environmental review team report

STONY BROOK ACRES

Stonington and North Stonington, Conn.

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
STONY BROOK ACRES
STONINGTON AND NORTH STONINGTON, CONNECTICUT
AUGUST, 1974

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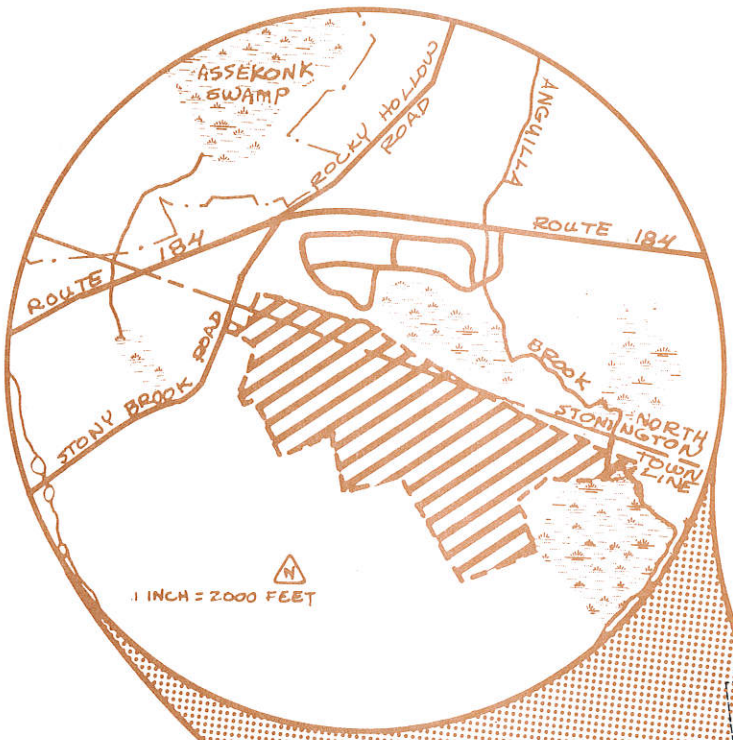
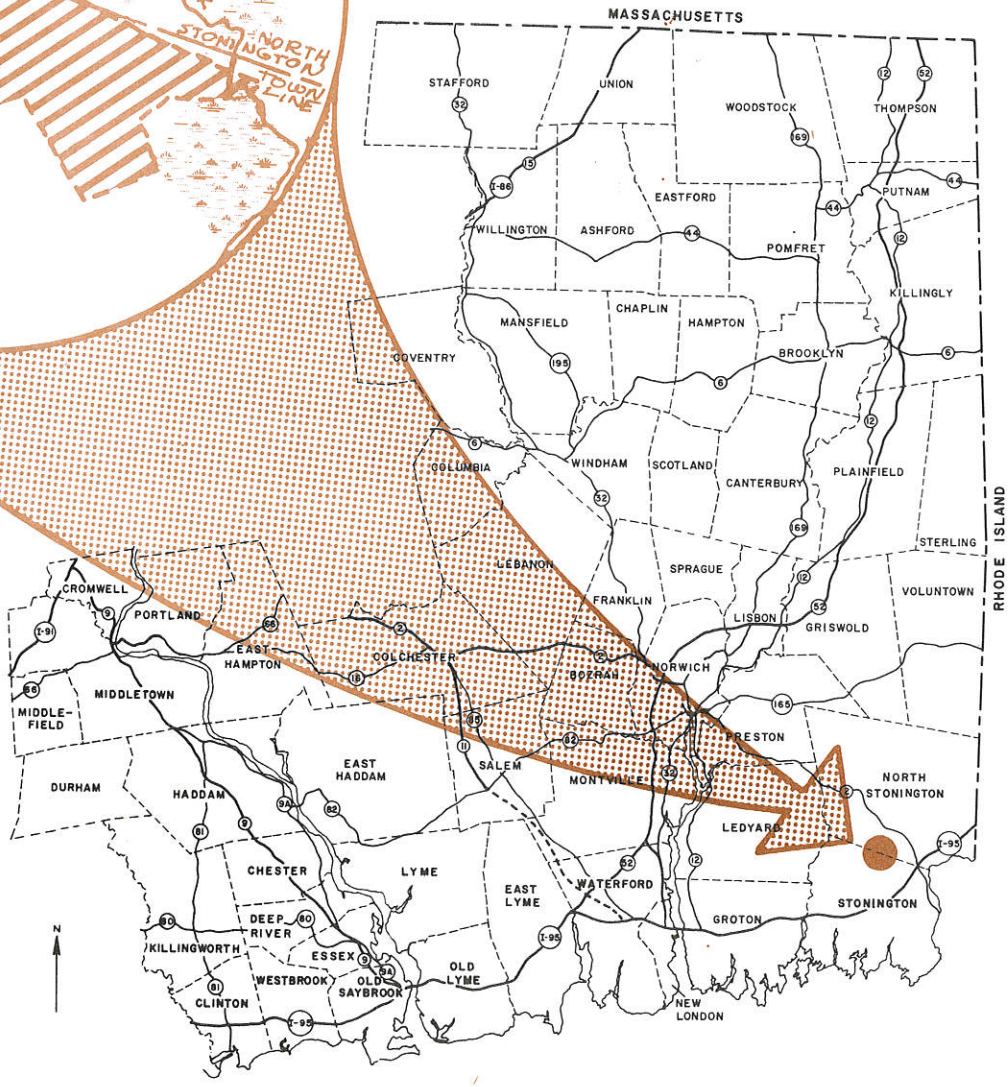
EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE

