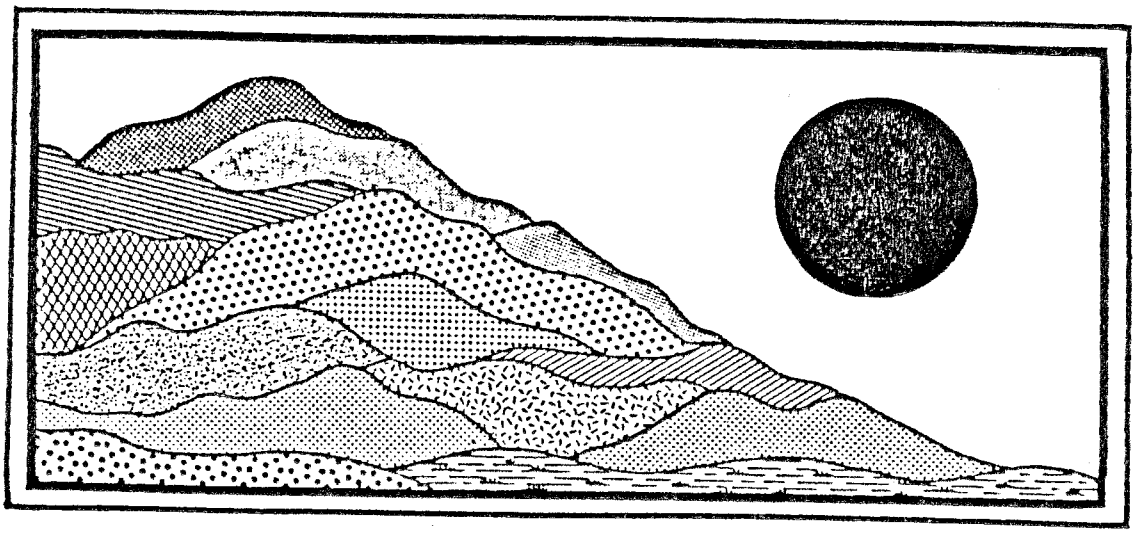
ZIMMERMAN SUBDIVISION

Sprague, Connecticut



October 1988

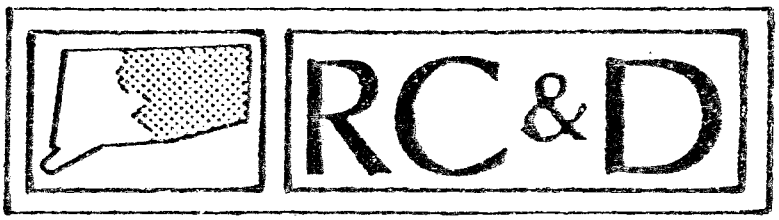
ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

