environmental review team report

RC&D

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES

ENVIRONMENTAL REVIEW TEAM REPORT
ON
INDIAN RIVER WOODS SUBDIVISION
AND
PEAT REMOVAL OPERATION
KILLINGWORTH, CONNECTICUT

AUGUST, 1976

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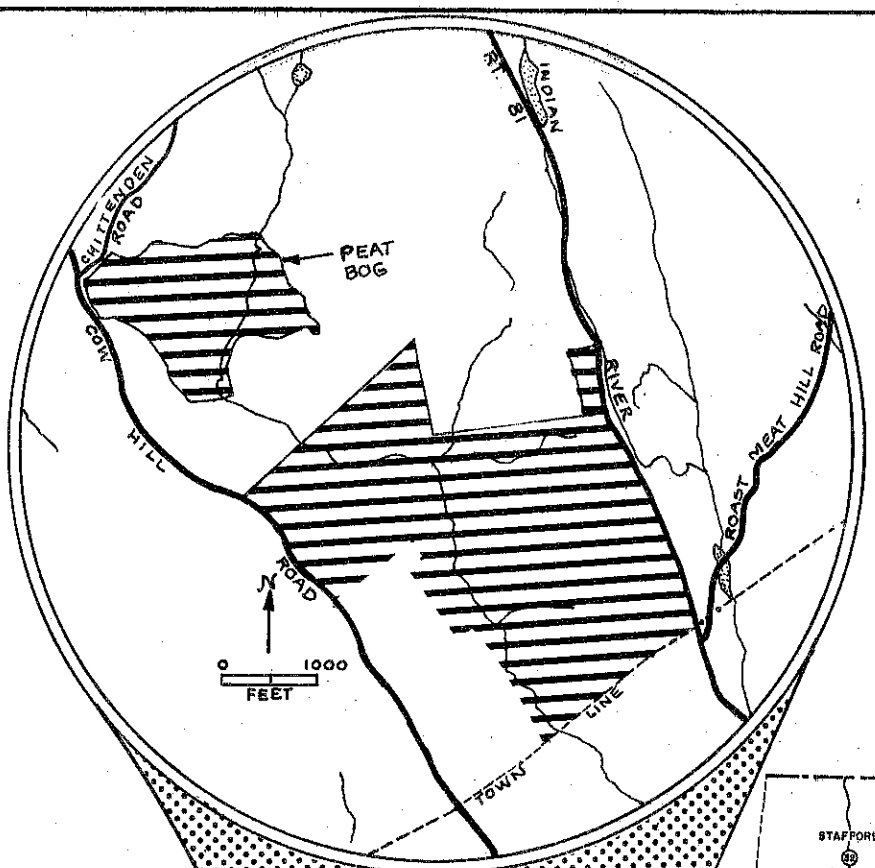
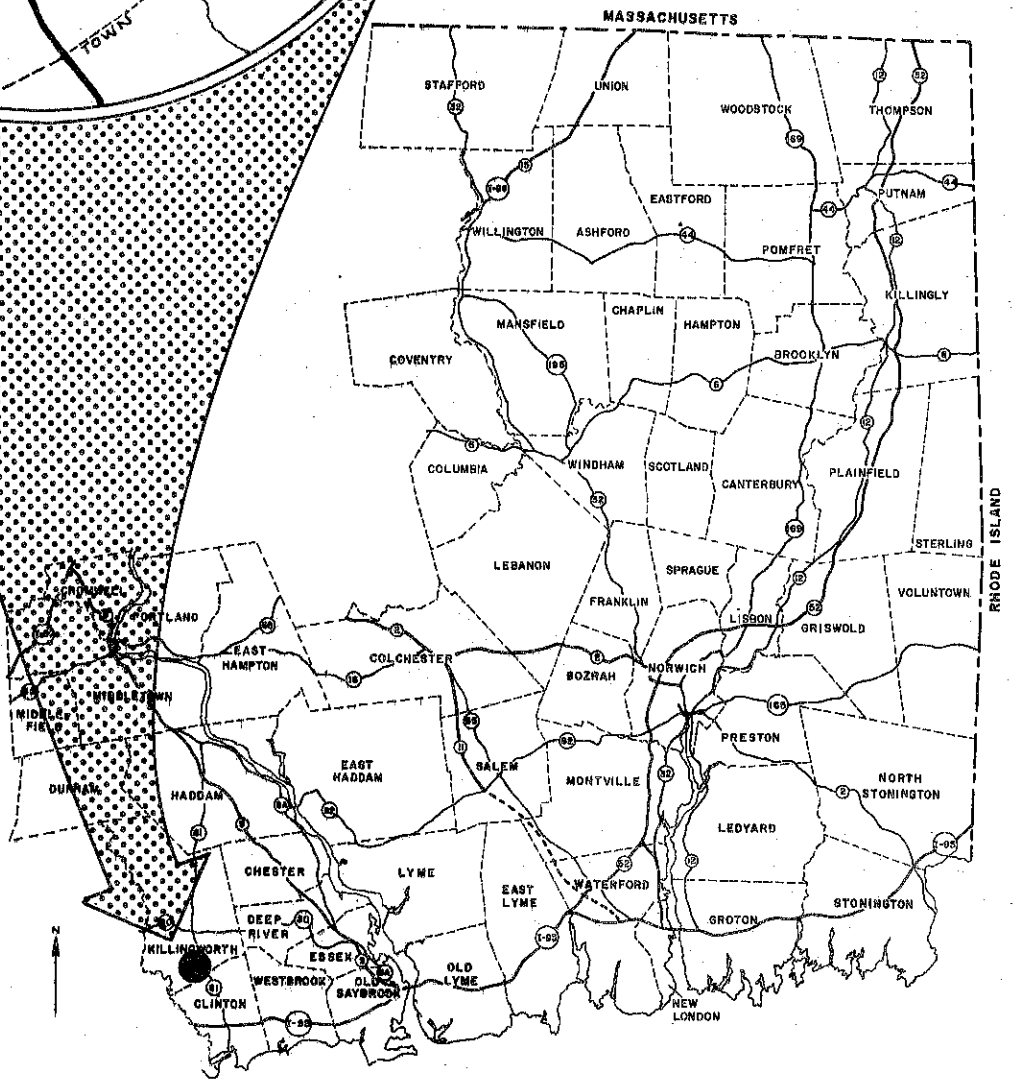
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMEMT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE

