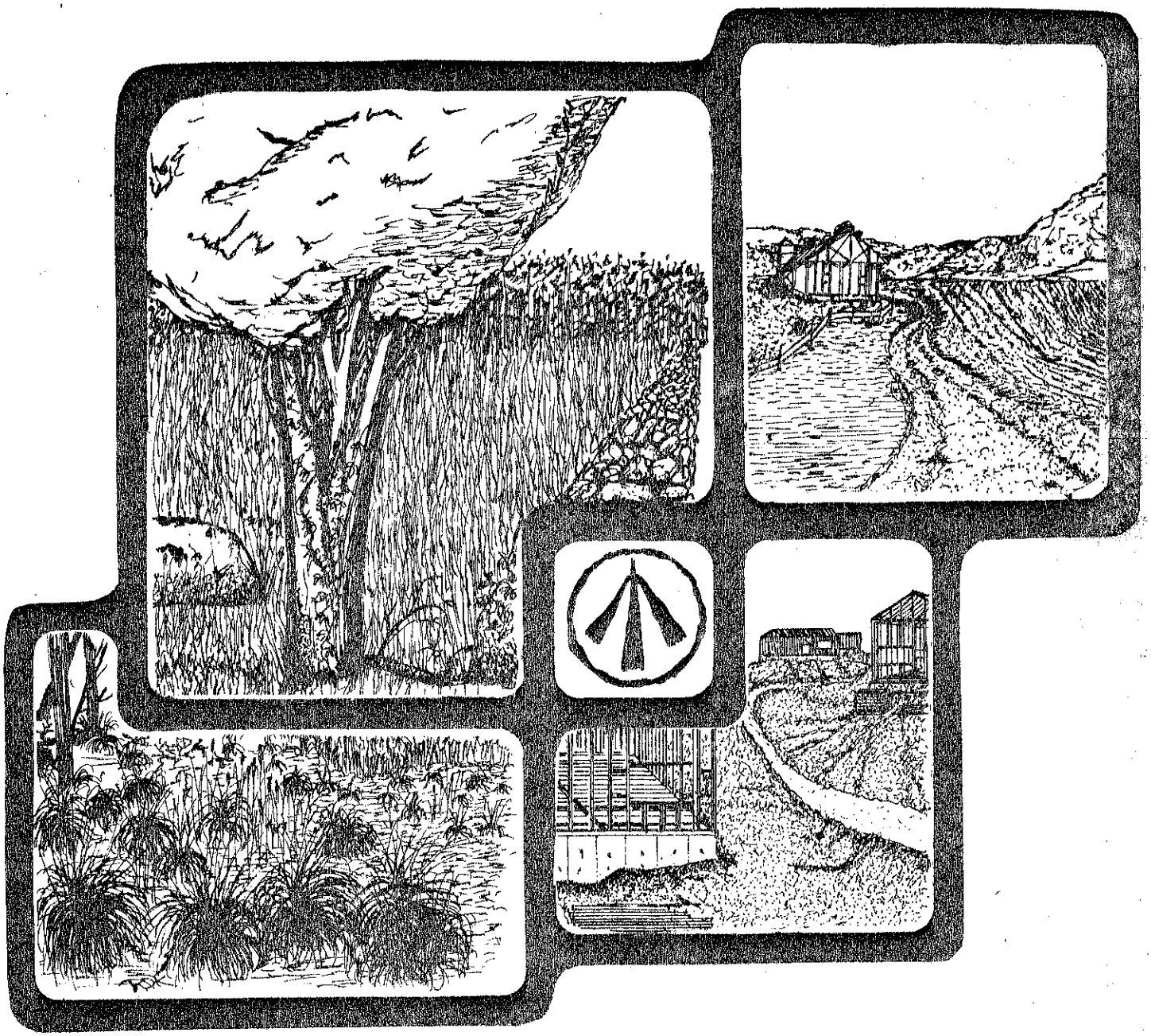
ENVIRONMENTAL REVIEW TEAM REPORT



PLYMOUTH HEIGHTS SUBDIVISION
PLYMOUTH, CONNECTICUT

KING'S MARK

RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

ON

PLYMOUTH HEIGHTS SUBDIVISION
PLYMOUTH, CONNECTICUT

MAY 1980

King's Mark Resource Conservation and Development Area

Environmental Review Team

P.O. Box 30

Warren, Connecticut 06754

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies

U.S.D.A. SOIL CONSERVATION SERVICE

State Agencies

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEPARTMENT OF HEALTH
DEPARTMENT OF TRANSPORTATION
UNIVERSITY OF CONNECTICUT COOPERATIVE EXTENSION SERVICE

Local Groups and Agencies

LITCHFIELD COUNTY SOIL AND WATER CONSERVATION DISTRICT
NEW HAVEN COUNTY SOIL AND WATER CONSERVATION DISTRICT
HARTFORD COUNTY SOIL AND WATER CONSERVATION DISTRICT
FAIRFIELD COUNTY SOIL AND WATER CONSERVATION DISTRICT
NORTHWESTERN CONNECTICUT REGIONAL PLANNING AGENCY
VALLEY REGIONAL PLANNING AGENCY
LITCHFIELD HILLS REGIONAL PLANNING AGENCY
CENTRAL NAUGATUCK VALLEY REGIONAL PLANNING AGENCY
HOUSATONIC VALLEY COUNCIL OF ELECTED OFFICIALS
AMERICAN INDIAN ARCHAEOLOGICAL INSTITUTE

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KING'S MARK RESOURCE CONSERVATION AND DEVELOPMENT AREA

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Staff Administration Provided By

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Thomas A. J. McGowan, Director
Richard Lynn, ERT Coordinator
Rebecca West, ERT Draftsman
Irene Nadig, Secretary

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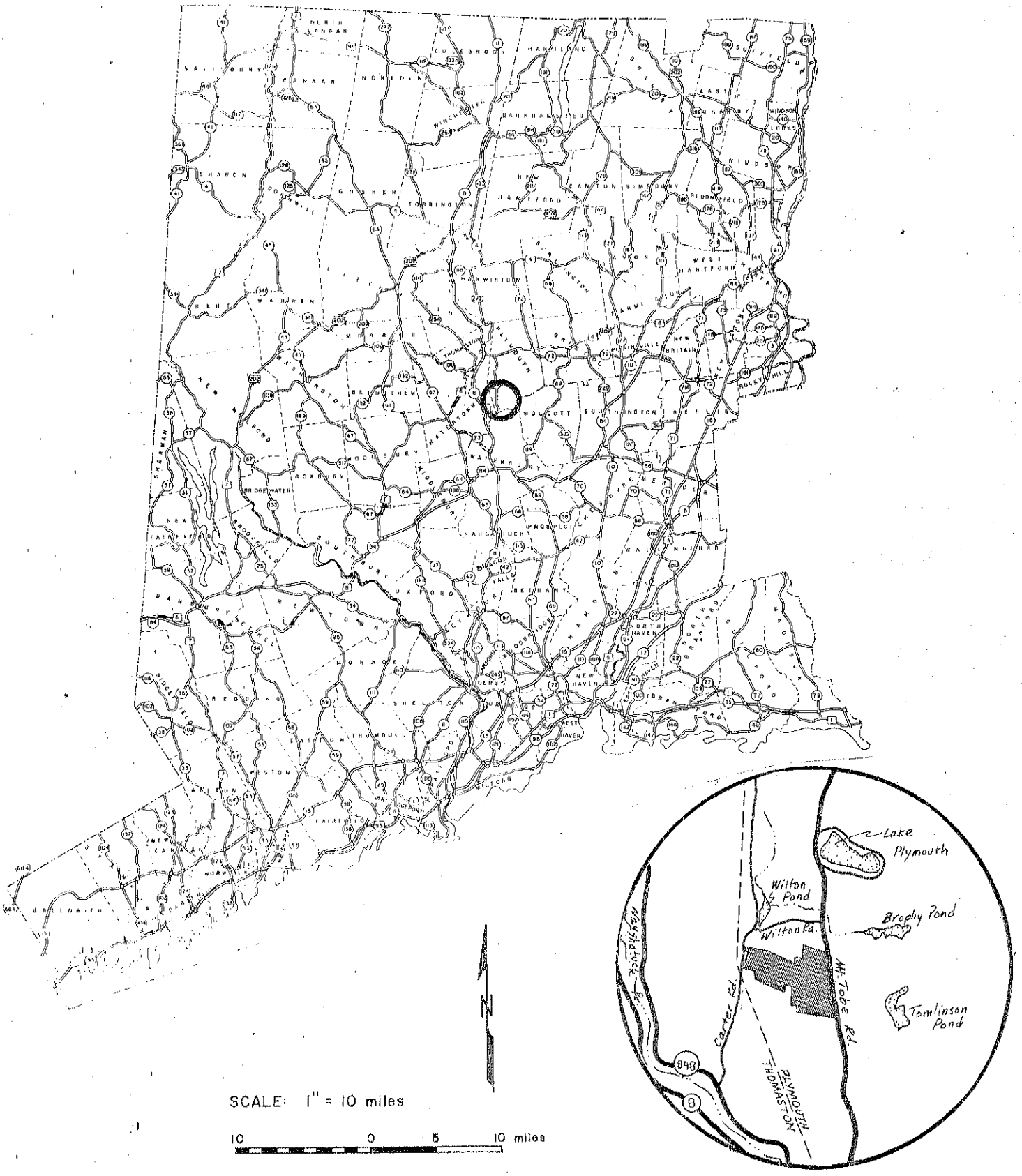
PLYMOUTH HEIGHTS SUBDIVISION
PLYMOUTH, CONNECTICUT



ENVIRONMENTAL REVIEW TEAM REPORT
ON
PLYMOUTH HEIGHTS SUBDIVISION
PLYMOUTH, CT.