ZIMMERMAN SUBDIVISION

Review Date: AUGUST 18, 1988

Report Date: OCTOBER 1988



ENVIRONMENTAL REVIEW TEAM

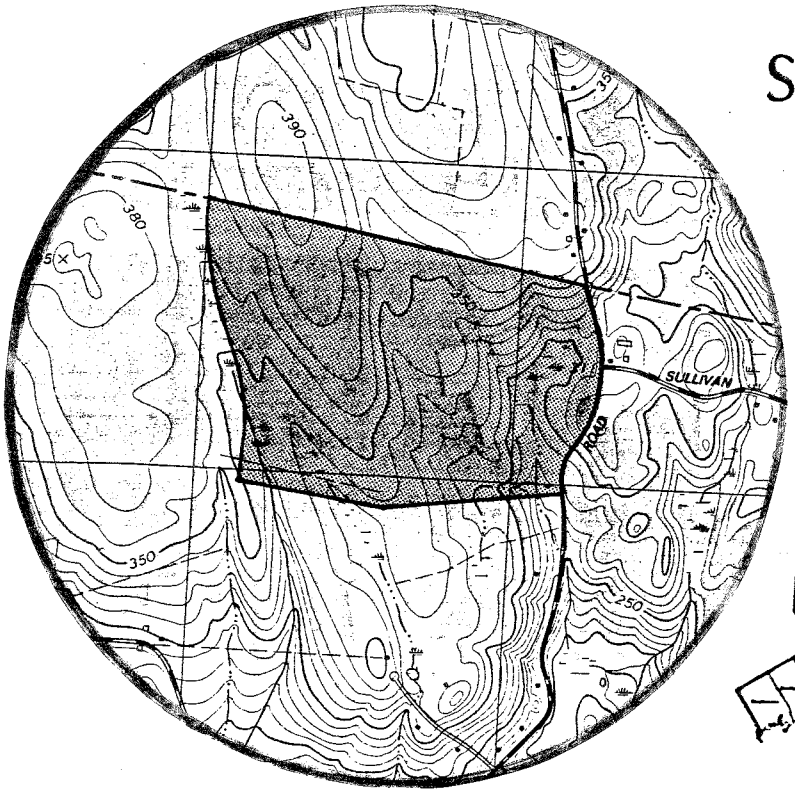
PO BOX 70

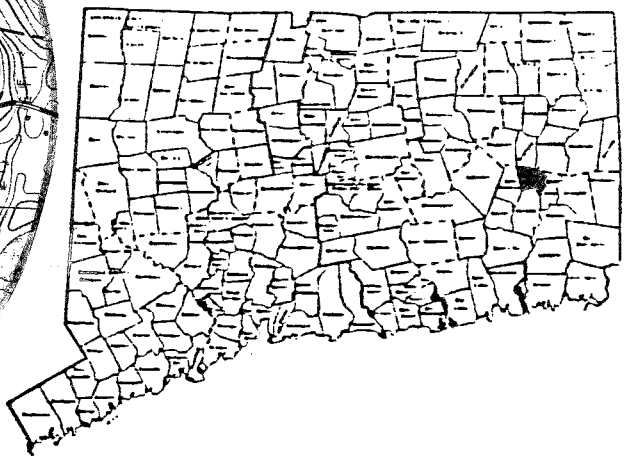
HADDAM, CONNECTICUT 06438

Site Location

ZIMMERMAN SUBDIVISION

SPRAGUE, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT
ON
ZIMMERMAN PROPERTY SUBDIVISION
SPRAGUE, CONNECTICUT

This report is an outgrowth of a request from the Sprague Planning and Zoning Commission to the New London Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The ERT met and field checked the site on Thursday, August 18, 1988. Team members participating on this review included:

Elizabeth Rogers	--Soil Conservationist - U.S.D.A., Soil Conservation Service
Richard Serra	--Regional Planner - Southeastern CT Regional Planning Agency
Elaine Sych	--ERT Coordinator - Eastern CT RC&D Area
Bill Warzecha	--Geologist - DEP - Natural Resources Center

Prior to the review day, each Team member received a summary of the proposed project, a list of the Town's concerns, a location map, a topographic map, and a soils map. During the field review the Team members were given preliminary plans for both proposals. The Team met with, and were accompanied by a State sanitarian, members of the Planning and Zoning Commission and the Inland Wetlands Commission, the developer and his engineers, and a SCS volunteer. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project--all final decisions and conclusions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Committee hopes you will find this report of value and assistance in making your decisions on these proposals for a subdivison.

If you require any additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 70
Haddam, CT 06438
(203) 345-3977