STONY BROOK ACRES
STONINGTON AND NORTH STONINGTON
CONNECTICUT





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ON
STONY BROOK ACRES
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This report is an outgrowth of a request from the Planning and Zoning Commissions of Stonington and North Stonington, with the approval of the landowners, 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) Executive Council for their consideration and approval as a project measure. The request has been approved and the measure reviewed by the Environmental Review Team.

The soils of the site were mapped by a soil scientist of the USDA Soil Conservation Service. Reproductions of the soil survey and a table of limitations for urban development were forwarded to all members of the Team prior to their review of the site.

The Team that reviewed the proposed development consisted of the following personnel: Sherman Chase, District Conservationist, Soil Conservation Service (SCS); Edwin Minnick, Civil Engineer, SCS; Daniel Meade, Geologist, Natural Resource Center, State of Connecticut Department of Environmental Protection (DEP); Clarence G. Merrill, Forester, DEP; T.E. Linkkila, Wildlife Biologist, DEP; Joseph J. Piza, Fishery Biologist, DEP; Robert W. Davis, Fishery Research Assistant, DEP; Manuel Cardoza, Jr., Sanitarian, State of Connecticut Department of Health; David Miller, Climatologist, Connecticut Cooperative Extension Service (EXT); Rudy Favretti, Landscape Architect, EXT; Linda Simkanin, Planner, Southeastern Connecticut Regional Planning Agency; Barbara A. Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on June 20, 1974. Reports from each Team member were sent to the Team Coordinator for review and summarization.

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 Towns of Stonington and North Stonington and the developers. 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 Council 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 Barbara A. Hermann (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Project, 139 Boswell Avenue, Norwich, Connecticut 06360.

INTRODUCTION

Stony Brook Acres is a proposed 68 unit residential subdivision located east of Stony Brook Road on the Stonington-North Stonington town line. It is located on a hillside which slopes downward to the Anguilla Brook and its associated wetlands. The site is characterized by a variety of soil types which have varying suitabilities for development.

Much of the present concern in both Stonington and North Stonington centers around past developments adjacent to wetlands in which problems have occurred. Some guidelines for development that will ensure protection of the functions and quality of wetlands are desired. As will become apparent further on in this report, the natural resource characteristics of a site should determine the degree and type of considerations made. In general, it is desirable to provide some sort of buffer between active construction and the border of significant wetlands which the town wishes to protect.

