine)
Poletimber and small sawtimber
15 acres

TYPE B : Softwood-Hardwood (White Pine, Hemlock, White Oak, Red Maple, Red Oak, Black Oak, Hickory)
Poletimber and small sawtimber
12 acres

TYPE C : Mixed Hardwood (Red Oak, Black Oak, White Oak, Red Maple, Black and White Birch)
Poletimber and sawtimber
52 acres

TYPE D : Mixed Hardwood (Black Locust, Black Cherry, Red Maple, White Ash)
Poletimber
4 acres

VI. VEGETATION

The eastern half of Sun Valley Resort (83 acres) which is proposed for the campground expansion is composed of four vegetative types fairly typical of north central Connecticut. There is a nearly pure stand of conifers, upland mixed hardwoods and a softwood-hardwood stand. Impact on vegetation from campground expansion should be minimal as long as openings are small and road building is well planned to avoid mechanical damage to trees and root cutting.

A. VEGETATION TYPE DESCRIPTIONS

Type A: Softwood This 15 acre stand is composed of poletimber and small sawtimber sized hemlock and white pine comprising 90% of the trees. Also included are scattered white oak, black oak and red maple. The dense overstory has resulted in a barren understory and open forest floor.

Type B: Softwood-Hardwood This is a 12 acre stand of poletimber and small sawtimber sized white pine and occasional hemlock with a hardwood component of white oak, black oak, red oak, red maple and hickory. Understory consists mostly of hardwood and softwood regeneration.

Type C: Mixed Hardwood This is the largest stand on the property covering 52 acres and composed of poletimber/sawtimber sized red oak, black oak, white oak, red maple, black and white birch with a sapling understory of hemlock and white pine.

Type D: Mixed Hardwood This is a small stand, 4 acres, of poletimber sized black locust, black cherry, red maple and white ash.

B. LIMITING CONDITIONS AND POTENTIAL HAZARDS

Trees are sensitive to the condition of the soil within the area under their crowns. Cutting, filling and grading for road construction may disturb the balance between soil aeration, soil moisture level and soil composition. These disturbances can cause tree mortality. However, if road building and and campsite construction is carefully supervised any mortality should be minimal in the predominantly poletimber sized stands of younger trees. Damage to tree butts with construction equipment should also be avoided to prevent the entry of fungal diseases and/or insects into the wound.

Care should be taken in the construction of the campsites to remove only understory and intermediate height vegetation when possible to prevent large openings. An opening up to 50 foot diameter at tree top level should be the largest opening to prevent wind throw of the trees around the opening edge.

This is especially important in the white pine and hemlock stands and along any streams where roots may be shallow. Also it is important to maintain stand density where there are no campsites so trees act as wind breaks and give each other side support during high winds.

Finally, nails, lag bolts, screws and large spikes in trees can be detrimental for any future maintenance in the event a tree has to be removed. Metal that is grown into a tree and hidden can be dangerous to personnel and costly to equipment if the tree is sawn up. The plan for underground utilities in the expansion is excellent. It is also recommended to put campsite numbers, road signs and other on cedar posts and put in the ground rather than nailed to live trees.

C. AESTHETIC CONSIDERATIONS

Healthy, high vigor trees are more pleasing to look at than declining, poorly formed trees. Both overstory and understory conifers are aesthetically pleasing all year long. Where possible, distinguish exceptionally large and/or well formed white pine, hemlock or red oak. Also sugar maple can be an excellent tree for autumn colors. To avoid future problems be sure to remove leaning and root sprung trees near campsites.

D. MANAGEMENT CONSIDERATIONS

Some of the trees removed in campsite construction and road building are marketable or useable at the resort. Most poletimber sized hardwoods can be used on site or marketed as fuelwood. Sawtimber sized hardwoods, especially red oak, and softwoods, white pine and hemlock, can be sold as sawlogs to a sawmill, if they are free of metal. The Connecticut Department of Environmental Protection Bureau of Forestry recommends the wise use of forest products. Assistance in marketing sawlogs would be available from the State Service Forester at 684-3430.

