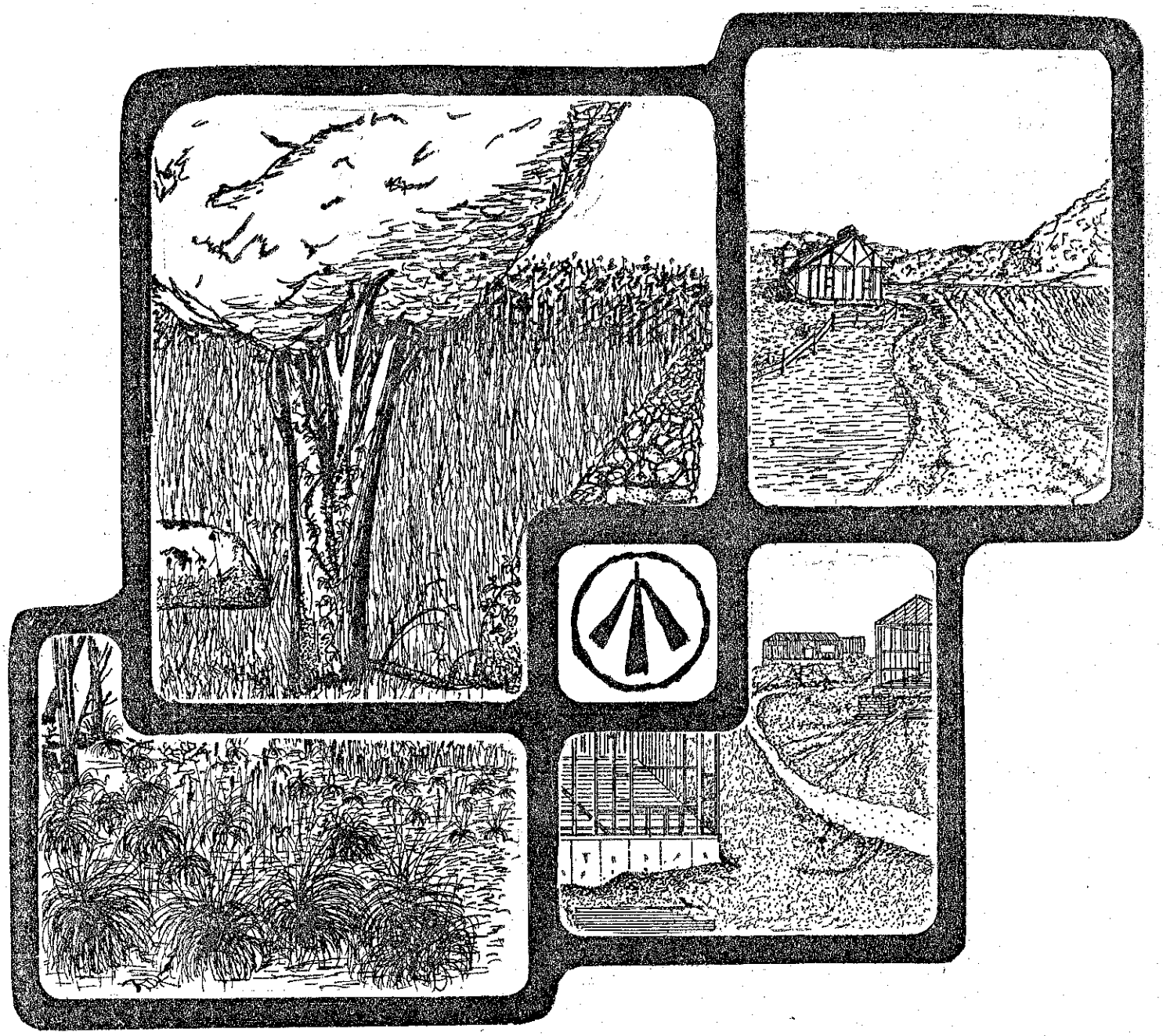
ENVIRONMENTAL REVIEW TEAM REPORT



AMITY VILLAGE SUBDIVISION
BETHANY, CONNECTICUT

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

ON

AMITY VILLAGE SUBDIVISION
BETHANY, CONNECTICUT

JULY 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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Funding Provided By

CONNECTICUT STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
Stanley J. Pac, Commissioner

Policy Determined By

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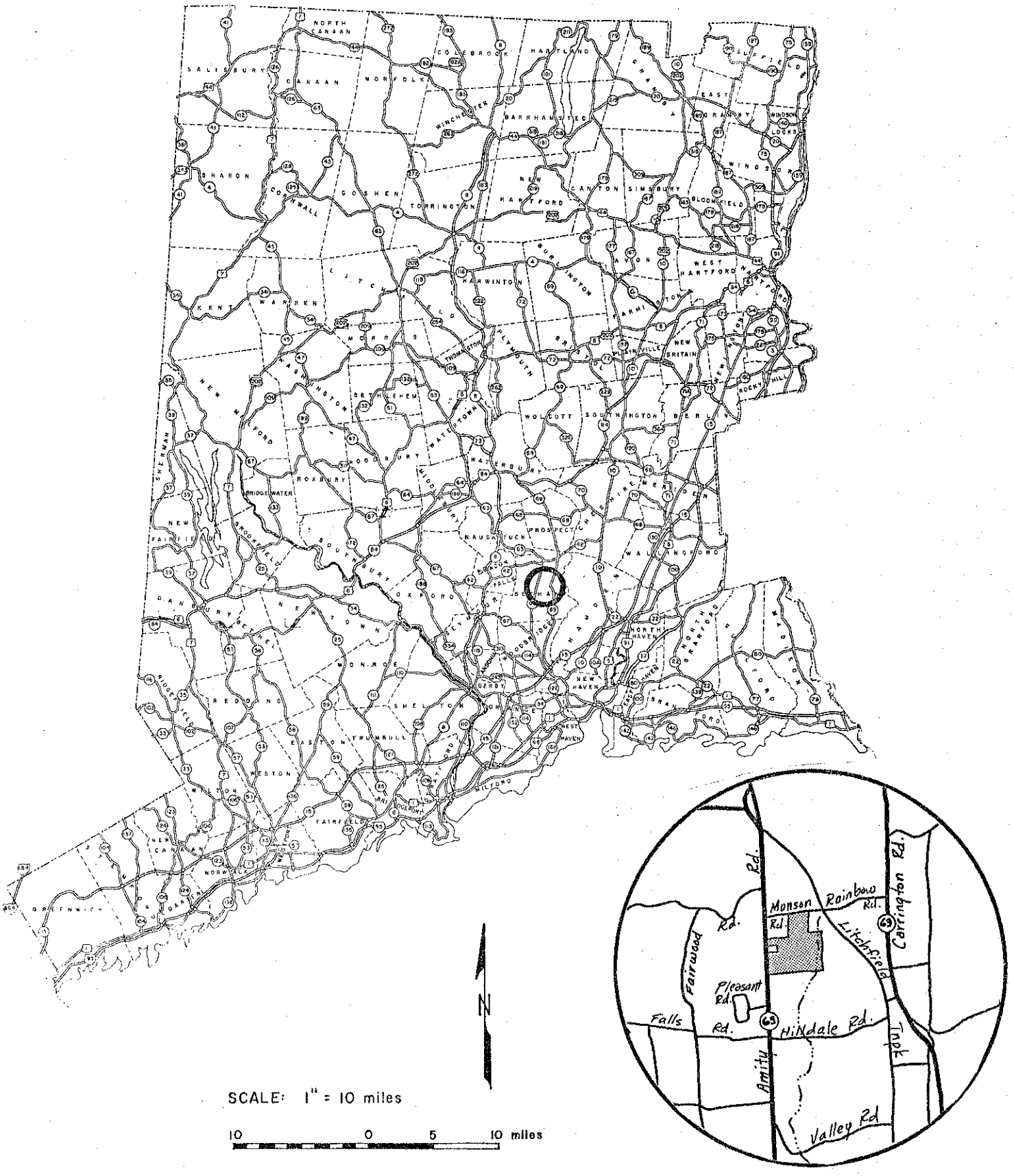
LOCATION OF STUDY SITE

AMITY VILLAGE SUBDIVISION
BETHANY, CONNECTICUT



ENVIRONMENTAL REVIEW TEAM REPORT
ON
AMITY VILLAGE SUBDIVISION
BETHANY, CT.

I. INTRODUCTION

The Inland Wetlands Commission from the Town of Bethany is presently reviewing an application for subdivision of ± 52 acres of land. The subject site is located in the northcentral portion of town and is bordered on the west by Route 63 and on the north by Munson Road. The land is wooded and characterized by moderate slopes. One major drainage swale with associated stream and wetland is present on the site. This swale runs from Munson Road through the central portion of the property to the southeast corner of the tract. The topography of the subject site is shown in Figure 1.

