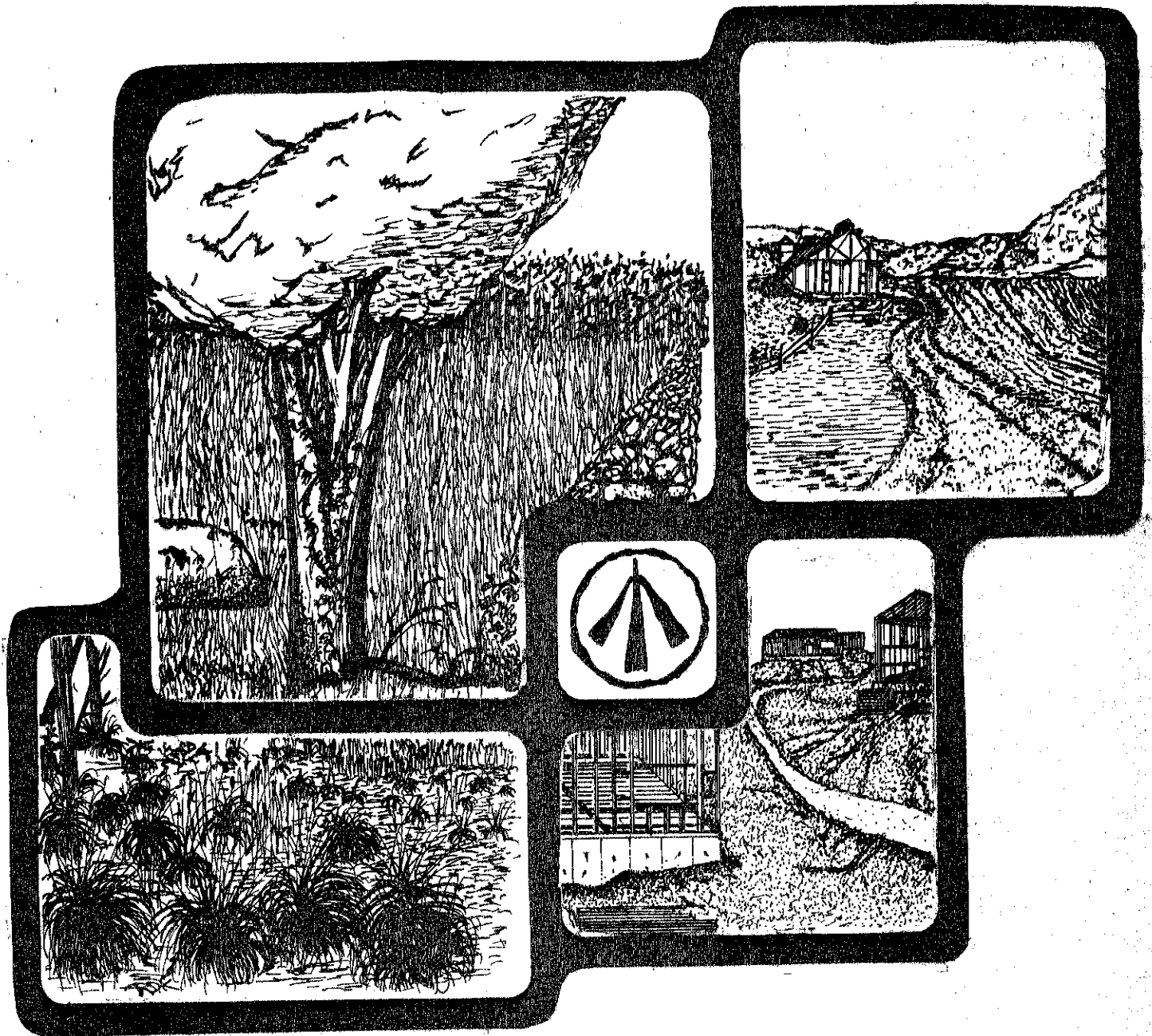


ENVIRONMENTAL REVIEW TEAM REPORT



LONG HILL FARM
GUILFORD, CONNECTICUT

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK ENVIRONMENTAL REVIEW TEAM REPORT

ON

LONG HILL FARM GUILFORD, CONNECTICUT



JANUARY 1980

King's Mark Resource Conservation and Development Area

Environmental Review Team

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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

x x x x x x

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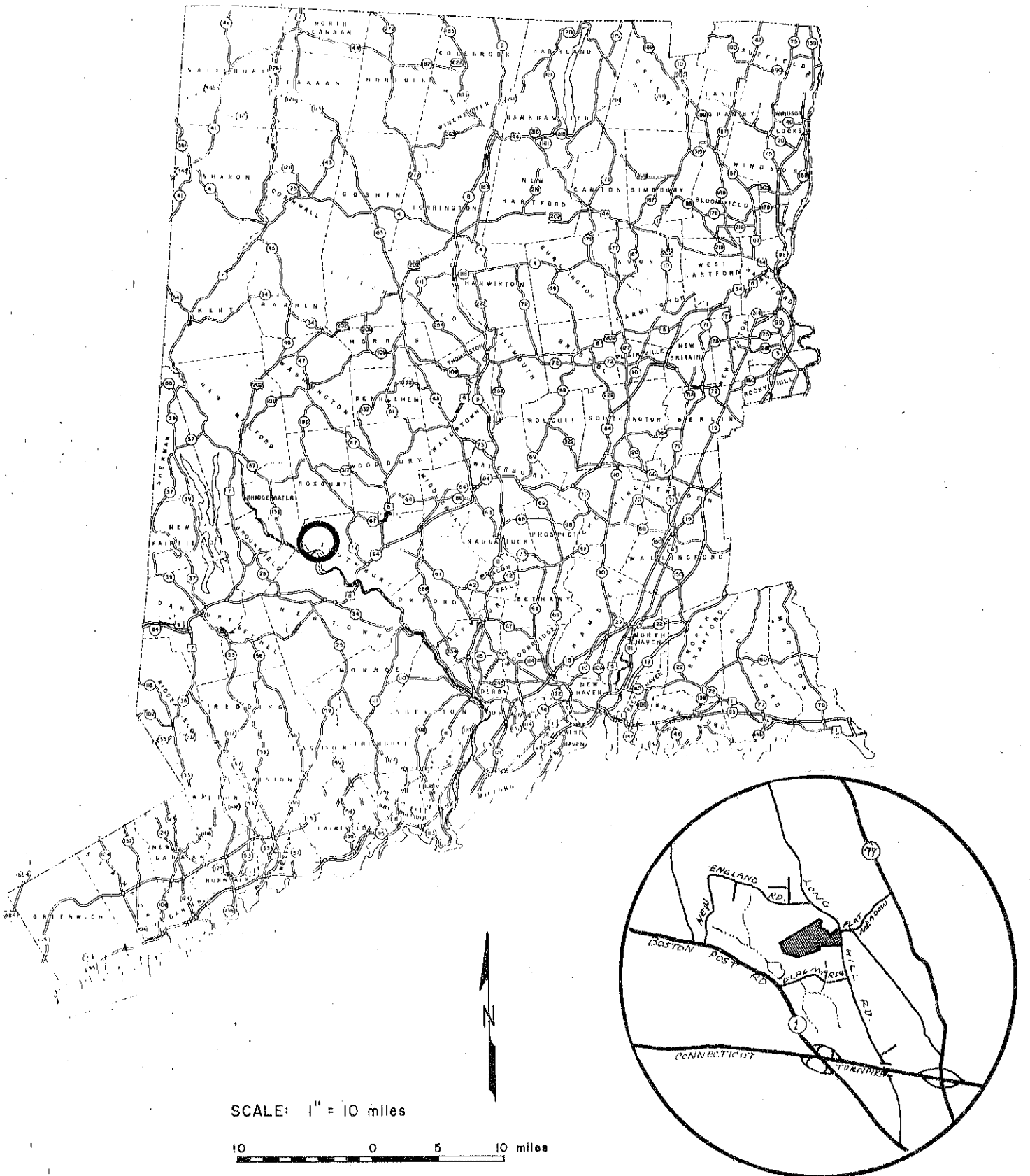
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LOCATION OF STUDY SITE

LONG HILL FARM GUILFORD, CONNECTICUT



SCALE: 1" = 10 miles

10 0 5 10 miles

ENVIRONMENTAL REVIEW TEAM REPORT
ON
LONG HILL FARM PLANNED RESIDENTIAL DEVELOPMENT
GUILFORD, CONNECTICUT

I. INTRODUCTION

The Guilford Planning and Zoning Commission is presently reviewing a special permit application for planned residential development of + 36 acres of land in the southcentral portion of town. The subject property, known as Long Hill Farm, is located just south of Guilford High School off Long Hill Road (see Figure 1).

The Long Hill Farm tract is characterized by open and wooded land of moderate slope. A dirt road provides access into the interior of the tract from Long Hill Road. A small pond and wetland area are located in the southcentral portion of the property (see Figure 2).

The preliminary development plan for Long Hill Farm (see Figure 3) calls for 54 single family dwelling units (46 two bedroom, 8 three bedroom) plus 34 condominium attached dwelling units (26 one bedroom, 8 two bedroom) for a total of 158 bedrooms.