INDIAN RIVER WOODS SUBDIVISION AND PEAT REMOVAL OPERATION

KILLINGWORTH, CONNECTICUT





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

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

The ERT that field-checked the site consisted of the following personnel: Barry Cavanna, District Conservationist, SCS; Marc Crouch, Soil Scientist, SCS; Tom Heisler, Soil Conservationist, SCS; Steve Elmer, Soil Scientist, SCS; Tim Dodge, Wildlife Biologist, SCS; Richard Hyde, Geologist, Connecticut Department of Environmental Protection (DEP); Charles Phillips, Fisheries Biologist, DEP; Stanley House, Forester, DEP; Donald Capellaro, Sanitarian, Connecticut Department of Health; David Miller, Climatologist, University of Connecticut Cooperative Extension Service; Ed Meehan, Regional Planner, Connecticut River Estuary Regional Planning Agency (CRERPA); and Linda Simkanin, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field-checked the site on Thursday, May 13, 1976. 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 Killingworth. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

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

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

INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to review approximately 300 acres of land for which is proposed (1) a peat removal operation in a 55 acre peat bog consisting of both shallow and deep peat deposits located near the intersection of Cow Hill Road and Chittenden Road, and (2) a multi-phase subdivision involving approximately 140 acres of land which is below the bog proposed for peat removal, between Cow Hill Road and Connecticut Route 81, and bounded on the south by the Killingworth/Clinton town line. The preliminary plans for the first phases of the subdivision proposal reviewed by the Team involve approximately 56 lots, two acres or larger in size. The later phases of the subdivision are proposed for Clinton, are adjacent to this property, but were not reviewed by the Team. In addition to the subdivision, the developer proposes to deed to the Town or a Land Trust about 60 acres of land as open space.

The entire site is presently undeveloped and is zoned for residential use on two acre lots. Water retrieval and sewage disposal will have to be developed on-site. The present land uses include extensive wetland and wooded upland slopes. An unnamed tributary to the Indian River divides the property, and numerous intermittent streams drain the eastern half of the site.

Some aspects of the proposed development discussed by the Team involve on-site waste disposal, the need for a sediment and erosion control plan to reduce the potential hazard of siltation and possible pollution into the streams during and after home construction, and the peat removal operation with possible acidification of the brook.

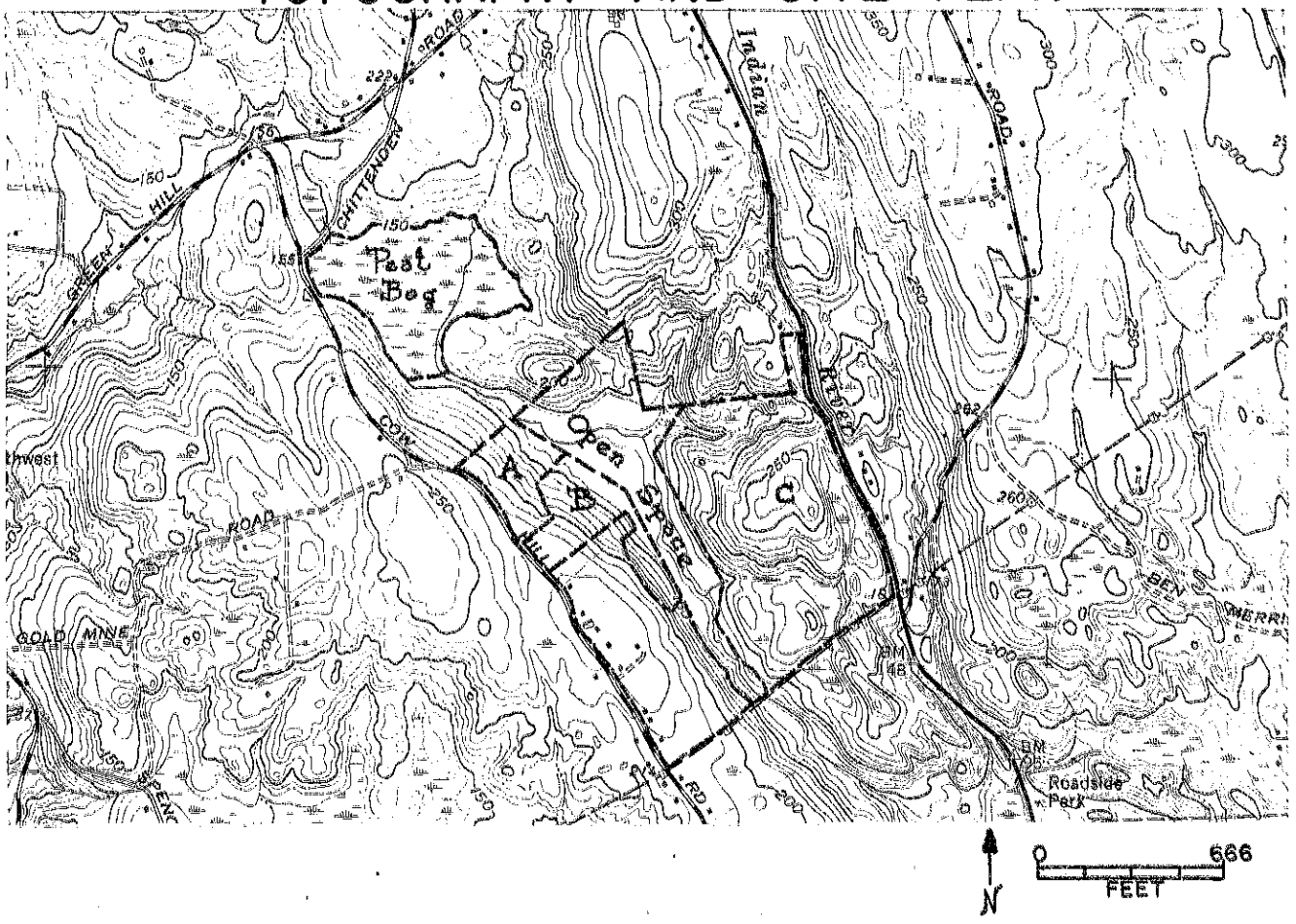
The report will also describe the natural characteristics of the site including topography, geology, soils, forest cover, and wildlife habitat. Consideration will be given to the compatibility and suitability of the proposals relative to the natural resource base. Comments or recommendations made within the report are presented for consideration by the developer and the town in the preparation and review of the development plans, and should not be construed as mandatory or regulatory in nature.