The site plan for "Amity Village" calls for 16 business lots and 8 residential lots. Most of the proposed lots are ± 2 acres in size. All lots are to be served by on-site wells and septic systems. Access to the interior of the property would be provided by constructing a loop road between Munson Road and Route 63. Figure 2 of this report presents a simplified site plan of the proposed project.

The Inland Wetlands Commission from the Town of Bethany 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. Of major concern to the Inland Wetlands Commission is the impact of the project on water resources. The stream on this site feeds Sargent River which in turn feeds Lake Chamberlain - a public water supply reservoir.

The ERT met and field reviewed the site on May 14, 1980. Team members for this review consisted of the following:

Frank Indorf.....	District Conservationist...	U.S.D.A. Soil Conservation Service
Fred Johnson.....	Sanitarian.....	State Department of Health
Henry Link.....	Sanitary Engineer.....	State Department of Health
Erin O'Hare.....	Regional Planner.....	South Central Connecticut Regional Planning Agency
Rob Rocks.....	Forester.....	State Dept. of Environmental Protection
Stephen Sasala.....	Transportation Planner.....	South Central Connecticut Regional Planning Agency
Mike Zizka.....	Geohydrologist.....	State Dept. of Environmental Protection

FIGURE 1.

TOPOGRAPHIC MAP

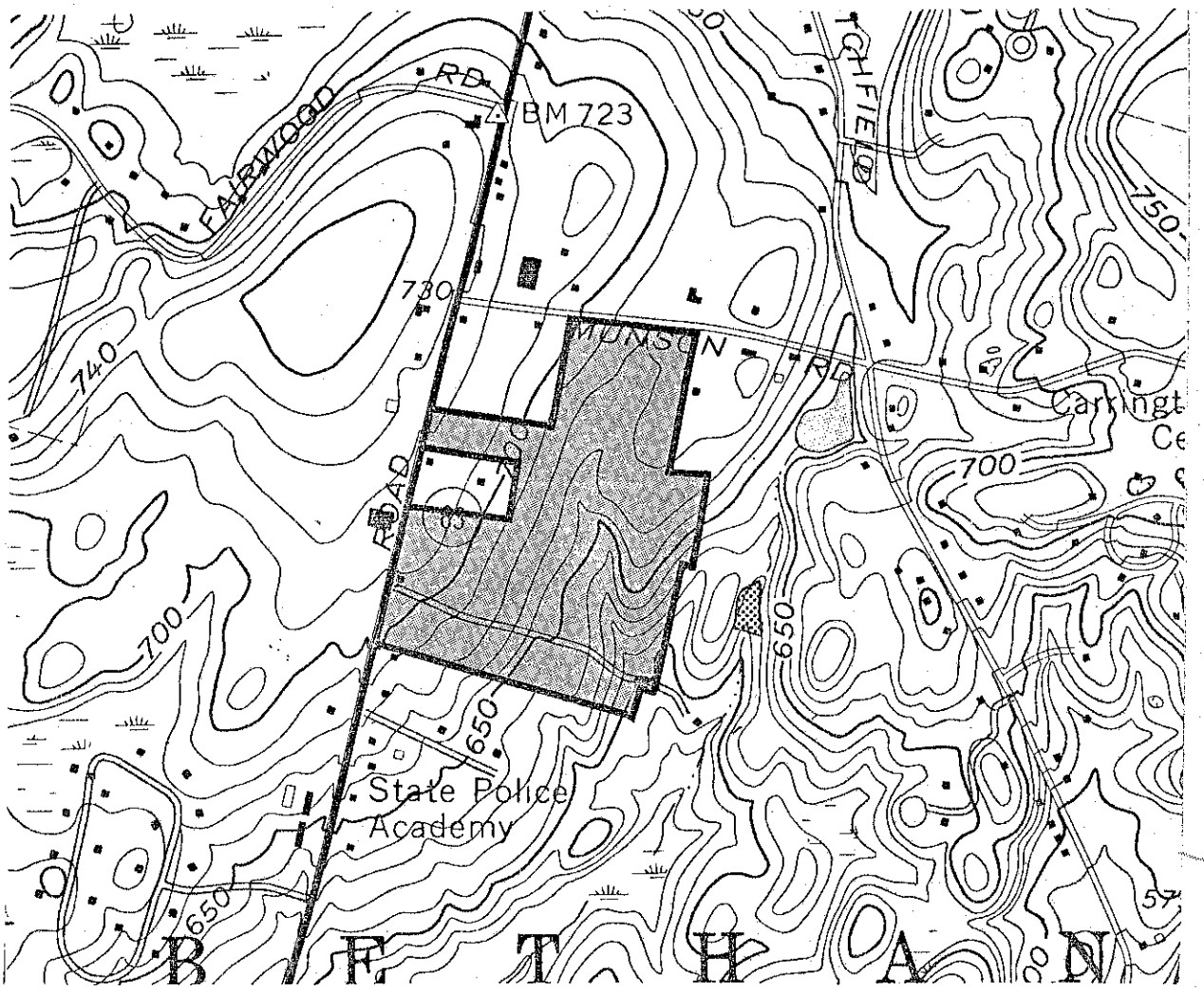
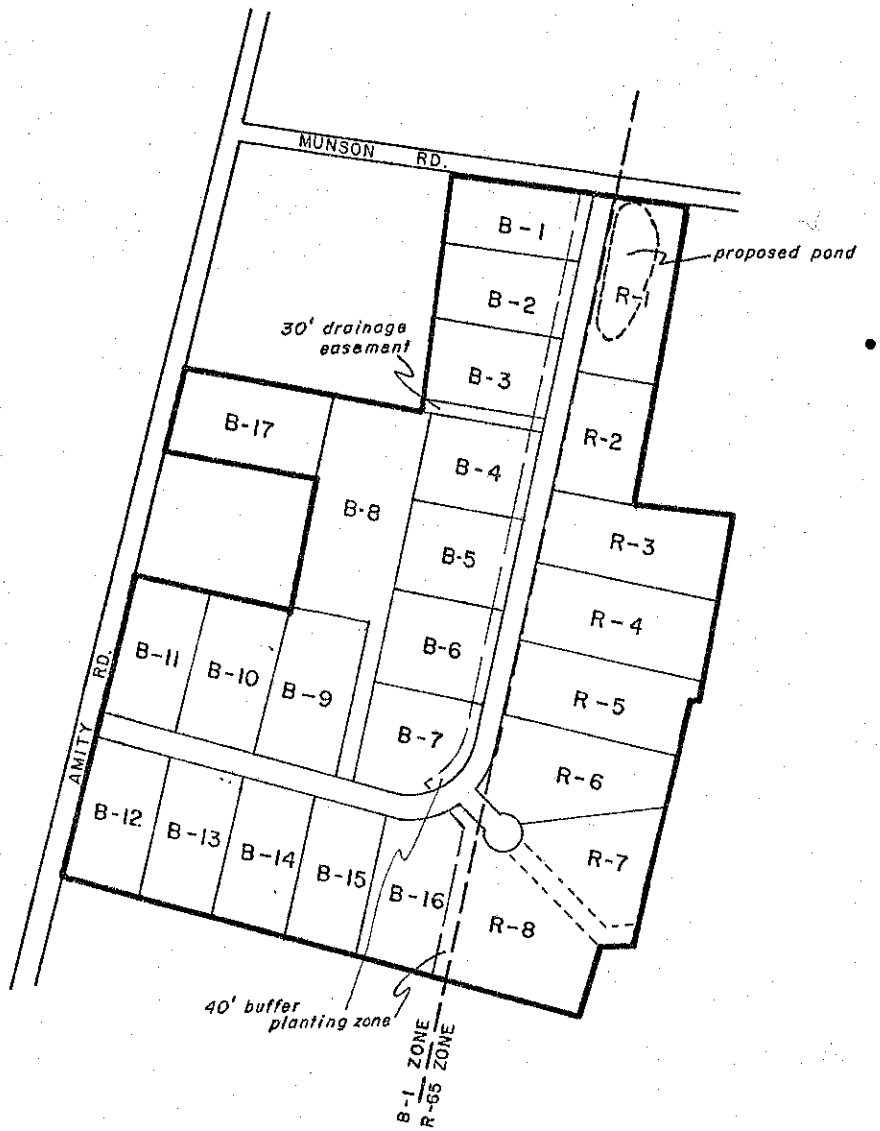


FIGURE 2.