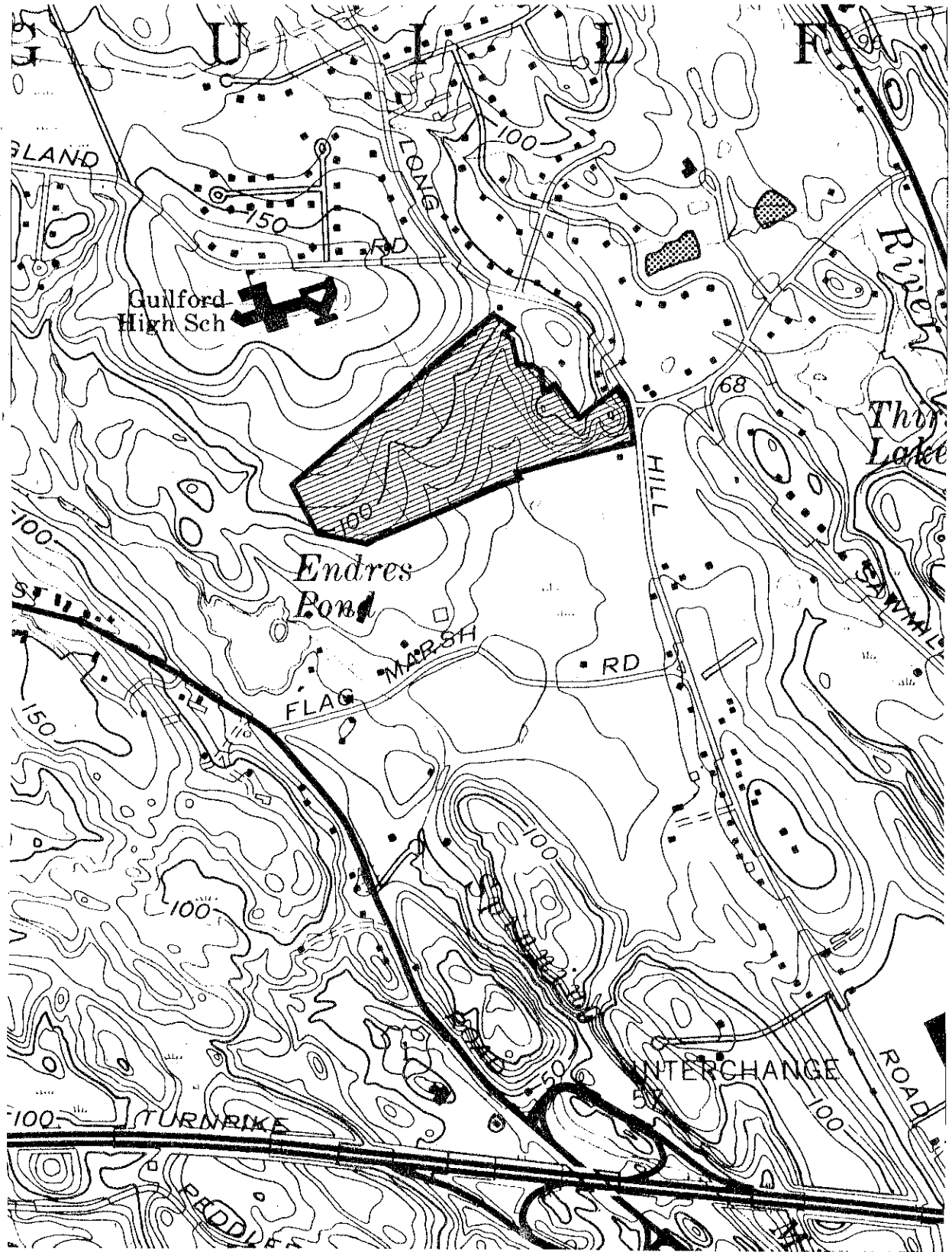
Access to the project is proposed to be created by constructing an interior road with cul de sacs off Long Hill Road. Domestic water supply would be provided by public water supply lines off Long Hill Road. Sewage disposal is proposed to be handled by on-site community septic systems.

The Planning and Zoning Commission from the Town of Guilford requested the assistance of the King's Mark Environmental Review Team to help the town in evaluating the special permit application for the planned residential development. Specifically, the team was asked to describe the natural resources of the site and to comment on the opportunities and limitations of the land for planned residential development. Major concerns raised by the town in requesting this review included the effect of the project on soils and traffic; and the suitability of the site for the proposed community septic systems.

The ERT met and field reviewed the site on December 12, 1979. Team members for this review consisted of the following:

Brian Curtis.....	Sanitary Engineer.....	State Dept. of Environmental Protection
Randy May.....	Sanitary Engineer.....	State Dept. of Environmental Protection
Frank Indorf.....	District Conservationist....	U.S.D.A. Soil Conservation Service
Dwight Southwich....	Civil Engineer.....	U.S.D.A. Soil Conservation Service
Erin O'Hare.....	Environmental Planner.....	Regional Planning Agency of Southcentral Connecticut
Stephen Sassala.....	Transportation Planner.....	Regional Planning Agency of Southcentral Connecticut

FIGURE I.
GENERAL SITE LOCATION



SCALE: 1" = 1000'

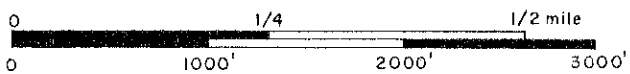


FIGURE 2.
EXISTING CONDITIONS

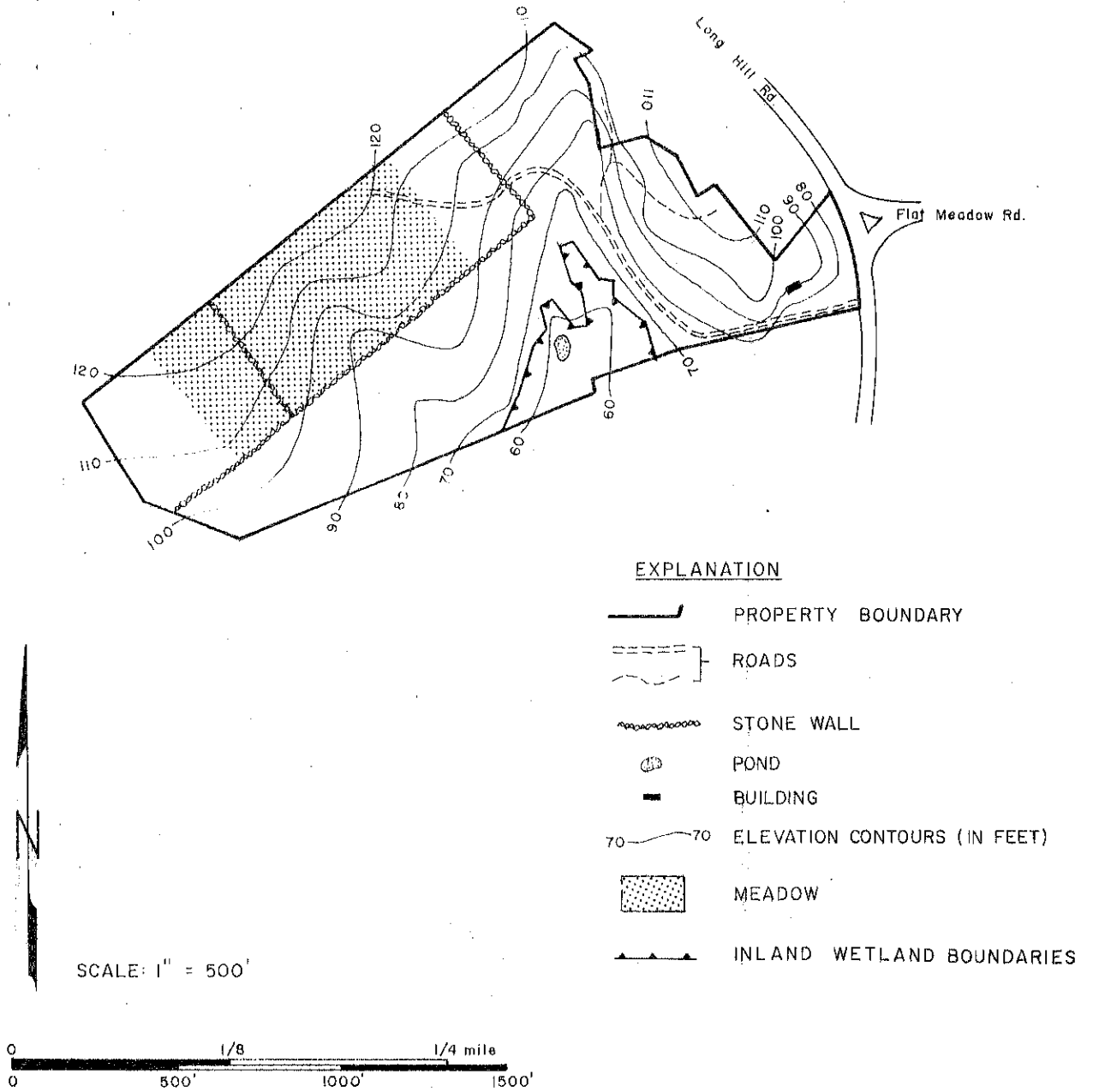
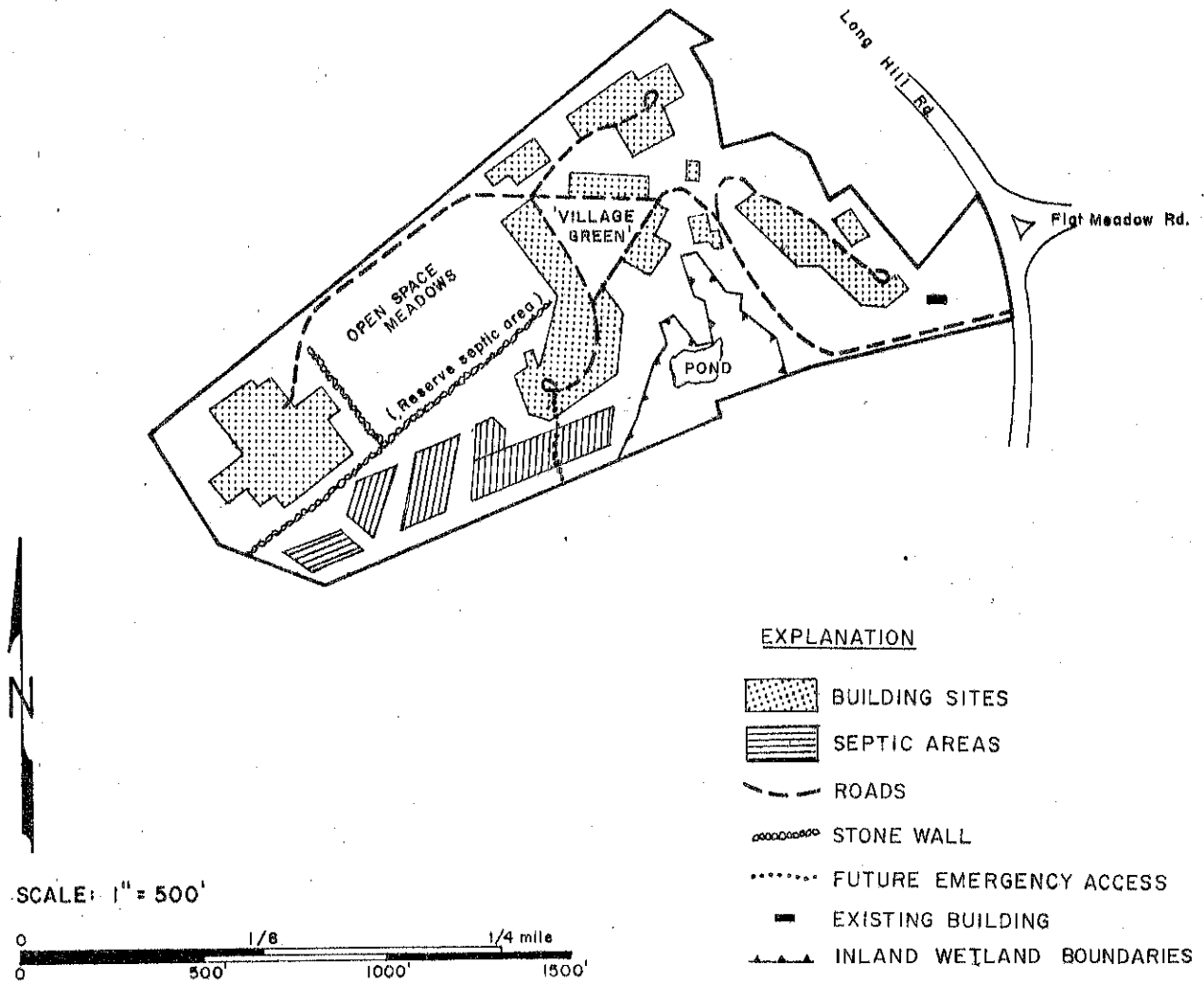


