Environmental Review Team Report

Lantern Hill Campground

North Stonington, Connecticut

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EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Environmental Review Team Report

Lantern Hill Campground

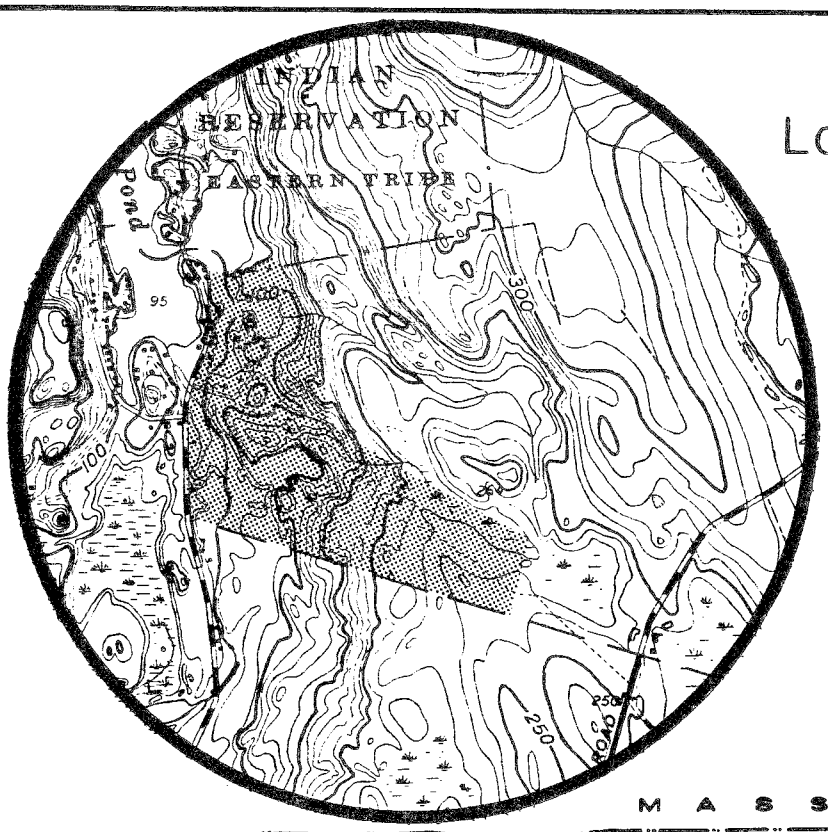
North Stonington, Connecticut

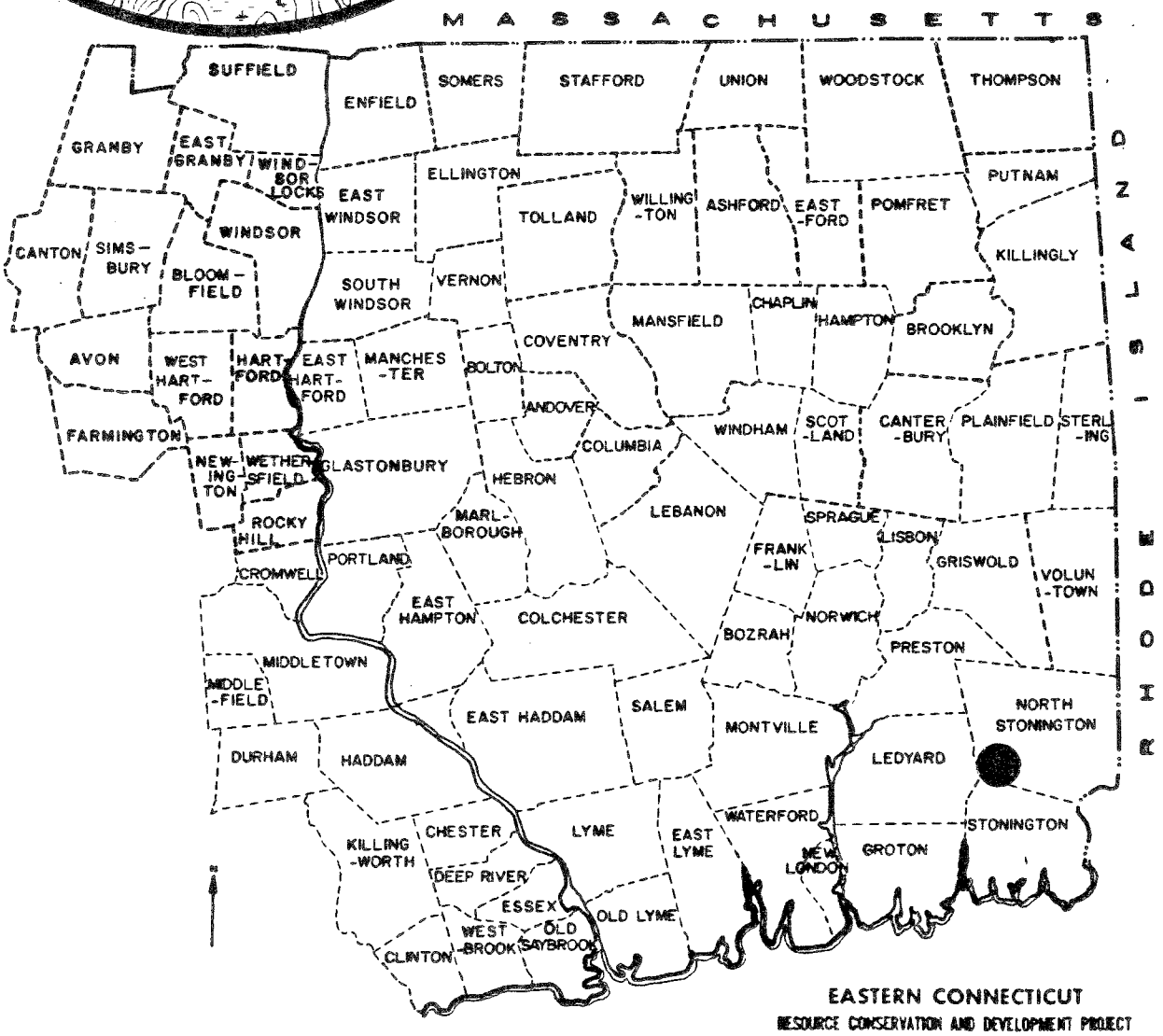
March 1984

Eastern Connecticut Resource Conservation & Development Area
Environmental Review Team
PO Box 198
Brooklyn, Connecticut 06234

Location of Study Site

LANTERN HILL CAMPGROUND
NORTH STONINGTON, CONNECTICUT





EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
LANTERN HILL CAMPGROUND
NORTH STONINGTON, CONNECTICUT

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

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

The ERT that field checked the site consisted of the following personnel: Barry Cavanna, District Conservationist, Soil Conservation Service (SCS); Bill Warzecha, Geologist, Department of Environmental Protection (DEP); Pete Merrill, Forester, DEP; Tom Seidel, Regional Planner, Southeastern Connecticut Regional Planning Agency; Don Capellaro, Sanitarian, Frank Homiski, Sanitarian, State Department of Health; Bob Dlugolenski, Recreation Specialist, DEP, Judy Wilson, Wildlife Biologist, DEP; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

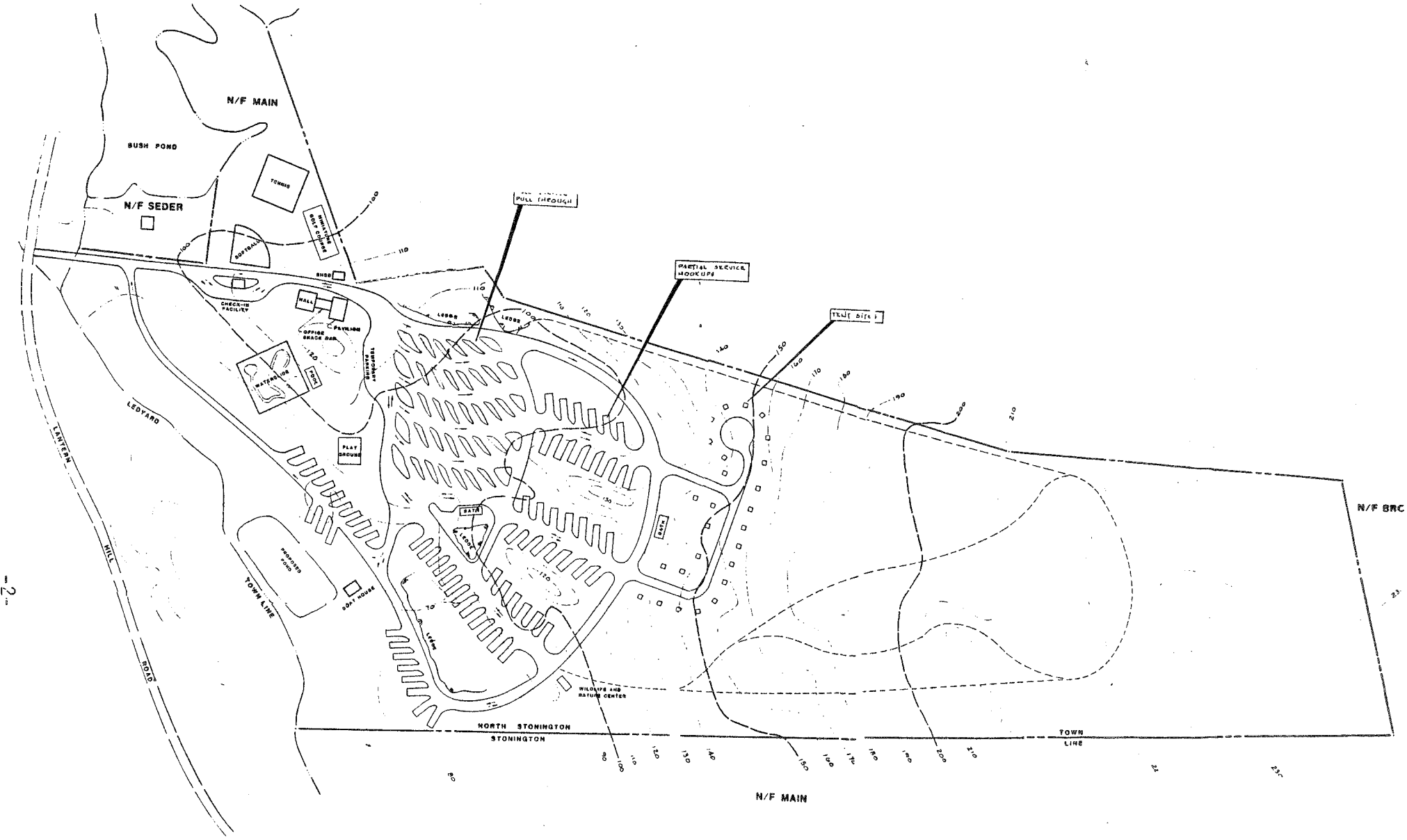
The Team met and field checked the site on Thursday, February 2, 1984. Reports from each Team member were sent to the ERT Coordinator for review and summarization for the final report.