SIMPLIFIED SITE PLAN



• ADAPTED FROM DEVELOPER'S SITE PLAN OF 11/13/79

N

SCALE: 1" = 500'

0 1/8 1/4 mile

0 500' 1000' 1500'

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 Bethany 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. GEOLOGY

The Amity Village site is located within the Mount Carmel topographic quadrangle. A bedrock geologic map of that quadrangle has been published by the U.S. Geological Survey (Map GQ-199, by C. E. Fritts, 1963). The bedrock underlying the site is described as a coarse-to-medium grained, well lineated, well-foliated, light gray granodiorite gneiss. The term "gneiss" refers to a crystalline rock in which very thin bands of elongate minerals alternate with bands of minerals having a rounder or blockier shape. The adjective "granodiorite" describes the mineral make-up of the rock: oligoclase, quartz, biotite, and microcline are major components; sphene, clinozoisite, muscovite, hornblende, garnet, and apatite are some of the minor mineral components. The descriptive terms "well-lineated" and "well-foliated", respectively, refer to the distinctness of the banding and to the noticeable thin layers of dark gray to black biotite flakes. Only small outcrops of bedrock were observed on the site, along and south of the present access road.

The surficial geology of the Mount Carmel quadrangle has been published by the Connecticut Geological and Natural History Survey (Quadrangle Report No. 12, by R.F. Flint, 1962). Till is the surficial deposit on the site. Till is a glacial sediment composed of rock particles and fragments of widely varying sizes and shapes. Little sorting by grain size is apparent in the deposit: clay-sized particles may be mixed with cobbles and boulders, and so forth. Sand-sized particles generally make up the largest fraction of the till, giving the deposit a friable texture. Pebbles and larger particles are often conspicuous, many times exceeding 20 percent of the deposit. The deeper portions of the till are commonly finer-grained and more compact than the portions near the surface.

Test pit data submitted by William E. Gilbert Associates, Consulting Engineers, shows the variability of the till within the site. Textures described in the data range from "clay" or "hardpan" to "fine medium sand with cobbles". Bedrock (ledge) was found within 4 feet of the surface in lots B-10, R-2, R-3, and R-4, and was found at depths between 4 and 7 feet in lots B-4, B-14, B-17, R-5, and R-6. Engineered septic system designs must usually be considered when bedrock is found less than 7 feet from the surface. Figure 3 shows the approximate extent of such shallow-to-bedrock areas on the site.

III. SOILS

A soils map of the Amity Village site is presented in the Appendix of this report. Also included in the Appendix is a soils limitation chart which identifies limiting factors for various land uses on each of the soil types. By comparing the soils map with the soils limitation chart, one can determine the suitability of the site for various land uses according to USDA Soil Conservation Service criteria.

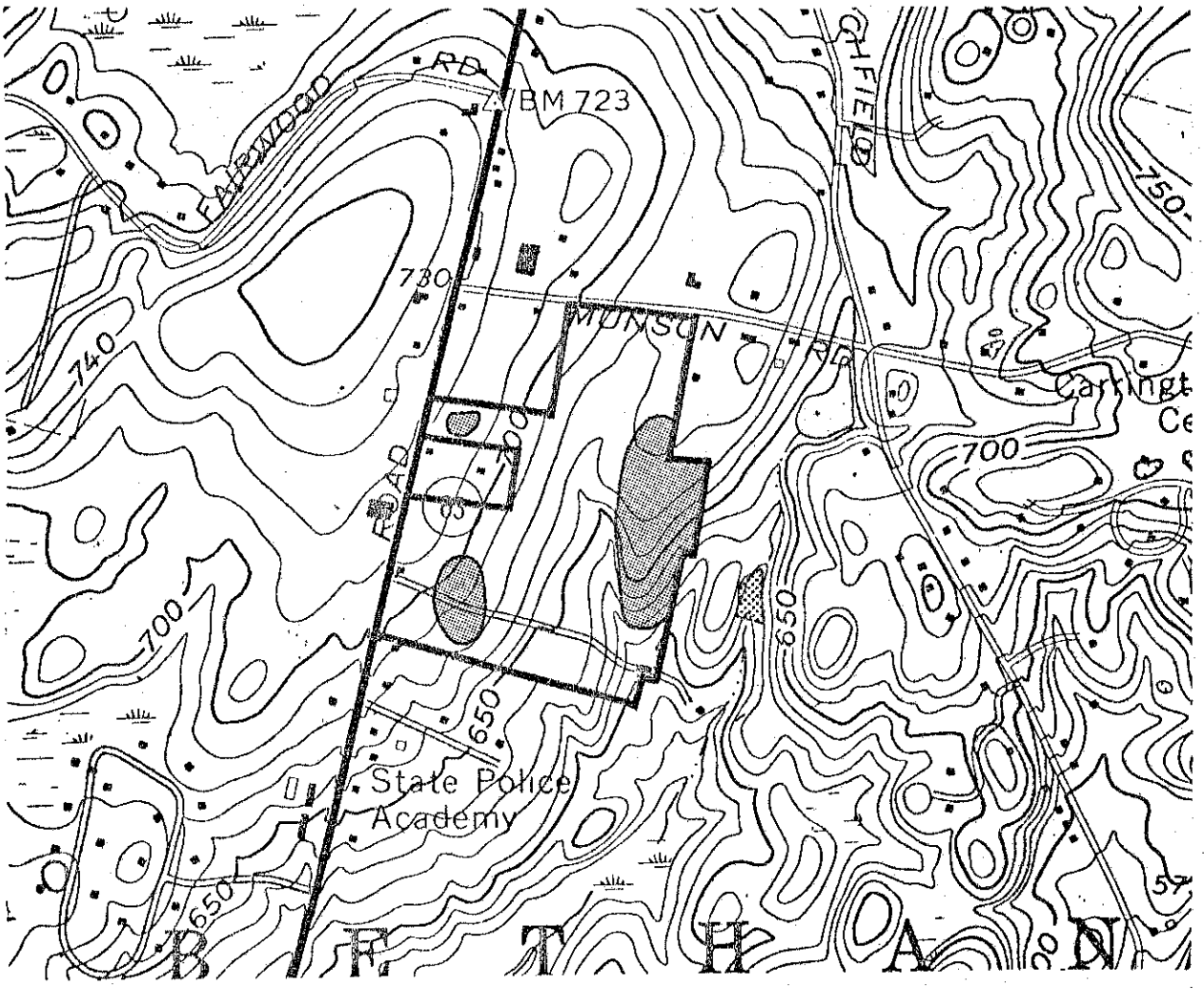
As shown in the soils map, the subject site consists of three predominant soil types. Each of these is described below.

Charlton Soils (CfB, CfC, CrC)

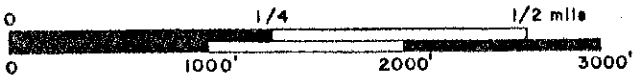
This is a gently to moderately sloping, well drained soil. Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil is

FIGURE 3.

SHALLOW TO BEDROCK AREAS



AREAS IN WHICH BEDROCK IS PRESUMED TO BE GENERALLY WITHIN 7' OF THE SURFACE



yellowish brown and light olive brown fine sandy loam 18 inches thick. The substratum, to a depth of 60 inches, is grayish brown gravelly fine sandy loam that has a few firm lenses up to 4 inches thick.

Permeability is moderate or moderately rapid. This soil has a high available water capacity. Runoff is medium. This soil tends to dry out and warm up fairly early in spring. It has a low shrink-swell potential. Unless limed, this soil is very strongly acid through medium acid.

This soil has good potential for community development. It is fairly easy to excavate but commonly has stones and boulders. Waste disposal systems such as onsite septic systems generally function satisfactorily with normal design and installation. This soil has good potential for landscaping. During construction of community developments, conservation measures are needed to prevent excessive runoff, erosion, and siltation.

Woodbridge Soils (WyB, WxB)

This gently to moderately sloping soil is moderately well drained. Typically, the surface layer is dark brown fine sandy loam 6 inches thick. The subsoil is 19 inches thick. It is dark yellowish brown fine sandy loam over olive brown, mottled fine sandy loam. The substratum, described to a depth of 60 inches, is olive, mottled, very firm gravelly fine sandy loam.

From late in fall until mid-spring, this soil has a water table at a depth of about 20 inches. Permeability is moderate in the surface layer and subsoil and slow in the substratum. This soil has a moderate available water capacity. Runoff is medium. This soil tends to dry out and warm up slowly in the spring. It has a low shrink-swell potential. In areas that are not limed, this soil is strongly acid through medium acid.

This soil has fair potential for community development. It is fairly easy to excavate; however, the substratum is very firm, and in many areas there are stones and boulders in the soil as well as on the surface. Because of the seasonal high water table, excavations are frequently inundated. Steep slopes of excavations are not stable when the soil is saturated and tend to slump. Particular attention needs to be given to building houses that have a basement because the basement generally is below the depth of the water table. A wet basement results unless the soil is drained. Waste disposal systems, such as an onsite septic system, will generally not function satisfactorily with only normal design and installation because of the slowly permeable substratum and the seasonal high water table. Very careful and often costly design and installation are required to insure a satisfactory system. The stones and boulders on the surface interfere with landscaping and are costly to remove. During construction of community developments, conservation measures are needed to prevent excessive runoff, erosion, and siltation.