I. INTRODUCTION

The Town of Plymouth, Connecticut is presently reviewing a proposed plan of subdivision for a ± 135 acre tract of land in the southwestern quarter of town. The subject site is bordered on the east by Route 262 and on the west by Carter Road. Wilton Road is located about 1000 feet north of the property. The land is characterized by open hayland on the eastern portion of the property and steeply sloping wooded land on the western portion. The topography varies from gently to steeply sloping and is randomly marked with boulders and rock outcrops (see Figure 1).

The preliminary subdivision plan for "Plymouth Heights" calls for 83 residential lots of 1 to 5+ acres in size. Most of the proposed lots are 1 to 1.5 acres in size. The project plans also call for a ± 9 acre "passive recreation area" and a ± 9 acre "active recreation area". Access to the proposed lots would be created by constructing an interior road network between Route 262 and Carter Road. Figure 2 shows a simplified site plan of the development proposal.

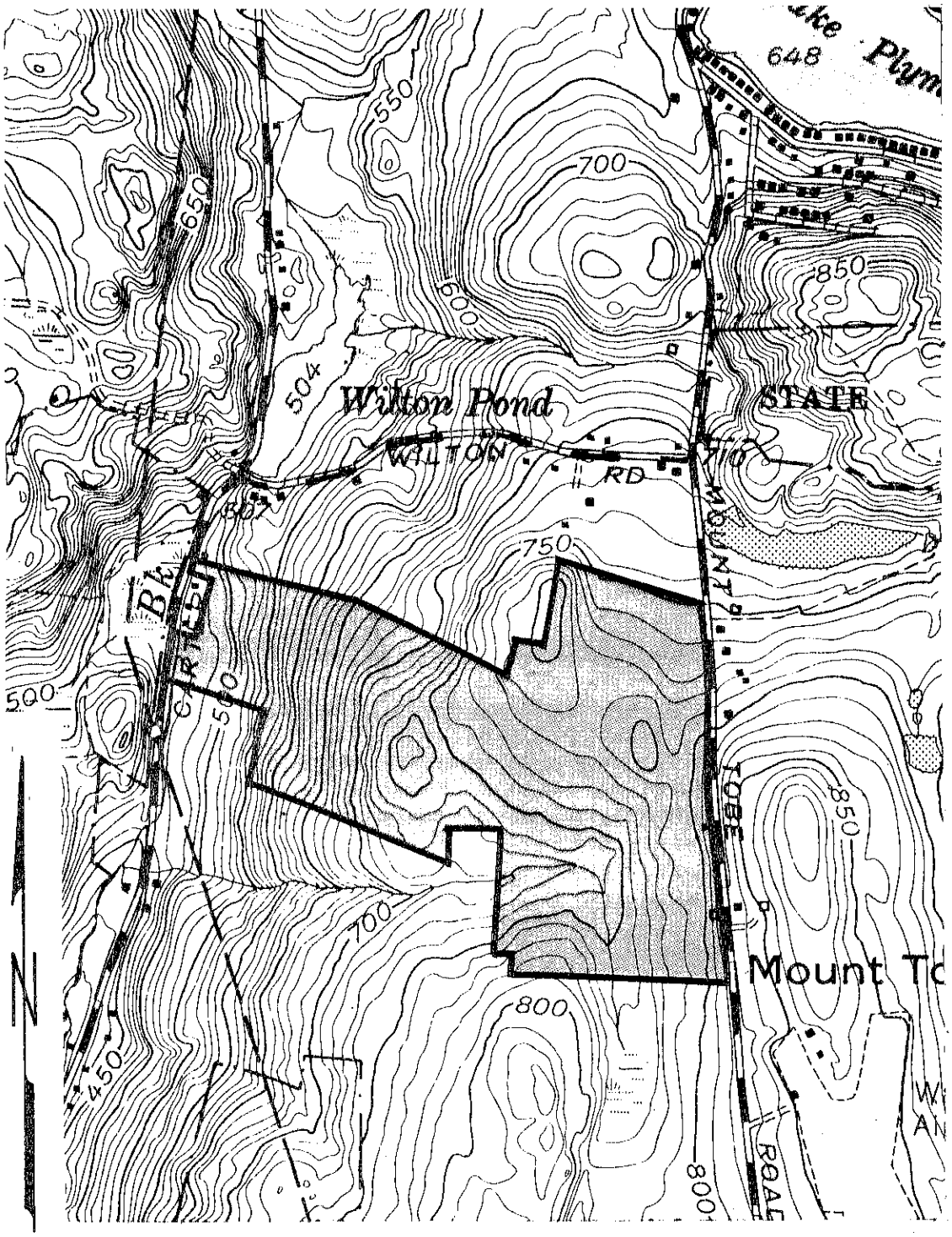
The Plymouth Inland-Wetlands Commission requested the assistance of the King's Mark Environmental Review Team to help the town in analyzing the proposed development. Specifically, the team was asked to identify the natural resource base of the site and to provide an objective evaluation of the potential development impact. Major concerns raised by the town in requesting this environmental review include the effect of the project on soils and stormwater drainage; and the suitability of the site for septic systems.

The ERT met and field reviewed the site on March 19, 1980. Team members for this review consisted of the following:

Mallory Gilbert	Soil Conservationist	U.S.D.A. Soil Conservation Service
Steve Jackson	Wildlife Biologist	State Dept. of Environmental Protection
Don King	Regional Planner	Central Connecticut Regional Planning Agency
Robert Rocks	Forester	State Dept. of Environmental Protection
Frank Schaub	Sanitary Engineer	State Department of Health
Carl Stamm	Recreation Specialist	State Dept. of Environmental Protection
Mike Zizka	Geohydrologist	State Dept. of Environmental Protection

FIGURE I.

TOPOGRAPHIC MAP



SCALE: 1" = 1000'

0 1/4 1/2 mile

0 1000' 2000' 3000'

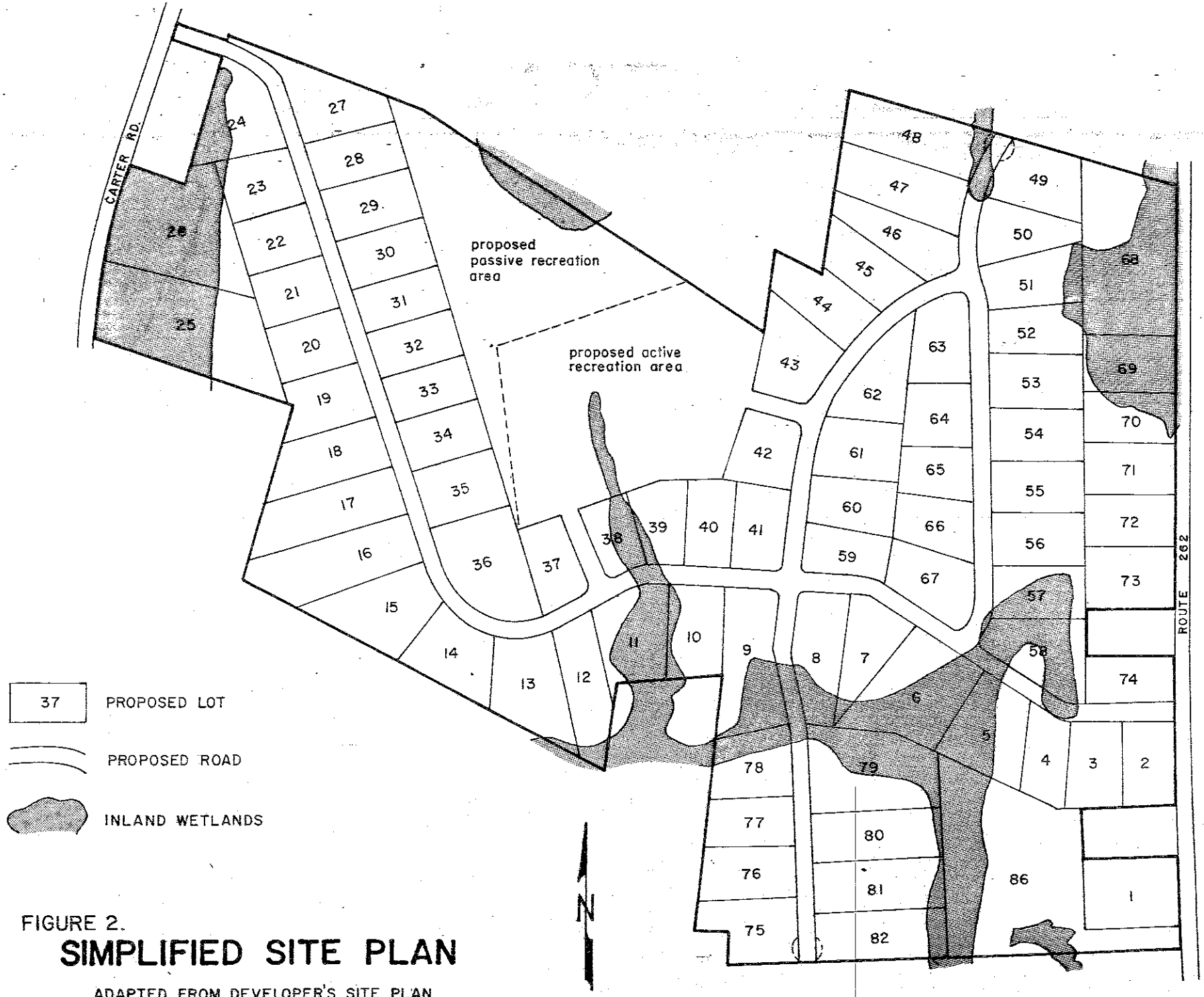


FIGURE 2.