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

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

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, P.O. Box 198, Brooklyn, CT 06234, 774-1253.

Preliminary Site Plan



INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment for a proposed zone change and campground development in the town of North Stonington. The site is approximately 65 acres in size and is located east of Lantern Hill Road, bounded on the south by the North Stonington/Stonington town line. Preliminary development plans have been prepared by Lenard Engineering.

Preliminary plans show 125 campsites proposed for the area. Twenty-six of these are tent sites, 34 are full service sites (electrical facilities, sewage disposal), the remaining 65 are partial service sites (electrical facilities only). Two bath houses are proposed to serve the site. A variety of recreation facilities are also shown on the proposed site plan. These include tennis courts, miniature golf, a softball field, a water slide, a pool, a playground, an office and snack bar building, and a wildlife/nature center. A small pond is also proposed for the campground. Access to the site would be provided from Lantern Hill Road. The property is presently being considered for a zone change to allow for campground development.

Site investigation revealed that the area identified for full and partial service campsites has severe limiting factors for the installation of campsites. A major portion of the campsites are proposed to be located in a natural hollow between two large ridges of ledge to the north and south and a steeply inclining area to the east. This area is very stony and includes several intermittent streams and wet areas.

There are many potential problems associated with site characteristics such as those which exist on this parcel. A natural hollow, with its wet areas and lack of air movement, is an ideal breeding area for biting insects. The lack of adequate air movement also provides an opportunity for the occurrence of an air inversion where smoke and odors from cooking can become trapped in this basin and make camping an unpleasant experience for the campers, especially during periods of hot weather.

The ledges which help to create this depression are in themselves an unfavorable feature for a campground. Adventurous children will find the ledges and rock outcroppings "attractive nuisances" where climbing the ledges could be a threat to their safety.

Slope and wetness offer other problems with establishing suitable campsites and roads. Ideally campsites are to be located on level, well drained soils; the area proposed for development does not meet either of these requirements. Seasonal water would cause problems with site and road stability during the spring and fall of the year. The installation of sewer, water and electrical lines would also be complicated by these conditions.

Slope becomes a real problem with road layout. Because the area designated for partial service hook-ups is on a steep incline, vehicles may find it difficult

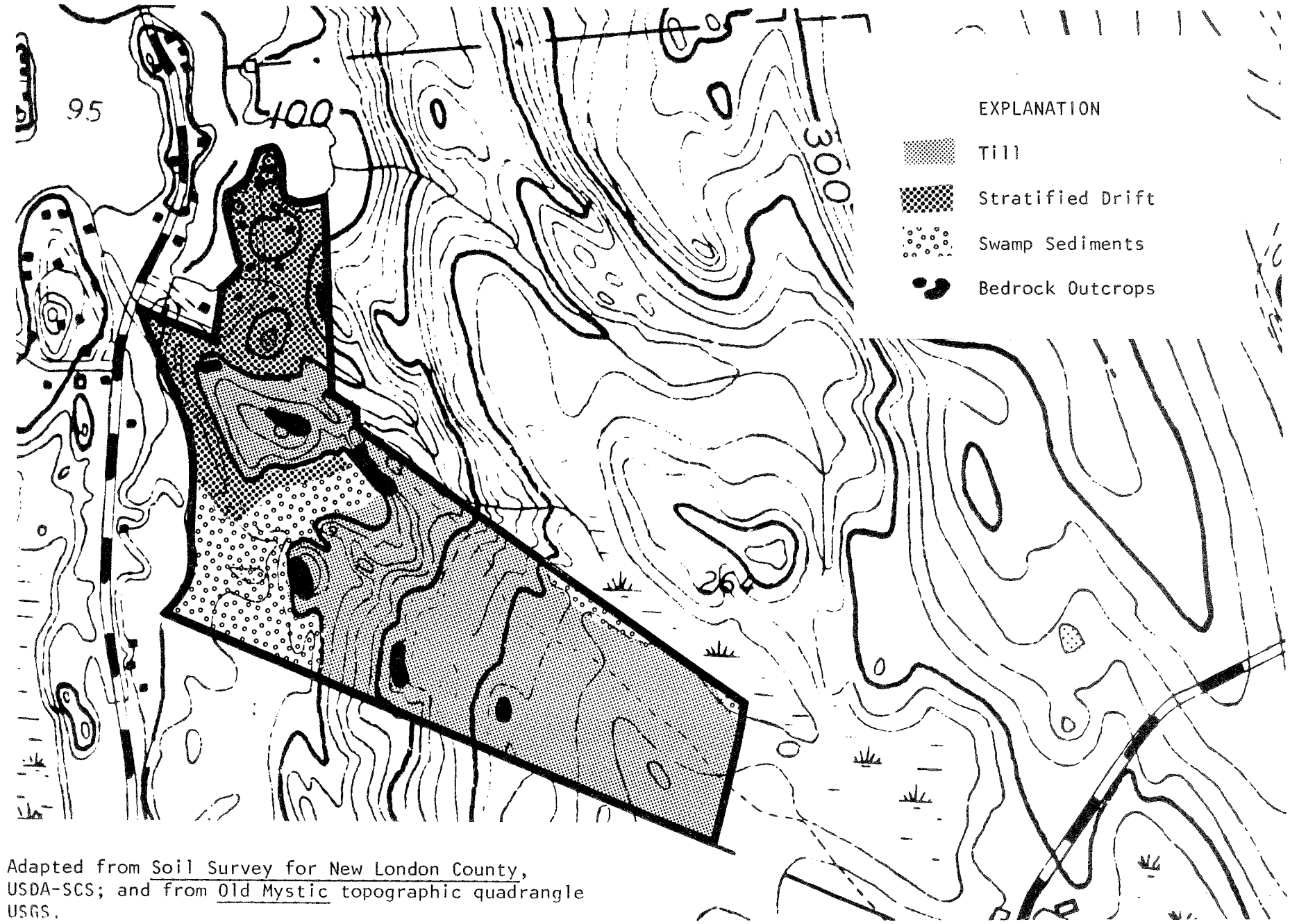
to maneuver while pulling a travel trailer. The recommended maximum road grades are minus 6 percent and plus 4 percent, most of the proposed campsites are located on grades well in excess of the recommended limits.

Campgrounds are regulated under Section 19-13-B97 of the Connecticut Public Health Code. The code addresses specific requirements for the establishment of campgrounds. Included in the regulation are requirements concerning location of sanitary facilities (all campsites must be located within 300 feet of such facility with exceptions for remote sites), provisions for holding tank dumping stations (one such facility for every 100 campsites) and sink waste disposal areas for semi-dependent vehicles to name only a few. The regulation is quite specific and must be addressed to ensure that the campground will be in full compliance with this and other applicable state and local regulations.

Team member concerns are discussed in greater detail in the following sections of this report.

Topography

Surficial Geology



Adapted from Soil Survey for New London County, USDA-SCS; and from Old Mystic topographic quadrangle USGS.

ENVIRONMENTAL ASSESSMENT

TOPOGRAPHY

The proposed "Lantern Hill Campground" site consists of an irregularly shaped parcel of land approximately 65 acres in size. It is located in the southwestern section of Town, south of Long Pond. Approximately 1,400 feet of the site's northern limit borders Bush Pond, which is connected to Long Pond.

Topography on the site is quite diverse. With the exception of a bedrock controlled knoll in the area of the proposed hall/office/snack bar and pavillion, the western and northern limits of the property are relatively flat to gently sloping. This area is predominantly controlled by the underlying stratified drift deposits. The central section of the site is characterized by a rough and rugged terrain comprised of numerous bedrock exposures, some precipitous rock escarpments, surface boulders, wetlands, and seasonal drainageways. From the central portion of the site (full service pull-through area), the land surface rises moderately southeastward to a generally flat area near the southeastern boundary of the property. The difference in elevation from the highest point on the site, which is at the east-southeast property line, to the lowest point, which occurs along the western property line near Whitford Brook, is approximately 150 feet.

GEOLOGY

The subject site is located entirely within the Old Mystic topographic quadrangle. At the present time, only preliminary (unpublished) bedrock geologic information is available for the quadrangle. This information can be reviewed at the Department of Environmental Protection's Natural Resources Center in Hartford. There has been no surficial geologic information compiled for the quadrangle to date. For the purpose of preparing surficial Geologic data for the site, the Team Geologist referred to the Soil Survey of New London County which was prepared by the Soil Conservation Service of the U.S. Department of Agriculture and Connecticut Water Resources Bulletin's No. 15 and 16 (Lower Thames and Southeastern Coastal River Basins).