FIGURE 3. SIMPLIFIED SITE PLAN

NOTE • THIS PLAN SHOWS AS FOLLOWS:

ATTACHED CONDOMINIUM HOUSING - 42 BEDROOMS
 DETACHED/SEMI-DETACHED SINGLE
 FAMILY HOUSING - 116 BEDROOMS
 158 BEDROOMS



Robert Rocks.....Forester.....State Dept. of Environmental
Protection
Michael Zizka.....Geohydrologist.....State Dept. of Environmental
Protection

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 site location map, an existing conditions 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 Guilford and the 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

- . Large bedrock outcrops are found in the eastern portion of the site. Smaller outcrops are found in the western and central portions, indicating that the depth of the surficial geologic material is shallow in many areas.
- . Most of the run-off from the site drains southward into a swamp, which forms part of the watershed of Spinning Mill Brook. Development of the site as planned would increase the volume of run-off flowing into the swamp during periods of precipitation, and would increase peak flows from the swamp unless run-off retention facilities were installed. For a two-year, 24-hour storm event, it is estimated that peak flows from the swamp would increase approximately 33% with construction of the project.
- . The majority of the soils on the site have moderate to severe limitations for residential development. Due to these adverse soil conditions, the developer will face many difficulties and high costs to successfully develop the proposal. However, with sound engineering and the use of best management practices, it is likely that the area can be successfully developed as proposed.
- . ERT field investigation of the site showed the wetland boundaries identified on the developer's site plan to be substantially correct. The pond located within this wetland area offers potential for enlargement and subsequent use for multiple purposes.
- . Because the soils on this site are erosive when cleared of vegetation, a comprehensive erosion and sediment control plan should be developed in advance of any construction.
- . With regards to sewage disposal, the principal constraints on this site are relatively tight soils overlaying fractured bedrock at shallow depths. Detailed analysis based on soil permeability will be needed to determine the allowable amount of sewage discharge on this property. The balance of engineering and administrative problems on this project can be solved with careful work.
- . The proposed project is compatible with surrounding land uses and generally consistent with state, regional and town plans. The project will present little impact to existing services.
- . The sole access/egress point for the project is proposed along Long Hill Road, a two-lane, two-way roadway in reasonably good condition for a low-volume local roadway. Long Hill Road appears to be able to easily accept the increased traffic generated by the project, but traffic counts would nonetheless be useful to assess possible impacts.
- . The Long Hill Farm site may be divided into four distinctive vegetation types. These include Old Field, Open Field, Hardwood Swamp and Open Swamp. Preservation of the larger trees and flowering trees on this site will improve the aesthetics of the area after the development has been completed. A buffer strip between 40 and 50 feet wide could be planted to conifers and flowering shrubs along the northern border of the property. This planting would provide a vision and sound barrier between Guilford High School and the proposed complex.

III. GEOLOGY

The Long Hill Farm site is located within the Guilford topographic quadrangle. A surficial geologic map of that quadrangle has been published by the Connecticut Geological and Natural History Survey (Quadrangle Report No. 28, by R. F. Flint, 1971). Although no corresponding bedrock map has been published, a preliminary copy is available for inspection at the Natural Resources Center of the Connecticut Department of Environmental Protection in Hartford.

The bedrock cropping out on and underlying the site has been classified as part of the Middletown Formation. Although individual rock types within the formation differ in mineralogy, most of the bedrock consists of medium to coarse grained metamorphic rock with igneous intrusions. Gneisses and schists predominate; prominent mineral components include quartz, plagioclase, hornblende, biotite, sillimanite, and anthophyllite. One of the largest outcrops on the site, located approximately 700 feet in from Long Hill Road along the present access road, is composed principally of pegmatite, a very coarse-grained igneous rock consisting largely of quartz and feldspar.

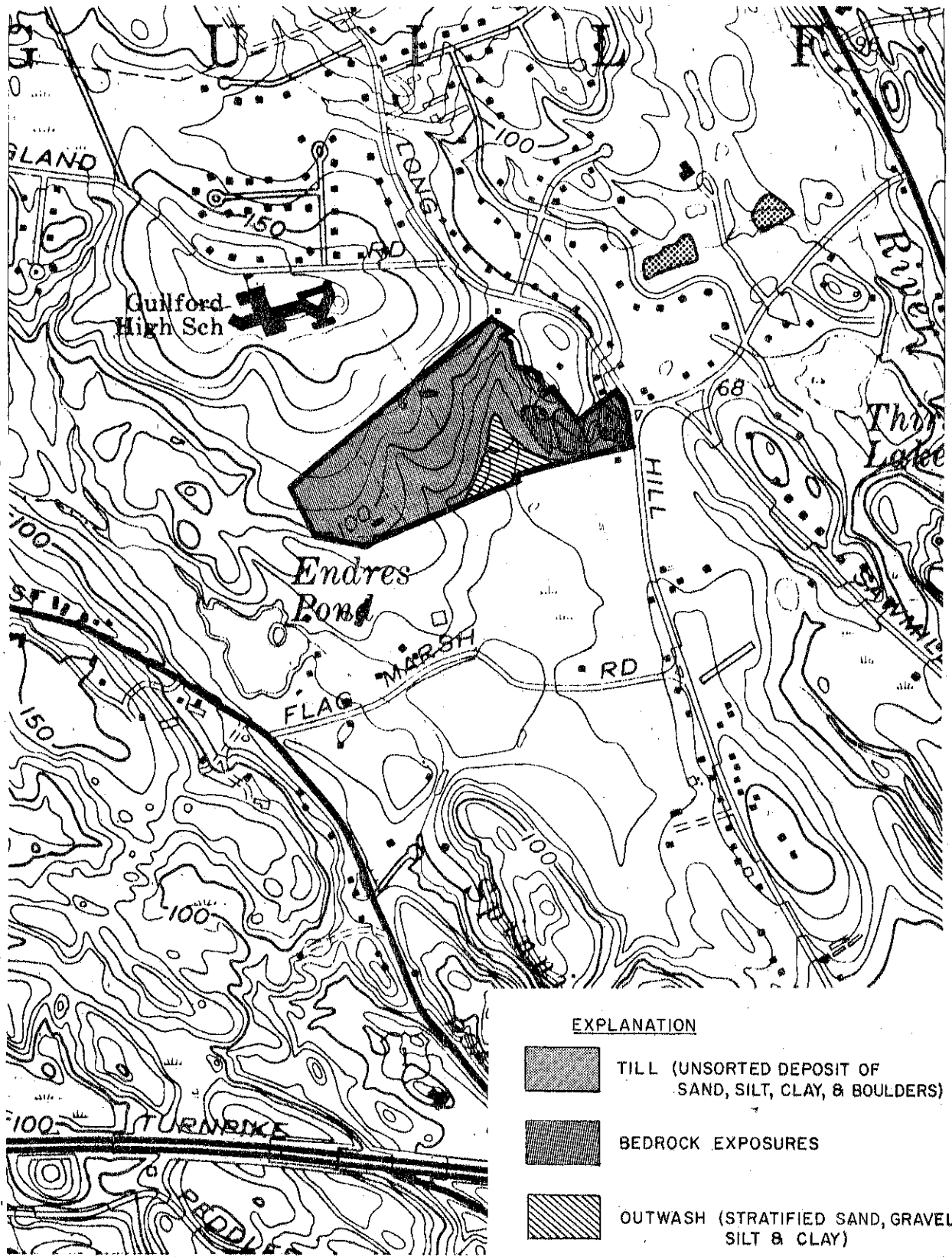
The largest outcrops are found at the eastern end of the site. Smaller outcrops are found in the western and central portions, indicating that the depth of the surficial geologic material is shallow in many areas. The surficial material itself is principally till, a glacial sediment composed of rock particles of widely varying shapes and sizes. These particles were incorporated into an ice sheet as it spread southward through the area, and were later redeposited directly from the ice without substantial sorting by meltwater. Till textures range from coarse grained and friable, particularly in the upper few feet, to silty and compact. In the wetland area along the southern boundary of the site, the surficial material appears to consist of glacial outwash, a stratified accumulation of sand and gravel with occasional layers of silt and clay. Figure 4 shows the approximate distribution of surficial geologic materials on the site.