SIMPLIFIED SITE PLAN

ADAPTED FROM DEVELOPER'S SITE PLAN

Prior to the review day, each team member was provided with a summary of the proposed project, a checklist of concerns to address, a detailed soil survey map, a soils limitation chart, a topographic map, and a simplified site plan of the development proposal. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the team's findings and recommendations. It is important to understand that the ERT is not in competition with private consultants, and hence does not perform design work or provide detailed solutions to development problems. Nor does the team recommend what ultimate action should be taken on a proposed project. The ERT concept provides for the presentation of natural resources information and preliminary development considerations--all conclusions and final decisions rest with the town and developer. It is hoped the information contained in this report will assist the Town of Plymouth and the landowner/developer in making environmentally sound decisions.

If any additional information is required, please contact Richard Lynn, (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P. O. Box 30, Warren, Connecticut 06754.

* * * * *

II. SUMMARY

- Most of the Plymouth Heights property has severe limitations for residential development according to U.S.D.A. Soil Conservation Service criteria. Major limiting factors include shallow to bedrock soils, wetness, hardpan soils, and steep slopes. Although a severe rating by SCS does not necessarily preclude development of the property as planned, it does indicate that very careful site planning and design will be required to avoid significant environmental harm. In addition, extensive and costly measures will undoubtedly be required to overcome the natural limiting factors of the land.

- Due to the steep slopes in the western portions of this property, there is concern that severe erosion and sedimentation problems could result with implementation of the proposed project. Preparation of a comprehensive runoff, erosion, and sediment control plan for the entire project is recommended.

- The three main areas of concern with respect to on-site sewage disposal are those lots which have shallow soil covers above bedrock, a seasonally high water table, and moderately steep slopes. Based upon existing information, it appears that nearly half of the proposed lots are characterized by such limiting conditions. Additional soil tests are needed to assure that suitable areas for sewage disposal are present on each lot.

- Peak flow increases with implementation of the project would be greatest in the stream located in the southeastern section of the site. These increases are viewed as significant and consideration should be given to locating a runoff retention basin or other storm drainage measures in the southeastern portion of the property. Peakflow increases in Nibbling Brook are not expected to be noticeably affected by the development alone. The overall effect of the proposed development on Nibbling Brook's water quality will ultimately depend largely on three factors: the success of the developers in controlling erosion on steep slopes and subsequent sedimentation into the brook; the adequacy of siting, design, and installation of septic systems; and the volume of salt and other road contaminants that are carried into the brook.

- Statistical data indicates that a suitable water supply for domestic purposes can be obtained from most of the proposed lots, but that large supplies are unlikely.

- The Plymouth Heights site has a wide variety of vegetation types; in all, eight are described. Preservation of large healthy trees on the property should be considered for aesthetics. A fuelwood thinning in the mixed hardwood portion of the site would improve the vigor of residual trees and thus improve the health and stability of the entire stand over time.

- Portions of this site (e.g. open fields, old reverting fields, edge borders) have high value for wildlife. The project cannot help but have some detrimental effects on wildlife. The best way to reduce this impact would be to reduce the density of development and/or cluster the housing units. Under the present plan, with development in all areas, the ability to manage wildlife populations is lost.

- *The proposed "active recreation area" would be difficult to develop for active recreation purposes. Consideration should be given to setting aside more suitable land on the property for such purposes if active recreational facilities are judged important in this section of town or as part of this subdivision. The proposed "passive recreation area" is considered generally suitable for such purposes.*

III. GEOLOGY

Bedrock outcropping on the site consists primarily of a lustrous, silvery hornblende-quartz mica schist. Outcrops were observed mostly in the open fields, but the numerous boulders and the steep slopes on the western side of the property suggest the proximity of bedrock to the surface in that area as well. Boulders at the extreme western edge of the site were slightly more varied in lithology, but mica schist was still the dominant rock type. Occasional boulders of garnet-studded amphibolite were found in all sections of the property. A few large boulders of pegmatite were noted in the open fields. Figure 3 shows the location of the bedrock outcrops observed on the site.

In the absence of a surficial cover, the bedrock surface underlying the site probably would appear to have an undulating topography in the eastern half and a steep, knobby face in the western half. The surficial materials, which were plastered onto the bedrock by a preexisting sheet of glacier ice, smoothed out the irregularities of the bedrock to some extent. Consequently, the overburden varies in thickness from one location to another. The texture of the overburden, which is called till, is primarily sandy but the material includes rock particles of widely varying sizes. The percentage of silt and clay in the till is often greater at depth (below about 3 feet) than it is near the surface. In addition, the till is often considerably more compact at depth and is therefore a poor transmitter of groundwater. This characteristic, in addition to the nearness of bedrock to the surface, probably accounts for the wet conditions in some parts of the site.

IV. SOILS

The Appendix of this report contains a soils map, a soils limitation chart, and a list of soil descriptions. Normally the soils mapping provided by the USDA Soil Conservation Service is used as a basis for soils commentary on environmental reviews. In this case, however, the developer(s) had a more detailed mapping of this site prepared by a private consultant (Mr. H. T. Moeller, soil scientist). Review of Mr. Moeller's mapping work on this site by the Team is favorable. Mr. Moeller's interpretations and recommendations for septic systems and homesites are, however, his; not those of the Soil Conservation Service. The soils limitation chart included in the Appendix is based on USDA Soil Conservation Service criteria, and careful comparison may show some disagreement with the developer's consultant.

Soils vs. Proposed Land Use

As shown in Figure 4, most of the Plymouth Heights property has severe limitations for residential development according to USDA Soil Conservation Service criteria. Major limiting factors include shallow to bedrock soils, wetness, hardpan soils, and steep slopes. Although a severe rating by the SCS does not necessarily preclude development of the property as planned, it does indicate that very careful site planning and design will be required to avoid significant environmental harm. In addition, extensive and costly measures will undoubtedly be required to overcome the natural limiting factors of the land. For example, several of the lots on this parcel will be difficult to develop with homes having full basements. Shallow depth to bedrock, wetland proximity and seasonally high water tables may necessitate blasting, filling, and/or footing drains. As discussed later in this report, extremely careful engineering will be required on

FIGURE 3.

BEDROCK OUTCROPS OBSERVED ON THE PLYMOUTH HEIGHTS SITE. (Does not include all outcrops on the site.)