VII. GEOLOGIC DEVELOPMENT CONCERNS

Based on visual observations, surficial and preliminary bedrock geologic mapping and soil mapping, the major geological limitations, which may pose constraints with respect to the proposed campground expansion include; (1) areas of the site where bedrock is at or near the ground surface, which is mainly in the northern parts and southeast corner; (2) moderately to steeply sloping areas; and (3) the presence of seasonally wet drainageways.

These geologic limitations will weigh heaviest in the potential for installation of leaching pits or galleries for gray water disposal at campsites. In order to prevent potential sewage problems, careful planning, which includes detailed soil testing is imperative for areas proposed for leaching system(s). The soil testing must be done in conjunction with the Town Sanitarian and in compliance with all applicable state and local health code regulations. (See Sewage Disposal Section)

The geologic limitations mentioned above may also pose constraints in terms of road construction, especially where steep slopes are encountered. Because of the potential for soil erosion in these areas, it is recommended that a detailed erosion and sediment control plan be developed for each phase of the campground expansion. Careful monitoring of all control structures is warranted on a regular basis.

Based on visual observations made during the field review, several west flowing seasonal drainageways in the eastern parts will need to be crossed in order to construct the proposed interior road system. Although undesireable wetland road crossings are feasible provided they are properly constructed. If major wetland crossings are necessary, they should be properly engineered.

The proposed access road should be constructed adequately above the surface elevation of the wetland. This will allow for better drainage of the road and also decrease the frost heaving potential of the road. Road construction through wetlands should preferably be done during the dry time of the year and should include provisions for effective erosion and sediment control. Outlets should include energy dissapators where necessary. Finally, culvert(s) should be properly sized and located so as not to alter the water levels in the area or cause flooding problems.

Plans for all wetland crossings, disturbances or modifications should be submitted to the Town's Inland-Wetland Commission for their review and ultimate approval.

VIII. WATER REQUIREMENTS AND SUPPLY

Section 19-13-B97(c)(1) of the Connecticut Public Health Code (PHC) requires that the well water supply at family campgrounds be of satisfactory sanitary quality and approved by the commissioner of health services. Wells used for such water supply shall comply with the requirements of Section 19-13-B51a to 19-13B51m, inclusive, of the PHC.

The water supply shall be of ample quantity to meet all the requirements for the maximum number of people utilizing the campground at any one time. For this purpose, the figure of 100 gallons per day per camp site is cited in the above mentioned Section of the PHC. Using the 100 gallon figure and multiplying it by the 815 camp sites (both existing and proposed), a figure of 81,500 gallons of available water per day will be required.

The proposed well sites indicate a 75 foot radius from the well as the separating distance from any source of pollution. This separating distance is based on the required withdrawal rate of a well. When the required withdrawal rate is under ten gallons per minute, a minimum separating distance of 75 feet shall be maintained from sewage disposal systems or other sources of pollution. Greater separating distances shall be required for certain industrial wastes or certain rock formations.

Wells having a required withdrawal rate of ten to fifty gallons per minute shall have a minimum separating distance of 150 feet from sewage disposal systems or other sources of pollution.

Therefore, depending upon the required withdrawal rate of the well, certain industrial wastes or certain rock formations, the separating distances may have to be increased. This may cause the elimination of a number of proposed and/or existing camp sites which lay within this greater radius from the well.

Although sand and gravel deposits in certain hydrogeologic settings can yield water to well or wells at a high rate, the sand and gravel deposits in western parts do not appear to be that extensive. Therefore, the water supply for the proposed campground expansion will need to tap the underlying crystalline, metamorphic rock. Although bedrock is not a prolific aquifer, bedrock wells can generally yield small to moderate quantities of water to wells (2-8 gallons per minute). The exact yield of a bedrock-based well is a function of many hydrogeologic factors including the number and size of fractures in the bedrock. Because the fractures are unevenly spaced throughout the rock, there is no practical way, short of expensive geophysical tests to assess the potential of any particular site for a satisfactory well.