IV. HYDROLOGY

Most of the run-off from the site drains southward into a swamp, which forms part of the watershed of Spinning Mill Brook. Development of the site as planned would increase the volume of run-off flowing into the swamp during periods of precipitation, and would increase peak flows from the swamp unless run-off retention facilities were installed. The run-off volume and peak flow increases would be proportionately greater for storms of lesser magnitude (more frequent storms). The reason for this result is as follows: land which is paved over or from which vegetation has been removed loses at least some of its capacity to absorb rainfall; however, during heavy precipitation, the ground becomes saturated with water and therefore naturally loses its absorptive capacity. Hence, after several inches of rain has fallen, an undeveloped tract of land may begin to shed nearly as much run-off per additional increment of rainfall as a developed tract.

From the conceptual development plan, using a standard hydrologic computation method, it is possible to estimate the increases in run-off volume and peak flows that may be expected following development of the site as planned. These estimates are given in the table below. Run-off volume increases apply to the site itself; peak flows were estimated for the discharge point of the swamp at Flag Marsh Road. The watershed for that discharge point is shown in Figure 5. Storm events used for the calculations are those which have a statistical frequency of occurrence of once every 2 years, once every 25 years, and

FIGURE 4.
SURFICIAL GEOLOGY MAP



SCALE: 1" = 1000'

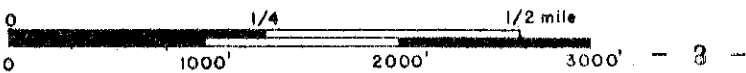
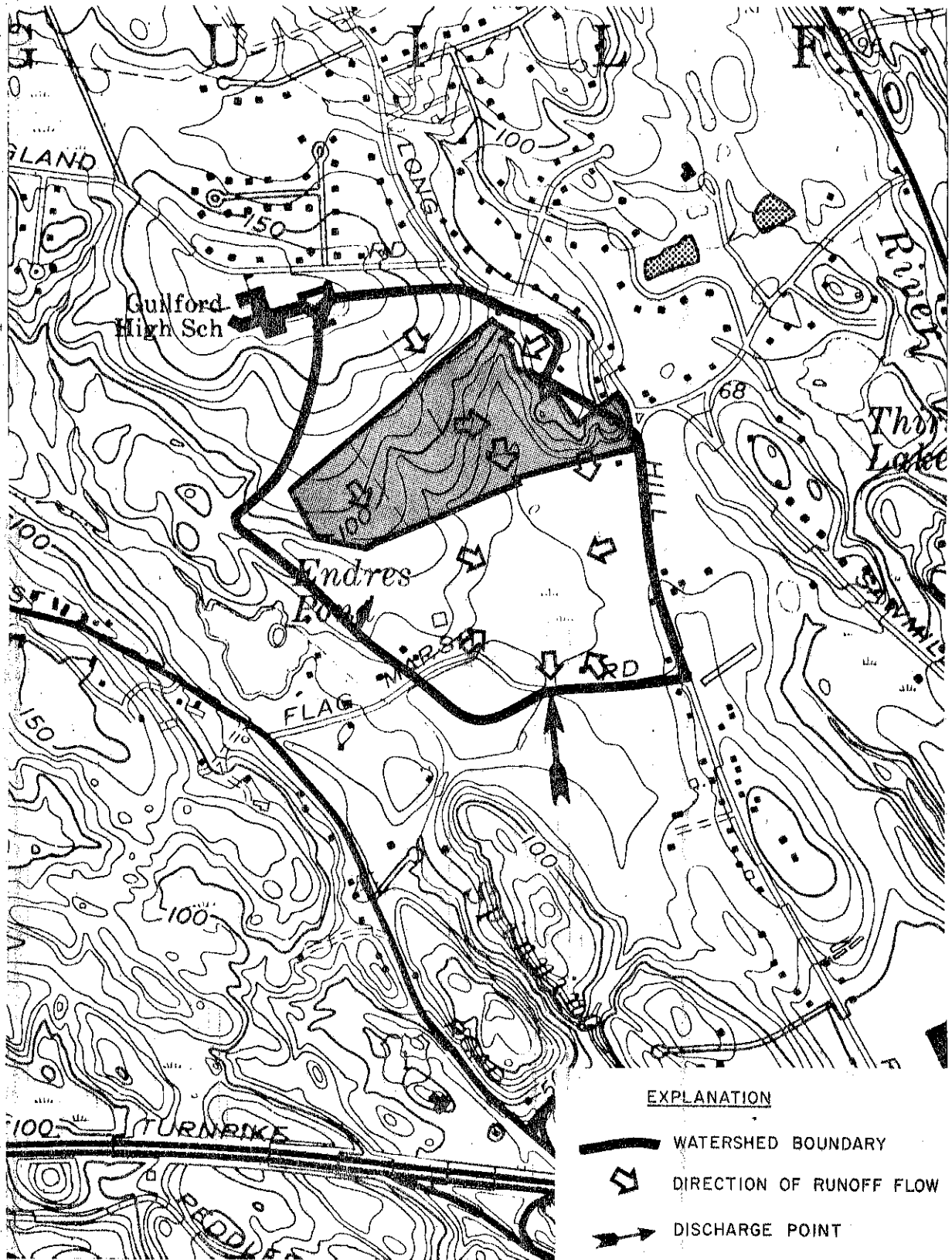





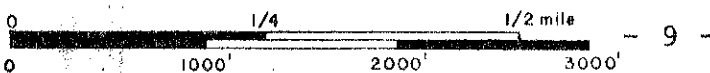
FIGURE 5.
 WATERSHED OF SWAMP DISCHARGE POINT
 ON FLAG MARSH ROAD



EXPLANATION

-  WATERSHED BOUNDARY
-  DIRECTION OF RUNOFF FLOW
-  DISCHARGE POINT

SCALE: 1" = 1000'



once every 100 years, respectively, and which would occur within a continuous 24 hour period. Because the frequency interval is merely an average, any given storm event may occur more than once during its particular statistical interval. For example, a 25 year storm may occur once, several times, or not at all during any given 25 year period.

Table of Estimated Peak Flows and Run-off Depths Before and After Development

<u>Peak Flows at Flag Swamp Road Culvert</u>			
	<u>2 year</u> <u>24 hr. storm</u>	<u>25 year,</u> <u>24 hr. storm</u>	<u>100 year,</u> <u>24 hr. storm</u>
Before Development	35 cfs	171 cfs	296 cfs
After Development	47 cfs	212 cfs	364 cfs
Percent Increase	33%	24%	23%

<u>Run-off Depths (Average) on the Long Hill Farm Site</u>			
	<u>2 year</u> <u>24 hr. storm</u>	<u>25 year,</u> <u>24 hr. storm</u>	<u>100 year,</u> <u>24 hr. storm</u>
Before Development	0.75 in.	2.89 in.	4.38 in.
After Development	1.11 in.	3.56 in.	5.16 in.
Percent Increase	48%	23%	18%

It is important to remember that the numbers given in the table above are merely estimates based on a conceptual plan. They are not meant to serve as the basis for engineering designs. The figures do, however, provide a general indication of the extent to which run-off may increase following development. Peak flows in particular may be affected by factors not considered in the calculations (eg. storm drainage systems).

Although run-off volume increases cannot be alleviated by artificial means, peak flow increases may be mitigated by several techniques. A properly designed run-off retention basin, possibly located in the wetland, would restrict flows from the site. The wetland itself could serve as a natural retention basin, but only if control is established by proper placement and sizing of the culvert on Flag Marsh Road. The present culvert was not examined during the field review, and it is therefore not certain whether it would be an effective control as is.

Groundwater levels in some sections of the site are relatively high. As a general rule, it may be anticipated that these levels will be higher in topographic swales than on the adjoining upland areas. When the water table rises during wet seasons, it may intersect the surface of the swales, forming temporary streams. Considering the copious volumes of effluent that would be discharged through the development's septic system, it may be best to keep leaching

trenches well removed from the swales. The current blueprints show the easternmost part of the major septic area to be within or very close to the bottom of a swale. Some rearrangement would be preferable. In addition, septic systems should not be located in shallow-to-bedrock areas, such as the easternmost part of the property, unless very careful engineering measures are used. The major consideration in this respect is the potential for poorly renovated effluent to enter fractures in the local bedrock, contaminating a possible future water supply source either for the development itself or for nearby homes.

V. SOIL AND ENGINEERING CONSIDERATIONS

A Soils Map of the Long Hill Farm site is presented in the Appendix of this report. The Appendix also contains a Soils Limitation Chart which identifies limiting factors for various land uses on individual soil types. For a detailed description of the individual soil types on the property, the interested reader is referred to the recently published "Soil Survey of New Haven County". This document is available at the New Haven County Soil and Water Conservation District.

Soils vs. Proposed Land Use

As described in the Soils Limitation Chart, the majority of the soils on this site have moderate to severe limitations for residential development. The major limiting factors for the various soils on the site include:

1. Shallowness to bedrock
2. Slope
3. Large stones
4. Wetness
5. Slow Perk rate
6. Frost action

In reviewing the results of deep test pit investigations conducted on the property, compact till and/or bedrock was encountered at shallow to moderate depths in most areas. Depth to compact till ranges from 15 to 41 inches in the soil, with pan and bedrock from 12 to 42 inches in the shallow to bedrock soils. Due to these adverse soil conditions and the rough topography of the site, the developer will face many difficulties and high costs to successfully develop this proposal. However, with sound engineering and the use of best management practices, it is likely that the area can be successfully developed as proposed. A planned residential development approach to developing this difficult site is considered preferable from an environmental standpoint to a conventional subdivision approach.

The road into the Planned Residential Development runs essentially parallel to the contours which means that the storm run-off flows across the road, creating the need for side road drainage and culverts. About 40 percent of the roads and parking areas are located on soils that are susceptible to frost action which means that adequate subsurface drainage is necessary. The rest of the roads and parking areas are located on shallow to bedrock soils which could mean that it will be necessary to excavate bedrock for subbase preparation. In either situation, the limitation for roads and parking is severe to moderate.