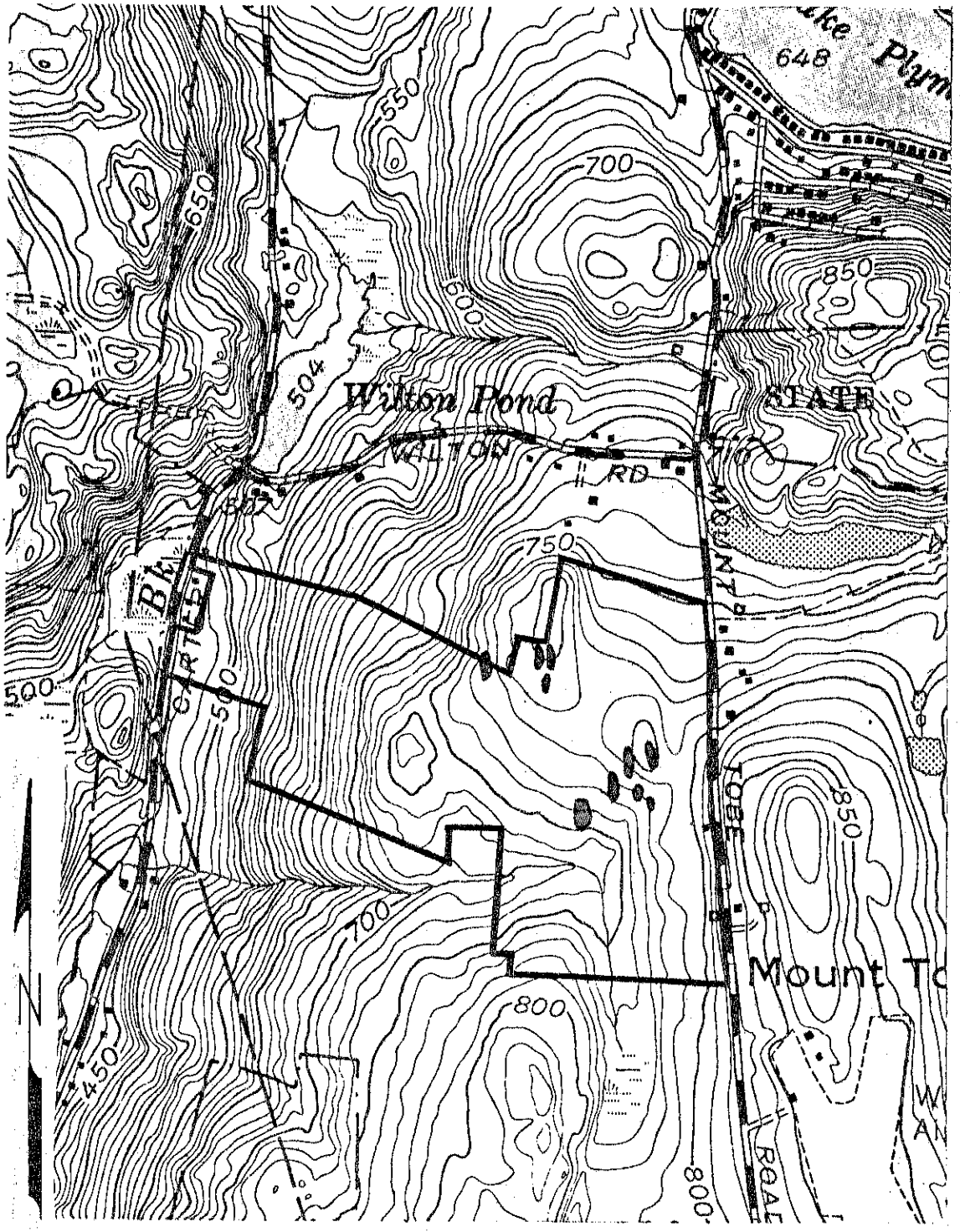
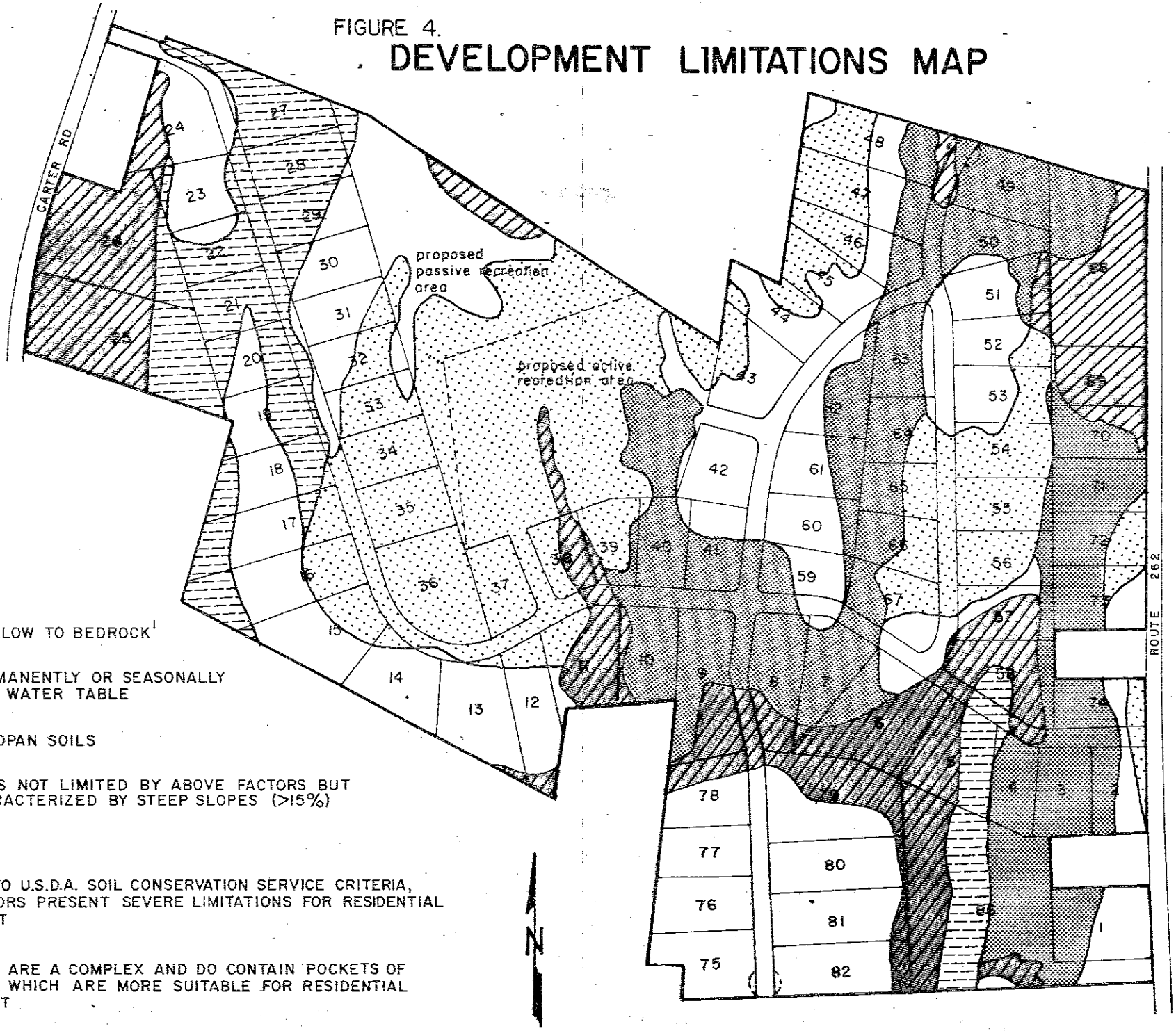


FIGURE 4.

DEVELOPMENT LIMITATIONS MAP



* ACCORDING TO U.S.D.A. SOIL CONSERVATION SERVICE CRITERIA, THESE FACTORS PRESENT SEVERE LIMITATIONS FOR RESIDENTIAL DEVELOPMENT

[1] THESE SOILS ARE A COMPLEX AND DO CONTAIN POCKETS OF DEEPER SOIL WHICH ARE MORE SUITABLE FOR RESIDENTIAL DEVELOPMENT

much of this site for proper septic system installation and operation. It should also be noted that shallow depth to bedrock increases the possibility that septic effluent may reach bedrock fissures and consequently enter bedrock wells. The proposed density of development on the shallow to bedrock soils increases this possibility.

The areas proposed for recreational use have moderate potential for passive uses (i.e. hiking, picnicking, etc.). The area proposed exclusively for active recreational uses will be difficult to develop. It must be cleared and regraded. Grading, specifically, may be difficult due to stoniness and depth to bedrock.

The wetlands found on this site are of general benefit as flood and storm water retention areas and, to a limited extent, as wildlife habitat. Any wetland road or driveway crossing should be accomplished using a permeable base road fill material with proper culvert sizing. Minimum septic system setbacks from wetland areas should be carefully enforced. Of additional importance are seasonal and perennial watercourses that flow throughout the parcel. These flows should be carefully crossed and acknowledged as though they were mapped wetland soils (i.e. setbacks, etc.).

Due to steep slopes and the substantial road cuts that would be required by this project, portions of the site may create critical erosion and sedimentation problems during and after construction. Consequently, it is recommended that a detailed erosion and sediment control plan be developed for this site. This plan should include a time schedule for development and revegetation of disturbed areas, as well as a listing and location of detailed erosion and sediment control practices. Erosion and sediment control practices are described in the "Erosion and Sediment Control Handbook for Connecticut", (USDA Soil Conservation Service, 1976). Additional assistance in the preparation and review of erosion and sediment control plans is available from the Litchfield County Conservation District.

V. SEPTIC SYSTEM

In an attempt to determine the suitability for onsite sewage disposal for each of the proposed parcels, a number of deep observation test pits and percolation tests were performed by the developer within a majority of the proposed lots. Observations of ledge rock, groundwater conditions, and seepage rates were obtained by the developer but unfortunately most soil tests were not observed by town sanitarian, George Jabs. As with many proposed subdivisions of this size, the soil tests are not necessarily representative of soil conditions within each exact leaching area, but are beneficial in determining suitability in general. It should be noted that there are approximately 14 lots which have not been tested.

The three main areas of concern with onsite sewage disposal are lots which have shallow soil covers above bedrock, a seasonally high groundwater table, and moderately steep slopes. Based upon the ERT Sanitary Engineer's inspection of this parcel and preliminary soil test data provided, it appears the two main areas with shallow soil cover over bedrock lie within the proposed lots numbered 52 thru 56, 63 thru 66 and lots 11, 33 thru 39. Soil test data provided from test holes located within and adjacent to these proposed lots indicate that there may not be sufficient soil cover above ledgerock in which to construct sewage disposal systems which will function adequately without creating adverse effects.