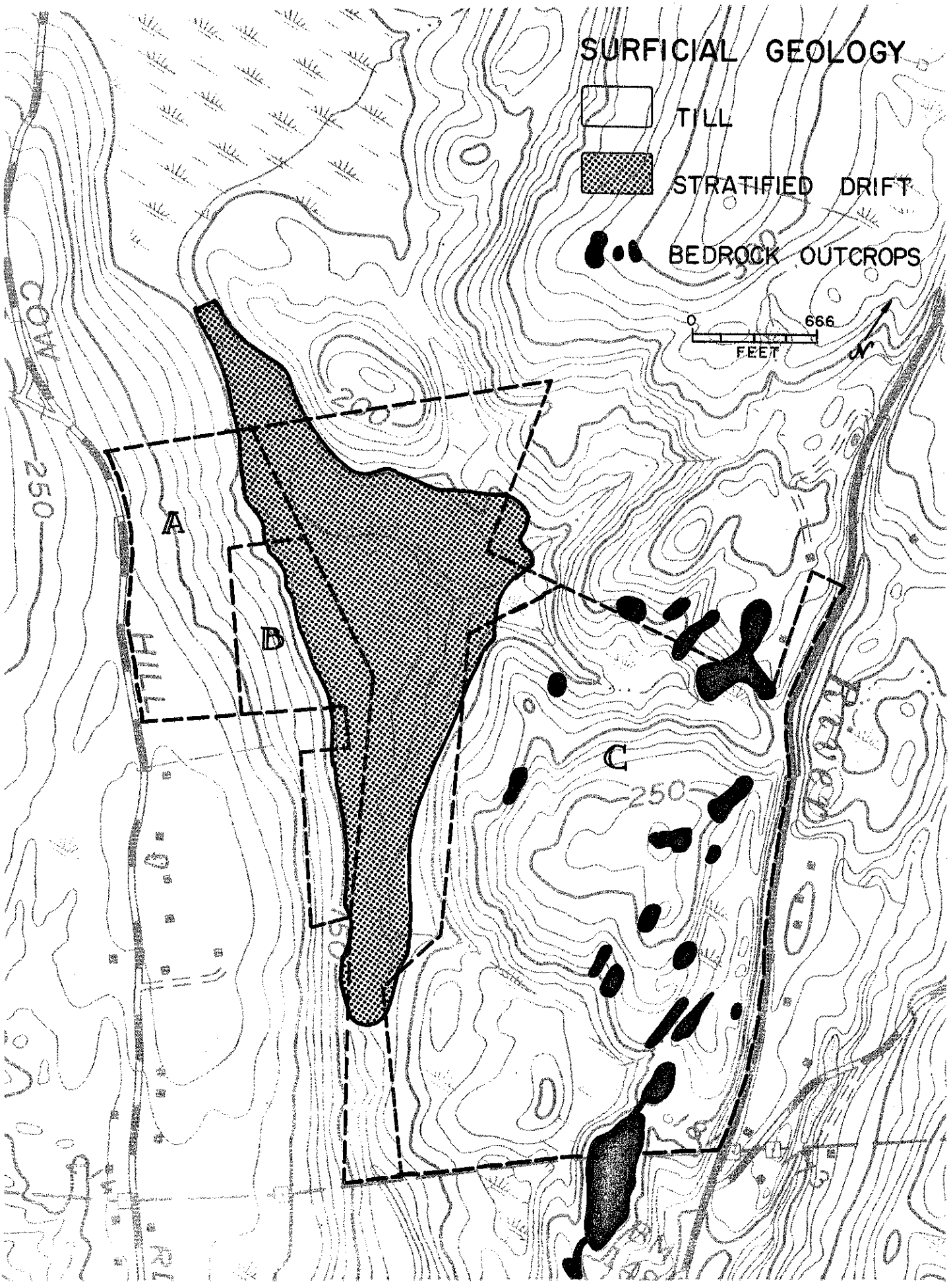
Topography

The proposed subdivision and open space property identified as "Indian River Woods" falls within a narrow elongate subdrainage tributary to the Indian River. The land contains a broad, flat valley bottom with its meandering unnamed stream, steep valley walls to the east and west and bedrock exposed hilltops to the east.

Subsurface elevations change from 135 feet above mean sea level in the valley floodplain to several hill knobs approximately 270 feet above mean sea level adjacent to Route 81. Along Cow Hill Road, land elevations reach a level of 225 feet above mean sea level. (See Topography and Site Plan map.)

TOPOGRAPHY AND SITE PLAN




SURFICIAL GEOLOGY
TILL
STRATIFIED DRIFT
BEDROCK OUTCROPS
0
666
FEET
N
COW
250
A
B
HILL
C
250
D

Surficial Geology

Two types of unconsolidated materials are found on the site that roughly correspond to the proposed activities for the property. Within development sections A, B and C, the primary overburden lying on top of the solid bedrock is glacial till. Within the proposed open space zone stratified drift or floodplain materials are the predominant overburden (see Surficial Geology map.) Till is the most widely distributed overburden material found in the state and was formed from rock and soil particles that were picked up and carried on, within or under glacial ice in the past. Once the ice melted, what remained in place is known as "glacial till." Till is a heterogeneous material composed of various mixtures of boulders, gravel, sand, silt and clay particles, none of which are significantly sorted or stratified according to grain size. Till deposits are normally found on hillsides and hilltops.

The thickness of overburden material is an important factor of consideration, particularly as it pertains to siting and designing of foundations and on-site septic systems. Development sections A and B along the western valley wall contain a thicker till section than is found on the sides and hilltops of the C section to the east.

Within the proposed open space area, which is actually a floodplain of the brook system, are inclusions of stratified glacial sands and gravels and remnant till pockets. The land is flat or very gently sloped toward the valley walls. Land forms of this type developed over periods of time through the meandering of the brook, occasional flooding over the brook banks and gradual downslope movement of finer materials from the valley walls. The deposits are fine grained, generally fairly high in organic content and because of their location in the low point of the drainage system have a long seasonal high water table.