Inland Wetland Soils (RN)

This undifferentiated group consists of nearly level to gently sloping, poorly drained and very poorly drained soils in drainageways and depressions. Stones and boulders cover 3 to 25 percent of the surface. Approximately 40 percent of the acreage consists of Ridgebury extremely stony fine sandy loam, about 35 percent is Leicester extremely stony fine sandy loam, about 15 percent is Whitman extremely stony fine sandy loam, and about 10 percent is other soils.

The typical Ridgebury soil has a very dark gray fine sandy loam surface layer 6 inches thick. The subsoil is mottled, grayish brown fine sandy loam 13 inches thick. The substratum, to a depth of 60 inches, is mottled, olive, very firm gravelly sandy loam.

Typically, the Leicester soil has a black fine sandy loam surface layer 6 inches thick. The subsoil is 17 inches thick. It is mottled, grayish brown, light grayish brown, and pale brown fine sandy loam. The substratum, to a depth of 60 inches, is mottled, dark yellowish brown, friable, gravelly fine sandy loam that has discontinuous firm lenses up to 4 inches thick.

The Whitman soil typically has 4 inches of decomposed and undecomposed litter over a black fine sandy loam surface layer, which is 6 inches thick. The subsoil is gray mottled fine sandy loam 16 inches thick. The substratum, to a depth of 60 inches, is olive, mottled, very firm gravelly sandy loam.

The Ridgebury and Leicester soils have a seasonal high water table at a depth of about 8 inches from late fall until mid-spring. The Whitman soils have a water table at the surface from fall through spring and after heavy rains. In many places, they are ponded for several weeks in winter. In summer, the water table may drop to a depth of 5 feet or more. These soils have moderate or moderately rapid permeability in the surface layer and subsoil. The Ridgebury and Whitman soils have slow or very slow permeability in the substratum, and the Leicester soils have moderate or moderately rapid permeability in the substratum. These soils have a high available water capacity. Runoff is slow or very slow. They have a low shrink-swell potential. Unless limed, the Leicester and Ridgebury soils are very strongly acid through medium acid; the Whitman soils are very strongly acid through slightly acid.

The soils of this unit have poor potential for community development. They are limited mainly by their seasonal high water table and stoniness. The Ridgebury and Whitman soils are also limited by a slowly permeable substratum. These soils are difficult to excavate because of the high water table and stoniness. The steep slopes of excavations tend to slump when saturated. These soils have poor potential for building foundations and basements because footings are placed below the depth of the high water table. Because of the high water table much of the year and because of the slowly permeable substratum in the Ridgebury and Whitman soils, waste disposal systems, such as septic tank absorption fields, do not function satisfactorily without very unusual and costly design and installation. Even if carefully designed, they often have a high failure rate. Wetness is also a hazard for road construction and can lead to severe frost heaving problems. The stoniness limits the use of these soils for homesites and landscaping. Removal of stones and boulders is very costly, and small areas are often left undisturbed for their esthetic value. During periods of construction, conservation measures are needed to prevent excessive siltation, runoff, and erosion.

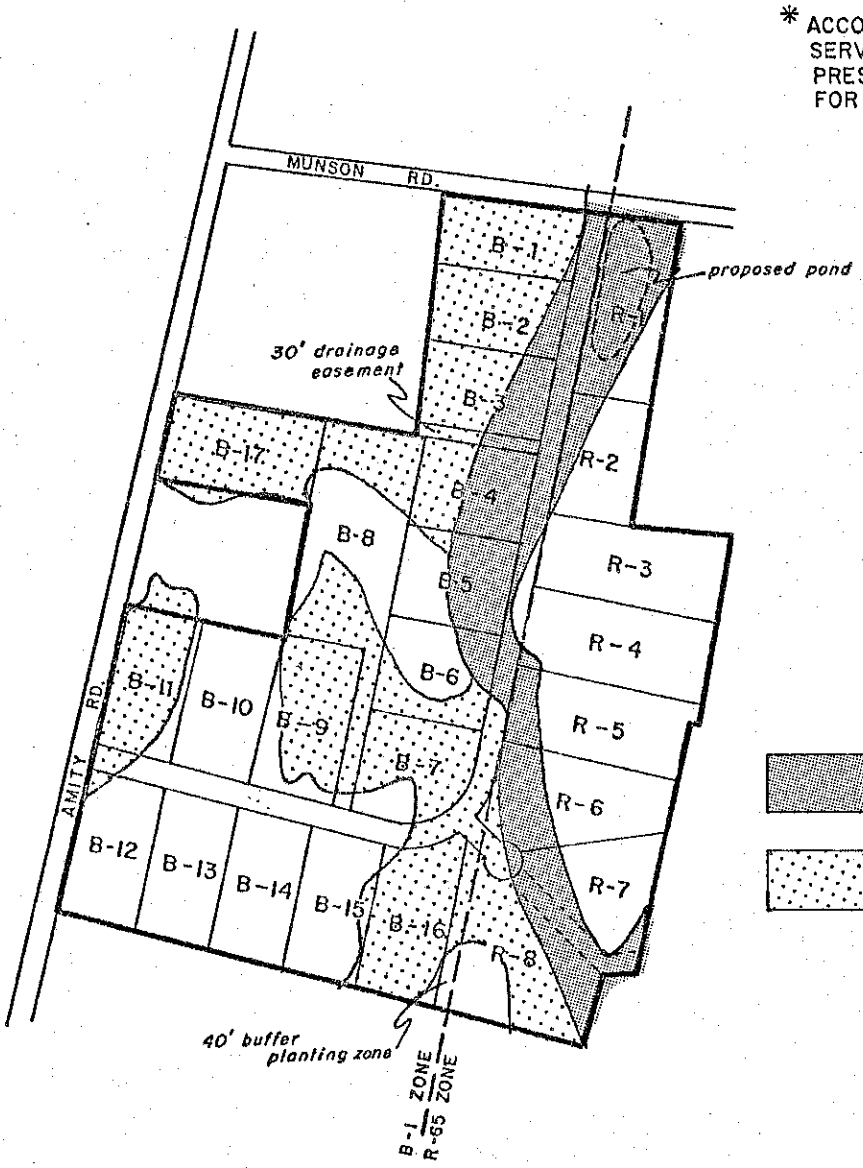
Conclusion

To conclude, the Charlton soils have good potential, the Woodbridge soils have fair potential, and the Inland Wetland soils have poor potential for community development. The "critical" soil areas on this property (Woodbridge and Inland Wetland soils), and how they relate to the proposed site plan, are shown in Figure 4. It should also be noted that test pit data provided by the project engineer indicate shallow to bedrock conditions on portions of the site. This too, presents a severe limitation for community development.

FIGURE 4.

CRITICAL SOIL AREAS*

* ACCORDING TO SOIL CONSERVATION SERVICE CRITERIA, THESE SOILS PRESENT SEVERE LIMITATIONS FOR COMMUNITY DEVELOPMENT



INLAND WETLAND SOILS

SOILS WITH SEASONALLY HIGH WATER TABLE

N

SCALE: 1" = 500'

0 1/8 1/4 mile

0 500' 1000' 1500'

Due to the problematic soils of much of this site, it is recommended that a complete erosion and sediment control plan be prepared for this site. This should show typical design sections; standards and specifications for measures to be installed; seeding recommendations including varieties of seed, seeding rates and time of seeding; and lime and fertilizer recommendations including fertilizer analysis and rates of application.

Also as much of this site is characterized by seasonally wet soils, proposed plans for subsurface drainage systems should be described in detail to demonstrate:

1. how the on-site sewage disposal systems will be protected from drowning out.

2. how basements will be protected against flooding.

3. how streets and parking areas will be relieved of the hydrostatic pressure developed in these soils or under pavement applied to these soils, which will cause streets to crack, freeze and heave during the fall, winter and spring months.

4. how road cuts will be protected from bleeding water most of the year.

5. how fill areas will be stabilized.

Finally, it should be noted that the inland wetland boundaries on this site were not flagged in the field. These should be flagged by a professional and competent soil scientist. The wetland boundaries should then be surveyed in the field and then properly superimposed on the subdivision plan. Also, the way the road is proposed, mainly through the middle of the inland wetlands, there is a very good possibility that the total wetland will be destroyed. Consideration should be given to re-designing the layout of the subdivision to avoid wetland soils.