The high seasonal groundwater conditions observed are extremely critical for those lots which are in or adjacent to the designated wetlands and, due to limited slope available, cannot be adequately drained. Lots 5 thru 11, 38, 39, 51, 52, 68, and 69 would be considered marginally suitable due to the high groundwater conditions observed.

The third primary concern, excessive slope, would have to be considered for all of the lots located on the westerly half of this proposed project. The proposed Sentinel Hill Road which originates at Carter Road is laid out at slopes of approximately 10%. In order to obtain a level road at that grade, it is most likely that extensive cutting and filling along the roadway will be performed. The creation of these cut embankments plus the additional cut embankments necessary for driveways to reach the proposed dwelling sites could significantly affect the suitability of all parcels located on the high side of the road. This is most critical for lots 27 thru 35. Construction of sewage disposal systems in subsoils located above a compact glacial till would most likely cause partially treated effluent to bleed out of the ground at the face of these cut embankments.

It is recommended that prior to subdivision approval, additional soil tests be performed on those lots which indicated shallow depths to bedrock in order to clearly define a sufficiently large suitable area for sewage disposal purposes. In addition, soil tests should be performed on those lots which had not previously been tested and on those parcels which exhibited seasonally high groundwater levels. It is essential that all groundwater monitoring be performed during the wet spring months in order to determine the maximum groundwater levels. Careful consideration should be given to the development of lots 27 thru 35 in order to avoid groundwater pollution. In determining the number of building lots which may be obtained from any given parcel of land, emphasis must be placed on the identification of suitable areas for sewage disposal purposes so that land is developed in accordance with the soils ability to properly treat and dispose of domestic wastes.

VI. HYDROLOGY

The Plymouth Heights site lies within the watershed of Nibbling Brook, a tributary of Naugatuck River. The size of the watershed is relatively small: approximately 1420 acres, or about 2.2 square miles. The point in the brook at which drainage from Plymouth Heights would most affect it is the location at which the feeder stream that flows through the southeastern section of the site joins the brook. At this point, the property represents approximately 7 percent of the total drainage area of the brook. Hence, the quality of water flowing from the site could have a noticeable impact on the quality of water in the brook. On the other hand, peak flows in the brook and any flooding problems that currently exist in its valley should not be noticeably affected by the development alone.

Peak flow increases would be greatest in the feeder stream mentioned above. The location on that stream where drainage from the site would have its maximum influence, and the total area draining to that location, are shown in Figure 5. Estimates of peak flows at that point before and after development are provided in the following table. Flows are given for three storm events: The 2-year, 24-hour rainfall; the 25-year, 24-hour rainfall; and the 100-year, 24-hour rainfall. The number of years specified for each event refers to the average recurrence

much of this site for proper septic system installation and operation. It should also be noted that shallow depth to bedrock increases the possibility that septic effluent may reach bedrock fissures and consequently enter bedrock wells. The proposed density of development on the shallow to bedrock soils increases this possibility.

The areas proposed for recreational use have moderate potential for passive uses (i.e. hiking, picnicking etc.). The area proposed exclusively for active recreational uses will be difficult to develop. It must be cleared and regraded. Grading, specifically, may be difficult due to stoniness and depth to bedrock.

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interval of a storm of that magnitude; for instance, the 100-year rainfall, over a very long period of time, would be expected to occur only once per each 100 years (6 times in a 600-year period, etc.). On the other hand, any storm event may occur more than once in any given year, or may occur several times within a period equal to its average recurrence interval.

The peak flows listed below are merely estimates, designed more to indicate the probable magnitude of the effects of development than to predict any actual flow rate.

Table 1. Estimated present and future peak flows in the feeder stream on the Plymouth Heights site at the discharge point shown in Figure 5. All flows are given in cubic feet per second.

	2-year, 24-hr. storm	25-year, 24-hr. storm	100-year, 24-hr. storm
Present peak flows	22	199	419
Future peak flows	31	227	464
Percent increase	41%	14%	11%

As the table shows, significant increases in peak flood flows may be expected in the feeder stream following development as planned. The increases are especially critical in view of the steep slopes to the west of the site and the presence of homes on Carter Road where the feeder stream enters the flatter floodplain of Nibbling Brook. These conditions would create a risk of severe erosion along the banks of the feeder stream and increased siltation and flooding hazards along Nibbling Brook at the mouth of the stream. Consideration should therefore be given to a runoff-retention basin or other storm-drainage measures in the southeastern portion of the property.

In the western half of the site, runoff problems would occur mostly as a function of the steep slopes and the cuts and fills that would be required for development. Indeed, the location of the road in that section, as presently planned, would require a slope at or exceeding 10 percent, and with the topography as steep as it is, it is difficult to conceive of any road layout that would improve upon this slope. Development would need to be exceptionally carefully planned in this section in order to avoid serious erosion and mass-movement (large scale sliding of overburden) problems.

Runoff problems associated with the northeast section of the site should, by comparison with the other two sections, be minimal, as the slopes are more moderate. The wetland in the northeastern corner should serve as a natural retention area for runoff, mitigating any increases in flow rates. Because of the proximity of bedrock to the surface in this area, however, water quality effects may be a more serious consideration. Septic systems will need to be carefully sited or engineered on the various lots to assure adequate renovation of effluent in the soil. Placement of leaching fields in soils of inadequate depth or soils having a seasonally or permanently high water table may lead to surfacing of effluent in the wetland area, with the attendant health and aesthetic problems. It seems particularly unlikely that a septic system could be adequately sited in proposed lot 69.

The estimated increases in overall runoff volumes following development of the site are given in Table 2. These estimates reflect an average increase for the site; actual increases will be greater in areas of more concentrated development and less in areas of lesser disturbance. Due to the increases in stormwater runoff volumes which will occur with development of this site, it is recommended that a detailed storm water management plan be prepared for this project for town review.

Table 2. Estimated present and future runoff volumes for Plymouth Heights. All volumes given in acre-feet. (An acre-foot is a volume of water measuring one foot high over a one acre area).

	2-year, 24-hr. storm	25-year, 24-hr. storm	100-year, 24-hr. storm
Present	6.55	3.62	78.25
Future	7.84	3.94	82.98
Percent increase	22%	9%	6%

The overall effect of the proposed development on Nibbling Brook's water quality will ultimately depend largely on three factors: the success of the developer(s) in controlling erosion of the steep slopes and subsequent sedimentation in the brook; the adequacy of siting, design, and installation of septic systems; and the volume of salt and other road contaminants that are carried into the brook. In terms of the last factor, a recent study by the U. S. Geological Survey indicates that the town of Plymouth used an average of 4.4 tons of salt per mile of town road in the winter of 1976-77. This average is moderate compared to others in the state (the lowest reported usage was 0.6 tons/mile in the towns of Goshen and Guilford; the highest was 23.1 tons/mile in the town of Norwich). With approximately 1.7 miles of new roads, the subdivision would receive about 7.5 tons of salt for a similar winter.

VII. WATER SUPPLY

The proposed subdivision would be served by individual on-site water-supply wells. These wells would have to tap the bedrock aquifer because of the lack of a suitable stratified drift (sand and gravel) or till deposit. While till is present over most of the site, its thickness is probably inadequate and its permeability too low to serve as a reliable water source. Bedrock, in most cases, provides yields that are small but sufficient for the needs of an average family. A yield of 3 gallons per minute is usually considered adequate. In the lower Housatonic River basin, 68 wells tapping schist bedrock were surveyed for Connecticut Water Resources Bulletin No. 19. Of these, approximately 70 percent yielded 3 gallons per minute or more, and approximately 80 percent yielded 2 gpm or more. On the other hand, less than 20 percent yielded 10 gpm or more. These data suggest that a suitable water supply can be obtained from most of the proposed lots, but that large supplies are unlikely. The probability of obtaining a certain supply on any particular lot is virtually impossible to determine, as the ultimate yield depends upon the number and size of water-bearing fractures that are encountered by the well. The distribution of these fractures in bedrock is highly irregular.

VIII. VEGETATION

The 135± acre tract proposed for development into Plymouth Heights Subdivision has a wide variety of vegetation types; in all, eight are described (see vegetation type map and vegetation type description chart). It should be noted that the boundaries between the hardwood swamp, mixed hardwood and northern hardwood stands are only approximate because of the wide transition zones between these stands. Below is a discussion of a number of forestry-related concerns with respect to the proposed project.

Aesthetics and Preservation

As with other subdivisions in forested areas, high quality trees (trees without damage or excessive defects) have high aesthetic value and should be preserved to the greatest extent possible. This is especially true of the large paper birch trees located in both stands A and D. Where trees are declining in health and vigor as a result of crowded conditions, removal of some of the poorer quality trees may prove to be beneficial.

Trees are very sensitive to the condition of the soil within their drip-lines. The drip-line zone corresponds to the entire area under a tree's crown. Development practices such as excavating, filling, and grading for construction of roadways, buildings, and septic systems in the drip-line zone may disturb the balance between soil aeration, soil moisture level, and soil composition. These disturbances may cause a decline in tree health and vigor, potentially resulting in tree mortality within three to five years. Mechanical injury to trees may cause the same results. Hence, care should be taken, especially during the prospective construction period, not to disturb trees that are to be preserved.