The rock unit underlying or cropping out on the parcel has been classified as Potter Hill Granite Gneiss. It outcrops extensively in the northcentral and central portions of the property. These rocks consists of a gray to pinkish gray, granitic gneiss composed predominantly of minerals quartz, calcic plagioclase, microcline and biotite. The word "granitic" in the preceding sentence is used to describe rocks which are coarse or very coarse grained and which are commonly rich in the minerals quartz, potassium feldspars and micas. Accessory minerals include magnetite, muscovite, and apatite. A "gneiss" is a metamorphic rock which is characterized by alternating bands of elongate minerals, i.e., micas, and more granular minerals, i.e., quartz, feldspars, etc. The term "metamorphic" refers to rocks which have been altered by tremendous heat and pressure deep within the earth's crust.

Overlying bedrock, on nearly 80 percent of the site, is a blanket of unconsolidated material of glacial origin referred to as till. Till, which was deposited directly by an ice sheet, consists of rock particles and fragments that range in size from clay to large boulders. Numerous surface boulders were visible on the site during the review, particularly in the central portions. Till is generally nonsorted and nonstratified due to its mode of deposition. As the glacier ice moved through the region, it collected and transported rock particles and preexisting surficial (overburden) deposits. Much of this transported debris was redeposited in an indescriminant manner from the ice, either by being plastered onto the land from beneath the ice mass or by being let down gently as the ice later melted. Till is commonly sandy, stony, and loose in the upper few feet, but at depth it becomes slightly fine grained and more compact. The thickness of the till on the site probably ranges from zero, where rock outcrops occur, to probably not more than 12 feet. The latter depth is based on deep test hole information compiled by the project engineer during soil exploration for onsite subsurface sewage disposal.

The western and northern limits of the site are covered by a material called stratified drift. "Stratified drift" refers to glacial sediments deposited by meltwater streams as the ice sheet began to melt. These meltwater streams were loaded with rock debris from the ice and redeposited this debris in well sorted to poorly sorted layers. Sand and gravel are the main components of stratified drift. Coarse grained material, i.e., sand and gravel, were commonly deposited near the ice, while finer grained material, i.e., silt and clay, were washed further downstream to be deposited in lakes or in the sea. Deposits found on the site are presumed to be coarse grained. The stratified drift deposits found on the parcel are delineated by the symbol HcB (Hinckley soils) on the accompanying soils map. The actual thickness of the stratified drift deposits on the site are unknown. However, based on information compiled in Connecticut Water Resources Bulletin #16, thicknesses probably range from a few feet at the till-stratified drift contact to probably not more than 40 feet along the western property line.

Swamp sediments are another type of surficial geologic material found on the property. Swamp sediments consist largely of decomposed plant material interbedded with layers of sand, silt, and gravel, which were deposited in wet depressional areas. They are found primarily along streams or intermittent drainage channels in the westcentral part of the site overlying stratified drift and/or till deposits. The accompanying soils map delineates "swamp sediments" on the site by the symbols Ce (Carlisle muck) and Wd (Walpole soils). The proposed recreation pond will be built in wetland soils in the southern limits of the site. It is recommended that the Soil Conservation Service be contacted for assistance prior to pond construction and that all the necessary local, state or federal permits be properly secured.

Due to the patchwork of till, stratified drift, swamp deposits (wetlands) and rock outcrops present, the opportunities for development activities on the site will vary considerably from point to point. The southeast half of the site which is comprised generally of a flat-upland area and the portion of the property covered by stratified drift in the northern and western sections, excluding wetland areas, appear to have the greatest potential for development. Bedrock outcrops, wetlands, shallow soil depth and moderate to steep slopes will be limiting geologic factors in the central and north central portion of the property. Based on the preliminary site plan submitted to Team members, the bulk of development will occur in these areas. The plan indicates that campsites and sanitary facilities will, for the most part, avoid the rock outcrops which are delineated on the plan areas.

However, there appears a chance that the construction of the proposed building housing the hall/pavilion/office/snack bar, and possibly the waterslide in the northcentral portions of the site, may require blasting. Should blasting, filling/grading or any other type of on-site preparation be required, it is strongly recommended that a detailed erosion and sediment control plan be prepared and implemented during the construction phase, particularly in moderate to steeply sloped areas and near watercourses and wetlands. It should be pointed out that some precipitous cliffs associated with bedrock outcrops south of Hyde Mill pentway in the central sections of the site lend themselves to being a potential hazard for campers, especially children (e.g., injuries sustained from falls of the high cliffs).

A possible alternative discussed by Team members on the review day, was to locate campsites on the higher, relatively flat area in the southeast portions of the site. Hyde Mill pentway, which traverses the site, could provide access to this area with some modification, good planning and engineering. If this is considered, the proposed leaching area could be located farther to the west, possibly on the moderate slopes rising to the flat upland area. This will require detailed site testing in order to determine if there is a suitable leaching area and identify potential limitations, i.e., high groundwater levels, shallow bedrock conditions, and slow percolation rates. If a workable area is found, the need to pump sewage effluent to the proposed leaching area could be eliminated. Although pump systems may work satisfactorily, they are commonly more expensive than gravity fed systems, require much more maintenance than the conventional gravity fed sewage systems and would become inoperable during electrical failures, which in turn could lead to potential problems such as sewage backups, discharges, and overflows.

HYDROLOGY

Approximately 75 percent of the site lies within the watershed of Whitford Brook, the outlet stream for Long Pond. This area includes most of the proposed development activity and comprises the southern half of the property. Surface runoff in this area is drained mainly by sheetflow and small, intermittent drainage channels into Whitford Brook. The Brook, which forms the western property line, flows in a southerly course enroute to Whitford Pond, south of the site. It ultimately discharges into the Mystic River. The remaining portions of the site are drained by an unnamed stream which flows along the northern property line. The stream which originates in a wetland east of the site, flows northwestward enroute to Bush Pond (Long Pond). (See Drainage Area map)

Development of the site as a campground will cause at least a slight increase in runoff, but unless the total amount of impermeable surfaces created were large, the increases should not have a significant affect on peak-flows on nearby streams. These increases would result from soil compaction, removal of vegetation, and placement of impervious surfaces (roof tops, roads, and parking areas). According to the project engineer, access roads will be gravel packed as opposed to paved roads.

It is recommended the project engineer prepares a stormwater management plan which also incorporates erosion and sediment control measures for the Town to review. When formulating the stormwater management plan, the project engineer should direct his attention to the culvert passing under the access road leading to cottages and mobile homes at the northern tip of the property. On the day of the site review,