Assuming that the water lines, electric lines, and sewer lines will essentially follow roads, the trenching may require rock excavation. Rock excavation will increase the cost of their installation.

The shallow to bedrock soils, where housing is proposed, could present problems with foundation and wall cracking because of unequal consolidation of soil and bedrock. The effects of this problem could be lessened by bedrock excavation and backfill for foundations thoroughly compacted.

Inland Wetland Soils

A detailed wetland mapping of the site by a professional soil scientist indicates that the wetlands on the site are not as extensive as shown in the New Haven County Soil Survey. The ERT field investigation confirmed this to be true. The wetlands as described on the site plan, see Figure 3, are substantially correct and give an accurate picture of the wetland conditions on the site.

The Inland-wetland soils mapped on this property consist mainly of Walpole sandy loam (Wa) with some small amounts of Wilbraham and Menlo extremely stony silt loams (WT).

The Walpole soils are poorly drained sands and gravels. This soil has a water table at a depth of about 8 inches from late in the fall until mid-spring. Permeability is moderately rapid in the surface layer and subsoil and rapid to very rapid in the substratum. Runoff is slow. This soil dries out and warms up slowly in the spring. The Wilbraham and Menlow soils are poorly and very poorly drained and are extremely stony on the surface and throughout the soil. These soils characteristically have a perched water table near the surface from fall to spring and after heavy rains during the summer.

Located within the wetland area on the site is a small, shallow pond. The total drainage area of this pond is about 32 acres and about 15 acres of the PRD is located within this drainage area. All of the proposed housing units are located within the drainage area of the pond except those units proposed on the extreme west side of the site. A large excavated pond, about 150 feet by 200 feet, could be constructed where the existing pond is located. This could act as a sediment trap during construction. The enlarged pond would also afford about 1 million gallons of water for fire protection, and, with close supervision, could provide some ice skating in the cold winter months, as well as fishing during the summer months. The pond could be a hazard, however, to children in the area. The material excavated to enlarge the pond would have to be hauled out of the pond site. The soils that would be excavated for this pond are rated A-4 for state roads because of the high silt content. An A-4 rating means that the soil is susceptible to frost action, and therefore has limited use in roads and parking areas.

Erosion and Sediment Control

The soils on this site are erosive when cleared of vegetation and a comprehensive erosion and sediment control plan should be developed in advance of any construction. It is recommended that the following best management practices be implemented as a minimum in the erosion and sediment control plan:

1. All disturbed areas including areas around homes, roadcuts and fills, and stockpiled topsoil should be vegetated as follows:
 - a. Permanent vegetation where final grading is completed in time for seeding dates, April 1st to June 15 and August 15 to September 30. Also in areas that will be exposed for twelve months or more.
 - b. Temporary vegetation where final grading is not completed in time for permanent seeding. Seeding dates are August to October 15.
2. Roads and driveways, curbs, water mains, electric and telephone cables, storm drains, etc. should be constructed in advance of home construction.
3. Remove only those trees and shrubs and grasses that are necessary for construction; protect the rest to preserve the aesthetic and erosion control value.
4. Discharge water from outlet structures at non-erosive velocities. Consider using sediment traps and energy dissipators where necessary and appropriate in the storm water management system.
5. Back fill, compact, seed and mulch trenches within 15 days after they are opened.
6. Install sediment basins where necessary. There appears to be room to install several small sediment and run-off retention basins along the edge of the wetland to keep most of the sediment and increased storm run-off from the wetland area.
7. Stockpile topsoil and protect with anchored straw mulch. Topsoil should be spread over areas that would otherwise be critical to establish in vegetation because of adverse soil conditions such as shallowness to bedrock.
8. Road cuts and fills should be stabilized at a minimum of 2:1 slopes (3:1 is better and is recommended for sandy or gravelly soils).
9. Hay bale erosion checks should be located around catch basins and across natural drainage outlets.
10. Install erosion and sediment control practices as indicated in the plan and according to SCS and Soil Conservation District standards and specifications. Erosion and sediment control practices are described in "The Erosion and Sediment Control Handbook - Connecticut", U.S.D.A. Soil Conservation Service, 1976. Additional assistance is available through the New Haven County Soil and Water Conservation District.

VI. SEWAGE DISPOSAL

Administrative Requirements

The proposal consists of 54 single family units and 34 condominium units. It is proposed that the entire property remain as one unit with eventual ownership by a property owners association. The concept of cluster housing and community sewage disposal utilizing the favorable soils present on a large tract is favored by the Department of Environmental Protection and discussed in the "Sewer Avoidance Report". When properly engineered and constructed this approach can provide better sewage disposal than a classic subdivision which creates lots of roughly equal size but extreme variation in suitability for sewage disposal.

Because this proposal is for community system(s) a dual jurisdiction for permitting the systems exists. The applicant must obtain approvals from the local director of health and the State Department of Health Services under the provisions of Sections 19-13-1320c (a) and (c) of the public health code. This approval is granted on the basis of compliance of detailed construction plans with the relevant provisions of the public health code. Current practice results in good coordination between the health agencies and DEP in the review and permit process for applications such as this. Conflicting requirements have seldom occurred, and most difficulties have been overcome easily.

A permit from the Commissioner of Environmental Protection is required under Section 25-54i of the General Statutes. Department of Environmental Protection procedure is somewhat different than health department procedures and is outlined as follows:

1. Based on site testing and preliminary (or final) plans the developer applies for a permit.
2. If the DEP staff determines that there is no immutable site capacity that prevents the system from working properly and protecting the State's surface and groundwater then a positive tentative determination is made which schedules a public hearing on the matter.

In the case of a proposed community system, Department of Environmental Protection staff also notifies the town Water Pollution Control Authority (WPCA).

3. If the public hearing results in no substantive testimony that the proposal will cause pollution then Department of Environmental Protection staff accepts and reviews construction plans for approval (authorization to construct).
4. In the case of a community system, approval is conditional on the town's WPCA agreeing to manage or accepting a management agreement for operation of the system.
5. Construction will take place under the construction administration of the design engineer who prepares as-built plans for Department of Environmental Protection.

6. Submission of adequate as-built plans results in issuance of a Permit to Discharge with monitoring, operation, and reporting requirements.

Technical Requirements for this Project

The project must conform to the requirements of the Public Health Code. Department of Environmental Protection performs a more complex engineering analysis of the proposal generally following six points. The following are a discussion of those points in relation to this project.

1. Mechanical Arrangement

This refers to the specification, arrangement and integrity of components such as sewers, pump stations, septic tanks and leaching structures. On a site such as this, these components are essentially infinitely variable to meet the site requirements and the requirements of the design engineer and regulatory agencies. This factor should pose no unusual problems. Cost will be a factor in meeting regulatory requirements; however, these costs are easy to estimate in the early stages of a project. For the community system it is important to note that the collection system must be designed, built and tested for essentially zero infiltration and the pump stations must conform to DEP guidelines.

2. Leaching System Size

From a regulatory standpoint the system size is governed by the public health code and DEP standards, with the more stringent requirement prevailing. DEP checks system size by calculating realistic sewage flow, and the wetted perimeter of leaching structure. The allowable sewage application rate is then calculated by comparing the soil permeability to the curves for long term acceptance of sewage at the stone/soil interface. This curve ranges from 0.2 to 0.8 gallons per day/ft². In general the residential system sizes in the health code meet this standard and are conservative. The reported percolation rates and the soils mapping for the area would indicate that no soils with excessively slow permeability or percolation are expected. There is sufficient land area to accommodate conservatively sized leaching systems.

3. Hydraulic Constraint

DEP requires that a hydraulic analysis be prepared to show that the soils can handle the sewage recharge in addition to rainfall and upslope recharge. This is done by field or laboratory measurement of permeability and utilization of the appropriate formulation of Darcy's Law or the well recharge equation.

On this project, a considerable number of test pits have been investigated and witnessed by DEP and town staff. The majority of the site correlates well to the soils mapping. The principal constraint appears to be very shallow depths to bedrock ranging from 2-6' below grade. In the western portion of the property, where the largest community system was proposed, the ledgerrock is shallow and does not appear to support a high groundwater table. It would appear that the soil structure has sufficient permeability to allow infiltrated rainwater to rapidly enter the rock structure with little retention or lateral movement. Based on this preliminary evaluation it would appear that the hydraulic constraint may not be too severe. This conclusion is somewhat surprising in that most of

the mapped soils in this portion of the site are characterized by slow permeabilities and hydraulic constraints. The timing of this project should allow for some reinvestigation in the early spring to confirm the initial estimate. The corollary problem that this soil structure presents may be very difficult to overcome. If the effluent flow path is as envisioned, then effluent would receive only a limited amount of renovation prior to entering bedrock. The only written standard in regulation which deals with this problem is the 4' vertical separating distance from the system bottom to ledge contained in the public health code. It should be noted that compliance with this requirement would be difficult over a great deal of the site. In order to meet this standard, portions of most of the proposed systems would have to be placed all or partially in fill. The broader question of the adequacy of the 4' distance on this site would seem to be the principal issue of the DEP permit process.

4. Renovation of Sewage

The DEP has developed a method of analyzing the renovation of septic tank effluent by the leaching system and the soil structure. Analysis is normally done to study bacteria, virus, nitrate, phosphate, and chlorides. The standard utilized is to ensure that effluent will be returned to drinking water quality and phosphates entirely retained prior to any potential reuse.

As a part of the DEP permit process it is normal for the applicant's engineer to work with DEP staff in developing this pollutant removal analysis. It was mentioned early in this section of the report that DEP advocates the community system concept to concentrate discharges in suitable areas when the balance of the site is very difficult. On this site the majority of the land area has the same restriction of shallow depth to ledge. The suggested order of procedure is for the applicant to complete permeability analysis and work with DEP staff to try to assess the impact of the proposed system on groundwater quality. It should be noted that the identified soils are normally characterized by slow percolation and permeability. Soils with relatively low permeabilities and a higher percentage of fines provide better renovation of effluent. It may be possible with careful layout to balance the factors of hydraulic load and sewage renovation for a fairly large discharge. The developer must be cautioned that the soil characteristics are largely immutable and further analysis may limit the allowable discharge.