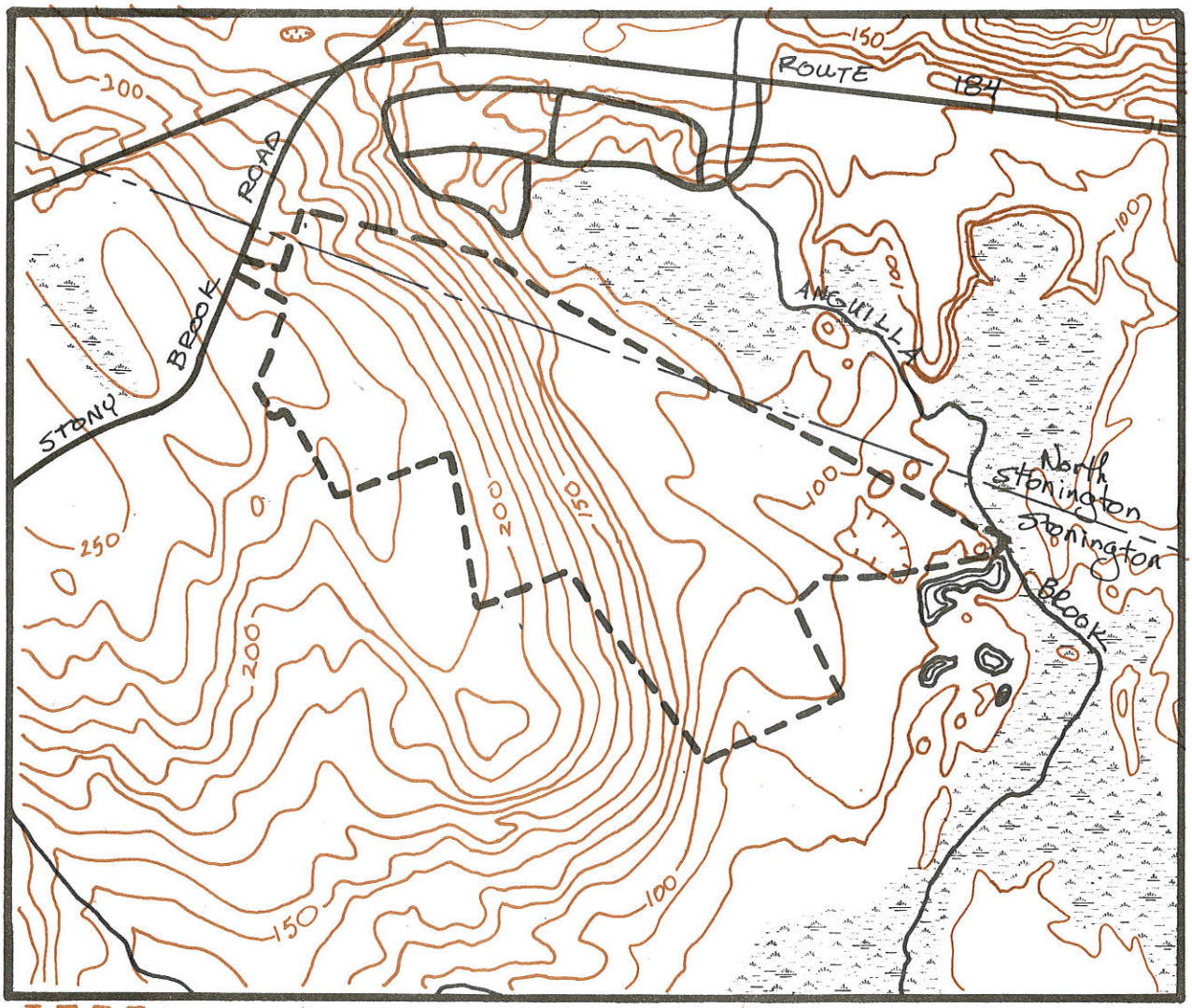
The following report will first describe the natural resources on the site and then discuss the various aspects of the proposed development. Comments or recommendations are offered for consideration by the developer and the town in the preparation and review of development plans, but should not be construed as mandatory or regulatory in nature.

EVALUATION

EXISTING RESOURCES

Topography. As seen on the topography map below, this site is located on a steeply sloping hillside with fairly level areas on the east and west portions. To the north and east of the site are substantial wetlands associated with Anguilla Brook. A significant aquifer has been identified along Anguilla Brook. The Water Supply Plan for the Southeastern Connecticut Region indicates an estimated safe yield of 3.6 mgd (million gallons of water per day). Though no specific plans have been developed for use of this aquifer, protection of the aquifer for potential future use is recommended by the regional plan.