Drainage Areas

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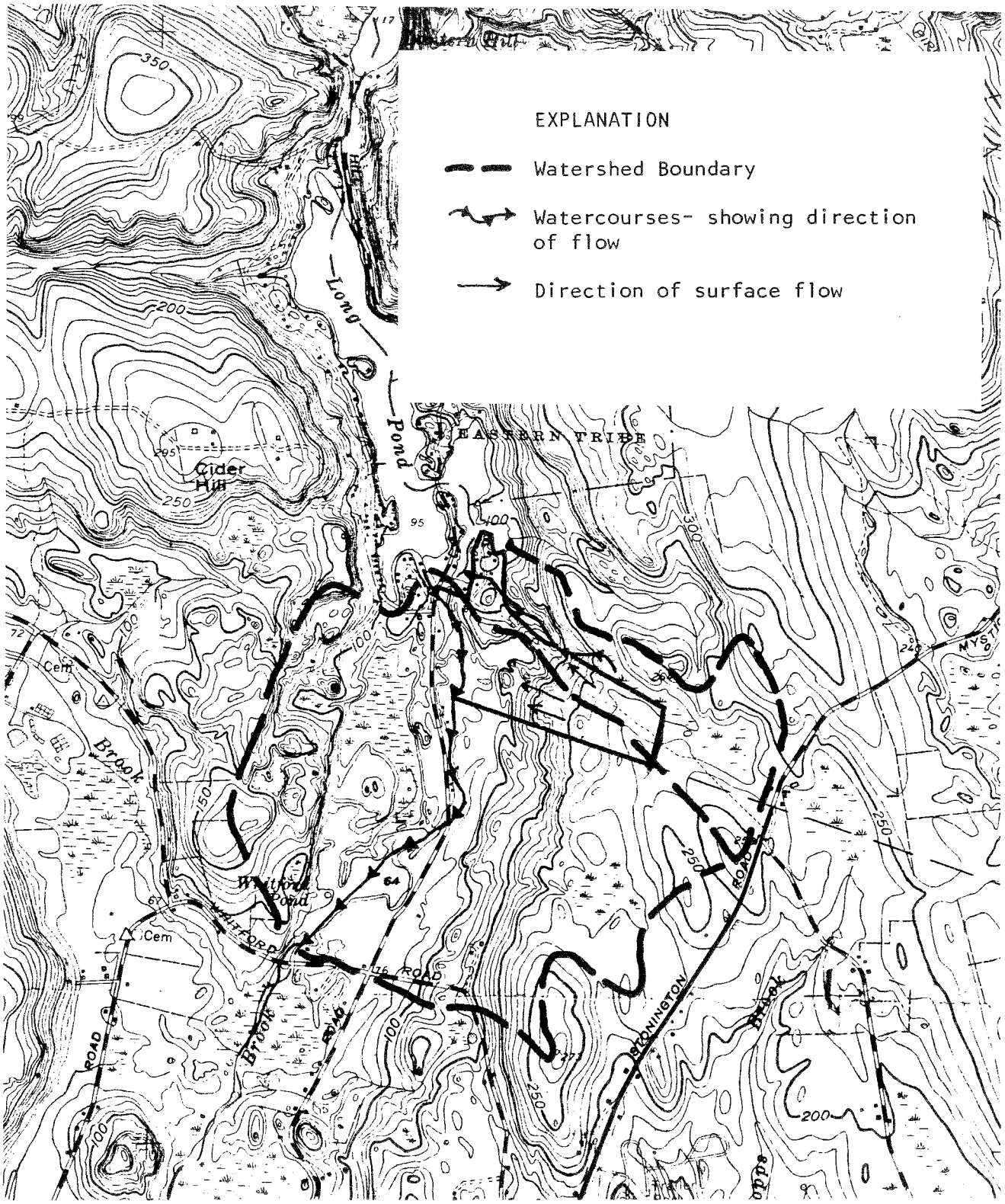
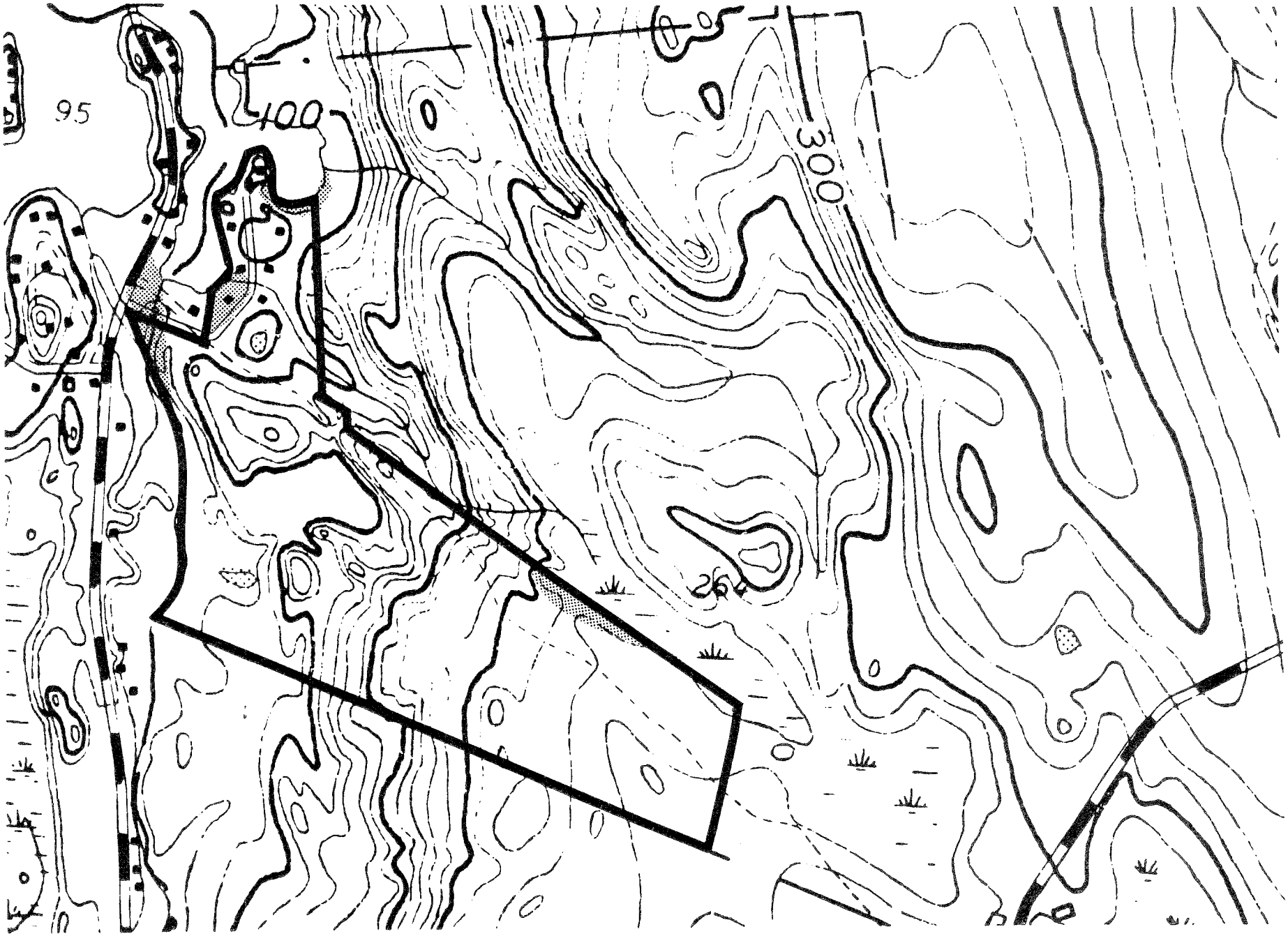


Floodprone Areas



it appeared that the corrugated metal pipe may not be functioning properly. There is visible evidence that the brook flooded the road in this area, resulting in erosion problems. If peak flow increases to this stream occurred as a result of development on the site, the existing problem may be further aggravated, possibly making the road impassible during periods of heavy rain. This should be of concern since the road is the only access to the five or six cottages and mobile homes on the northern tip of the site.

FLOODPRONE AREAS

The Department of Housing and Urban Development (Federal Insurance Administration) has produced a Flood Hazard Boundary Map for the Town of North Stonington. Based on the map, the principal areas on the site which lie in the special flood hazard zone include: (1) along the shore of Bush Pond in the northern portions, (2) along Whitford Brook at the western section, and (3) a small portion of the wetlands in the southeast section of the property. It should be pointed out the entrance road into the campground lies in the Flood Hazard area. The applicant should keep this area in mind particularly when designing the access road into the park. Also, there may be other topographic depressions on the site which may become inundated during periods of heavy rainfall.

SOILS

A detailed soils map of this site and detailed soils descriptions are included in the Appendix to this report, accompanied by a chart which indicates soil limitations for various urban uses. As the soil map is an enlargement from the original 1,320'/inch scale to 660'/inch, the soil boundary lines should not be viewed as absolute boundaries, but as guidelines to the distribution of soil types on the site. The soil limitation chart indicates the probable limitations of each of the soils for on-site sewage disposal, buildings with basements, streets and parking, and landscaping. However, limitations, even though severe, do not preclude the use of the land for development. If economics permit large expenditures for land development and the intended objective is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used. The soils map, with the publication, New London County Soil Survey Report, can aid in the identification and interpretation of soils and their uses on this site. "Know Your Land: Natural Soil Groups for Connecticut" can also give insight to the development potentials of the soils and their relationship to the surficial geology of the site.

Soil series typical of this site include the Carlisle series, the Canton-Charlton series, the Charlton-Hollis series, the Haven series, the Hollis-rock outcrop series, the Ridgebury, Leicester and Whitman series, the Sutton series, and the Walpole series. These soils, their properties and development limitations are described in detail below.

Carlisle muck (Ce). This nearly level, very poorly drained soil is in pockets and depressions of flood plains, stream terraces, outwash plains, and glacial till uplands. Slopes range from 0 to 2 percent.

Typically, this Carlisle soil has black and dark reddish brown, muck organic deposits to a depth of 60 inches or more.

Included with this soil in mapping are small areas of poorly drained Limerick Variant and Rippowam soils and very poorly drained Adrian, Palms, Scarboro, and Whitman soils. Included areas make up about 10 percent of this map unit.

The Carlisle soil has a high water table near or above the surface for most of the year. Permeability is moderately rapid. The available water capacity is high. Runoff is very slow. The soil is strongly acid through slightly acid.

This soil is not suited to cultivated crops because of wetness. Most areas do not have a suitable drainage outlet.

This soil is poorly suited to trees. Machine planting is not practical. Windthrow is common because of the shallow rooting depth above the high water table.

This soil is generally not suited to community development. Onsite septic systems are not feasible without extensive filling. The organic material does not support foundations. If drained, the organic layers shrink and subside. Lawns are difficult to maintain.

Canton and Charlton very stony fine sandy loams (CcB). These gently sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 1 to 8 percent of the surface.

The mapped acreage of this undifferentiated group is about 55 percent Canton soil, 25 percent Charlton soil, and 20 percent other soils. Mapped areas consist of either Canton soil or Charlton soil, or both. These soils were mapped together because there are no major differences in use and management.

Typically, the Canton soil has a black, fine sandy loam surface layer 1 inch thick. The subsoil is dark yellowish brown fine sandy loam and sandy loam 23 inches thick. The substratum is grayish brown gravelly sand to a depth of 60 inches or more.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Narragansett, Paxton, and Montauk soils; moderately well drained Sutton soils; and poorly drained Leicester soils.

Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is medium. This soil warms up and dries out rapidly in the spring. The soil is strongly acid or medium acid.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is medium. This soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

These soils are not suited to cultivated crops. Stones and boulders make the use of farming equipment difficult. Stone removal is costly. The hazard of erosion is moderate. Maintaining a permanent plant cover helps to control erosion.

These soils are suited to trees. Machine planting is generally practical, but stones and boulders hinder the use of planting equipment.

Onsite septic systems need careful design and installation. Stones and boulders need to be removed in order to establish lawns. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help to control erosion during construction.

Canton and Charlton extremely stony fine sandy loams CdD. These moderately steep to steep, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 8 to 25 percent of the surface.

The mapped acreage of this undifferentiated group is about 55 percent Canton soil, 25 percent Charlton soil, and 20 percent other soils. Mapped areas consist of Canton soil or Charlton soil, or both. These soils were mapped together because there are no major differences in use and management.

Typically, the Canton soil has a black, fine sandy loam surface layer 1 inch thick. The subsoil is dark yellowish brown fine sandy loam and sandy loam 23 inches thick. The substratum is grayish brown gravelly sand to a depth of 60 inches or more.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Narragansett, Paxton, and Montauk soils.

Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is very rapid. The Canton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is very rapid. The Charlton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

These soils are not suited to cultivated crops. Stones and boulders make the use of farm equipment impractical. The hazard of erosion is severe. Maintaining a permanent plant cover helps to control erosion.