Bedrock Geology

The entire parcel of property is underlain by a rock group called the Monson Gneiss. The Monson Gneiss consists of metamorphosed or deformed igneous rocks, the result of high temperatures and pressures. Igneous rocks solidified from molten or partly molten materials which may have been volcanic, flowed on the land surface, or formed within the earth. In Connecticut, the Monson Gneiss comprises a variety of gray quartz-feldspar rocks containing little or no potassium feldspar. The term gneiss is a descriptive word meaning the rock is a relatively coarse-grained metamorphic type in which fairly wide bands, several feet in thickness, rich in granular mineral crystals which alternate with groups of narrow bands, usually just inches thick, rich in platty, flat and elongate minerals.

Soils

A detailed soil map of the site is given in the Appendix of this report. As the soil map is an enlargement from the original 1,320'/inch to 660'/inch scale, the soil boundary lines shown should not be viewed as absolute boundaries but rather as guidelines to the distribution of soil types on the property. The soils map, along with the SPECIAL SOILS REPORT, Middlesex County (USDA, SCS, 1975), can serve as an educational tool regarding the identification and interpretation of soils.

The soils limitations chart for certain land uses which is found in the Appendix of this report, provides useful information concerning each soil type found on the Indian River Woods site. An explanation of the numbered ratings for particular land uses is provided on the last page of the Appendix.

Sections A and B are primarily Paxton soils. Although they have a severe limitation for urban development (refer to soil chart in the Appendix of this report), subsurface sewage disposal systems can be designed that will function in this soil. One of Connecticut's rare plants was found in this area, and all efforts should be made to preserve the area (see section on Forest Cover). Also, there are numerous stone walls in the area that are in excellent condition, and efforts should be made to preserve them. This could possibly be accomplished by having lot lines conform to stone walls. A sediment and erosion control plan should also be developed and implemented prior to construction in the area.

Section C has soils with severe limitations for urban uses. The Hollis/Charlton complex, and the Hollis/Rock outcrop complex soils are characterized by steep slopes, bedrock outcrops, and a general shallow depth to bedrock. Both these soil complexes present severe limitations for on-site sewage disposal systems, basement construction, and other uses listed in the chart. The bedrock is typically less than two feet below the land surface, with numerous bedrock outcrops (exposed rock surfaces) as were observed during the field inspection. Due to the considerable amount of land having a shallow to bedrock condition, acceptable soil locations for septic systems should be determined before individual house lots are established on a site plan. Among these two soil complexes, the Hollis/Charlton offers a slightly better development potential. Within these Hollis/Charlton soils it should be understood that there can be pockets of deep soil which, if found, can provide acceptable locations for development, probably individual house sites. These pockets can tend to be difficult and costly to locate, and may be widely spaced as the site contains areas of very steep slopes (greater than 15%.) The Hollis/Rock outcrop complex finds the occurrence of bedrock outcrops more frequent and shallow soil nearly universal.

In sections A, B, and C, the areas containing Sudbury, Ridgebury & Whitman, Adrian & Palms muck, and Carlisle muck have severe limitations for all urban uses because of wetness. The value of the land earmarked for recreational development is dependent on the type and intensity of recreation use desired. With drainage, the Sudbury soils can be used for many types of active recreation (picnicking, play fields, etc.) Drainage, combined with stone removal, should allow the Paxton soils to be used for active recreation. The Hollis/Charlton and Hollis/Rock outcrop soils will be difficult to utilize for play areas and picnic sites because of shallow soils and slope. The Ridgebury & Whitman soils, Adrian & Palms muck and Carlisle mucks are valuable for pond development. Their existence also enhances the value of adjacent land by providing a variable vegetative type.

In areas where homes and roads are planned, sediment and erosion control plans should be developed and implemented. Components of effective sediment and erosion control include, but are not limited to, keeping much of the area under existing vegetative cover and keeping areas devoid of cover exposed for the shortest practical period of time. Permanent roads should be installed as early as possible. Temporary seeding and munching may be necessary if development becomes protracted. Sediment basins and other temporary mechanical measures may be necessary to control sediment and reduce the erosive effect of runoff water.

This type of development will cause an increase in runoff. Provisions should be made to accommodate the added runoff without causing harmful effects on land users within the watershed's downstream area.

Forest Cover

Vegetation over the entire site is primarily mixed deciduous hardwood trees with occasional conifers scattered throughout. The understory consists of sparse to moderately dense understory plants including hardwood sprouts, shrubs, and vines. Wetland plants are common along the stream in poorly drained areas.

Section A of the proposed multi-phase subdivision is an old field which has come into mixed hardwood of poor quality. From a forestry standpoint, this section is probably best suited for homesites. This area has been out of the old field habitat for about 35 years, and little or no impact will result in the cutting of these trees. Better hardwoods, and some planted softwoods such as hemlock or white pine should be planted to add aesthetic appeal to this section of the proposed subdivision.

Section B exhibits a similar forested condition, except that it has been out of the old field use longer. The largest and best hardwoods should be saved as land is selectively cleared for development. The proposed open space corrider area is in some areas quite flat and has a quantity of oak and maple trees of pole or small sawlog size. This area could be greatly enhanced by the planting of hemlocks under existing hardwoods on a 20' by 20' spacing.

Section C has a great deal of rock exposed ridges and steep slopes, as well as some locally wet areas and does not have high quality timber. Large, well-spaced house lots could retain most of the tree cover which now exists in an effort to maintain a natural forested condition for the homesites.

Wildlife Habitat

The site provides woodland habitat to wildlife in the form of mixed hardwood trees and shrubs. Species of wildlife utilizing this type habitat include white-tailed deer, gray squirrel, raccoon,ruffled grouse, songbirds, and woodpeckers. Trees and shrubs present include tulip poplar, white oak, red oaks, birches, red maple, white pine, red cedar, witch hazel, spicebush, flowering dogwood, mapleleaf virburnum, sycamore, blueberry, sassafras, greenbriar, mountain laurel, and wild azalia. Low growing wetland plants are also present. On the eastern portion of the property in the vicinity of bedrock outcrops black oak and hemlock are also present. Overall quality of the wildlife habitat is good. Cover is better in the laurel and hemlocks along the eastern portion, however, potential for browse production is limited. The area designated as open space contains considerable acreage of wooded wetlands (type 7 as defined by the U.S. Fish and Wildlife Service.) The western portion has a greater potential for growth of desirable understory plants. The size of this property (270+ acres) makes this a considerable habitat area.