IV. HYDROLOGY AND WATER QUALITY CONCERNS

The site is traversed from north to south by a stream which, according to local residents, ceases to flow only during exceptionally dry periods. Several drainage modifications within the watershed of the stream were made by the Department of Transportation. Drainage problems on and in the vicinity of the site reportedly have accompanied the modifications. Flooding has occurred in a low area of Munson Road at the northern boundary of the site. An ineffective culvert crosses underneath the road at that location. The subdivision proposal involves the creation of a pond in the wetland immediately south of the culvert. The new subdivision road is planned to lie within the narrow wetland corridor for almost all of its 1500-foot north-south-oriented extent.

Construction of the subdivision as planned would lead to increases in runoff from the site and to increased peak flows in the local stream. The extent of the increases would depend upon the nature of the use of the various lots. In general, the most important factor would be the amount of new impervious surfaces that will be placed on the lots. Businesses tend to create impervious

surfaces (e.g. employee parking lots and various types of storage buildings or other facilities) over more of a lot's area than do other types of lot owners. Although the subdivision plan itself does not indicate the nature of the businesses that would occupy the site after development, it is possible to estimate the runoff and peak-flow increases that would occur based on the general characteristics of other business and residential lots.

Estimates were made of runoff and peak-flow increases that would be experienced following development during a 25-year storm, a 50-year storm, and a 100-year storm. These storms occur on a statistical average of once every 25, 50, and 100 years, respectively, but any of the storms has a chance of occurring in any given year. Peak flows were calculated for the point at which the stream on the site passes underneath the present driveway in the southern section. The drainage area for that point is shown in Figure 5. Runoff increases were calculated as average depths of runoff for the drainage area as a whole. Results are given in the tables below. It must be remembered that the figures below are meant only to indicate the prospective magnitude of the increases; they are not designed to indicate absolute flow rates (which may be significantly greater or less than the corresponding estimates).

Estimated average runoff depths (inches) for the drainage area as a whole.

	25-year Storm	50-year Storm	100-year Storm
Presently	2.94	3.44	4.05
After Development	3.82	4.38	5.04
(Percent Increase)	(30%)	(27%)	(24%)

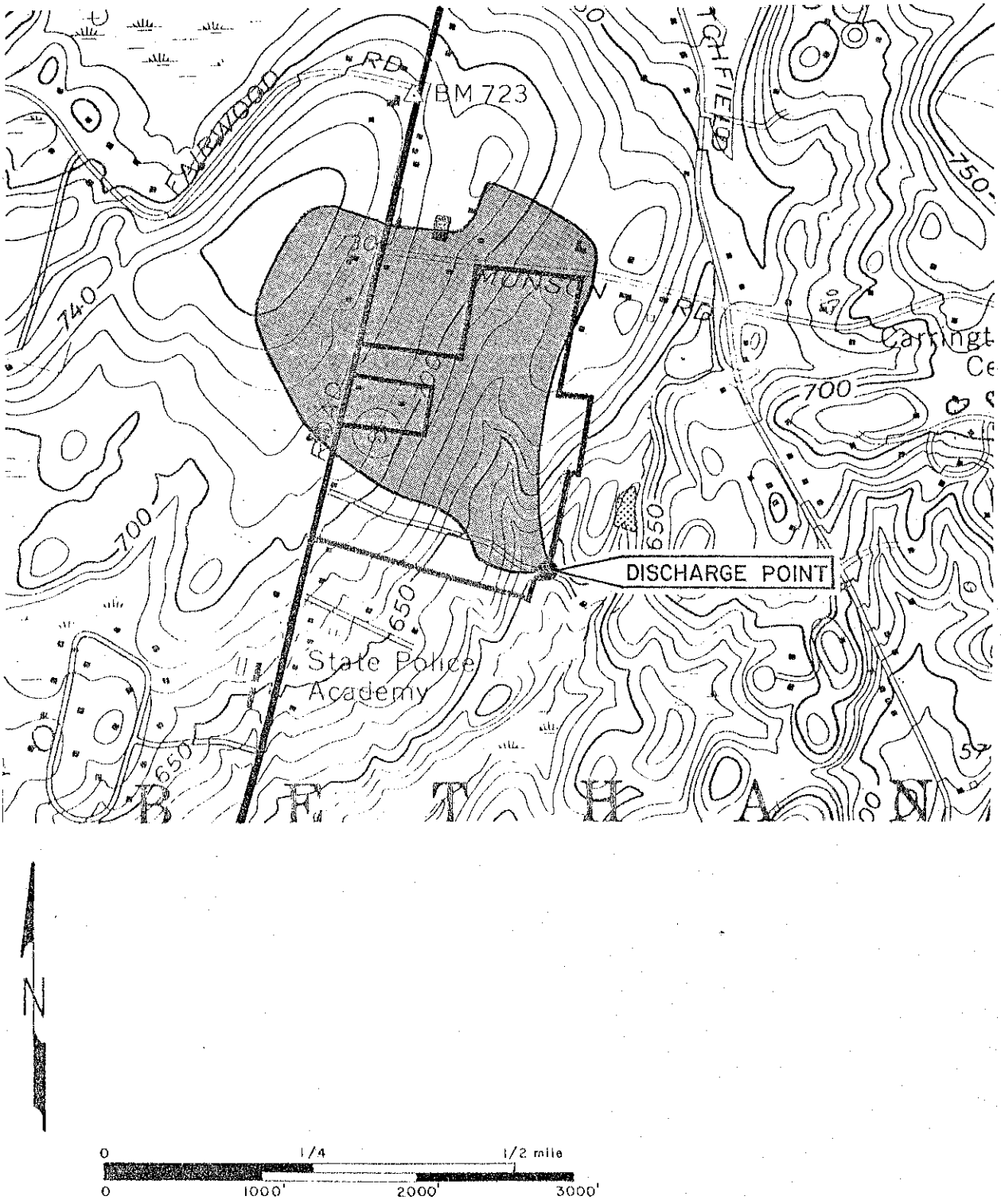
Estimated peak flows (cubic feet per second) where the stream passes under the present driveway.

	25-year Storm	50-year Storm	100-year Storm
Presently	135	163	201
After Development	253	301	362
(Percent Increase)	(88%)	(84%)	(80%)

As the figures given above suggest, peak flow increases in the stream may be expected to be substantial following development. Since a flooding problem is already known to exist in the area of the study point (local residents informed the Team that the house at the end of the driveway is effectively isolated by floodwaters during heavy rains), it seems essential that some means of runoff retention be provided on the site to prevent increased flood damage downstream. The pond proposed for the northern end of the site would not be in a hydrologic position to noticeably mitigate the increased runoff flows from the site; a retention pond near the existing driveway would offer maximum protection.

FIGURE 5.

DRAINAGE AREA MAP (Drainage area and discharge point used in hydrologic analysis)



The increased runoff volumes are important in terms of the additional sediment that presumably would be carried away from the watershed. Sediment controls would be needed to prevent increased loading of the drainage system, particularly in view of the water-supply reservoir located slightly more than two miles downstream from the property. Therefore it is recommended that a comprehensive erosion and sediment control plan be developed covering each stage of the proposed project. Erosion and sediment control measures should be shown on the subdivision site plan. Also, according to Section 19-13-B32 of the Connecticut Public Health Code, in part, "design of storm water drainage facilities shall be such as to minimize soil erosion and maximize absorption of pollutants by the soil." Therefore, it is recommended that detailed drawings of proposed storm control measures be shown on the subdivision plans (e.g. detention pond design). Hydraulic calculations should be worked up to justify culvert sizes. Also, plunge pools should be designed for all storm drainage outlets.

From a hydrologic standpoint, the layout of the proposed road and several of the lots represents the least acceptable usage of the land. The road's north-south segment cuts through the center of the stream-wetland system, providing maximum disruption of surface waters and enhancing both the potential for degradation of water quality and the possibility of flood-related problems both on and off the site. Moreover, wet soil conditions would hamper the placement of building foundations and, particularly, septic systems in those parts of lots B-1 through B-7 that would front on the road (presumably the most desirable parts of the lots for construction). Construction and maintenance of the road itself would be more difficult, as well. If environmental hazards are to be minimized on this site, the layout of the subdivision should be redesigned.

Special consideration needs to be given to the most probable sources of groundwater or surface water pollution: (1) septic systems; (2) storage facilities for road salts, fuels, or other chemicals; (3) application of road salts. Since much of the site has a high groundwater table, septic systems in many lots may need careful engineering, particularly if the systems are large. Some trade-offs will be needed in the siting of septic systems, chemical storage areas, and water-supply wells: although it would be advisable to keep septic systems and storage facilities as far from the watercourse as possible, it would also be preferable to keep them downslope of the wells. Since the stream feeds a public water-supply system, it is difficult to decide whether the wells or the stream should receive the most protection. In either case, application of road salts in the subdivision should be minimized, and storage of chemicals and salts should be regulated and monitored to the extent possible under current state and municipal laws.