These soils are suited to trees. Stoniness makes machine planting impractical. Careful layout of woodland roads is needed to prevent erosion.

Steepness of slope is a major limitation for community development. Onsite septic systems need special design and installation to prevent effluent from seeping to the surface in areas downslope from the leaching system. Stones and boulders

need to be removed for landscaping. Quickly establishing a plant cover and using mulch and netting, temporary diversions, and sediment basins help to control erosion during construction.

Charlton-Hollis fine sandy loams, very rocky (CrC). This moderately steep to steep complex consists of somewhat excessively drained and well drained soils on glacial till uplands. Rock outcrops cover up to 10 percent of the surface. Stones and boulders cover 1 to 8 percent of the surface.

The soils of this complex are so intermingled on the landscape that it was not practical to separate them in mapping at the scale used. The complex is about 55 percent Charlton soil, 20 percent Hollis soil, and 25 percent other soils and rock outcrops.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 50 inches or more.

Typically, the Hollis soil has a very dark brown, fine sandy loam surface layer 2 inches thick. The subsoil is dark brown and dark yellowish brown fine sandy loam 15 inches thick. Hard, unweathered bedrock is at a depth of 17 inches.

Included with these soils in mapping are small areas of well drained Canton and Narragansett soils. Many small areas have bedrock at a depth of 20 to 40 inches. A few small areas in the northwestern part of the county have redder colors in the subsoil.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is rapid or very rapid. Charlton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Hollis soil is moderate or moderately rapid above the bedrock. The available water capacity is low. Runoff is rapid or very rapid. Hollis soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

These soils are not suited to cultivated crops. Stoniness and rock outcrops make the use of farming equipment impractical. The Hollis soil has a shallow rooting depth and is droughty. Maintaining a permanent plant cover helps to control erosion.

These soils are suited to trees. Stoniness and rock outcrops generally make machine planting impractical. Windthrow is common the Hollis soil because of the shallow rooting depth.

The major limiting factors for community development are steepness of slope, shallow depth to bedrock, and rock outcrops. Extensive onsite investigations are often needed to locate a suitable site for an onsite septic system. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface in areas downslope from the leaching system. Stones and boulders need to be removed for landscaping. The Hollis soil is droughty. Excavations require blasting in many places. Quickly establishing a plant cover and using mulch and netting, temporary diversions, and sediment basins help to control erosion during construction.

Haven silt loam (HcB). This gently sloping, well drained soil is on stream terraces and outwash plains.

Typically, this Haven soil has a dark brown, silt loam surface layer 7 inches thick. The subsoil is brown, yellowish brown, and dark yellowish brown silt loam 16 inches thick. The substratum is light yellowish brown very gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of excessively drained Hinckley soils, well drained Agawam soils, and moderately well drained Ninigret and Tisbury soils. A few areas have a gravelly surface layer and subsoil. Included areas make up about 15 percent of this map unit.

Permeability of the Haven soil is moderate in the surface layer and subsoil and very rapid in the substratum. The available water capacity is high. Runoff is medium. Haven soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid.

This soil is well suited to cultivated crops. The hazard of erosion is moderate. Minimum tillage and the use of cover crops help to control erosion.

This soil is suited to trees. Machine planting is practical.

Onsite septic systems function with normal design and installation, but they can pollute the ground water in places. Slopes of excavated areas are unstable. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help to control erosion during construction.

Hollis-Charlton-Rock outcrop complex (HrC). This gently sloping to sloping complex consists of somewhat excessively drained and well drained soils and Rock outcrop on glacial till uplands. Stones and boulders cover 1 to 8 percent of the surface.

The soils and Rock outcrop in this complex are so intermingled on the landscape that it was not practical to separate them in mapping at the scale used. This complex is about 40 percent Hollis soil, 25 percent Charlton soil, 20 percent Rock outcrop, and 15 percent other soils.

Typically, the Hollis soil has a very dark brown, fine sandy loam surface layer 2 inches thick. The subsoil is dark brown and dark yellowish brown fine sandy loam 15 inches thick. Hard, unweathered bedrock is at a depth of 17 inches.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Canton and Narragansett soils, moderately well drained Sutton soils, and poorly drained Leicester soils. Many small areas have bedrock at a depth of 20 to 40 inches. A few small areas in the northwestern part of the county have a redder color in the subsoil.

Permeability of the Hollis soil is moderate or moderately rapid above the bedrock. The available water capacity is low. Runoff is medium or rapid. Hollis soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is medium or rapid. Charlton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

These soils are not suited to cultivated crops. Stoniness and the Rock outcrop make the use of farming equipment impractical. The hazard of erosion is moderate to severe. Maintaining a permanent plant cover helps to control erosion.

These soils are suited to trees. Stoniness and the Rock outcrop make machine planting impractical in most places. Woodland roads need to be carefully planned to prevent erosion. Windthrow is common on the Hollis soil because of the shallow rooting depth.

The major limiting factors for community development are the shallow depth to bedrock in many places, and Rock outcrop. Extensive onsite investigations are often needed to locate a suitable site for onsite septic systems. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface in areas downslope from the leaching system. Stones and boulders need to be removed for landscaping. The Hollis soil is droughty. Rock outcrops provide an attractive setting for homes in many places. Excavations require blasting in many places. Quickly establishing a plant cover and using mulch and netting, temporary diversions, and sediment basins help to control erosion during construction.

Ridgebury, Leicester, and Whitman extremely stony fine sandy loams (Rn). These nearly level, poorly drained and very poorly drained soils are in drainageways and depressions of glacial till upland hills, ridges, plains, and drumloidal landforms. Stones and boulders cover 8 to 25 percent of the surface. Slopes range from 0 to 3 percent.

The mapped acreage of this undifferentiated group is about 35 percent Ridgebury soil, 30 percent Leicester soil, 20 percent Whitman soil, and 15 percent other soils. Some mapped areas consist of one of these soils, and other areas consist of two or three. These soils were mapped together because there are no major differences in use and management.

Typically, this Ridgebury soil has a black, fine sandy loam surface layer 4 inches thick. The subsoil is gray and brown, mottled fine sandy loam 16 inches thick. The substratum is very firm, brittle, grayish brown, mottled sandy loam to a depth of 60 inches or more.

Typically, this Leicester soil has a very dark gray, fine sandy loam surface layer 6 inches thick. The subsoil is dark grayish brown, grayish brown, and pale olive, mottled fine sandy loam 26 inches thick. The substratum is light olive gray, mottled gravelly fine sandy loam to a depth of 60 inches or more.

Typically, this Whitman soil has a black, fine sandy loam surface layer 9 inches thick. The subsoil is dark grayish brown, mottled fine sandy loam 7 inches thick. The substratum is very firm, brittle, grayish brown, mottled fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of moderately well drained Rainbow, Sutton, and Woodbridge soils and very poorly drained Adrian and Palms soils. A few areas in the southeastern part of the county have a silt loam surface layer and subsoil. Many small areas have fewer stones on the surface.

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

The Leicester soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is very slow or slow. Leicester soil warms up and dries out slowly in the spring. It is very strongly acid through medium acid.

The Whitman soil has a high water table at or near the surface for most of the year. Permeability is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is very slow, or the soil is ponded. Whitman soil warms up and dries out very slowly. It is very strongly acid through slightly acid.

These soils are not suited to cultivated crops. Stoniness makes the use of farming equipment impractical. The erosion hazard is slight. Maintaining a permanent plant cover helps to control erosion.

These soils are suited to trees. Stoniness makes the use of machine planting impractical, and woodland roads are difficult to construct in most places. Windthrow is common because of the shallow rooting depth above the high water table.

The major limiting factors for community development are the high water table and the slow or very slow permeability in the substratum. Onsite septic systems need special design and installation, and sites generally require extensive filling. Slopes of excavated areas slump when wet. 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 to control erosion during construction.

Sutton extremely stony fine sandy loam (SxB). 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.

Typically, this Sutton soil has a very dark grayish brown, fine sandy loam surface layer 4 inches thick. The subsoil is yellowish brown, dark yellowish brown, and 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, Charlton, and Narragansett soils; moderately well drained Woodbridge and Rainbow soils; and poorly drained Leicester soils. A few areas in the southeastern part of the county have a silt loam surface layer and subsoil. 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. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum.

This soil is not suited to cultivated crops because stoniness makes the use of farming equipment impractical. The hazard of erosion is slight or moderate. Maintaining a permanent plant cover helps to control erosion.

This soil is suited to trees. However, stones and boulders make machine planting impractical in most areas.

The major limiting factor for community development is the seasonal high water table. Onsite 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 to control erosion during construction.

Walpole fine sandy loam (Wd). This nearly level, poorly drained soil is on stream terraces and outwash plains. Slopes range from 0 to 3 percent.

Typically, this Walpole soil has a very dark brown, fine sandy loam surface layer 6 inches thick. The subsoil is dark brown and dark grayish brown, mottled sandy loam 15 inches thick. The substratum is grayish brown and olive brown, mottled loamy sand, sand, and coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Sudbury and Ninigret soils, poorly darined Raypol soils, and very poorly drained Scarboro soils. Many areas have a loamy sand or sand subsoil. Included areas make up about 15 percent of this map unit.

The Walpole soil has a seasonal high water table at a depth of about 6 inches. Permeability is 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. Walpole soil warms up and dries out slowly in the spring. It is very strongly acid or medium acid.

This soil is suited to cultivated crops. Wetness hinders the use of farming equipment in spring and fall. Artificial drainage is needed. The hazard of erosion is slight. Minimum tillage and the use of cover crops help to control erosion.

This soil is suited to trees. Wetness hinders machine planting when the soil is wet. Woodland roads are wet and soft in the spring and fall. Windthrow is common because of the shallow rooting depth above the high water table.