In Section A of the proposed subdivision, there is a large (50 x 100') area of a groundcover plant commonly known as "horsetails" (Equisetum spp.) This is a relatively rare plant in Connecticut, and may be uncommon to the Killingworth area. It would be desirable to protect this vegetative area within the subdivision

plans. The proposed open space area, as indicated on the Site Plan map, will help protect the stream quality of the unnamed tributary to the Indian River, while maintaining a linear corridor for wildlife movement.

Development of Area C will reduce the amount of hemlock and laurel winter cover for wildlife. Development of Areas A and B will reduce the quantity of wildlife habitat available, however, this appears to be the best area suited to development. All development will increase disturbance to wildlife. Minimizing the impact can be best accomplished by retaining as much natural vegetation as possible, landscaping with fruiting shrubs and vines, and seeding all cleared areas to grasses and legumes. The existing habitat could be improved by creating small openings 1/4 to 2 acres in size, and developing woodland access roads which could be seeded with grasses and legumes. Brushy growth would be encouraged in the openings.

Fish Habitat

From a fisheries standpoint, a primary concern is to prevent excessive runoff and effluent from entering the unnamed tributary to the Indian River which bisects the site. As steep sloped and rocky soils are severe limiting factors in some areas of the site, a detailed sediment and erosion control plan should be prepared and carefully followed in order to minimize runoff into the wetlands and watercourses of the site. Where possible, steep slopes should be left in forested condition. The proposed open space corrider will offer some protection to the stream.

Climatology

There are no severe climatic limitations to development of the site for residential housing. The current air quality is quite high and a large number of houses will cause increased automobile emissions. Traffic will be increased considerably on a very undeveloped road system. The fact that no services are available nearby (as for example, shopping areas) will increase the incidence and distances of private automobile trips by the residents, and thus significantly add to the air pollution loads along Route 81.

Annual Mean Precipitation.....48 inches

Annual Mean Temperature.....50° F

Annual Heating Degree Days.....5800

Annual Snow Depth.....40 inches

Maintenance of the tree canopy will essentially reduce the radiational and wind exposure effects of the development.

Hazards

Shallow bedrock surfaces are evident throughout the development section C. These rocks generally trend parallel to the brook and dip to the southwest ranging from 20 degrees to 65 degrees. The fracture pattern of the Monson Gneiss runs in three directions, generally parallel with the individual rock layers which dip to the southwest, perpendicular to the rock trend meaning vertical to the land surface in a northeast by southwest direction and parallel but vertical to the rock trend

meaning vertical to the land surface in a northwest by southeast direction. These fracture patterns insure the ground water flow pattern is toward the stream valley to the southwest. Septic effluent, if it entered the bedrock, is little altered or purified by the rocks themselves and consequently only dilution can be considered beneficial. In areas where high density developments are placed in shallow to bedrock soils the potential for ground water contamination is greatest and the chances dilution will be a beneficial factor are diminished.

Development on shallow to bedrock soils requires careful and organized procedures during construction to minimize adverse erosional problems. Slope is also an important factor in on-site septic system design and placement, and should also be carefully considered in the plan of development. Much of the section C area is characterized by slopes greater than 10% and even 15% in grade. Soils on steep slopes are very susceptible to erosion, particularly if large areas are stripped of the vegetative cover at one time. Land clearing should be kept at a minimum to accommodate the roads and the construction of buildings themselves and only just prior to implacement. Shallow to bedrock soils on steep slopes are extremely susceptible to erosion and proper development practices are essential if hazardous, unsightly and costly corrective measures are to be avoided.

Water Supply

The Connecticut River Estuary Regional Planning Agency's (CRERPA) Water Supply Study indicates that the portion of Killingworth in which proposed subdivision is located is within the Indian River Watershed. This water service area is approximately 7.6 square miles. It was classified in 1972 as B Standard. This watershed provides ground water supply to the Clinton well of the Connecticut Water Company - Guilford Division. This well has the highest yield of the entire water system - 1,000 gpm. The Clinton well is approximately three miles south of the proposed subdivision. The Indian River Woods site is not scheduled for public water service in either the Town or Regional Plans, or the State Plan of Conservation and Development. The feasibility of extending transmission lines into this vicinity is remote.

Due to the terrain, site conditions and size of lots, it is apparent that it would only be feasible to have the water supply for the development derived from private on-site wells, rather than from a central system. With large lots and the installation of drilled wells, there should not be particular difficulty in locating well sites which will meet the required separating distances from potential sources of pollution, primarily the subsurface sewage disposal systems. However, consideration should be given to slope, ledge rock, and the expected direction of ground water flow. A drilled or rock well can generally be expected to supply a sufficient yield to meet the daily needs of a single family dwelling. Problems with low producing wells, which do not yield sufficient water in order to meet peak hour demands, can generally be resolved by providing larger water storage facilities.

On-site water supply would have to be derived from the bedrock aquifer identified as the Monson Gneiss. This rock is a highly metamorphosed material formed by the melting and recrystallization of the constituent minerals. Throughout the area the rock is relatively hard and dense and composed of tightly interlocking mineral grains which do not contain a high percentage of interconnected pore spaces between the individual mineral grains. Consequently little water may be derived

from the rock itself, rather wells drilled into such rock are almost completely dependent on the water flowing through any joints or cracks that the well shaft happens to intersect. Obviously if the well is located in an area where numerous and large rock cracks occur below the water table, then well yields will tend to be high. But, if few cracks exist, then the amount of water potentially available decreases. Except in places where fault zones exist, which may extend deep into the earth, the greatest number of rock openings are found between the bedrock surface and generally 200 to 250 feet deep. Below this point the weight of the overlying rock tends to decrease the potential for openings to remain open. As a general rule, the capacity for rock to yield water to a well decreases with depth. Statistically Connecticut crystalline bedrock wells yield at least 3 gallons of water per minute in 75 percent of the cases, a sufficient quantity for the average single family household.