5. Installation

Installation of these systems will have to be done by an installer licensed under the provisions of section 20-341a -20-341m of the General Statutes. The DEP approval of a project such as this sets a specific standard for the project outlining the requirement for supervision of construction by the design engineer. On a project of this size, requirements might include fieldstaking of components, inspection of site preparation and fill, infiltration testing of sewers, checking evaluations of components and preparation of as-built plans showing locations and elevations certifying compliance with approved plans.

This work is an added cost but has had a very salutary effect in ensuring proper system installation. This procedure is augmented by inspection by the town engineer/health department.

6. Operation and Maintenance

The culmination of the DEP process is the permit to operate the system. The permit for a system such as this would require routine inspection of the septic tanks, pump station and leaching area with results reported to the

Director of Water Compliance. Inspections would be either quarterly or annually depending on the component. This procedure can also include the monitoring of ground or surface water adjacent to the system if detailed analysis would indicate such monitoring is needed. This procedure is useful in ensuring correct operation providing the initial owner (builder) and the property owners association are responsible and have the financial resources to operate and repair the system as needed.

To ensure that integrity of operation, PA78-154 states that "Each Municipal Water Pollution Authority...shall manage or ensure the effective management of any community sewerage system not owned by a municipality".

The strongest method of ensuring correct operation is for the WPCA to establish the project area as a sewer district. This enables the WPCA to take over and operate the system collecting user charges from the property owners so that the system does not pose a burden on the general taxpayer. To date most towns have been reluctant to take this step. This seems to be based primarily on a feeling that the town will ultimately be left "holding the bag" on an unknown and deficient system. The DEP position is that systems which undergo our exhaustive analysis are fairly fool-proof. Towns should recognize that Section 25-54g of the General Statutes places ultimate responsibility for all sewage disposal systems on the town's shoulders, even if privately owned. The Department would prefer that towns accept this responsibility early on when proper financial and legal arrangements are easy to establish.

If the town will not accept ownership and operation, then the alternative is for private ownership with appropriate legal protection for the town. This has normally been accomplished under a two stage format. The initial problem is to provide for completion and operation and maintenance during the development phase. In the case of a condominium, protection is provided by the unit ownership act which binds the lending institutions to the first offerings. In other cluster developments, protection can be provided by binding or sinking escrow accounts. The second concern is the establishment of a property owners association with sufficient powers to tax its members to provide continued operation.

In normal practice, both of these objectives can be reached in an orderly fashion. Department of Environmental Protection has a fair amount of documentation about agreements reached between a number of towns and developers. DEP will make this information and comments available to interested parties.

Conclusion

The principal constraints on this site are relatively tight soils overlying fractured bedrock at shallow depths. Detailed analysis based on soil permeability will be needed to determine the allowable amount of sewage discharge on this property. The balance of engineering and administrative problems on this project can be solved with careful work.

VIII. VEGETATION

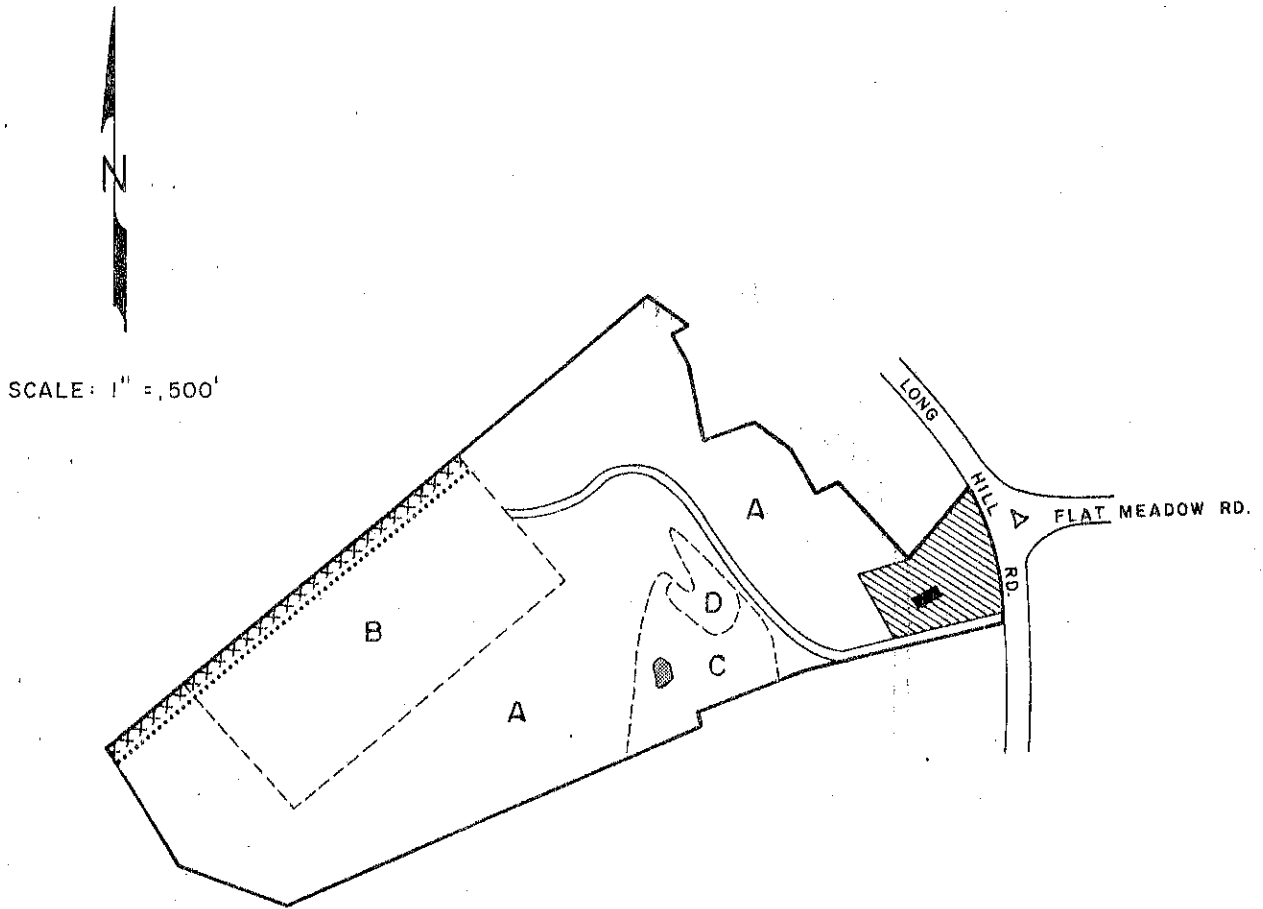
The following chart summarizes the vegetation types present on the property (refer to Figure 6).

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. Old Field	22	Sapling with occasional sawlog size trees	Ranges from understocked to fully-stocked	Medium	Eastern red cedar, black cherry, black birch, red maple, gray birch, flowering dogwood, apple, with occasional sawlog-size white oak, black oak, shagbark hickory & white ash.	Staghorn sumac, multi-flora rose, high bush blueberry, bayberry, barberry, blue beech, old field juniper, green brier.	Grasses, poison ivy, golden rod, Japanese honey suckle, low bush blueberry, hairy call moss.
B. Open Field	9						Grasses, golden rod, Indian paint brush, sweet fern.
C. Hardwood Swamp	2	Sapling to pole size	Over-stocked	Poor to medium	Red maple in clumps with occasional white ash.	High bush blueberry, arrow-wood, speckled alder.	Skunk cabbage, poison ivy, tussock sedge, sphagnum moss, cinnamon fern.
D. Open Swamp	1				Scattered clumps of speckled alder.		Sphagnum moss, tussock sedge.

*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.
 Sawlog size = trees 11 inches and greater in d.b.h.

FIGURE 6.
VEGETATION TYPE MAP



LEGEND

-  ROAD
-  PROPERTY BOUNDARY
-  VEGETATION TYPE BOUNDARY
-  PLANTING PROPOSED FOR SOUND AND VISION BARRIER
 (X EVERGREENS
 . DECIDUOUS SHRUBS)
-  POND
-  RESIDENTIAL AREA AND BUILDING SITE, 2 ACRES

VEGETATION TYPE DESCRIPTION

- TYPE A - OLD FIELD, UNDER TO FULLY-STOCKED SAPLING SIZE, 22 ACRES.
- TYPE B - OPEN FIELD, 9 ACRES.
- TYPE C - HARDWOOD SWAMP, OVER-STOCKED SAPLING TO POLE SIZE, 2 ACRES.
- TYPE D - OPEN SWAMP, 1 ACRE.

Aesthetics and Preservation

As noted in the preliminary development plans, the preservation of all of the large healthy trees which are scattered throughout the old field area (vegetation type A) would be desirable. Several flowering species present in this area should also be preserved and if need be, relocated. These species include flowering dogwood and apple trees. Ideally the flowering trees should be released from any other vegetation which reduces the amount of sunlight which reaches them. The additional sunlight available to these trees after they have been released will stimulate their flowering and increase their aesthetic value.

Soil disturbances and mechanical injuries caused by construction practices near trees or shrubs to be preserved should be minimized to maintain vegetation health and vigor. 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 or shrub's crown. Disturbances which disrupt the balance between soil aeration and soil moisture in this zone may cause a decline in vegetation health and vigor, potentially resulting in mortality within three to five years.

Limiting Conditions

The high water table and accompanying poor soil aeration in the hardwood swamp (vegetation type C) and the open swamp (vegetation Type D), limits vegetation growth to species tolerant of excessive moisture. Red maple will survive under the conditions present in the hardwood swamp; however, growth rates are usually slow and tree quality is generally poor due to over-crowding. The moisture conditions are more critical in the open swamp, where no tree species can survive at present.

Potential Hazards and Mitigating Practices

Windthrow is a potential hazard in the hardwood swamp. As a result of the high water table and saturated soils, the trees present are shallow rooted and unable to become securely anchored. The crowded condition of the trees in this stand increases the potential for windthrow if disturbances occur. At present these trees rely on each other for stability. Any openings which would allow wind to pass through rather than over this stand will 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 increased run-off or blocking and restricting natural drainage flows, may cause trees and shrubs in this area to die. Alterations which may significantly raise the water table in this area, thereby drowning vegetation, should be avoided.