Based on an assessment of presently installed bedrock based wells in the Shetucket River Basin, which includes the subject site, 9 out of 10 or 90% of the wells drilled into bedrock have obtained yields of 3 gallons per minute or more.

According to Section 19-13-B97, Family Campgrounds of the Connecticut Public Health Code, one hundred gallons of water per day per campsite should be provided. This pertains only to campsites and does not include other facilities such as the restaurant, bar, etc. Based on the 100 gallons of water/day/campsite, it is estimated that 81,500 gallons of water per day would be required for the total 815 campsites. If a well was pumped continuously for an 18 hour period, a well capable of yielding about 75 gallons per minute would be required. As a result, it seems likely that several wells in conjunction with adequate water storage facilities would be required in order to meet the demands of an 815 site campground.

Since the Public Water Supply section of the Department of Health Services and the Department of Public Utility Control reviews and approves community water supplies, the applicant should contact them as soon as possible in order to discuss the following: (1) projected needs of the campground expansion in terms of water quantity; (2) location of the well or wells on the site; (3) water quality testing requirements; and (4) plans for pumpage, storage, treatment (if necessary) and the distribution system.

The natural quality of groundwater in this area should be satisfactory. However, due to the mineralogy of the rock types underlying the site, especially, the Partridge Formation there may be a chance that elevated iron, iron sulfides, and manganese levels could affect well water quality. As a result, it may be necessary to install an appropriate water treatment filtration system.

It should be pointed out that, if the withdrawal rate of the wells alone or combination exceeds 50,000 gallons in a 24-hour period, a diversion permit will be required from the DEP-Water Resources Unit in Hartford (telephone 566-7220).

IX. PUBLIC SERVICE BUILDINGS

The Public Health Code requires that all campgrounds provide centrally located sanitary facilities consisting of flush toilets, urinals, lavatories and showers with hot and cold running water.

There presently exists six such service buildings at various locations throughout the existing camping area. The number of fixtures within these buildings was not available at the time of this writing. However, if the total proposed expansion does take place, then the total number of fixtures (both existing and proposed) which would be required by the PHC for 815 camp sites is as follows:

Flush Toilets:	27 Male; 29 Female
Urinals:	10 Male
Lavatories:	28 Male; 28 Female
Showers:	21 Male; 21 Female

No camp site shall be located at a distance greater than three hundred feet from a central service building except for remote camp sites.

The site location of a central service building(s) is dependent on a number of factors including but not limited to; topography, soil conditions for on-site subsurface sewage disposal system(s), availability of a water distribution system and the above mentioned three hundred foot radius requirement for camp sites.

X. SEWAGE DISPOSAL

A. GENERAL

The area is not served by public sanitary sewers, therefore all facilities will have to be served by on-site subsurface sewage disposal systems.

Because the total daily application rate of waste water generated at the campground will probably exceed 5,000 gallons, the Department of Environmental Protection's regulations will take precedent. Therefore, comment on this aspect of the review will be made by the DEP after they investigate the site.

It should be noted that at the present time, dumping stations must consist of a holding tank with no leaching area for effluent. This requirement is based on the knowledge that many camping vehicle owners use chemical additives in their holding tanks to aid in odor reduction and the breaking down of solids. Many of these additives contain chemicals which are not allowed to be discharged to the ground where the groundwater can become contaminated.

This requirement becomes critical because of the owner's plan to have all sites served by on-site gray water systems for sink and shower waste water, while providing a pumping service for holding tank wastes. The wastes pumped from the camping vehicle's holding tanks would than be dumped at the on-site dumping station which in turn would be pumped and disposed of at the municipal sewage treatment facility. It is understood that the existing dumping station is equipped with a leaching area for effluent. Therefore, additional dumping stations with no leaching area would have to be installed to be able to meet this requirement. Consideration would have to be given to the cost of tipping fees at the municipal sewage treatment facility which could be cost prohibitive.

B. DEP - WATER COMPLIANCE REVIEW

The Water Compliance division of DEP has reviewed the existing and proposed expansion of campground facilities at the Sun Valley Resort and finds that the site is one that would require issuance of a permit from their department for the discharge of domestic sewage.