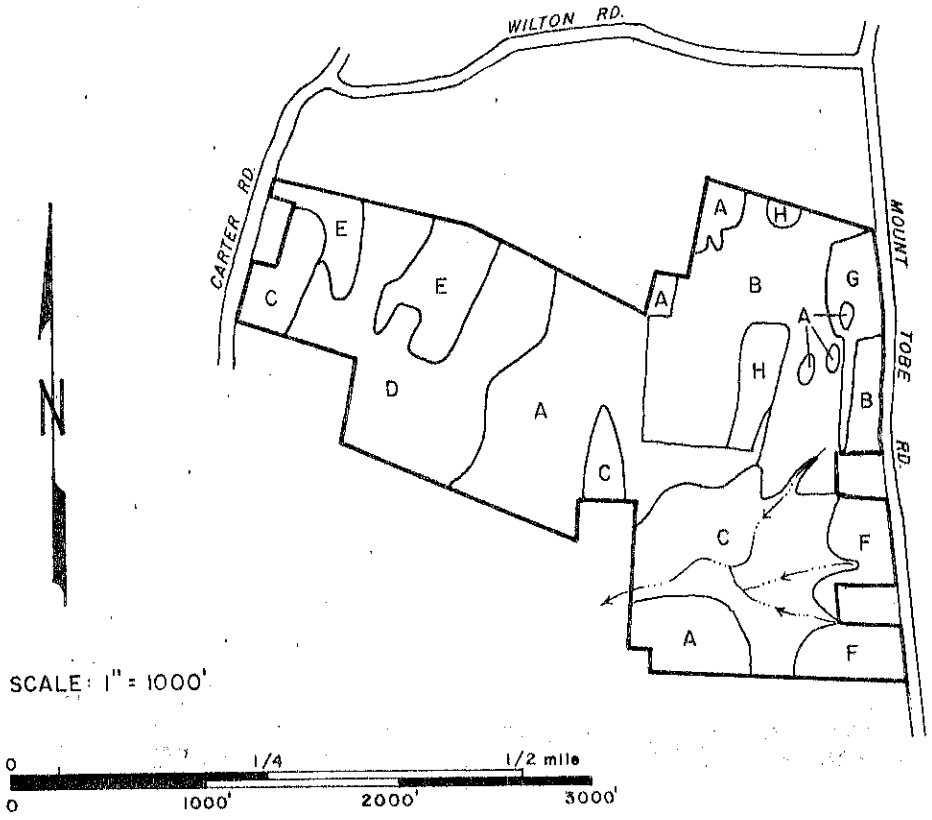
In general, healthy and high vigor trees should be favored over unhealthy trees because they are usually more resistant to the environmental stresses brought about by construction of a subdivision of this nature. Where feasible, trees should be saved in small groups or "islands". This practice lowers the possibility of soil disturbance and mechanical injury. Individual trees and "islands" of trees should be temporarily, but clearly, marked so they may be avoided during construction. Recent research has shown that healthy trees on a house lot may enhance the value of that lot by as much as twenty percent.

Limiting Conditions

The high water table and saturated soils associated with the hardwood swamp area near Carter Road, and also the open swamp area (stand G), limit vegetative growth to species tolerant of excessive moisture conditions. The red maple in this portion of the hardwood swamp are slow growing and of poor quality. The high water table is more critical in the open swamp where vegetative cover is dominated by shrubs and herbaceous species. Management of these areas for wood products is not economically feasible because of the lack of desirable species, poor growth rates and the severe limitations that the high water table imposes on equipment use.

FIGURE 6.

VEGETATION TYPE MAP



LEGEND

- ROADS
- PROPERTY BOUNDARY
- VEGETATION TYPE BOUNDARY
- STREAM

VEGETATION TYPES

Stand	A	Mixed hardwoods, 29 acres, fully stocked, pole to sawtimber size
Stand	B	Open fields, 26 acres
Stand	C	Hardwood swamp, 23 acres, over stocked, pole size
Stand	D	Northern hardwoods, 23 acres, fully stocked, pole to sawtimber size
Stand	E	Old field/madeland, 11 acres, under stocked, seedling - sapling size
Stand	F	Mixed hardwoods, 9 acres, fully stocked, pole size
Stand	G	Open swamp, 6 acres, under stocked, seedling size
Stand	H	Mixed hardwoods, 4 acres, fully stocked, seedling size

VEGETATION TYPE DESCRIPTIONS (Refer to Figure 6)

STAND TYPE	ACRES	*MAIN STAND SIZE CLASS	STOCKING LEVEL	MAIN STAND QUALITY	MAJOR COMPONENTS OF: OVERSTORY	UNDERSTORY	GROUND COVER
A. Mixed Hardwoods	29	Pole to saw-timber	Fully-stocked.	High. Trees are of good form. Trees average 2-2½ logs in merchantable height. Some oak mortality. Trees are starting to decline in health and vigor.	Red oak, white oak, black oak, mockernut hickory, shagbark hickory, pignut hickory, red maple, sugar maple and scattered black birch, yellow birch and paper birch.	Maple leaved viburnum, witch-hazel, azalea, shadbush and scattered patches of Mt. laurel. Gray birch and bigtooth aspen are present where this stand borders the field.	Club moss, cinnamon fern, Christmas fern, evergreen wood fern, bracken fern and spinalose woodfern.
B. Open Fields	26	---	---	---	---	---	Grasses, sedges, some goldenrod and cinqfoil.
C. Hardwood Swamp	23	Pole	Overstocked.	Medium. Trees have good form, but small tops with some breakage.	Red maple, with scattered white ash, yellow birch and American elm. Hemlock are present near Carter Rd.	Dense spice bush and highbush blueberry. Poison sumac and black alder near Carter Rd.	Sphagnum moss, skunk cabbage, cinnamon fern and tussock sedge.
D. Northern Hardwoods	23	Pole to saw-timber	Fully-stocked	High. Trees are of good form and growing vigorously.	Sugar maple, yellow birch, paper birch, white ash and red maple.	Sugar maple seedlings, and spice bush.	Christmas fern and evergreen woodfern.
E. Old Field/ Made land	11	Seedling to sapling	Understocked.	---	Gray birch, eastern red cedar, sassafras, black cherry and scattered red maple.	Spirea, smooth sumac, old field juniper and hardwood tree seedlings.	Grasses, hairy capped moss, goldenrod, sweet fern, blackberry, raspberry, barberry, poison ivy, huckleberry

VEGETATION TYPE DESCRIPTIONS (Refer to Figure 6)

STAND TYPE	ACRES	*MAIN STAND SIZE CLASS	STOCKING LEVEL	MAIN STAND QUALITY	MAJOR COMPONENTS OF: OVERSTORY	UNDERSTORY	GROUND COVER
F. Mixed Hardwoods	9	Pole	Fully-stocked.	Medium	Red maple, white ash, and black cherry.	Arrowwood with scattered spicebush and high bush blueberry.	Christmas fern and club moss.
G. Open Swamp	6	Seedling	Understocked.	---	Red maple, silky willow, pussy willow and cattail.	Spirea (hard hack) swamp rose, elderberry, raspberry and foxgrape.	Grasses, sedges, sensitive fern, deer tongue and sphagnum moss.
H. Mixed Hardwoods	4	Seedling	Fully-stocked	---	Sugar maple, red maple, black cherry, sassafras, gray birch with scattered white pine and eastern red cedar.	Scattered speckled alder, tartarian honeysuckle, and gray stemmed dogwood.	Grasses, goldenrod, and sensitive fern.

* Seedling size - trees less than 1 inch in diameter at 4½ feet above the ground (d.b.h.)
Sapling size - trees 1 to 5 inches in d.b.h.
Pole size - trees 5 to 11 inches in d.b.h.
Sawtimber size - trees 11 inches and greater in d.b.h.

Potential Hazards and Mitigating Practices

Windthrow is a potential hazard in the portion of the hardwood swamp (stand C) located near Mount Tobe Road (Rte. 262), and also in the parts of stands A and D where soils are shallow to bedrock.

As a result of the high water table and saturated soils, the trees in the hardwood swamp are unable to become securely anchored. The crowded condition of some of the trees in this stand increases the potential for windthrow, especially if disturbances occur. At present many of these trees rely on each other for stability. A light fuelwood thinning in this stand will help to increase tree stability, over time, by stimulating crown and root growth in residual trees.

The shallow to bedrock soils in stands A and D cause windthrow of poorly anchored trees to be a potential hazard. The windthrow hazard is lessened where the underlying bedrock is highly fractured, because roots may penetrate deeper into cracks and fissures, helping trees to become more securely anchored.

Linear openings made in or along these areas, which allow wind to pass through rather than over these stands, may increase the windthrow hazard and should be avoided if possible.

It should be noted that changes in the water table depth in the hardwood swamp area, caused by blocking or restricting natural drainage flows, may cause trees and shrubs in these areas to die. Alterations which may permanently raise the water table in these areas should also be avoided to prevent the drowning of vegetation.