The dense growth of green brier and other thorny vegetation located in the old field area (vegetation type A) is a potential hazard to people that want to use and enjoy this area. The thorny nature of this vegetation greatly restricts the use and therefore the enjoyment received from this area at the present time. Trails would have to be cut through this area (and periodically maintained) to provide recreational opportunities such as jogging and hiking for the people that will live in the proposed complex.

Management Practices

The planting of a buffer strip of several staggered rows of a mixture of white pine and hemlock planted approximately eight feet apart on the northern boundary of this property will eventually produce a vision and sound barrier between Guilford High School and the proposed complex. Fruiting and flowering shrubs such as crab apple, silky dogwood and autumn olive could also be planted in this buffer strip preferably to the south of the conifer planting. The entire buffer zone need not take up any more than a 40 to 50 foot strip.

In recent years the demand for red cedar posts has grown considerably; therefore, the red cedar which is cleared during the construction of this complex should be marketed and utilized for fence posts.

VIII. PLANNING CONSIDERATIONS

Land Use Considerations

The town plan, The Comprehensive Plan of Development and Conservation of Guilford, Connecticut, adopted August, 1978, designates the general area in question within Development Program A, suitable for increased residential development. The area is zoned R-5, minimum lot size 40,000 square feet with a special permit procedure for Planned Residential Development.

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 1 family/acre).

The State Plan - State of Connecticut Conservation and Development Policies Plan 1979-1982, "Locational Guide Map" indicates the area in question as a "rural area". By definition, a "rural area" is characterized by "single-family housing with water and sewage disposal provided by on-lot systems." Adhering to the concept of "rural area", "structural development forms and intensities which exceed on-site carrying capacity for water supply and sewage disposal on a permanent basis", should be avoided. Applying guidelines for State action to local action, it would appear that the proposed project is not in accordance with the Plan's goals as the project is to be serviced by public water supply. However, the designation of this section of Guilford as a "rural area" is not considered appropriate by this writer as public water service along Long Hill Road (to a northern extent approximately 10,000 feet north of the site) was in place before adoption of the Plan. The Plan's guidelines call for the avoidance of development "inconsistent with open rural character or conservation values of adjacent areas". The proposed project would not be out of character with surrounding uses due to its high percentage of open space, the retention of natural features, and the setback from Long Hill Road.

Adjacent Land Use

The land use in the surrounding area would be compatible with the proposed residential use. North of the site is the Guilford High School, with an athletic field and an open field abutting the property. To the east of the site, and along Long Hill Road, the use is low density residential. The piece in question

is bordered on the southwest by land for which a subdivision development "Flag Marsh Estates" has been approved (execution currently delayed by litigation). There had been a subdivision proposed for the property abutting the piece on the southeast boundary, but this proposal has been withdrawn. The land here is flat and open and marshy in areas.

The proposed Long Hill Farm project allows for a high percentage of open space and retention of natural features and large trees. As described, the project is not in view from the residences on Long Hill Road to the east.

Services to Support Development

Safety - The site is approximately 2½ miles from both Fire and Police Headquarters. There are three fire stations in the center of town, approximately 2½ miles from the site. A fire hydrant is located on Long Hill Road at Flat Meadow Road. The fire marshall will request 3 additional hydrants within the development.

Education - Leete Elementary School and Cox Elementary School are located approximately 1.9 miles from the site. Baldwin Middle School is approximately 2½ miles from the site. Guilford Lakes Middle School is approximately 1.7 miles from the site. Adams Middle School is approximately 1.3 miles from the site. Guilford High School is located approximately ½ mile north of the site.

Impact on Schools - It is difficult to gauge the impact of the proposed development on the Guilford School System. The project calls for 46 two bedroom single family units, 8 three bedroom single family units, 26 one bedroom condominium attached dwelling units, and 8 two bedroom condominium attached dwelling units. Three approaches for estimating the school age school population for the proposed development were considered. The developer intends to limit the number of people in these units to 3 in the two bedroom single family units, 4 in the three bedroom single family units, 2 in the one bedroom attached dwelling units, and 3 in the 2 bedroom attached dwelling units. Under consideration is a prohibition of occupants under twelve years old in the attached units. With this arrangement, the maximum number of school age children would be 70. However, the developer feels that in light of the composition of occupants in similar developments in the region, the actual figure will be grossly lower. If there weren't the above restrictions on number of occupants, theoretically each additional bedroom could accommodate one or more children and these children could be school age. Therefore, 70 students would be a conservative maximum of the number of school age children. However, in actuality, the regional trend indicates that a development of the type proposed would attract older couples and young couples without children, so this figure is undoubtedly high. Using criteria developed in The Fiscal Impact Handbook, Center for Urban Policy Research, 1978 (statistics derived from figures from the 1970 U.S. Census Public Use Sample) it is estimated that a development of this size and type would have a school age children population of about 30 students using national average figures or 20 students using figures developed for the north-east. These figures appear to be more realistic, taking into account regional trends.

According to the Town Planner, the number of additional school age children anticipated from this development would not pose a capacity problem at the local schools as the schools are presently experiencing a decline in total student numbers.

Commercial - The commercial center located closest to the site is the downtown Guilford area, approximately 2½ miles south of the site via Long Hill Road.

Recreation - Tennis courts open to the public are located at Adams Middle School and Guilford High School. Town owned wooded areas available for passive recreation nearby include Hubbard Park (approximately ½ mile from the site), the Bittner Property (approximately 2½ miles from the site), Timberlands (with privately administered golf course), approximately 2½ miles from the site.

Groundwater Protection

Roughly 80% of the site in question is located within an area that serves as groundwater recharge for a small water saturated stratified drift deposit, the surface expression of which is Flag Marsh. Most of the property falls within the "secondary recharge area"--the area of adjacent till and bedrock from which groundwater flows directly into the stratified drift deposit. A small portion of the property falls within the "primary recharge area"--the area immediately overlying the stratified drift deposit. In the case of the proposed development, public water will be supplied so on-site contamination of well water would not be an immediate concern. However the off-site impact of septic tank effluent recharging to the small aquifer described above should be taken into consideration especially if there are private wells planned in the vicinity of Flag Marsh.

A small portion of the site in question, roughly 3%, falls within an area that serves as secondary recharge to an extensive aquifer along the West River. Due to the size of this area and the intended use, the impact to the quality of the groundwater in the vicinity of the project would be negligible.

Summary of Land Use Considerations

The proposed project is in accordance with the town plan and is in accordance with the intent of the State plan. The 1968 regional plan calls for less dense development, however, the planned residential development concept, to paraphrase Guilford Zoning Regulations, "was intended to encourage innovative and flexible land development and housing design, to conserve open spaces for common use, to reduce lengths of streets and utilities, to provide a greater choice of housing type, size and price range and to retain a good living environment in lieu of large individual lot development." These objectives are embraced by the 1978 report, Land Use In South Central Connecticut 1978-2000: Policies and Principles in its statement of goals for the region, and hence it may be concluded that the proposed development is in accord with the sentiments of the regional plan. The proposed project is compatible with surrounding land uses. The project presents little impact to existing services.

Transportation Considerations

Site Accessibility

The sole access/egress point for the project is proposed along Long Hill Road, just west of the Flat Meadow Road/Long Hill Road intersection. Running north-south, Long Hill Road is a two-lane, two-way roadway which is in reasonably good condition for a low-volume local roadway.

Comments on internal circulation are not included herein since a complete site plan depicting placement of the residential units, new roadway and so on is necessary for substantive comment. It should be noted, however, that the presence of the "future emergency access" shown on the developer's preliminary plan is significant and important for safety reasons.

Existing/Projected Conditions

While traffic volume counts for Long Hill Road are not available, traffic volumes along the "major" access roads in the area are sufficiently low to suggest that: 1) a local road like Long Hill will carry significantly less traffic in 1980 than arterials like Route 80 (6,000 vehicles ADT--average daily traffic) and Route 77 (5,000 vehicles ADT)--which runs parallel to Long Hill Road; and 2) since these arterials operate at fairly high service levels, it can be assumed that Long Hill Road operates at comparably high or higher service levels.

ConnDOT forecasts for the region's major road network indicate that even ten years hence (1990), the volumes in this area will increase at a rate of only one to two percent a year yielding ADT volumes in the range of 6,000 (Route 77) to 7,000 (Route 80) vehicles.

These roadway volumes need to be compared, however, with roadway capacity calculations to assess the impact of present and projected traffic on the existing network. Route 77 is capable of carrying a vehicle capacity of some 12,000--13,000 vehicles per day as can Route 80. Thus, only 50 percent of the roadway's capacity is expected to be consumed ten years hence and this creates no problem for the existing major access roads. If Long Hill Road receives a proportional amount of increased use, its volume to capacity ratio should also be satisfactory.

With 88 new dwelling units being proposed for the Long Hill Farm Planned Residential Development, approximately 15 vehicle trips per dwelling unit can be expected from each dwelling unit. This converts to about 1,300 (approximate) additional vehicle trips per day. This in and of itself is not a lot of traffic; however, depending on existing volumes on Long Hill Road and Flat Meadow Road, it may require some sort of geometric modification (doubtful) and/or traffic control (probable) at the intersection of the project's access road with Long Hill Road. Traffic control may also prove necessary at the intersection of Flat Meadow Road and Long Hill Road. It is recommended that traffic counts (24 hour machine count) be made on both Long Hill Road and Flat Meadow Road to assess the possible impacts of these additional 1,300 vehicle trips, especially during the evening peak period.