TOPOGRAPHY

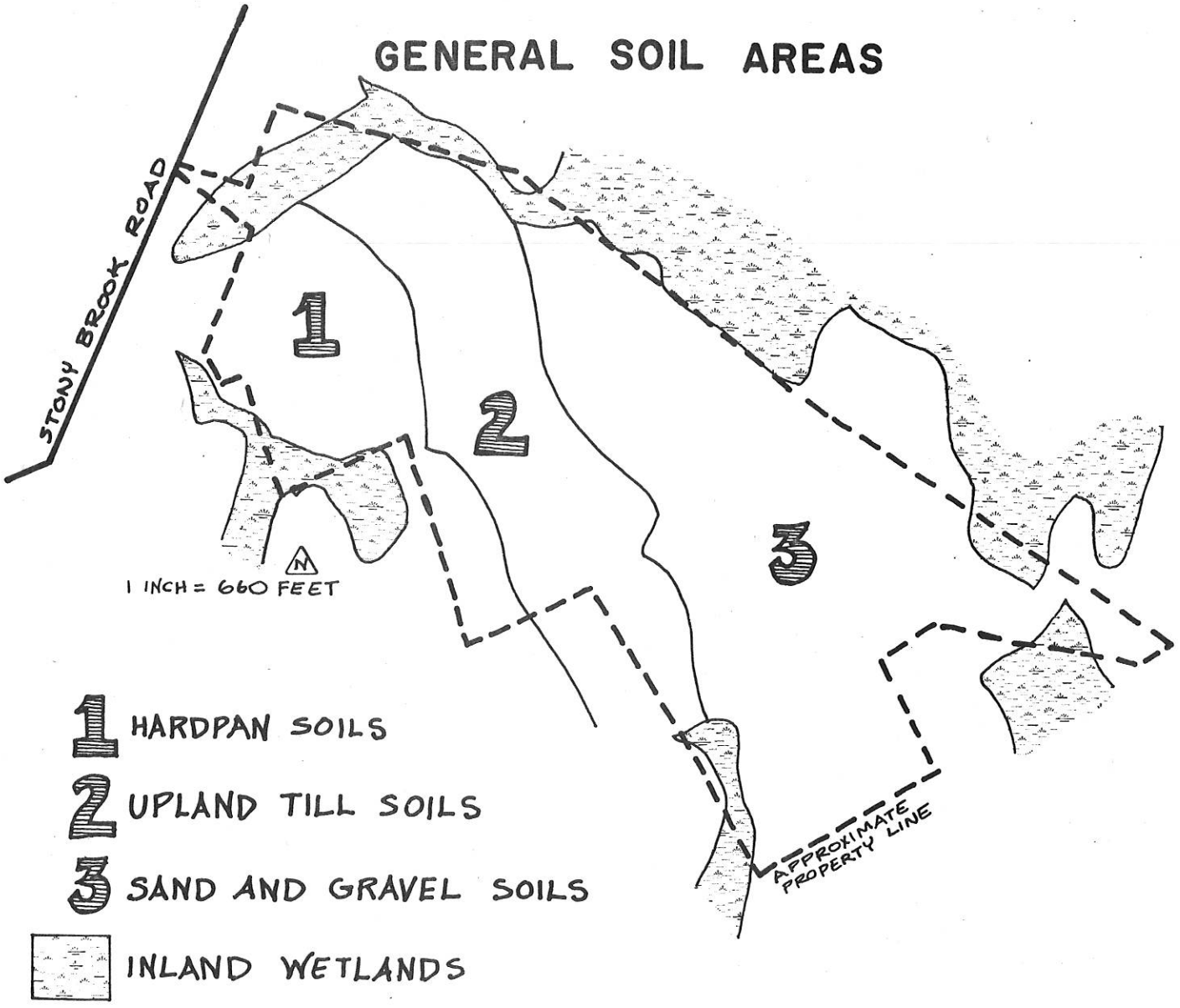


APPROXIMATE PROPERTY LINE

1 INCH = 1000 FEET

Soils. A detailed soils map of this property is given in the Appendix to this report along with a soils limitations chart. Due to the original scale at which the soils are mapped (1"=1,320') the lines shown on the soils map should not be viewed as precise boundaries, but rather as guidelines to the distribution of soil types on the property. The soils limitations chart indicates the probable limitations for each of the soils for on-site sewage, basements, landscaping, and streets and parking. However, limitations, even though very severe, do not always preclude the use of the land for development. If economics permit greater 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 on this site can generally be subdivided into four general classifications: hardpan soils, upland till soils, sand and gravel soils, and inland wetlands. The map below shows these four delineations.



The hardpan soils (153XA, 31MBC, and 35MBC on detailed map) are moderately well-drained soils overlying compact glacial till, commonly referred to as a hardpan. This severely restricts the downward movement of water through the soil, thus resulting in a high water table during the wet seasons. The upland soils in section 2 (52D) are well drained and stony. Though they normally are suitable for development, the excessive slopes present problems for most phases of development. The sand and gravel soils (63A, 213BC, 214AB, 158D) are moderately to well drained, with slopes in the 3 to 15% range. These soils are better suited for development than the remaining soils on the property, though their high degree of permeability will necessitate extra caution in locating water and sewage facilities. The remaining soils (27M, 825, 92, 291, 24, 98X) are poorly to very poorly drained and fall within the legal classification of inland wetlands. Development in these soils will require a permit from the local inland wetlands agency.