The major limiting factor for community development is the seasonal high water table. Onsite septic systems need special and often unusual design and installation, and areas commonly require extensive filling. In places, onsite septic systems pollute the ground water. Steep slopes of excavations are unstable. Foundation drains help to prevent wet basements. Lawns are wet and soggy in the fall and spring. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help to control erosion during construction.

As can be seen on the accompanying soils map, the more easily developable soils are located in the eastern section of the site. The preliminary development plans show this section of the site to be used for septic leach fields and tent camping. Wetland and rocky areas are to be used for the most intensive site development (full and partial service camping and recreational facilities). It is suggested that the developer reconsider these plans, regrade the existing roadway into the site and use it as access to the areas of better soil conditions in the eastern section of the site.

Prior to development, a detailed sediment and erosion control plan as well as a stormwater management plan should be prepared for the property. The New London County Soil and Water Conservation District is available to assist in preparation of these plans.

VEGETATION

Vegetation found on site is shown on the accompanying map and described as follows:

Area 1. This area includes the open field and house lot areas. The area is open or semi-open. The field has been harvested for hay and contains only various kinds of perennial grasses and sedges. Around the houses it is mostly red maple with some black oaks and white oaks. The edges of the field contain seedlings/saplings of red maple, black birch, sassafras, and oaks. There is blueberry, spicebush, sweet pepperbush and azaleas in the more moist areas, especially along the shore of the pond.

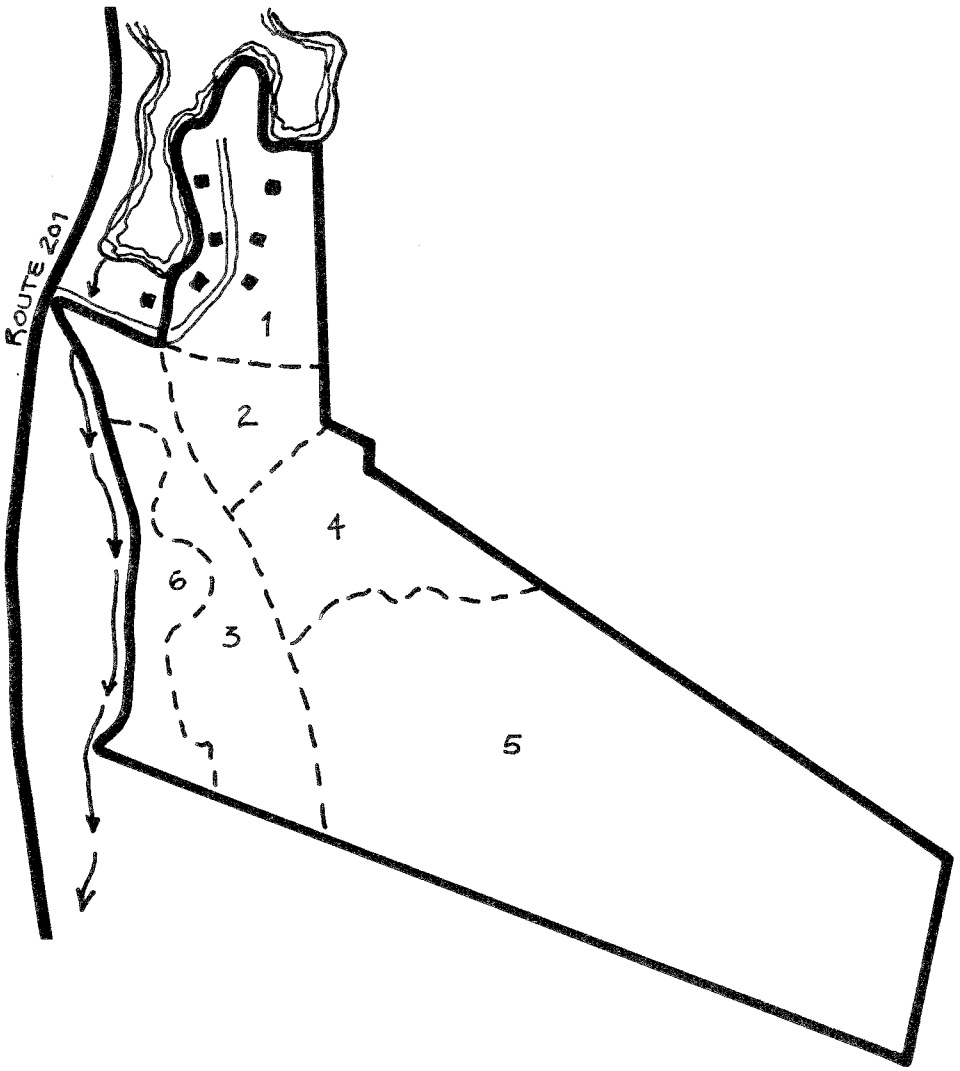
Area 2. This area encompasses a steep knoll that is a rather poor growing site, due in most part to the droughty soil conditions. Most of the trees are in the six to ten inch DBH (diameter at breast height) class with the large ones having been removed in the recent sawlog harvest. The present overstory consists of black oak, scarlet oak, and white oaks. Most of the understory is very light but there are flowering dogwood, black birch, blueberry, huckleberry, sugar maple and red maple.

Area 3. This area is rather diverse in its appearance but all of it can be labelled "old field" type. It varies from open grass and sedge areas to areas with scattered large overstory trees and advanced reproduction. The scattered large trees are usually black or white oak and pignut hickory, with the smaller trees (1" to 6") being black oak and white oak, pignut hickory, red cedar, sassafras, red maple and black cherry. The understory includes: blueberry, huckleberry, gray dogwood, sweet fern and blackberry. This was a pasture areas so the trees are in patches with areas in between diminishing to small seedlings or even grasses.

Area 4. This is the low, relatively level area that is at the bottom of the hillside drainage. The area has been cut in the recent harvest operation, but there is a well stocked stand of red maple and sugar maple, red oak and black oaks remaining.

Most of the area has only a sparse understory, but there are some patches of spicebush and witchhazel, plus maple leaf viburnum, azalea, flowering dogwood,

Vegetation



and sweet pepperbush are scattered throughout the area. Also, there are seedlings and saplings of black birch, yellow birch and American beech.

Area 5. This area is woodland with the predominant stand being 10 to 16 inches in diameter. This area also has been thinned in the recent harvest operation, but there remains a good stand of black oak, white oak, red oaks, black birch, American beech and red maple. The area within the study area has very little understory. There are some seedlings/saplings of black birch and beech, and some huckleberry and maple leaf viburnum.

Area 6. This is an area of bottomland most of which is heavily stocked with red maple. Parts of the area become so wet that the trees thin out and are replaced by grassy hummocks (actually sedges). There are some blueberry bushes in the understory but little else.

Development of this area according to the plans presented, will have considerable effect on the current tree growth. First, in the area planned for recreation development, the field area, can be filled in and leveled to make the area suitable. The pool, waterslide, hall and snack bar on the steep knoll of shallow soils will necessitate cutting and filling of the site; in addition, there will be a large number of foot trails, all of which will be detrimental to the tree growth. All walk areas should be paved or preferably heavily mulched with chips to prevent compaction and erosion of the soil. Some facility locations will have to be changed as the filling necessary to make level areas will involve areas much larger than the facility warrants.

The second, and much more serious problem area, is the "Full Service" camping area. This is a drainage area, very stony, and requiring water channelization and fill. Without careful engineering, water and seasonal flooding will be a problem in this area. Disturbance of the ground to install drainage, plus the filling necessary to make the roads and parking area, will all but eliminate the present stand of trees.

With good road planning and drainage, the tent site area should have little effect on the present tree stand. Although the site, in general, appears to have a good potential for a campground. The project should be redesigned to take advantage of the natural resources present. This would eliminate the drastic changes that the current plan would produce.

WILDLIFE

A majority of the 65 acres of the proposed site is covered by a hardwood forest with light understory growth. A portion of a large hardwood swamp is found in the southwestern corner of the property. An area reverting to old field species is found on the northwestern boundary of the property.

There is a small seasonal brook which runs approximately along the northern boundary of the property and empties into Bush Pond (part of Long Pond). There is a small seasonal pond in the open field.

Site elevation varies from low swampy areas of less than 100 feet above sea level to the hardwood forest areas at an elevation of 200 feet above sea level.

The proposed campground development will utilize a major portion of the 65 acres because of the number of campsites and the many planned facilities. Campground development places high use on an area over the spring and summer months, when wildlife is most active (mating and the raising of young takes place). But, because one of the main goals of a campground is to maintain the area in as natural a state as possible for the enjoyment of the campers, many wildlife requirements can be met.

The layout of the campground should be designed to leave as much undeveloped land as possible without compromising the aesthetics of the campground. Nature trails could be cut through undeveloped areas which will attract and hold more wildlife. Trail users will have a greater chance of seeing wildlife and will have an aesthetically more pleasing trail to walk on.

Development near the brook and hardwood swamp should be minimized so that wildlife habitat can be maintained and erosion problems will be minimized.

The reverting old field areas on the northwestern edge of the property should be maintained by periodic mowing. Valuable wildlife habitat requirements are met by the variety of vegetation and the high degree of interspersion of food and cover found in these areas. Snag trees on the property should be preserved for cavity nesting and snag utilizing birds and mammals.

Small areas of the hardwood forest could be clearcut or selectively cut to allow sunlight to reach the forest floor and thus encourage growth of shrubs, tree sprouts, and herbaceous species. This would provide browse for a variety of wildlife.

Maintain and create edges (areas of shrubby brushy vegetation occurring where two vegetative types meet) to attract and hold wildlife. Any shrubs, bushes and vines providing berries should be encouraged to provide food for wildlife.