Finally it should be noted that synthetic organic chemicals associated with septic tank degreasers or even commonly used household products can present future problems to the nearby wells. These chemicals are persistent in nature and can travel great distances in ground water. Separating distances for wells and septic systems were designed with regard to possible bacterial contamination. Therefore, prospective homeowners and commercial establishments should be forewarned not to use septic degreasers and to establish regular maintenance procedures so that systems do not clog. Judicious care should also be taken with regard to other substances added to the waste disposal systems.

V. WATER SUPPLY

The water needs of both the commercial and residential lot owners would be served by on-site wells. Bedrock appears to be the only suitable aquifer within the site, although a dug well in the till might be used as a source of additional supply for unusually heavy demands in a particular lot. Till reservoirs, however, may dry up during droughty weather conditions, particularly where the depth of the dug well is shallow.

Bedrock generally provides small, but reliable yields of groundwater. In Connecticut Water Resources Bulletin No. 27, prepared by the U.S. Geological Survey in cooperation with the State DEP, many wells in the Quinnipiac River basin, of which the Amity Village parcel is a part, are analyzed in terms of yields and chemical quality. Of those wells studied that tapped metamorphic rock (the type which underlies the site), 90 percent yielded 2 gallons per minute (gpm) or more, 80 percent yielded 4 gpm or more, 50 percent yielded 8 gpm or more, and only 10 percent yielded 25 gpm or more. An average household usually may be adequately served by a yield of 3 gpm, or less if ample storage is provided. Most of the residential lots should therefore be able to achieve a sufficient well-water supply. The water demand of businesses will vary with the nature of the business, so the adequacy of the bedrock for the commercial lots is less easy to predict. There is no way to determine what the yield of a well drilled at any specific point in the parcel would be, since yield depends upon the number and size of water-bearing fractures that are intersected, and since the distribution of fractures in bedrock may be highly irregular.

Although the chemical quality of groundwater in the Quinnipiac River basin has been found to be good, there may be a need for filtration and/or softening systems on this site. A well on Route 63, less than one-half mile south of the site, was reported to yield groundwater which contained high iron and manganese concentrations and which was moderately hard. The wells on this site would also need to be protected from the sources of pollution discussed in the Hydrology Section.

VI. SEPTIC SYSTEMS

Based upon the engineering data submitted to the town by the applicant, the following comments and recommendations are made concerning the feasibility of this site for the installation of subsurface sewage disposal systems:

1) It appears from the project engineer's soil reports that a major portion of the "Amity Village Subdivision" is characterized by a high seasonal water table. It will therefore be necessary to lower the groundwater to enable the bottom of leaching systems to be the required 18" above the high groundwater level. Groundwater tables are lowered by the use of curtain drains. Curtain drains are groundwater control drains designed to collect and direct groundwater moving laterally away from the sewage disposal area. Curtain drains are located on the uphill side of leaching systems and on the sides if necessary.

The Public Health Code requires a 50 foot separation distance between a sewage disposal system and a curtain drain on a public water supply watershed. Curtain drain efficiency is greatly reduced the further uphill the interceptor

portion of the drain is located from the sewage disposal system. Effectiveness of groundwater control by drains located much greater than 25 feet from septic systems is questionable. In order for such drains to be relied upon, installation of the drains and monitoring during the wet time of year would be required prior to septic installation. Keeping septic systems high with fill will be required if curtain drains are not effective in lowering the groundwater table.

2) The eastern portion of the Amity Village parcel is bisected by a watercourse bounded by a wetland soil (designated RN) on either side. The Public Health Code requires that a subsurface sewage disposal field and the 100% reserve area be at least 50' from a watercourse or area of surface water in a public water supply watershed. The presence of this watercourse limits the amount of usable land available for sewage disposal on lots B3-B5, R1, and R4-R7.

The wetland associated with this stream also limits the usable land for septic systems from a practical standpoint. This concern is particularly significant with regards to lots R1, B3, B4, B5, R6, and R7 (see Figure 4).

3) The location of percolation tests and deep hole tests are not indicated on the subdivision plan. The location of these tests should be noted. Depending on test locations, additional testing may be necessary.

4) The project engineer's soil report indicated shallow to ledge rock depth on lots R4, R3, R2 and B10. It is a normal recommendation of the State Department of Health Services that no permit for sewage disposal be granted in areas where there is less than four feet of existing soil over ledge rock, even if fill is proposed. On this basis, the above mentioned lots are considered unsuitable for installation of a subsurface sewage disposal systems in their present condition. The owner/developer may make suitable site improvements as planned by a professional engineer and ask for reconsideration by the State Department of Health Services.

5) The source of water supply should be indicated on the subdivision plan. If individual wells are proposed, their tenative locations should be noted.

6) The proposed "Amity Village" subdivision is within two different zones, R65 residential and B-1 business. The Town of Bethany Zoning Regulations indicate that businesses such as restaurants, laundries and other high water use establishments are permitted in the B-1 zone. Due to the relatively small lot sizes and poor soil conditions, development of the B-1 zoned lots should be limited to establishments with an estimated daily sewage flow equal to or less than a single family home. The daily sewage flow from an average single family dwelling is approximately 350 gal./day.

In conclusion, there are many factors associated with this parcel of land that could pose constraints in the successful functioning of subsurface sewage disposal systems. The project engineer should address these constraints and provide additional information so that an accurate assessment of the suitability of the proposed lots can be made.

VII. VEGETATION

The 52± acre tract proposed for business and residential subdivision is completely forested. The property may be divided into five distinctive vegetation types. These include a northern hardwood stand - 18 acres; a mixed hardwood stand - 12 acres; a hardwood swamp - 11 acres; Old field - 8 acres; and pine-3 acres (see vegetation type map and vegetation type description chart).

Complete clearing of the vegetation in the business zoned area and road construction in its presently proposed position will have significant negative effect on the vegetation in the area and may lower water quality.

Retention of at least some of the large healthy trees on this tract, especially in vegetation types A and E, will help to preserve the aesthetic quality of the area.

The high water table in the hardwood swamp limits vegetative quality and composition. Wind-throw of the shallow rooted trees in this area is a potential hazard. Removal of the red pine mortality in the mixed hardwood stand (B), prior to any construction, will reduce the potential hazard of these trees damaging property.

Aesthetics and Preservation

The high quality sawtimber-size sugar maple in the northern hardwood stand and the large healthy eastern white pine in the pine stand have high aesthetic value. Retention of at least some of these trees will help to preserve the aesthetic quality of the area. Care should be taken during any construction, not to disturb the soil within the drip zone (entire area under a tree's crown) of trees that are to be retained.

It is interesting to note that Stand type B was previously a red pine plantation. The red pine has recently died and has given way to a healthy sapling-sized mixed hardwood stand. Standing dead red pine are present, however, and are creating an adverse visual impact and potential fire hazard.