Geology. Though neither bedrock nor surficial geologic maps are published for the Old Mystic quadrangle, some preliminary data does exist for the area. The site is underlain by Sterling granitic gneiss with an overburden of till on the hillsides and sand and gravel in the lowland areas.

The Sterling granitic gneiss is fairly typical of rock in this part of Connecticut. It consists of assemblages of quartz, felspars, and minor amounts of associated minerals. The rock is generally medium to coarse grained in texture and is light colored, ranging from pink to red to gray. Overall the rock is relatively competent, but does contain fractures capable of yielding small quantities of water to domestic wells.

The hilltop and hillside areas are covered by till, a heterogeneous mixture of clay, silt, sand, gravel, and boulders deposited from glacial ice without the benefit of sorting by water. The areas of till generally coincide with sections 1 and 2 on the soils classification map on page 7. Typically, the hydraulic conductivity of these materials is relatively low and is generally unsuitable for water supply wells.

The lowlands are characterized by sand and gravel deposited from the meltwater streams of glaciers. These materials have good hydraulic conductivity and high infiltration capacity. The materials are fairly coarse grained here, with gravels being common.

Vegetation and Wildlife. The site is presently characterized by second growth hardwoods and brushy old fields. Little of the forest growth is of commercial importance. There is a lot of red cedar, but it is not of sufficient size to be of value. Some small timber and pulpwood is located in the south and southwest parts of the property.

However, the forest and old fields provide good habitat for quail, grouse, rabbits, deer, and many songbirds. The close proximity of Anguilla Brook adds to the value of the total area and the

utilization of the upland habitat. Anguilla Brook is presently stocked with trout by the State.

Land Use. The immediate surrounding land uses are residential and undeveloped. The Stonington-North Stonington town line passes near the northern boundary of the site. Route 184 is within 1,000 feet of the northern property line and a very dense 100 home subdivision is located between the site and Route 184. Occasional single family homes are situated along Stony Brook Road. Post-agricultural land punctuated by stone walls prevail on the south and east sides of the property. The site is presently zoned for residential use.

WATER SUPPLY

Either a community type well system or individual wells would be feasible for this subdivision. If a community system is planned, wells located in the sand and gravel area would have much higher yields than would bedrock wells. The soils indicate slight to severe limitations for the installation of transmissions lines. The cost to the developer and eventually to the homeowner would most likely be less with a community system than with individual wells.

The key to a successful community water supply system is a well organized operation and maintenance program. Questions regarding ownership, repair costs, etc., have created problems in such systems elsewhere in Connecticut. The State Health Department might be contacted with respect to organizational structures which have been found to be successful.

Individual wells would avoid the operational problems of a community system, though the cost may be higher. In the till areas, bedrock wells should produce sufficient quantities to meet the needs of single family homes. There is a potential for screened wells in the sand and gravel areas. Provided there is a sufficient saturated thickness of sand and gravel, these wells would probably produce a much higher yield than the bedrock wells.

WASTE DISPOSAL

Since municipal sewers are not anticipated in this area for the immediate future, on-site sewage disposal systems will be necessary. With the proximity to the Anguilla Brook aquifer, the necessity for properly designed and operating systems is mandatory to prevent possible contamination of the underground water supply. The soils give a good indication of the difficulties to be expected with the installation and operation of septic systems.

Looking at the soils limitations chart in the Appendix, it can be seen that only 37.8 percent of the site is considered to have

slight limitations for on-site sewage systems, while the rest has mostly severe or very severe limitations. These are the well-drained sand and gravel soils with slopes under 15%. However, due to their high permeability, they are not as effective as other soils in renovating the septic effluent. Therefore, the distance from water supplies should be as great as possible. A community well system would minimize this problem.

Most of the remaining soils on the site have severe limitations for on-site sewage disposal. With the hardpan soils, this can be directly related to the seasonal high water table and generally poor drainage characteristics of the hardpan. Drainage and fill are measures commonly used to help overcome the limitations. With the upland till soils and one of the sand and gravel soils (158D), steep slopes impose the major difficulty. Specially designed systems will be necessary in these areas, probably requiring extensive site preparation and/or a "step down" design.