WATER SUPPLY

Since no public water supply lines are available to the site, water serving the campground would have to be provided by on-site wells. As mentioned previously in the Surficial Geology section of this report, western and northern portions of the property are covered by stratified drift (sand and gravel). Because these deposits have the ability to transmit water rapidly, they commonly have potential for high yielding wells. However, the yield of any particular well tapping stratified drift deposits would depend upon the thickness, texture, the proximity to streams and the size of the stream or streams as well as other hydrological characteristics of the saturated section of the aquifer at that well location. Due to the presence of these deposits, the applicant may wish to drill a test well to analyze its water supply potential. If a test well is drilled, water samples should be collected and analyzed for quality.

Bedrock underlying the central and southeast sections of the site may also be a potential source of water to serve the campground. Although bedrock base wells usually do not produce the high yields associated with stratified drift aquifers, they are commonly capable of providing small but reliable yields to individual wells. Yields from bedrock based wells depend upon the number and size

of water-bearing fractures that are intersected by the well(s). Because the density and size of fractures vary widely in different bedrock zones, the exact yield of any bedrock based well is difficult to predict without expensive geophysical testing. Nevertheless, based on Connecticut Water Resources Bulletin #15, there would be at least a 90 percent chance that a well at any site could yield at least 3 gallons per minute. Wells, which are unproductive to put into use or bedrock wells which yield more than 100 gallons per minute are usually scarce. (Source: Connecticut Water Resources Bulletin #15 Lower Thames and Southeastern Coastal River Basin) Because of the smaller yields associated with bedrock wells, it may be necessary to drill more than one well in order to meet the needs of the campground.

The Public Water Supply section of the State Health Department should be contacted regarding the projected needs of the campground, in terms of water quantity, location of the well or wells, storage facilities, test wells to determine potential yield of well(s) particularly in the stratified drift, and water quality testing requirements.

The natural quality of the groundwater should be moderate to good. Elevated concentrations of iron and manganese may occur locally, however, they are usually not at objectionalbe levels. Judicious care should be taken with the development of any well so that it is protected from contamination, i.e., sewage disposal systems, fuel oil storage tanks, runoff from campsites and parking areas and dumping stations. Wells should be located uphill and as far as possible from any sources of pollution.

From a potential pollution standpoint, it seems likely that if properly constructed, a drilled well tapping the underlying bedrock, would probably provide a greater degree of protection of the water source than a well tapping the stratified drift aquifer. If the stratified drift deposits are course grained and gravelly, contaminants such as sewage effluent can move through the soils without much renovation before the wastewater passes back into the saturated zone (zone where pore space between soil particles are saturated with water). In light of this, it would probably be safer for an on-site well or wells to tap the underlying bedrock in order to minimize the potential for well contamination. Nevertheless, if the geohydrological characteristics of the stratified drift is found to be favorable for development and the water quality is found to be good, it is recommended that any water supply well drilled in the sand and gravel deposits should tap the deposit at the deepest level possible. This would place the well in a better position to avoid contamination that might exist in the upper levels.

WASTE DISPOSAL

As there are no public sewerage facilities available, the campground would be served by on site septic facilities. Sanitary facilities housed in several proposed central service buildings, a dump station and a snack bar would be served by a central subsurface sewage disposal system. Because of severe limitations of bedrock and boulders, slope and intermittent drainage courses within the middle section of the property where most of the campsites would be located, sewage would be piped by gravity to a large septic tank and pump chamber and pumped towards the eastern portion of the property where a subsurface leaching system would be installed. Based on visual observations, soil mapping data and the findings of some deep test pits conducted by the engineering firm, this area would probably be the most feasible for sewage disposal purposes. This area has less slope and

the soils are apparently much deeper and well drained. Although a subsurface leaching system would need careful design and installation, particularly to prevent the possibility of effluent breakout down grade of the system (where the slope might be steep--greater than 15 percent). The Team Sanitarian is concerned with the prospect of developing campsites and installing all the sewer lines as well as other utilities in the previously discussed depressional area of the property. In addition, the cost of installing, operating and maintaining the pumping facilities would, no doubt, be substantial. For these and other reasons given in the report, the site in general would seem to be poorly suited for a large campground development. However, based upon the topography and soil conditions, the eastern portion of the site appears to be much more suitable for campsite development as well as sewage disposal purposes. Waste disposal facilities could probably be developed without the need for pumping. Although there is a question of camping vehicles being able to gain access to this area due to the steep incline and bedrock outcrops, it is one that should be investigated more fully.

Should any possible development take place, particularly in the low, central portion, a detailed erosion and sediment control plan would be warranted along with detailed plans for drainage and storm water controls.

PLANNING CONCERNS

Land Use/Transportation

Surrounding land uses are low density residential, seasonal residential and undeveloped. The North Stonington Town Plan recommends this area of Town for recreation, reservation and preserve uses. The Regional Development Plan recommends this area of North Stonington for low density uses which include residential, agricultural, conservation, recreation and water supply uses. A well designed campground will be compatible with existing and proposed land uses.

Several steps are involved for this application. The applicant is requesting a zoning map change to District R-R, a low density residential zone with 60,000 square feet lots. The applicant is also requesting a zoning text change to allow travel parks as a special permit in R-R zones. Currently, travel parks are only permitted in industrial zones in North Stonington. The surrounding towns of Griswold, Preston and Voluntown allow travel parks in the lowest density residential zones (usually 40,000 and 60,000 square feet lots) as a special permit. If the above changes occur, then the applicant will have to begin the site plan review process for a special permit.

Access to the site is in Ledyard from Lantern Hill Road. Hyde Mill pentway should be widened and adequate site lines provided at the intersection with Lantern Hill Road. Approval will be needed of the Ledyard Public Works Director for this entrance and the Ledyard Inland Wetlands Commission may have to review the pentway brook crossing.

No existing traffic counts are available for the Town portions of Lantern Hill Road. The northern end of Lantern Hill Road is State Route 214 before its intersection with Route 2. This has an average daily traffic count of 880 vehicles. Even if one assumes the worst case situation, i.e., all the campsites would fill within two hours on a Friday evening, this would still be only 14 percent of the

average daily traffic. CONNDOT indicates that the volume capacity ratio for Route 214 in this section is 0.08. A ratio of 0.75 is considered congested and 1.25 is considered the intolerable threshold, so the road is well below the problem traffic levels.

The marketing strategy and emphasis of the campground management will influence the direction of arrival at the campground. It is most likely that campers will arrive from both the north and south, but if tapping the tourism market is emphasized, Mystic Seaport is located five-six miles to the south. This could mean that much of the traffic would be from the south along Lantern Hill Road in Stonington. This road does have curves in it and some widening might be desirable. However, if the traffic counts are low (as they are at the northern end) and low speed limits are followed, the problems should not be severe. Intersection improvements are scheduled for Lantern Hill Road and Marjorie Street in the Regional Transportation Plan.

Alternative access to the site is not available because the applicant's land does not extend east to Route 201, the nearest state highway.

Recreation

The preliminary site plan for the proposed development of the Lantern Hill Campground in North Stonington includes a wide variety of recreational facilities. These facilities, planned for development and construction on a phased basis include: a double tennis court, a softball field, a miniature golf course, an office/snack bar/pavillion and hall complex, an outdoor swimming pool, a waterslide, a playground, a wildlife and nature center building, a pond for canoe, paddle and rowboats, a boathouse, an equipment and storage shed, and hiking trails.

The costs to develop these facilities will range from relatively low expense to major capital investments. Priorities need to be established to determine which facilities are necessities for the initial operation of the camp and those which are more of an amenity. Once these decisions are made, the recreational facilities can be constructed in phases according to the plan of development.

The experiences gained from one or two seasons of the camp's operation may necessitate changes and shifting priorities in the original plan. Thus, it is important that the plan or development be reviewed and evaluated frequently to reflect these changes.

The general layout of the recreational facilities in the form of a "Complex," with the placement of the camp office in the hub, will lend itself to management control and supervision of the facilities.

Opportunities for swimming are an essential feature of a successful campground. The proposed outdoor swimming pool must be planned to have the capability of handling the potential numbers of campers when the full campsite development is reached. The size of the pool, the design, i.e., rectangular "L" shaped, "T" shaped, etc., separate diving well and wading pool design options need to be carefully planned. Because the water slide and swimming pool are public pools by definition, they must comply with Section 19-13-B33a of the Connecticut Public

Health Code entitled "Artificial Pools With Controlled Water Supply." This section requires that plans and specifications for public pools be approved (prior to construction) by the Commissioner of Health Services in accordance with the "Connecticut Public Swimming Pool Design Guide" manual which establishes minimum regulations and standards for both the construction and maintenance of public swimming pools.

Bathhouse facilities are not shown on the preliminary plans. Consideration and attention must be given to these facilities since they are mandated by the State Public Health Laws. The bathhouse should be planned to house the pool's filtration system and the control point for the mechanics of the water slide.

The softball field is located in a low, wet area. Grading will be required and perhaps additional fill. Additional drainage requirements may be necessary by pitching or tilting the field and creating swales on the perimeter. The field orientation, for the safety of the participants, should have home plate facing either northeast or southwest. The site plan proposes the softball field with a northeast orientation which is compatible with the location of the miniature golf course. The reverse orientation would subject a danger to people playing golf from tipped foul balls coming over the backstop.

The double tennis court should be oriented on a north-south axis to reduce sun glare to the players. A non-porous surface such as asphalt which is sealed and color coated is recommended for attractiveness, durability and minimal maintenance.