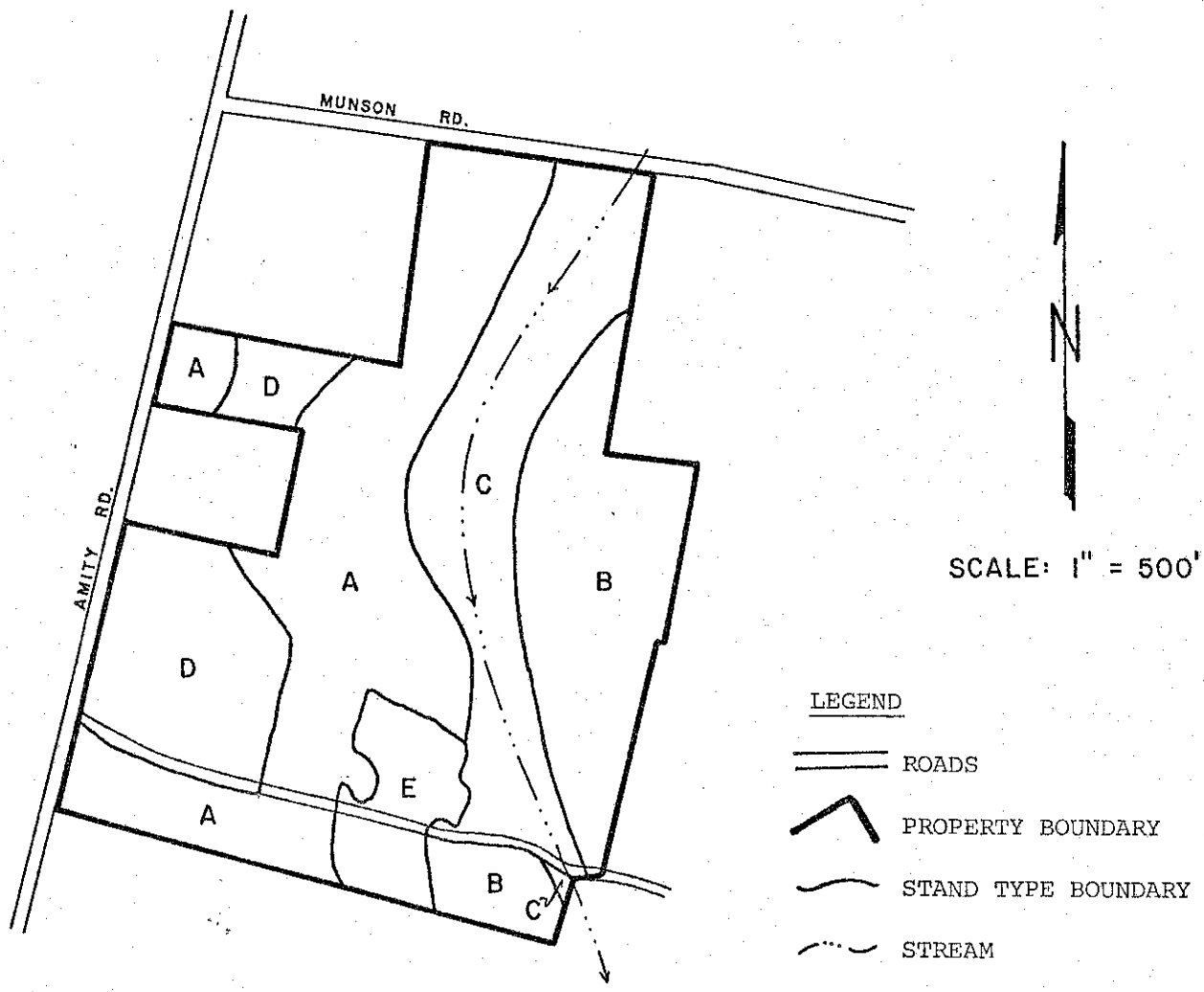
Impact of Proposal on Vegetation and Water Quality

Complete vegetative clearing of the area zoned for business may have significant impact on the water quality of the stream which passes through this property. Clearing and later replacement of the vegetation with asphalt and building surfaces will increase runoff which may in turn, cause accelerated erosion and sedimentation of the wetland and stream. Extensive clearing will also lower the aesthetic quality of the area, and increase the chances of wind-throw of nearby trees.

The proposed road through the hardwood swamp may also cause significant impact to the vegetation in this area. Construction of this road will require extensive filling. This fill material may alter the natural flow of water through this area, causing back pooling. Permanently raising the groundwater level in this manner will undoubtedly cause mortality of many of the trees, shrubs and herbaceous vegetation which are present in this area at this time. Fill material placed anywhere within the drip line zone of a tree has the

FIGURE 6.

VEGETATION TYPE MAP



VEGETATION TYPE DESCRIPTIONS*

STAND TYPE **A** Northern hardwood, 18 acres, fully stocked, pole to sawtimber size.

STAND TYPE **B** Mixed hardwoods, 12 acres, fully stocked, sapling size.

STAND TYPE **C** Hardwood swamp, 11 acres, under stocked, pole to sawtimber size.

STAND TYPE **D** Old field, 8 acres, under stocked, seedling to sapling size.

STAND TYPE **E** Pine, 3 acres, fully stocked, pole to sawtimber size.

* Seedling size trees - less than 1 inch in diameter at 4½' 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.

VEGETATION TYPE DESCRIPTIONS

STAND TYPE	ACRES	MAIN STAND SIZE CLASS*	STOCKING LEVEL	MAIN STAND QUALITY	MAJOR COMPONENTS OF: OVERSTORY	UNDERSTORY	GROUND COVER
A. Northern Hardwoods	18	Pole to saw-timber	Fully-stocked.	Medium. Trees are reasonably healthy.	Sugar maple, red maple, white ash, yellow birch with occasional blackgum and black cherry.	Sugar maple seedlings, arrowwood and scattered dense patches of spice bush.	Club moss, poison ivy, Virginia creeper, Canada Mayflower, sensitive fern, hayscented fern and occasional skunk cabbage.
B. Mixed Hardwoods	12	Sapling size	Fully-stocked.	Medium.	Red maple, sugar maple, tulip tree and black birch. Note: this stand contains a plantation of pole size red pine mortality.	Spice bush, raspberry and sugar maple seedlings. Fox grape is present in trees along the dirt road.	Club moss, poison ivy, Virginia creeper, cinquefoil, star flower, Solomon seal, false Solomon seal, Canada Mayflower, trillium, Jack-in-the-pulpit, trout lilly, wild geranium, wild strawberry, wood rue, bracken fern, wood fern and sensitive fern.
C. Hardwood Swamp	11	Pole to saw-timber size	Under-stocked.	Poor. Trees have small, damaged tops. Many trees have rot and are malformed.	Red maple and white ash.	Extremely dense spice bush and sweet pepperbush with occasional swamp azalea and highbush blueberry.	Cinnamon fern, sensitive fern, skunk cabbage, false hellbore, wild geranium, and sphagum moss.

VEGETATION TYPE DESCRIPTIONS

STAND TYPE	ACRES	MAIN STAND SIZE CLASS*	STOCKING LEVEL	MAIN STAND QUALITY	MAJOR COMPONENTS OF: OVERSTORY	UNDERSTORY	GROUND COVER
D. Old Field	8	Seedling to sapling size	Under-stocked.	Medium.	Red maple, white ash, blackberry and scattered eastern red cedar.	Highbush blueberry, arrowwood, gray stemmed dogwood and staghorn sumac.	Grasses, goldenrod, black eyed Susan, milkweed.
E. Pine	3	Pole and sawtimber size	Fully-stocked.	Medium. Some trees have small crowns. Trees are healthy overall.	Sawtimber size eastern white pine and pole size red pine.	Hardwood tree seedlings including red maple, black birch and white ash. Spice bush, highbush blueberry and arrowwood.	Same ground cover as in Stand Type B.

* 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 to damage that tree. Most trees are very sensitive to the soil conditions within the entire area under their crowns. Changes in the soil that affect soil moisture and aeration will affect tree health and vigor. If trees are to be retained in this area and elsewhere on this tract, care should be taken not to disturb the soil near them or cause any mechanical damage. Trees near construction areas that are to be saved should be clearly but temporarily marked so they may be easily avoided.

Limiting Conditions by Stand

The high water table and saturated soils present in the hardwood swamp (vegetation type C) limit vegetation growth to species tolerant of excessive moisture. The red maple and white ash present in this stand will survive under these conditions, however their growth rates are extremely slow and their quality and health is poor.

Potential Hazards

Windthrow is a potential hazard in the hardwood swamp (vegetation type C). As a result of the high water table and saturated soils, the trees present are shallow rooted and unable to become securely anchored. Linear openings made in (such as the proposed road) or along side (such as the complete clearing in the business area) this area will increase the windthrow hazard. Any openings which would allow wind to pass through, rather than over, this stand will also increase the windthrow hazard and should be avoided if possible.

The red pine mortality, which is present in the vegetation type B (mixed hardwood), creates a potential hazard to people and property if this area is developed. With or without development the dead pine create a potential fire hazard. These trees should be cut down prior to development of this area.

At the present time additional management of the vegetation on this property is not needed. If development of this property does not occur, reevaluation of the vegetation for health and vigor would be advisable in approximately ten years.

VIII. ADDITIONAL PLANNING CONSIDERATIONS

A. Consistency of Project with Current Plans

. Town Plan - The proposed development would be in partial agreement with the Comprehensive Plan of Development, Town of Bethany, 1961, which calls for business use. As presented, the subdivision plan calls for 16 business lots and 8 residential lots.

. The Regional Plan - Proposed Land Use Plan--2000 South Central Connecticut Planning Region, adopted 1968, recommends the area in question as a residential area (under one family per acre); however, the area immediately adjacent is recommended for a commercial use ("employment area-service").

. The State Plan - State of Connecticut Conservation and Development Policies Plan, 1979-1982, "Locational Guide Map" indicates the area in question as a "conservation area." The area qualifies under the definition criteria for a "conservation area" due to its value for "public water supply quality protection," and the predominance of inland wetland soil classes. The State Action Strategy is to "plan and manage for the long term public benefit the lands contributing to the State's need for....water and other resources, open space, recreation and environmental quality, and insure that changes in use are compatible with the identified conservation values." Applying guidelines for State action to local action, the proposed development would meet these criteria if carefully designed within the limits of the carrying capacity of the soils, and if precautions are taken vis a vis the quality, volume, and velocity of runoff on this part of the West River system public water supply watershed.