With the extra care in design and installation needed for septic systems in soils with severe limitations, the cost of the systems can be expected to be much higher. However, if future problems and possible pollution of the Anguilla Brook aquifer are to be avoided, it will be a worthwhile investment. It is also recommended in these soils that the location of the leaching field be determined before house location and in some cases before lot lines are established.

Though only 7.7 percent of the site is classified as inland wetlands, the map on page 7 shows substantial wetlands adjacent to the site. These are all directly or indirectly related to Anguilla Brook. Due to the poor drainage of wetlands soils and the hydrological functions they fulfill, any type of development is not recommended in these areas, with the occasional exception of roadways which may have to cross a wet area. In this case, since the wetlands both on and off the site are related to a significant aquifer, the need for protection is even greater. It is recommended that a buffer strip at least 100 feet wide be left along the borders of the wetlands. These should be undeveloped and left in natural vegetation. As well as protecting the wetlands from possible pollution from septic systems and siltation from construction, they would also serve as open space areas and wildlife habitat.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

The major limiting factors for the installation of basements is stoniness and slope. Both of these factors, if ignored, can be instrumental in causing differential settlement. The effects of differential settlement in housing developments is not immediately visible, but can be seen after several years when basement walls crack and the floors begin to undulate. Understanding the load bearing capacity of the material under the footing and adjusting the design accordingly will eliminate or reduce the chance of differential settlement.

Foundation drains may be necessary in soils with a high seasonal water table to prevent basement flooding.

Erosion and sedimentation control should be a consideration in any development, particularly during the construction stage. The developer's method of construction can do much to minimize erosion. This includes practices such as keeping as much of the area as possible in its natural state, clearing only what land is necessary for the continuance of work, protecting cleared areas with temporary or permanent seeding, and using appropriate protective measures. The Erosion and Sediment Control Handbook for Connecticut (available from the County office of the Soil Conservation Service) gives standards and specifications for numerous measures, as well as guidelines for their use.

The areas which will be most susceptible to erosion are those with steep slopes. Bank stabilization could prove difficult, and depending on the type of cut and fill needed, could necessitate expensive retaining walls.

Another factor which affects the amount of potential erosion is the increased runoff on a site during and after construction. The following table is a rough analysis of the watershed associated with the proposed subdivision. The table is based on the Soil Cover Complex Method of computing runoff.* The storms used for comparison are the 2 year (50% chance of occurring in any one year), 5 year (20% chance), 10 year (10% chance), and 25 year (4% chance). The rainfall (R) associated with the above storms are based on U.S. Weather Bureau data for a 24 hour period. The drainage area was considered to be approximately 120 acres.

The table shows the estimated runoff in terms of acre-feet. An acre-foot is a volume representing 43,560 cubic feet; or the volume attained by flooding one acre of land one foot deep or two acres one-half foot deep. The table points out the significant effect that land use change can have on the amount of water (and/or silt) entering our streams. It also shows that the most runoff occurs during the construction period when the soil is least protected against erosion. Thus, the need for sediment and erosion control measures during construction cannot be overemphasized.

It should be mentioned again here that the buffer strips recommended previously would help prevent siltation from entering the wetlands both during and after construction. During construction, however, specific measures installed in critical areas would also be desirable.

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* For those persons familiar with this method, the Curve Number (CN) 60 was used for present wooded conditions; CN 89 for the construction period; and CN 66 for the development when completely established.

LAND USE	RUNOFF (in acre-feet)			
	2 Year (R=3.5")	5 Year (R=4.3")	10 Year (R=4.9")	25 Year (R=5.7")
Present Conditions (Wooded)	5.3	9.1	12.5	17.3
During Construction+	23.6	31.1	36.8	44.5
Development Established	8.0	12.7	16.6	22.2

+ During Construction reflects the case where the total acreage is developed as a unit as opposed to individual lot development. The method and time of construction can do much to reduce these figures.

ROADS AND UTILITIES

According to the soils, almost half the site has severe to very severe limitations for the installation of roads. The major limiting factors are slope and stoniness. The roads should be planned and constructed using sound engineering principles. Consideration should be given to the degree of slope, subsurface drainage, and storm water systems. Cut and fill slopes should be flat enough to establish and maintain erosion resistant vegetation (generally not steeper than 1 vertical to 3 horizontal). The method of construction should be flexible enough to permit the least amount of exposed soils open to the elements during any one construction period.

POTENTIAL HAZARDS

Damage to the wetlands and Anguilla Brook from siltation and/or pollution is a possibility. However, by following the suggestions for septic systems and erosion control, this can be avoided. The 100 foot buffer strip along the wetlands would also be of value.