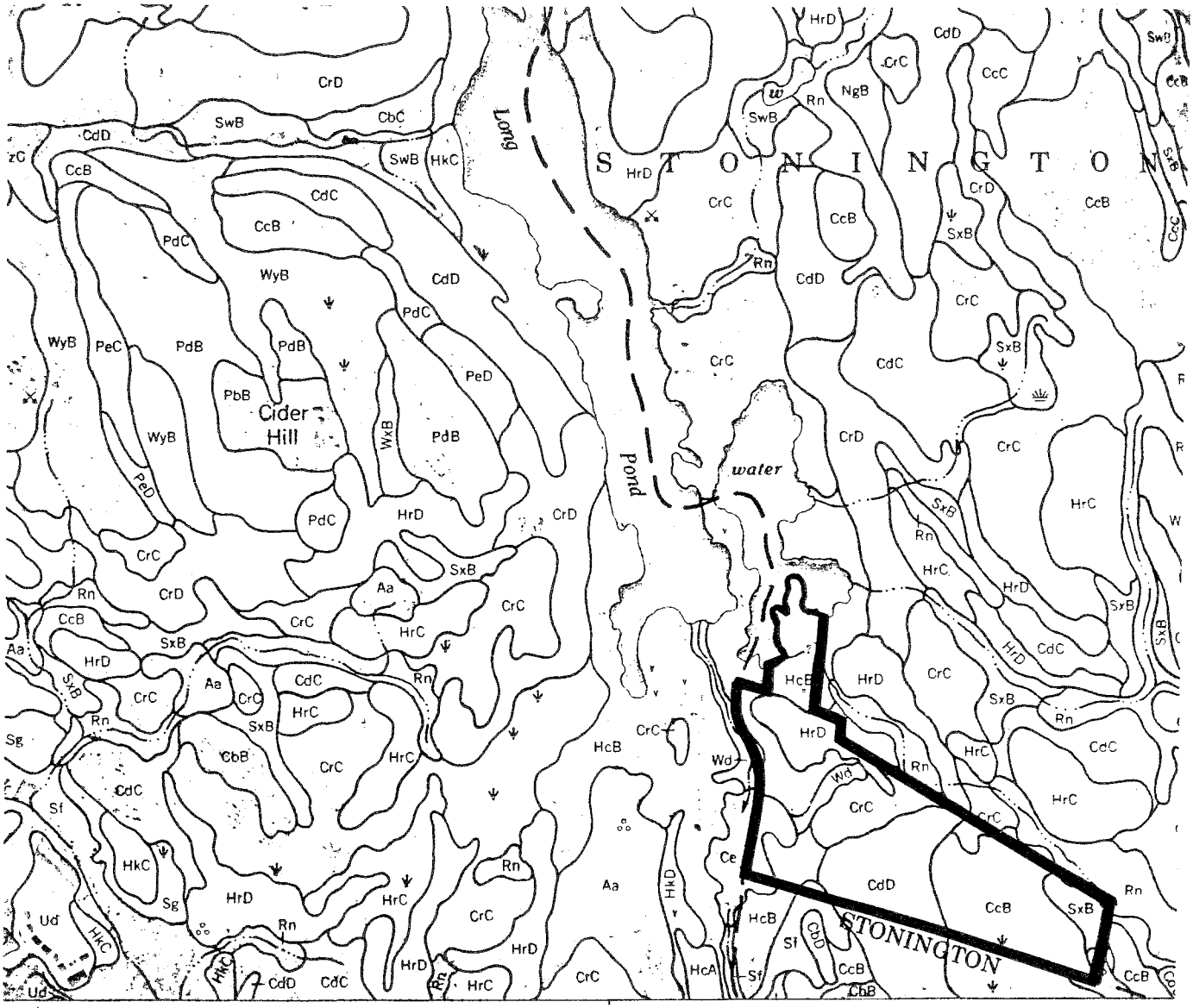
Some consideration should be given to locating other paved areas for basketball, shuffleboard, etc.

The miniature golf course, while a popular activity, will be expensive to construct and will require a considerable amount of maintenance.

The preliminary site plan calls for 125 campsites: 26 are tent sites, 34 full service sites, and the remaining 65 are partial service sites. The full and partial service sites are surrounded by high ledges and gradual slopes. In essence, the sites are located in an area which is not unlike the bottom of a bowl. A wetland area and drainageway traverses this portion of the site. These sites perhaps should be reconsidered since the area will have minimal air circulation, it will retain dampness and moisture and will be a haven for a myriad of insects. The full and partial areas appear in addition to be over-crowded. The quantity versus the quality of the campsite and camping experience should be more clearly defined. Utilization of the underdeveloped and flat area of land on the eastern boundary of the property could provide alternatives and options in re-planning and redesigning the campsite plan. Final development plans should take into consideration the number of camp staff required to supervise and manage the recreation facilities and provide for the necessary equipment and personnel to maintain the campgrounds and its facilities.

Appendix

Soils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STONINGTON
S T O N I N G T O N

INTERPRETATIONS FOR PROPOSED CAMPGROUND DEVELOPMENT
NORTH STONINGTON

SOIL MAP SYMBOL AND SOIL NAME	DWELLINGS WITHOUT BASEMENTS	LAWNS AND LANDSCAPING	LOCAL ROADS AND STREETS	CAMPGROUND & RECREATION	SEPTIC TANK ABSORPTION FIELDS
Ce - Carlisle	Severe: excess humus, ponding	Severe: ponding excess humus	Severe: ponding low strength, frost action	Campground - Severe: ponding, excess humus Picnic areas - Severe: ponding, excess humus Playground - Severe: excess humus, ponding Paths & trails - Severe: ponding, excess humus	Severe: ponding
CcB - Canton & Charlton	Slight	Canton - Moderate: large stones Charlton - Moderate: large stones	Canton - Slight Charlton - Slight	Campground, Playgrounds, Picnic areas - Canton - Moderate: large stones Charlton - Moderate: large stones Paths & trails - Canton - Slight Charlton - Slight	Canton - Slight Charlton - Slight
CdD - Canton & Charlton	Severe: Slope	Canton - Severe: slope, cut banks cave Charlton - Severe: slope	Canton - Severe: Slope Charlton - Severe: Slope	Campground, Playgrounds, Picnic areas - Canton - Severe: Slope Charlton - Severe: Slope Paths & trails - Canton - Moderate: Slope Charlton - Moderate: Slope	Canton - Severe: Slope Charlton - Severe: Slope

SOIL MAP SYMBOL AND SOIL NAME	DWELLINGS WITHOUT BASEMENTS	LAWNS AND LANDSCAPING	LOCAL ROADS AND STREETS	CAMPGROUND & RECREATION	SEPTIC TANK ABSORPTION FIELDS
CrC Charlton & Hollis	Charlton - Moderate: Slope Hollis - Severe: depth to bedrock	Charlton - Moderate: slope Hollis - Severe: depth to rock	Charlton - Moderate: slope Hollis - Severe: depth to rock	Camp areas, Picnic areas - Charlton - Moderate: Slope, large stones Hollis - Severe: depth to bedrock Picnic areas - Charlton - Moderate: Slope, large stones Hollis - Severe: Depth to rock Playgrounds - Charlton - Severe: Slope, large stones Hollis - Severe: Slope, depth to rock, large stones Paths & trails - Charlton - Slight Hollis - Slight	Charlton - Moderate: Slope Hollis - Severe: depth to bedrock
HcB - Haven	Slight	Slight	Moderate: frost action	Camp areas, Picnic areas- slight Playgrounds, Paths & trails - Moderate: Slope, small stones	Severe: Poor filter
HrD Hollis, Charlton, Rock outcrop	Hollis - Severe: slope, depth to rock Charlton - Severe: slope	Hollis - Severe: slope, thin layer Charlton - Severe: slope	Hollis - Severe: Slope, depth ro rock Charlton - Severe: Slope	Camp areas, Picnic areas Hollis - Severe: slope, depth to rock Charlton - Severe: Slope Playground - Hollis - Severe: slope, depth to rock, large stones Charlton - Severe: slope, large stones Paths & trails - Hollis-Moderate: slopes Charlton - Moderate: Slope	Hollis- Severe: Slope, depth to rock Charlton-Severe: Slope

SOIL MAP SYMBOL AND SOIL NAME	DWELLINGS WITHOUT BASEMENTS	LAWNS AND LANDSCAPING	LOCAL ROADS AND STREETS	CAMPGROUND & RECREATION	SEPTIC TANK ABSORPTION FIELDS
Rn - Ridgebury, Leicester & Whitman	Ridgebury - Severe: wetness Leicester - Severe: wetness Whitman - Severe: ponding	Ridgebury - Severe: wetness Leicester - Severe: wetness Whitman: Severe: ponding	Ridgebury - Severe: wetness, frost action Leicester - Severe: wetness frost action Whitman - Severe: frost action, ponding	Campareas - Ridgebury and Leicester - Severe: large stones, wetness: Whitman - Severe: large stones, ponding Picnic areas - Ridgebury, Leicester - Severe: wetness, large stones Whitman - Severe: ponding, large stones Paths and trails - Ridgebury, Leicester - Severe: wetness Whitman - Severe: ponding	Ridgebury - Severe: percs slowly, wetness Leicester - Severe: wetness Whitman - Severe: percs slowly, ponding
SxB Sutton	Moderate: wetness	Moderate: wetness, large stones	Moderate: frost action, wetness	Camp areas, picnic areas, playgrounds - Severe: large stones Playground - Severe: large stones Paths & trails - Moderate: wetness	Severe: Wetness
Wd Walpole	Severe: Wetness	Severe: Wetness	Severe: Wetness, frost action	Camp areas, picnic areas, Playgrounds, paths & trails - Severe: Wetness	Severe: Wetness, poor filter

SOIL INTERPRETATIONS FOR URBAN USES

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

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

Slight Limitations

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

Moderate Limitations

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

Severe Limitations

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

About the Team

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

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

PURPOSE OF THE TEAM

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

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

REQUESTING A REVIEW

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

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