The oak mortality in stand A may become a potential hazard if roads, buildings or utility lines are constructed near them. These trees should be removed and utilized as fuelwood prior to completion of the proposed subdivision.

Suggested Management Techniques

The trees in the mixed hardwood stands (A and F) are becoming crowded and as a result are declining in health and vigor.

If construction in this area is not planned for several years, commercial thinnings for fuelwood would be beneficial at this time. These thinnings would reduce the competition for space, sunlight, water and nutrients; thereby improving the health, vigor and stability of residual trees, over time. These thinnings should remove approximately one-third of the total volume and should focus on removing poor quality trees, unhealthy trees and undesirable trees, along with trees that are directly competing with healthy, high quality trees.

The majority of the hardwood swamp (vegetation type C) is over crowded and would also benefit by receiving a thinning. As fuelwood demands rise, it may become feasible to manage certain hardwood swamps by periodically harvesting a limited quantity of cordwood. Due to the sensitivity of this area, thinnings should remove no more than one quarter of the total volume. This thinning, like those recommended for stands A and F, will help to improve the condition of the stand, over time, by reducing competition between residual trees. It should favor tree species other than red maple, and focus on removing the poorest quarter of the trees in the stand. To help avoid irreversible soil damage, this thinning

should be implemented during the winter, when the ground is frozen, or the summer, when the ground is relatively dry.

If either of the proposed thinnings are agreed to, a consultant forester should be contacted to mark the trees to be removed. Revenues from these thinnings will more than cover the cost of hiring a consultant.

If subdivision approval and home development of this tract occurs within a year, thinnings might best be accomplished by individual lot owners. The harvested trees may be used as fuelwood.

The trees cleared for the construction of roads, houses, septic systems and also the 9± acre "active recreation" area, should be utilized as fuelwood or, where possible, sawtimber.

IX. WILDLIFE

The property may be divided into six wildlife habitat areas. These areas are briefly discussed below.

Open Fields. This area is shown as stand B in Figure 6 and has high value for wildlife. Wildlife benefit will be largely lost with development of this area due to habitat loss. Many species presently utilizing this area will not be able to following the proposed development.

Old Reverting Fields. This area, shown as stand E in Figure 6, offers the best of all wildlife habitat on the property. Road and housing development will greatly reduce its value. Time will also reduce its value if not managed as wildlife habitat; however, several years would be involved for plant succession to reduce the areas value significantly.

Wildlife Edges. This area includes all stream edges, field edges, and old field edges on the property. This land also offers good wildlife habitat. To some extent, this edge cover will probably be increased with development due to the opening up of additional wooded areas. This will tend to counter some of the other habitat loss which will result from the project.

Woodland. This habitat type takes up much of the area. Many of the oak trees in this area have been lost to insect damage, thus reducing food availability. The entire proposed open space area is made up of this type of habitat. Preserving this open space has minimum significance to wildlife in view of the changes in surrounding habitat planned.

Rock Outcrops. These areas, scattered throughout the property, may serve as den areas for wildlife to some extent.

Wetlands. These areas for the most part are not planned for development and wildlife impact should not be significant.

To conclude, the areas of maximum value to wildlife on this property are the old reverting fields, the open fields, and the areas of wildlife edge. The project cannot help but have some detrimental effects on wildlife. The best way to reduce this impact would be to reduce the density of development and/or cluster the housing units. Under the present plan, with development in all areas, the ability to manage wildlife populations is lost.

X. RECREATION

The project plans call for a ± 9 acre passive recreation area and a ±9 acre active recreation area (see Figure 1). These areas are proposed to be turned over to the town for development and management following subdivision approval.

The active recreation site is primarily wooded and characterized by moderate slopes (3-15%). Active recreational development (tennis courts, ballfields, etc.) over much of this area will require extensive cutting and filling to create land of suitable grade. The soils will also present some problems for active recreational development. The majority of this area is underlain by a Hollis-Charlton rocky complex soil. This soil is characterized by pockets of shallow soil which will complicate earth removal operations. The eastern border of this site is underlain by Woodbridge soils of slight-moderate slope. Although topographically this area is more suitable for active recreational development, the soil has a hardpan which restricts drainage during the wet seasons of the year. As a result, expensive drainage measures may be necessary to develop this area.

If active recreational facilities are judged important in this section of town or as part of this subdivision, consideration should be given to setting aside some more suitable land on the property (e.g. the gently sloping Charlton soil areas) for such purposes. The proposed active recreation area may support a limited amount of recreational development, but the land would seem more suitable for passive recreational and open space uses.

The proposed passive recreation area consists of Hollis-Charlton complex soils on its southeastern border and moderately steep Charlton soils on the remaining portions. This land is generally suitable for passive recreation and open space purposes but care should be taken in laying out any trails to follow contours as much as possible to avoid erosion problems.

XI. ADDITIONAL PLANNING CONSIDERATIONS

Historically, the proposed subdivision site was zoned by the Town as rural/agricultural and general manufacturing. In response to a similar subdivision proposal several years ago, the Town of Plymouth Planning and Zoning Commission re-zoned that portion designated general manufacturing to rural/agricultural (RA-1). The minimum lot size for single-family detached units in this zone is 40,000 square feet. General uses and exceptions usually associated with one acre lots are in effect with the following specific requirements:

General Bulk Regulations for RA-1 District

Minimum lot area	40,000 sq. ft.
Minimum lot frontage and width	150 feet
Minimum required front yard	50 feet
Minimum required side yard	25 feet
Total width required side yards	50 feet
Required rear yard depth	50 feet

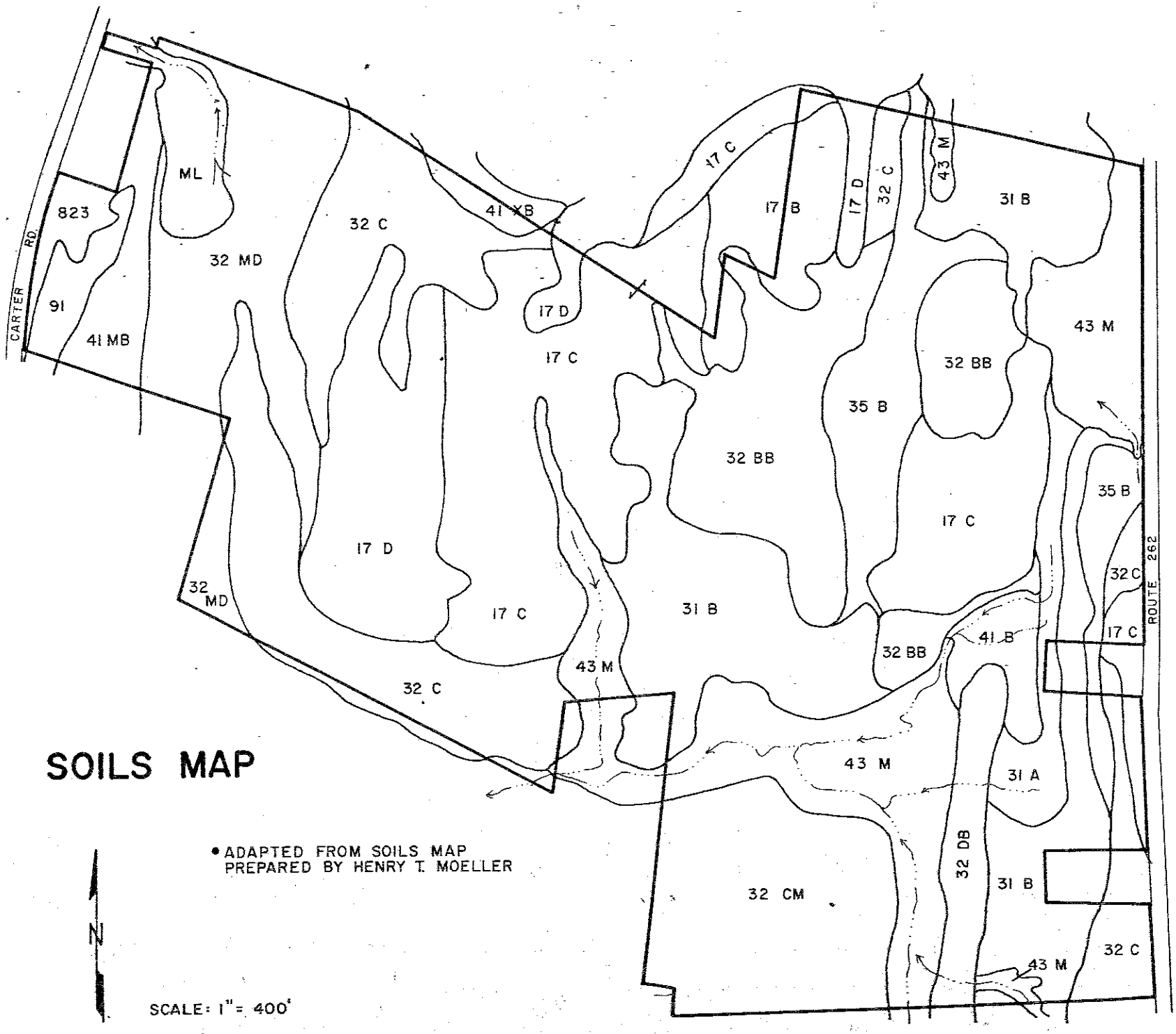
From the analysis of existing regulations there are few restrictions imposed by existing zoning regulations for the construction of the total number of units on this site. Of course, this assumes two very important considerations: 1) general public utilities (e.g. storm sewer, roads, curbs, etc.) can be designed and constructed to meet minimum town requirements and 2) approval for 86 individual septic systems can be gained from the Health Department.