With the increased storm runoff on the site during and after construction, there will be an increased potential of flooding downstream on Anguilla Brook. If flooding is or has the potential of being a problem downstream, the incorporation of storm retention basins on this site would be desirable.

AESTHETICS AND PRESERVATION

Most of this site is forested and on a slope. Because of this, development should occur in such a way that much of the tree cover remains, thus preserving the existing wooded character of not only the site, but much of the surrounding area. Retaining as much cover as possible on the steep areas will also help to absorb runoff and reduce erosion. Any of the small timber or pulpwood which must be cut, should be harvested as the area is developed. Though the economic benefits would be minimal, the disposal problems on the site will be reduced.

Development of the steeper hillsides will cause significant changes in the warm air movement up the hill in the day and in the cold air drainage down the hill at night. This would have little effect on the houses, but in the long term could significantly affect the swamps at the bottom of the hill. Over a long period, these changes in the normal temperature pattern will affect both plants and animals present in the ecosystem. This effect can be minimized by leaving a buffer strip along the wetlands and across the bottom of the hill.

Resident wildlife will be largely eliminated by the proposed development. However, the creation of buffer strips along the wetlands would help to minimize the loss. Another possibility might be to cluster some of the homes in order to provide a larger area for open space. Due to the soils limitations, this would be feasible only in the sand and gravel soils. In conjunction with a proposed pond on the eastern end of the site, an open space area could also provide for passive recreation.

The developer's idea of constructing a small pond (about 3 acres), into which storm runoff could be directed, would appear to increase the protection against nutrient enrichment and siltation of Anguilla Brook. This would also prevent warm rain water from washing into the stream and raising water temperatures, which are very critical for water life.

COMPATIBILITY OF SURROUNDING LAND USES

Based on the current land use pattern in the area, residential development on this site would be a compatible use. The larger lot sizes are an improvement both aesthetically and environmentally over the existing subdivision to the north. However, proposed lot lines should not be finalized here until the septic system, well, and house locations are determined, particularly on the hardpan and upland till soils.

ALTERNATIVE LAND USES

The best land use alternatives for this site appear to be low to moderate density residential use and/or open space. The variety

of soil types offer some interesting plant and wildlife diversities which would provide for attractive open space for any residential development. Hiking or bicycle trails would further enhance the open space.