While the bacteriological quality of a properly located and constructed well should be safe, certain minerals may be present in sufficient concentrations to affect the appearance and taste of the water. Iron and manganese, which are the chief offenders, in excessive amounts would necessitate the installation of corrective treatment in order that the supply would be suitable for normal domestic uses.

Waste Disposal

The Town Plan of Development, the CRERPA Regional Plan of Development, and the State Plan of Conservation and Development all recommend limited development for this section of Killingworth, and consequently anticipate that any development in this vicinity (as the Indian River Woods site) will require the provision of on-site sanitary waste disposal. The Region's long range plan does not propose that this area ever be served with public sewers.

Based on soil mapping data, visual observations and consideration of the topography, it is apparent that overall conditions are generally unfavorable for subsurface sewage disposal. The major factors which restrict or impose definite limitations for this purpose are: excessive slope; ledge rock at or close to ground surface; and wet areas with defined watercourses. Of the total acreage involved, Section C, which is approximately 125 acres, is basically tree-covered rock, with varying slopes and contours. The suitability of this section of the proposed development to support successful operation of the large numbers of leaching systems proposed in this section is questionable.

The area which probably is the most suitable, having the least restrictive factors, is the area off Cow Hill Road, extending to the stream (sections A and B.) The slope, while being continuous, is more gradual. The prime consideration in this section is that some of the lower land (portions of several of the proposed lots) becomes part of or encroaches on wetlands. It is questionable whether several of the proposed lower lots, without revisions to the property lines, would be feasible. Another area of concern is the lateral flow of seasonal surface and/or subsurface water in certain parts of the hillside. Such drainage could, if not properly located or controlled in respect to sewage installations, interfere with the operation of the systems.

In general, it may be said development sections A and B have overburden thicknesses greater than 10 feet to bedrock and probably the average thickness exceeds 20 feet. The Surficial Geology map showed that the greatest concentrations of bedrock outcroppings occurred in section C, indicating a relative shallow till over-

burden there, as compared to sections A and B west of the brook. In section C in general, overburden thickness probably does not exceed, on the average, 3 feet to 7 feet although some deeper pockets of soil may exist at scattered locations as mentioned earlier in the SOILS section of this report. This area will require much more site investigation to locate such pockets for on-site septic installation and, in all likelihood, engineering requirements and considerations will have to be higher than will probably be necessary west of the brook. It may be beneficial for all parties concerned if final lot layouts, sizes and configurations are finalized only after the more favorable thicker soils have been located within development section C.

While the entire site is generally zoned for 2 acre lots, the overall density should truly reflect the capability of the area to support such numbers. There is a definite need to more than mathematically design the subdivision on paper. An in-depth study needs to be made which would take into consideration the various adverse factors which present field problems. For sewage disposal purposes, a detailed site investigation needs to be made to locate possible areas that may support individual sewage systems. Once the basic information is available, individual lot layouts for the entire subdivision can be planned.

Roads and Utilities

Cow Hill Road is a typical country thoroughfare. It intersects with Green Hill to the north and crosses into Clinton to its south. Cow Hill has 1.5 miles of surface in Killingworth and 3.4 miles in Clinton. Development, at present, is sparcely settled along the entire length of this road. Cow Hill is planned to remain a minor residential road in both Killingworth and Clinton Town Plans, however a considerable increase in traffic and anticipated repeated daily automobile trips (as was mentioned earlier in the CLIMATOLOGY section of this report,) could necessitate upgrading Cow Hill Road.

Proposed access to section A & B via road frontage and cul de sac do not present traffic hazards. Access from Rte. 81 into section C could propose problems. Route 81 is a minor arterial road carrying traffic between Clinton/Killingworth. The proposed access point is at a bend where several accidents have occurred. To prevent a dangerous traffic situation from developing at Route 81 and any road access into section C, careful design consideration, with special attention to slope and visibility in two directions on Route 81, should be given.

Aesthetics and Preservation

The proposed Indian River Woods Subdivision site is typical of the terrain found throughout most of Killingworth. The site contains significant rough rock outcroppings as well as some extensive rock-exposed ridges, substantial wetlands acreage, and abandoned old fields of second stage forest growth. The subdivision conceptual diagram has recognized some of the site's natural constraints and has taken into account the significant wetland feature of the site, namely the brook, and has proposed protecting this as a linear open space corridor.

Compatibility of Surrounding Land Uses

Proposed use of this site for residential use is generally compatible with existing and future land use plans. Killingworth's Town Plan (1969) Building Analysis Map indicates the frontage along Cow Hill Road as suitable for development (front portions of sections A and B.) Sections A and B are within the Regional Plan's Limited Development category. Connecticut's Plan of Conservation and Development also recommends this area for limited development. Section C is entirely classified as poor with steep slopes and wetlands. Section C falls within the Regional Plan's proposed Natural Resource area.

Killingworth continues to be one of the fastest residentially growing towns in the Connecticut River Estuary Region. During the 1960 decade, its housing stock increased by 483 units - population 1337 people (127%). Since 1970, an estimated 269 residential building permits have been issued. Killingworth is experiencing the growing pains of suburbanization. The town has recently entered into a regional school arrangement with Haddam and apparently resolved its solid waste problem by closing its dump and opening a transfer station. These facilities should be adequate to accommodate the expected increase in school population and solid wastes from the Indian Woods subdivision. Killingworth Subdivision Regulations include requirements for the submission of erosion and sedimentation control plans to the SCS prior to approval and construction - effective December 16, 1974. The Killingworth Planning and Zoning Commission should examine the entire development concept, including the Clinton portion of the proposed development, as the Indian River Woods proposal comes before their final consideration.

Alternative Land Uses

Other than leaving the land in its natural state due to the severe site limitations discussed throughout this report, the site is best used for limited residential development provided the site limitations are respected. Relative to the existing natural resources and proposed public facilities, this is a combination of low density residential use carefully integrated into the site's wetlands and stream system.

PEAT REMOVAL OPERATION

Topography

As shown earlier on the Topography and Site Plan map, a peat removal operation is proposed in an approximate 55 acre swamp consisting of both shallow and deep peat deposits. Topographically the drainage area of the swamp being considered for organic material removal consists of steep hillsides with slopes greater than 10 percent to flat or gently rounded hilltops. Land elevation changes from 150 feet above mean sea level at the margin of the swamp to 320 feet above mean sea level to the west, 350 feet above MSL to the north and 250 feet above MSL to the southwest.