The DEP's permitting process will require a favorable hydraulic and pollutant renovation analysis of the proposed and possibly the existing discharge. Once a DEP engineer has reviewed the project and finds the project engineer's calculations satisfactory, a public hearing can be scheduled. {This is separate from Planning and Zoning.}

The permitting process from initial site testing to "approval to construct" typically runs approximately six {6} months.

Design flows from a project of this sort will be in the range of 35-50 gallons per day {gpd} per person with 3.5 people per site assumed.

XI. SWIMMING AREA

The body of water which is used for the bathing area was created by impounding Patten and Ellis Brooks. It has a surface area of approximately 9.5 acres and is reported to have 2,000 feet of beach area. Use of the beach is restricted to campers and members of the Sun Valley Beach Club.

Bathymetric and flow data was not available to the writer to determine the number of bathers which this bathing area could safely accommodate without compromising water quality. When bathymetric and flow data become available, the maximum number of bather loading can be determined by dividing the required 1,000 gallon of dilution water per day per bather into the total amount of dilution water through the bathing area per day. Therefore, using the hypothetical number of 600,000 gallons of total dilution water per day and dividing it by the 1,000 gallons of dilution water per bather per day, the bathing area could theoretically support 600 bathers per day, assuming that the inflowing water is of high sanitary quality and satisfactory for bathing.

XII. TRAFFIC

A review of existing information relative to the proposed development indicates there will be a traffic impact. The intersection of Old Springfield Road and Route 190 may require geometric adjustments and the installation of traffic control devices. No improvements to Route 190 are programmed at this time by the Connecticut Department of Transportation. The owner should transmit the necessary data to the State Traffic Commission for a determination if a certificate is required once the town has approved the development.

The increase in traffic between 1980 and 1983 reflects land use change in the town and surrounding communities and the completion of improvements to I-84. Stable growth between 1983 and 1985 may indicate the influence of I-84 being dominant with respect to traffic growth.

Relevant traffic counts on Route 190 and Lake Road are summarized {locations indicated on the Traffic Count Map}:

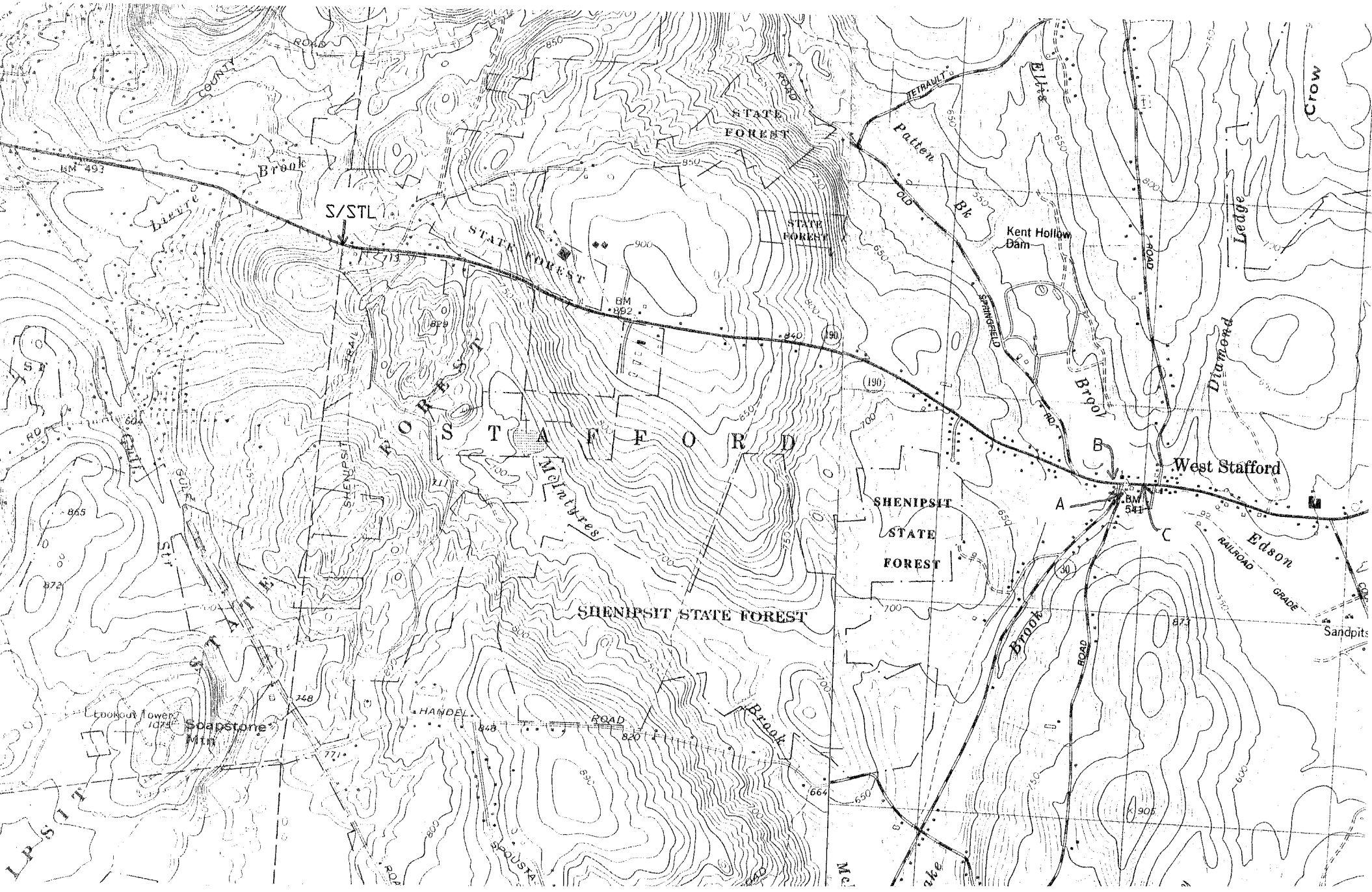
Location	1980	1983	1985
A	2800	3400	3300
B	5200	6000	6500
C	7000	8700	8800
S/STL	4500	6100	6300

Count location S/STL is at the Somers/Stafford Town line.

An estimate of the number of trips generated by 400 spaces during the month of May to October is 2000 trips per day. Peak hour traffic would be between 200 and 250 trips.

The vertical geometry of Route 190 to the west of the intersection would influence the type of improvement necessary for safe traffic operations. A review of drainage should be made to determine if modifications are necessary. {See Planning Review for further road comments}

TRAFFIC COUNT LOCATIONS



XIII. PLANNING REVIEW

The present use of this site reflects a great deal of care and good site planning. It is obvious that the owners take a great deal of pride in what they have developed here. It is also obvious that the people that are the clients of the owners have an equal amount of pride in their sites and enjoy what the owners provide for them.

815 campsites, as shown on the plan, would completely develop every part of the property with intense seasonal living, leaving no open spaces simply in wooded area. It would be desirable if some of the area were simply left as wooded. The owner has expressed this as his goal and it would be of benefit to the campers.

The owner has said that the regulations would allow him as many as 1,300 campsites. If this is so, the regulations should be reviewed in light of the appearance of this campground plan with only 815 sites shown.

Before seeing the site, the Planner's main concern would have been its affect on the surrounding properties. This fear was greatly allayed by viewing the site. Surrounded as it is, mainly by road, public properties, wetlands, and some areas that the owner has tastefully landscaped the possibility still existsto continue to affect the surrounding properties minimally with good site planning and landscaping.

The one major concern that the Town should try to solve is the inadequacy of the road from Route 190 to the main entrance to the Campground. At times of heavy traffic with many vehicles hauling large trailers the capacity of this road will certainly be exceeded. The owner has stated to me that he is willing to offer some help to the Town with the redesign and construction of this road because he understands the benefits he would derive from a new road.

About The Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area--an 86 town area.

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

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, a statement identifying the specific areas of concern the Team should address, and the time available for completion of the ERT study. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Elaine A. Sych (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.