ADDITIONAL COMMENTS

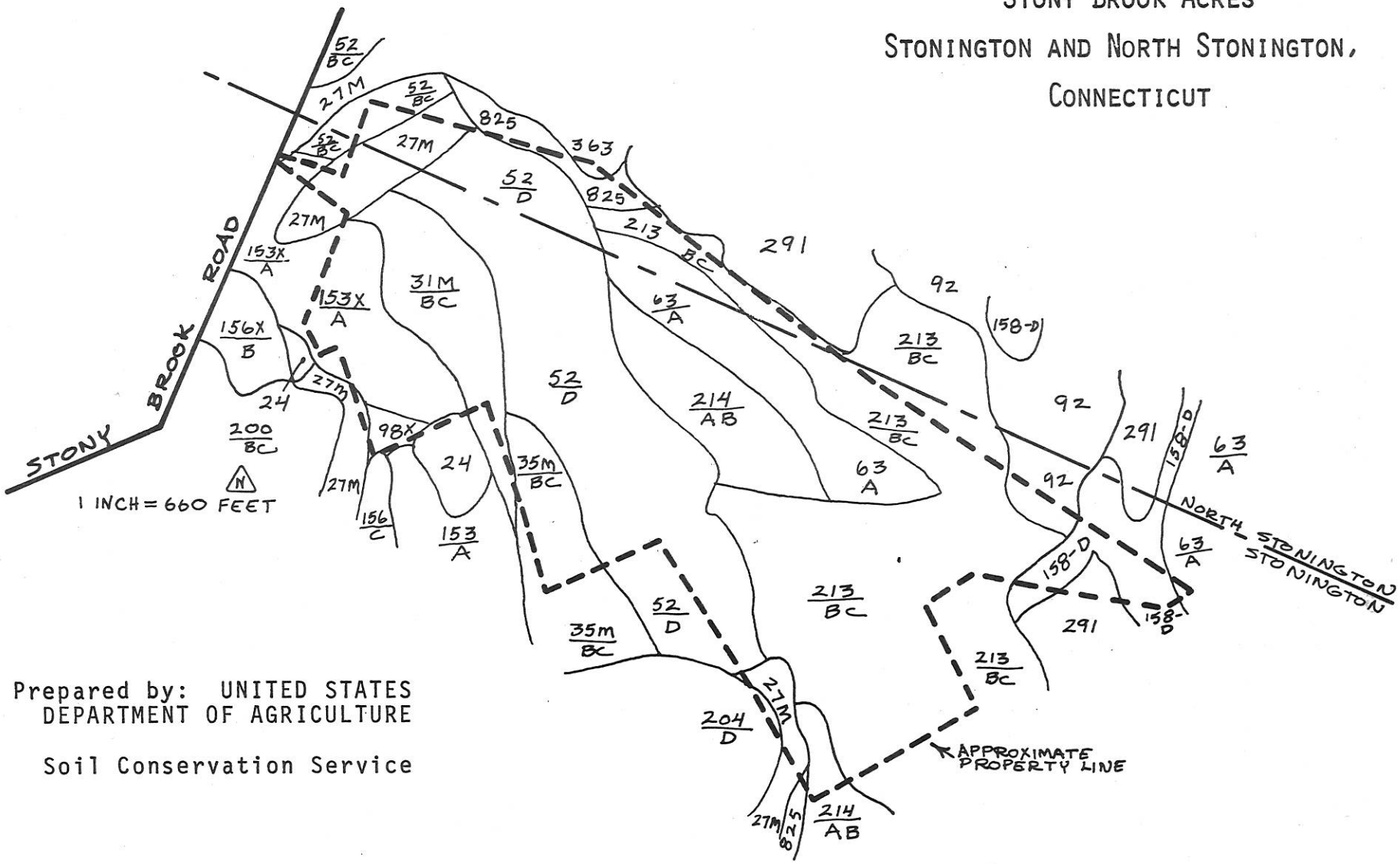
Further development of the plans for Stony Brook Acres should consider the variety of soils on the property and the different limitations each soil type presents. Protection of the wetlands and the function they serve in maintaining the quality of Anguilla Brook and the underlying aquifer should also be included in the plans. Consideration should be given to wetlands adjoining the site as well as those on the site.

APPENDIX

SOILS MAP

STONY BROOK ACRES

STONINGTON AND NORTH STONINGTON, CONNECTICUT



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE

JUNE, 1974

SOILS LIMITATIONS CHART

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For:** On-Site Sewage	Base ments	Land-scaping	Streets and Parking	Principal Limiting Factor(s)
A-1a	63A, 363	10.2	9.0	1	1	1	1	None.
A-1b	213BC	32.5	28.8	1	1	2	2	Droughtiness, slope 3-15%
A-1c	158D	3.0	2.7	3	3	4	3	Slope over 15%, droughtiness.
A-2	214AB	9.8	8.7	3	2	2	2	Seasonal high water table
A-3b	825	1.6	1.4	3	3	3	3	Flood hazard, high water table.
B-1c	52BC	.5	.4	2	2	3	3	Stoniness, slope 3-15%.
B-1e	52D	28.0	24.8	3	3	4	4	Stoniness, slope over 15%
C-1c	35MBC	5.0	4.4	3	3	2	3	Stoniness, hardpan, slope 3-15%.
C-2a	153XA	7.2	6.4	3	2	2	2	Hardpan, seasonal high water table, stoniness.
C-2b	31MBC	8.0	7.1	3	2	3	3	Hardpan, seasonal high water table, stoniness, slope 3-15%.
C-3a	98X, 24	.6	.5	3	3	3	3	High water table.
C-3b	27M	4.8	4.3	4	4	4	4	High water table, stonines
F-1	92	1.0	.9	4	4	4	4	High water table, organic material.
G-3b	291	.7	.6	4	4	4	4	High water table.
		112.9	100.0					

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups

** Limitations: 1-slight; 2-moderate; 3-severe; 4-very severe.

ACREAGE SUMMARY OF SOILS LIMITATIONS

	Slight		Moderate		Severe		Very Severe	
	Acres	%	Acres	%	Acres	%	Acres	%
On-site Sewage	42.7	37.8	.5	.4	63.2	56.0	6.5	5.8
Basements	42.7	37.8	25.5	22.6	38.2	33.8	6.5	5.8
Landscaping	10.2	9.0	54.5	48.3	10.7	9.4	37.5	33.3
Streets and Parking	10.2	9.0	49.5	43.9	18.7	16.5	34.5	30.6