Regional Plan Impact

From a regional transportation planning and traffic engineering perspective, the proposed development should have no significant impact:

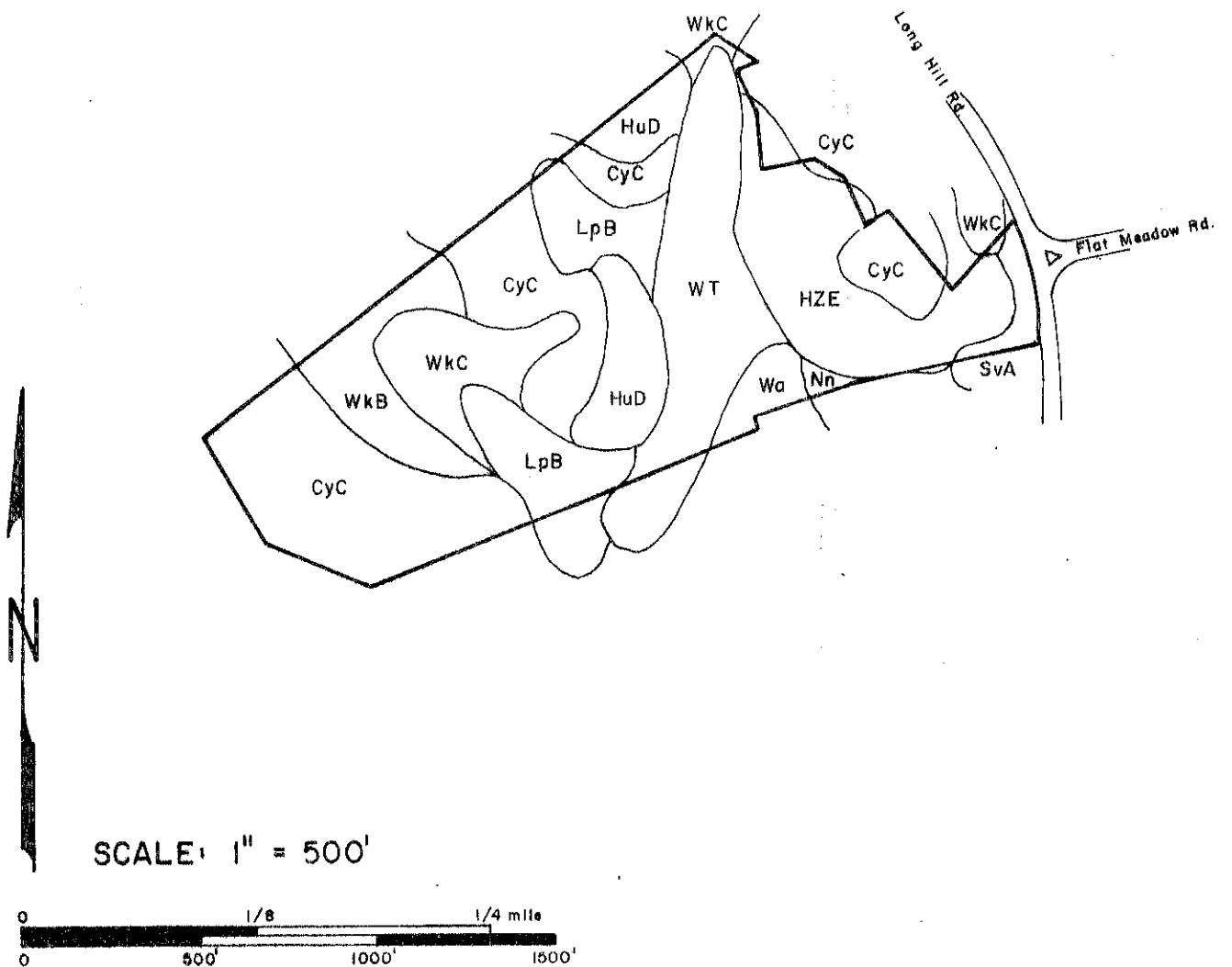
- . The subject site is in a low density area and of a sufficiently small size that residential development could not support public transportation--no impact.
- . The development's probable access/egress point is along a road of apparently adequate width, in sufficiently good condition, that any impact should be capable of remedy with minimal financial involvement.
- . The property is in an area where the air pollution problem (carbon monoxide only) has been assessed to be below the regional average--therefore, there is no appreciable impact anticipated from the site.

* * * * *

APPENDIX

SOILS MAP

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



SOILS LIMITATION CHART

"LONG HILL FARM PLANNED RESIDENTIAL DEVELOPMENT", GUILFORD, CT.

MAP SYMBOL	SOIL NAME	SEPTIC TANK ABSORPTION FIELDS	DWELLINGS WITH BASEMENTS	LOCAL ROADS	LANDSCAPING
CYC	Cheshire-Holyoke complex, 3 to 15% slopes	Moderate: large stones, slope Severe: depth to rock	Moderate: large stones, slope Severe: depth to rock	Moderate: depth to rock Severe: depth to rock	Moderate: large stones, slope Severe: depth to rock
HuD	Holyoke-Cheshire complex, 15 to 35% slopes	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
	Cheshire part	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HZE	Holyoke-rock outcrop complex, 15 to 35% slopes	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
IpB	Ludlow silt loam, 3 to 8% slopes	Severe: perc's slowly wetness	Severe: wetness	Severe: frost action	Slight
Mn	Minigret fine sandy loam	Severe: wetness	Severe: wetness	Moderate: frost action	Slight

SOILS LIMITATION CHART

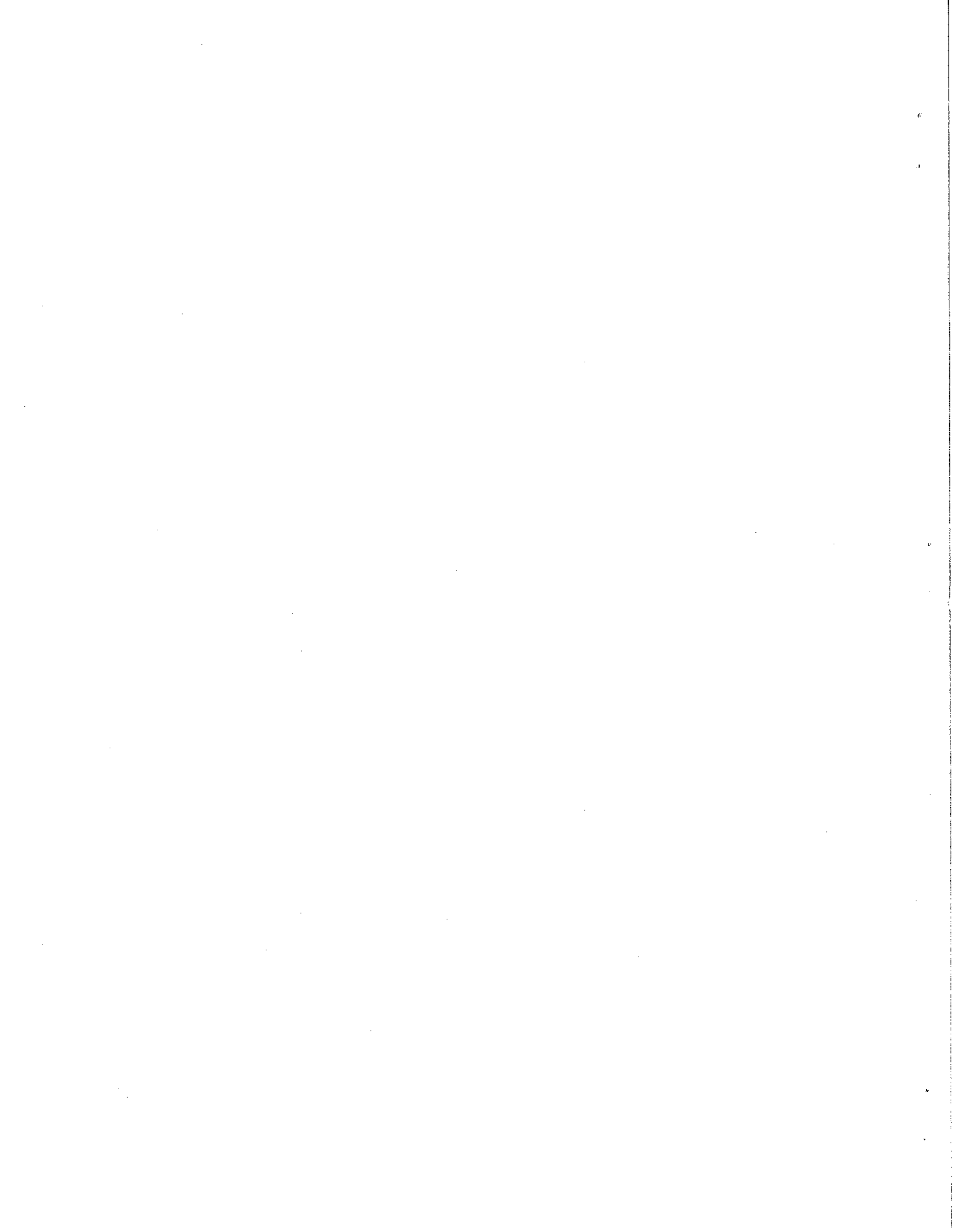
"LONG HILL FARM PLANNED RESIDENTIAL DEVELOPMENT", GUILDFORD, CT.

MAP SYMBOL	SOIL NAME	SEPTIC TANK ABSORPTION FIELDS	DWELLINGS WITH BASEMENTS	LOCAL ROADS	LANDSCAPING
SVA	Sutton fine sandy loam, 0 to 3% slopes	Severe: wetness	Severe: wetness	Moderate: frost action	Slight
Wa	Walpole sandy loam	Severe: wetness	Severe: wetness	Severe: wetness, frost action	Severe: wetness
WKB	Wethersfield loam, 3 to 8% slopes	Severe: percs slowly	Slight	Moderate: frost action	Slight
WKC	Wethersfield loam, 8 to 15% slopes	Severe: percs slowly	Moderate: slope	Moderate: slope, frost action	Moderate: slope
WT	Wilbraham and Menlo extremely stony silt loams	Severe: wetness, percs slowly, large stones	Severe: wetness, frost action, large stones	Severe: wetness, frost action, large stones	Severe: wetness, large stones
	Menlo part	Severe: wetness, percs slowly, large stones	Severe: wetness, large stones	Severe: wetness, frost action	Severe: wetness, 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 industrial 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.