B. Adjacent Land Use and Site Design

The land use in the surrounding area is compatible with the proposed business and residential use. North, northeast and south of the site are single family homes. There is an extensive wooded area east of the site. The piece of property adjoining the northwest corner of the site is a recreational area owned by the Town. Next to it is a garden and food shop, and a gasoline service station and liquor store. To the north of Munson Road is a sheet metal working establishment and a kennel. The land to the west of Amity Road is the Town-owned "Airport" property used for fairs. Directly across from the site on the west side of Amity Road is a screw machine shop.

The layout of the proposed subdivision could be improved to better accommodate business use adjacent to residential use. It is not desirable to have business lots fronting on the opposite side of the road from residential lots. This presents a hazard with delivery trucks etc. utilizing the road and children in the immediate area, and also detracts from neighborhood identity, character and values. It would be far better to establish two separate road networks for this parcel: one serving the business lots and one serving the residential lots. Alternately, the two land uses could be separated on the same road system (i.e. residential use clustered at one end, business use at the other end).

C. Traffic Impact

Amity Village is accessible from both Amity Road (SR 63) and Munson Road. In all probability, Amity Road, a two-lane (one in each direction) facility, would be its principal access. Currently, Amity Road carries approximately 6,400 vehicles per day (two way) and operates at a very high service level ("A").

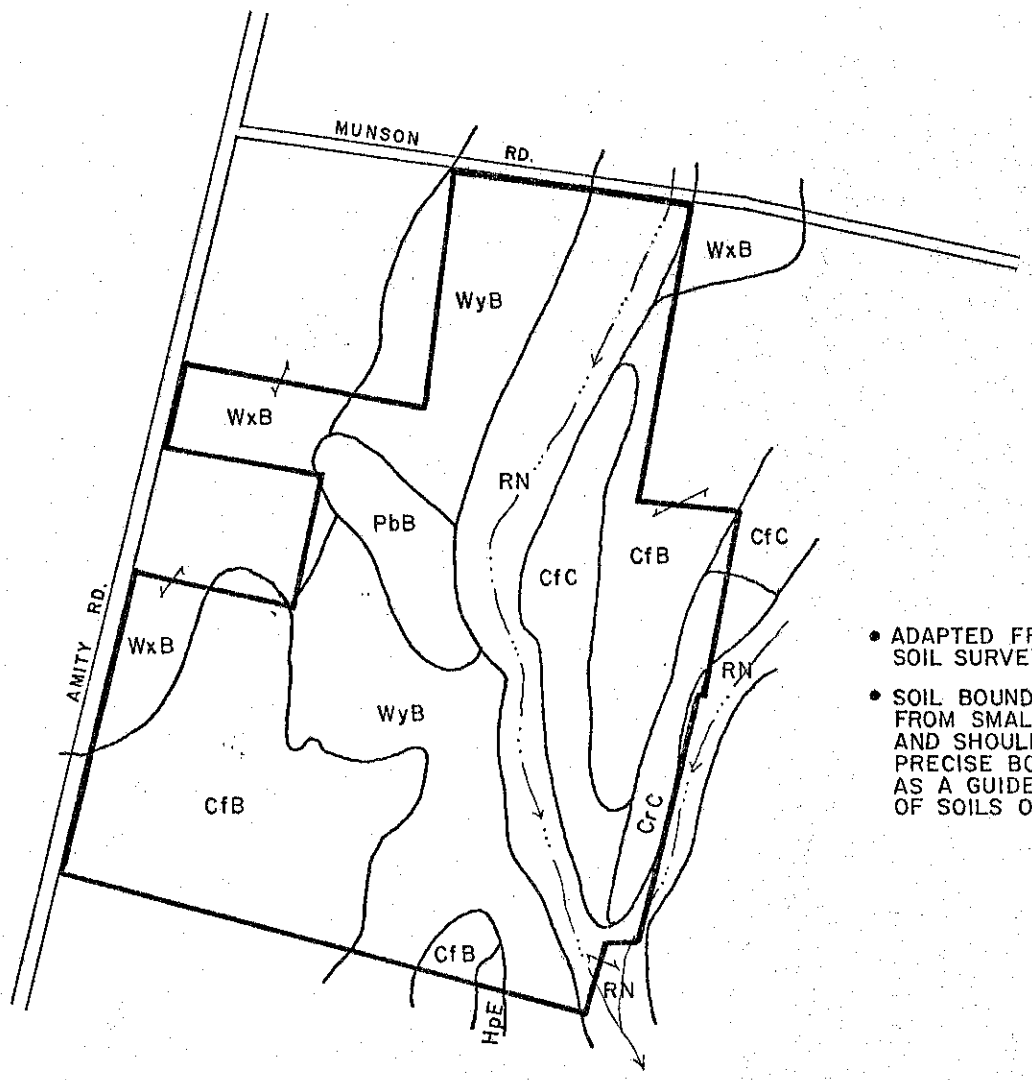
The design capacity of the existing roadway is more than adequate to handle the additional traffic that would be generated by the proposed use of the project site. Even under conceivable "worst case conditions", the impact would be negligible.

D. Summary of Planning Considerations

The proposed project is in partial agreement with the local, regional and State plans. The land use concerns here would be the compatibility of use within the proposed subdivision and the environmental quality considerations vis a vis the property's status as watershed land and the predominance of wetland soils on the site. The project will not have a significant impact on traffic in the area.

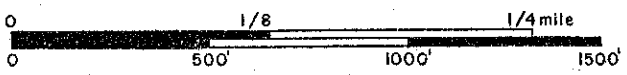
IX. APPENDIX

SOILS MAP



- ADAPTED FROM NEW HAVEN COUNTY SOIL SURVEY, U.S.D.A. – S.C.S.
- SOIL BOUNDARY LINES DERIVED FROM SMALLER SCALE MAP (1" = 1320') AND SHOULD NOT BE VIEWED AS PRECISE BOUNDARIES BUT RATHER AS A GUIDE TO THE DISTRIBUTION OF SOILS ON THE PROPERTY.

SCALE: 1" = 500'



SOILS LIMITATION CHART

"AMITY VILLAGE SUBDIVISION" - BETHANY, CT.

MAP SYMBOL	SOIL NAME	SEPTIC ABSORBTION FIELDS		DWELLINGS W/ BASEMENTS		ROADS OR DRIVEWAYS		LANDSCAPING	
		RATING	REASON	RATING	REASON	RATING	REASON	RATING	REASON
CfB	Charlton fine sandy loam, 3-8% slopes	Slight		Slight		Slight		Slight	
CfC	Charlton fine sandy loam, 8-15% slopes	Moderate	Slope	Moderate	Slope	Moderate	Slope	Moderate	Slope
CnC	Charlton extremely stony fine sandy loam, 3-15% slopes	Moderate	Large stones	Moderate	Large stones, slope	Moderate	Slope	Severe	Large stones
HpE	Hollis-Charlton fine sandy loam,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
PbB	Paxton fine sandy loam, 3-8% slopes	Severe	Percs slowly	Moderate	Wet	Moderate	Frost action	Moderate	Small stones
RN	Ridgebury, Leicester and Whitman extremely stony fine sandy loams Ridgebury part	Severe	Large stones, Percs slowly, Wetness	Severe	Large stones, Wetness	Severe	Wetness, Frost action	Severe	Large stones, Wetness
	Leicester part	Severe	Large stones, Wetness	Severe	Large stones, Wetness	Severe	Large stones, Wetness, Frost action	Severe	Large stones, Wetness

CONTINUED ON NEXT PAGE

SOILS LIMITATION CHART

"AMITY VILLAGE SUBDIVISION" - BETHANY, CT.

MAP SYMBOL	SOIL NAME	SEPTIC ABSORBTION FIELDS RATING	SEPTIC ABSORBTION FIELDS REASON	DWELLINGS W/ BASEMENTS RATING	DWELLINGS W/ BASEMENTS REASON	ROADS OR DRIVEWAYS RATING	ROADS OR DRIVEWAYS REASON	LANDSCAPING RATING	LANDSCAPING REASON
	Whitman part	Severe	Percs slowly, Wetness	Severe	Wetness	Severe	Wetness, Frost action	Severe	Wetness
WxB	Woodbridge fine sandy loam, 3-8% slopes	Severe	Percs slowly	Severe	Wetness	Severe	Frost action	Slight	
WyB	Woodbridge very stony fine sandy loam, 3-8% slopes	Severe	Percs slowly	Severe	Wetness	Severe	Frost action	Moderate	Large stones

EXPLANATION OF RATING SYSTEM

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

NOTE: Limitation Ratings Based Upon U.S.D.A. Soil Conservation Service Criteria.

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.