The total land area within the watershed of the approximately 55 acre swamp is .75 square miles with most of the surface water entering from a stream to the northwest. Water leaving the property exits to the south through the unnamed brook. At some point in the past, a small dam, 3 to 4 feet in height, was placed in the narrowest section of the drainage outlet at the point where the brook leaves the property. The dam, through time, has acted to extend the swamp to a certain extent up drainage and has helped to retard water flow through the area. As a result, organic build-up within the swamp probably has been quite rapid since its implacement.

Surficial Geology

Three types of unconsolidated deposits may be found lying on top of the solid bedrock at the site: till and stratified drift overlain by swamp deposits.

Till - This is the most widely distributed overburden material found in Connecticut. It was formed from the rock and soil particles that were picked up and carried on, within or under the glacial ice. After the ice melted, what remained in place consisted of a heterogeneous material composed of various mixtures of boulders, gravel, sand, silt and clay particles, none of which show significant sorting or stratification according to grain sizes. Till deposits are normally found on hillsides and hilltops. Several areas of bedrock outcroppings were evident indicating the thickness of till overburden to be shallow around those areas. Only in the highest elevations along the eastern and northern boundaries of the watershed do overburden thicknesses probably exceed 10 to 15 feet as a general rule.

Stratified drift - Those materials carried away from the ice by meltwater streams and deposited in valley bottoms in sedimentary layers are what is called stratified drift deposits. Depending on the level or intensity of ice melt, which fluctuates on a daily as well as seasonal basis, these deposits consist of sorted and stratified gravel sand and silt particles laid down in irregular layers that often exhibit wide ranges in texture between layers and over relatively short lateral distances. On this property the swamp is located in a depression between bedrock highs and it appears the valley bottom was covered at least with a thin veneer of stratified drift material although exploratory drilling would be required to assess the quantity and texture of the deposit.

Swamp deposit - Based on the 1:24,000 scale topographic map and aerial photos

of the site, it would appear the original drainage area providing water to this site may have been much larger than it is today. The small brook passing under Chittenden Road and entering the swamp at the northwest corner has the appearance of being an old abandoned channelway and if this were true, for even a short period of time, the total watershed would have been much larger than at present. Chances are the thickest sedimentary deposits, swamp and/or stratified drift may be found in the northwest and western sections of the existing swamp but without further investigation this cannot be known for certain.

Probably after the bowl-shaped swamp basin had developed and after the northwestern drainage inlet had been diverted to flow southwest along what is now Green Hill Road, debris began accumulating in the area of where the dam is today. This restriction in normal drainage retarded the movement out of the valley bottom and allowed a swamp or shallow lake environment to develop with its characteristic plant associations. In time, drainage blockage and plant debris accumulations help to form the existing, possibly thick, organic swamp deposit. In addition to the natural physical conditions of the swamp system, man entered the picture at some point in the more recent past by placing a small dam at the point where the brook exits the property. Such a structure probably promoted and accelerated the accumulation of organic material within the swamp.

Soils

As indicated on the soils map found in the Appendix of this report, the swamp is composed of 91 and 92 soils. 91 is an Adrian and Palms Muck soil. These are deposits of plant remains ranging from 16 to 50 inches in depth and occurring in very poorly drained areas. They are remains of reeds, sedges, sphagnum moss, trees, and shrubs which grow in wet areas. All such deposits have high organic matter content but some are mixed with sand, silt, and clay. The underlying mineral layers are sandy or loamy. The 92 soil is a Carlisle muck which are deposits of plant remains more than 51 inches thick. They formed chiefly in woody organic deposits but may include remains of reeds, sedges, sphagnum moss and shrubs which grew in wet areas. From the soil map there appears to be approximately 28 acres of 91 soil, and 27 acres of 92 soil. On-site test borings are necessary to determine the exact acreage and more importantly, the actual depth of the peat deposits, and hence expected yield.

Forest Cover

The area of the peat swamp is mostly small pole hardwoods with some white pine, and some white cedar. It would be desirable to salvage as much of the pine and cedar as possible in the event of the peat removal. As much of the area mapped as peat deposits is vegetated with trees, a detailed site investigation should be conducted to determine the actual extent of peat present before the peat removal operation is begun. If peat removal is found to be too low (economically speaking,) the end result would be a pond condition which would only serve to reduce the amount of wooded wetland habitat which is now presently available. This type of habitat offers cover during winter months to wildlife.