The Land Use Plan: A Plan for Conservation and Development in the Central Connecticut Region identifies the site as residential (low/medium) depending upon the development of centralized sanitary sewers. The Regional Plan clearly suggests future development in this area with the extension of sewers. Without the extension of sewers, the site obviously could not support the density of development (.18-.5 acres/unit) discussed in the Plan. The present proposal does not suggest either the densities of development or the extension of public sewers that CCRPA envisions.

The accessibility of the site is good considering the rural attributes the site offers. Road capacity would not be significantly diminished by the full construction of this project as planned. It is nearly impossible to live in the rural environment that the Plymouth Heights site offers and to further expect such urban conveniences as public bus service, trash collection, nearby shopping centers, etc. These services are relatively closeby (within 10 miles), but not at the front door.

* * * * *

APPENDIX



SOILS MAP

• ADAPTED FROM SOILS MAP PREPARED BY HENRY T. MOELLER

N

SCALE: 1" = 400'

SOILS LIMITATION CHART

BUILDING SITE DEVELOPMENT

MAP SYMBOL	SOIL NAME	BUILDINGS W/ BASEMENTS	SEPTIC ABSORBTION FIELDS	ROADS OR DRIVEWAYS	LANDSCAPING
17B 17C	Hollis-Charlton rocky complex, 3-15% slopes Hollis part	Severe; Depth to rock	Severe; Depth to rock	Severe; Depth to rock	Severe; Depth to rock
	Charlton part	Moderate; Large stones, slope	Moderate; Large stones	Moderate; Slope	Moderate; Large stones
17D	Hollis-Charlton rocky complex, 15-35% slopes Hollis part	Severe; Slope, Depth to rock	Severe; Slope, Depth to rock	Severe; Slope, Depth to rock	Severe, Slope, Depth to rock
	Charlton part	Severe; Slope	Severe; Slope	Severe; Slope	Severe; Slope
31A	Woodbridge fine sandy loam, 0-3% slopes	Severe; Frost action	Severe; Percs slowly	Severe; Frost action	Slight
31B	Woodbridge fine sandy loam, 3-8% slopes	Severe; Frost action	Severe; Percs slowly	Severe; Frost action	Slight
32B 32BB	Charlton fine sandy loam, 3-8% slopes	Slight	Slight	Slight	Slight
32C	Charlton fine sandy loam, 8-15% slopes	Moderate; Large stones, slope	Moderate; Large stones	Moderate; Slope	Moderate; Large stones
32CM	Charlton very stony fine sandy loam, 3-15% slopes	Moderate; Large stones, slope	Moderate; Large stones	Moderate; Slope	Moderate; Large stones
32MD	Charlton very stony fine sandy loam, 15-35% slopes	Severe; Slope	Severe; Slope	Severe; Slope	Severe; Slope
32DB	Charlton very stony fine sandy loam, 15-25% slopes	Severe; Slope	Severe; Slope	Severe; Slope	Severe; Slope

MAP SYMBOL	SOIL NAME	BUILDINGS W/ BASEMENTS	SEPTIC ABSORBTION FIELDS	ROADS OR DRIVEWAYS	LANDSCAPING
35B	Paxton fine sandy loam, 3-8% slopes	Moderate; Frost action	Severe; Percs slowly	Moderate; Frost action	Moderate; Small stones
ML	Madeland	------ Soil Characteristics Variable ------			
41B	Sutton fine sandy loam	Severe; Wetness	Severe; Wetness	Moderate; Frost action	Moderate; Large stones
41XB	Sutton stony fine sandy loam, 3-8% slopes	Severe; Wetness	Severe; Wetness	Moderate; Frost action	Moderate; Large stones
41MB	Sutton very stony fine sandy loam, 3-8% slopes	Severe; Wetness, Large stones	Severe; Wetness, Large stones	Moderate; Frost action, Large stones	Moderate; Large stones
43M*	Leicester, Ridgebury, Whitman, very stony fine sandy loam	Severe; Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
91*	Palm Muck	Severe; Wetness	Severe; Wetness	Severe; Wetness, Frost action	Severe; Wetness
823*	Saco silt loam	Severe; Wetness, Floods, Frost action	Severe; Wetness, Floods	Severe; Wetness, Frost action, Floods	Severe; Wetness, Floods

EXPLANATION OF RATING SYSTEM: SLIGHT LIMITATION: indicates that any property of the soil affecting use of the soil is relatively unimportant and can be overcome at little expense.
MODERATE LIMITATION: indicates that any property of the soil affecting use can be overcome at a somewhat higher expense.
SEVERE LIMITATION: indicates that the use of the soil is seriously limited by hazards or restrictions that require extensive and costly measures to overcome.

*Inland wetlands as defined by P.L. 155.

SOIL DESCRIPTIONS:

Nine different soils groupings were identified on the property. These soils are described below.

CHARLTON SOILS - The Charlton series consists of deep, well drained, nearly level, or undulating to hilly soils that developed in friable to firm glacial till. These soils are well distributed on uplands throughout Litchfield County. They are stony to very stony on about two thirds of their total acreage. Permeability is moderate to moderately rapid throughout. These soils are classified as fine sandy loam. Except where slope and stoniness are problems, they are well suited for homesites, landscaping, septic fields and roads.

CHARLTON-HOLLIS ROCKY COMPLEX, as defined by H. T. Moeller. This mapping unit is composed of gently sloping and sloping soils. It consists of up to 50 percent Charlton fine sandy loam, 30 percent of an unnamed soil that is 20 to 40 inches deep over bedrock and 20 percent of Hollis rocky fine sandy loam. These percentages are variable. The soils in this unit occur in such an intricate and complex pattern that it is not practical to separate them. Bedrock outcrops are few to numerous and stoniness ranges from almost non to extremely stony. There is usually less than 10 percent of the total surface consisting of exposed bedrock outcrops.

"The Hollis soil is somewhat excessively drained and consists of friable to very friable fine sandy loam less than 20 inches deep to bedrock. The well drained unnamed soil is also a fine sandy loam." The Charlton soil has been described above. All of these soils are moderately permeable but drainage may be restricted by the underlying bedrock in places or in pockets.

On the property the deep soils are generally less than 5 feet to bedrock. The wooded areas are generally very stony on the surface. The open fields are generally non-stony. The deep holes generally had no standing water.

*LEICESTER, RIDGEBURY AND WHITMAN COMPLEX: This undifferentiated unit is made up of poorly and very poorly drained soils. All of these soils are nearly level.

Stones and excess water make these soils unsuitable for development. They are, however, suitable for wildlife habitat development.

MADELAND - as defined by H. T. Moeller.
On the property this is an area of which part has been cut and excavated to the substratum so that the entire soil profile has been removed. The other part of this area has been filled with a very stony soil material. This unit has no soil or drainage classification. There is also an intermittent stream flowing through this unit which is water being collected from soils upslope. This is indicated on the soils map with this report. Generally the soil material appears to be very stony sandy loam till.

PAXTON SERIES - is made up of well-drained soils that developed in glacial till. These soils have a compact layer at a depth of about 2 feet. They are moderately permeable in the surface layer and subsoil but slow to very slow in the substratum. Most use limitations are associated with slow percolation rates, seasonal wetness, and large stones. Some engineering modifications may be needed for foundation placement, spetic fields and road construction.

*PEAT AND MUCK (PALMS MUCK) as described by H. T. Moeller. "This mapping unit consists of organic deposties of muck less than 50 inches thick over mineral soil material. The water table is at or near the surface most of the year. It is often flooded during the winter and after heavy rains." On the property, these soils are as described above. They are also wetlands.

*SACO SERIES - The Saco series consists of very poorly drained, silt loam soils that are associated with flood plains. Flooding is a frequent hazard and the water table is at or near the surface in winter and spring. Development limitations are severe.

SUTTON SERIES - The Sutton series consists of moderately well drained, nearly level to sloping soils that were developed mainly from schist. These fine sandy loam soils occur in scattered areas around the county. Their permeability is generally moderate but distinct mottles are often present just below the 18 inch depth. Consequently, engineering modifications are often needed to establish properly functioning septic systems. Homes with full basements may require footing drains.

WOODBRIDGE SOILS: The Woodbridge series consists of moderately well drained, nearly level to sloping soils developed in compact glacial till. These soils are underlain by a compact layer, or hardpan at a depth of about 24 inches. Their permeability is moderate in the surface layer and subsoil but is slow in the substratum. Most use problems are related to seasonal wetness and slow percolation. Generally, these soils require engineering modifications for foundation placement, septic fields, and road construction.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, recreation specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - a 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

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

REQUESTING A REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality or the chairman of an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer 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 King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.