Hazard

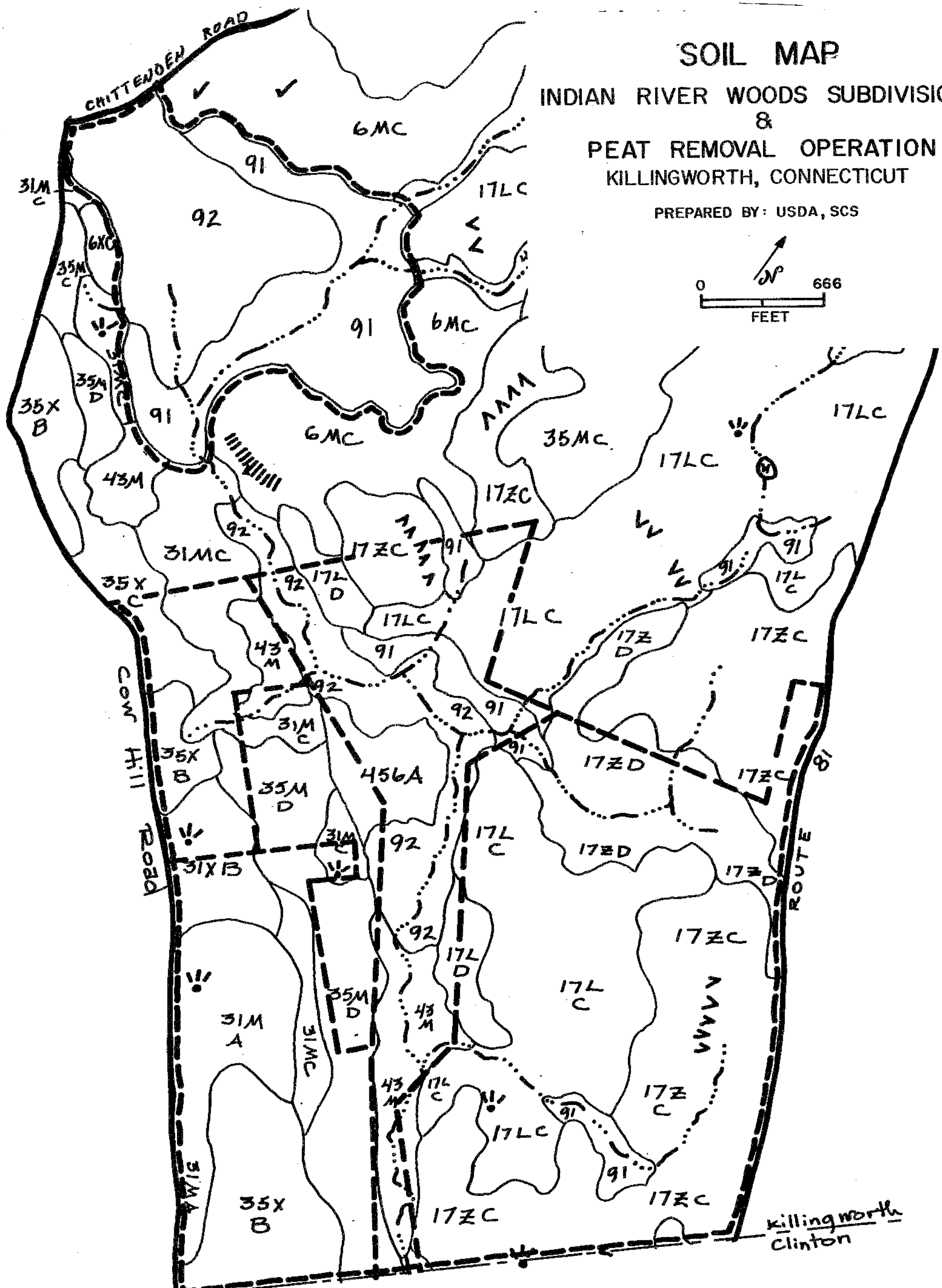
If, after detailed site investigation, peat is found to be in sufficient quan-

tities to be removed for commercial purposes, measures should be taken to prevent acidification of the brook which runs through the swamp. Acidification of the brook could conceivably kill fish throughout the tributary brook and even as far as the Indian River. As organic material is disturbed and removed during the constant brook-flow process, the brook water will exhibit a more acid condition. Until the area is again stabilized, and the peat removal operation ended, some acid buffering device should be used to minimize the danger to fish life in the watershed. In addition, water draining from the area outside the wetland maybe lower in tannic acid and mineral nutrients and higher in organic nutrients. This in turn might effect downstream areas, especially the proposed pond in Clinton, by increasing the possibility of algae problems in impoundments. The fisheries biologist located in the DEP Region III field office in Marlborough can assist with these preventive measures. Regarding peat removal, a sediment and erosion control plan should be developed and implemented; the District Conservationist located in the Middlesex County SCS field office can assist with this.

Prior to any firm decisions being made on how and where organic materials are to be mined from this site, an effort should be made to determine how much organic matter is in the proposed extraction area and the quality of the material for its intended use. In addition, the town should plan for and anticipate long-term effects from the extraction operation, may want to carefully look at how the operation is to be undertaken. Some of the aspects to be considered regarding the proposed peat removal operation: truck traffic, how long a period, how many daily trips; will dust control be necessary; will there be storage or holding areas; how will waste materials be handled; preparation and execution of an sediment and erosion control plan; installation of an acid buffering device to protect fish from excessive brook acidification; and what are the plans for land restoration during and after the resource has been exhausted.

Consideration may be given to the removal of the low dam at the property boundary. Removal may make the extraction process easier, less costly and possibly help to reduce the operation's table. However, such action coulc also have a detrimental effect on the existing forms of plant life within the swamp today.

APPENDIX


SOIL MAP
INDIAN RIVER WOODS SUBDIVISION
&
PEAT REMOVAL OPERATION
KILLINGWORTH, CONNECTICUT
PREPARED BY: USDA, SCS
0
666
FEET
CHITTENDEN ROAD
Cow Hill Road
ROUTE 81
Killingworth
Clinton
6MC
91
92
17LC
17ZC
17ZD
17LD
35MC
35XB
35XC
35MD
31MC
31MA
31XB
43M
6XC
456A

KILLINGWORTH INDIAN RIVER WOODS SUBDIVISION & PEAT REMOVAL OPERATION

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Urban Use Limitations*			
					On-Site Sewage	Buildings with Basements	Streets & Parking	Land-Scaping
Hollis/Charlton	17LC	46.5	14.4	Slope, shallow to bedrock, stony	3	3	3	3
Hollis/Charlton	17LD	6.5	2.0	"	3	3	3	3
Hollis/Rock outcrop complex	17ZC	55	17.0	Depth to bedrock, out-crops	3	3	3	3
Hollis/Rock outcrop complex	17ZD	17.5	5.4	"	3	3	3	3
Woodbridge	31MA	17.5	5.4	Stony	3	3	3	3
Woodbridge	31MC	15.5	4.8	Stony	3	3	3	3
Woodbridge	31XB	9.5	2.9	Stony, wet	3	3	3	2
Paxton and Montauk	35MD	24.5	7.6	Slope, stony	3	3	3	3
Paxton	35XB	20.5	6.3	Stony	3	2	2	2
Paxton	35XC	4	1.2	Stony, slope	3	2	2	2
Ridgebury and Whitman	43M	15	4.7	Wet, stony	3	3	3	3
Adrian and Palms Muck	91	37.5	11.6	Poorly drained, floods	3	3	3	3
Carlisle Muck	92	45	13.9	"	3	3	3	3
Sudbury	456A	8	2.5	Wet	3	3	2	1
TOTAL		322.5	100%					

* Urban Use Limitations: 1 = slight; 2 = moderate; 3 = severe (see back of this page for a further explanation of limitation classifications).

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.