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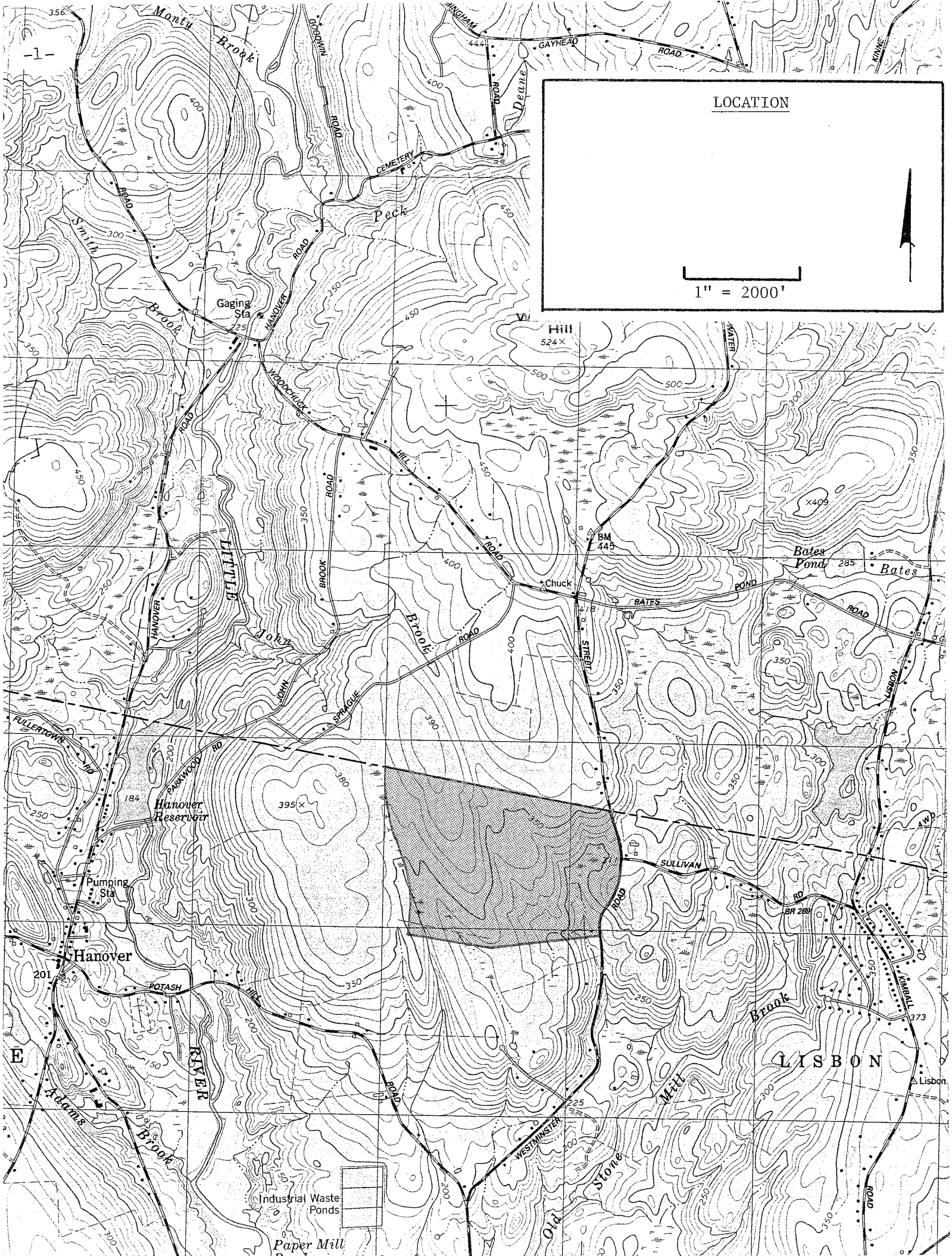

-1-
LOCATION
1" = 2000'
Monty Brook
Goodwin Road
Bingham
Gayhead Road
Deane
Cemetery
Peck
Smith
Brook
Road
Gaging Sta
225
Hanover Road
Woodchuck
Hill
524
Water
500
450
400
350
300
250
Mill Road
Little John Brook
Hanover Road
John
Sprague
Brook
Road
Fullertown Rd
Parkwood Rd
184
Hanover Reservoir
395
Pumping Sta
Hanover
201
Potash Hill
River
Adams
Brook
Industrial Waste Ponds
Paper Mill
Old Stone Mill
Westminster Road
Bates Pond
285
Bates
Pond Road
BM 445
Chuck
Bates Street
Lisbon Road
Sullivan Rd
BR 269
4WD
Kimball
373
LISBON
Lisbon
Kinne

1. INTRODUCTION

The 213 acre site under review is located in a R-80 Zone, which would permit residential development with minimum lot sizes of 80,000 square feet or about two acres. Preliminary subdivision proposal number one is for a "conventional lot layout" of approximately fifty-nine (59) 80,000 square foot lots. It is understood that the applicant may also consider a proposal for a "cluster lot layout" of approximately eighty-six (86) 20,000 square foot lots. This proposal would require a zone change and a possible change in the Town regulations. This development concept would be concentrated in the eastern portions of the site and would require extension of the municipal sewer line from the village of Hanover.

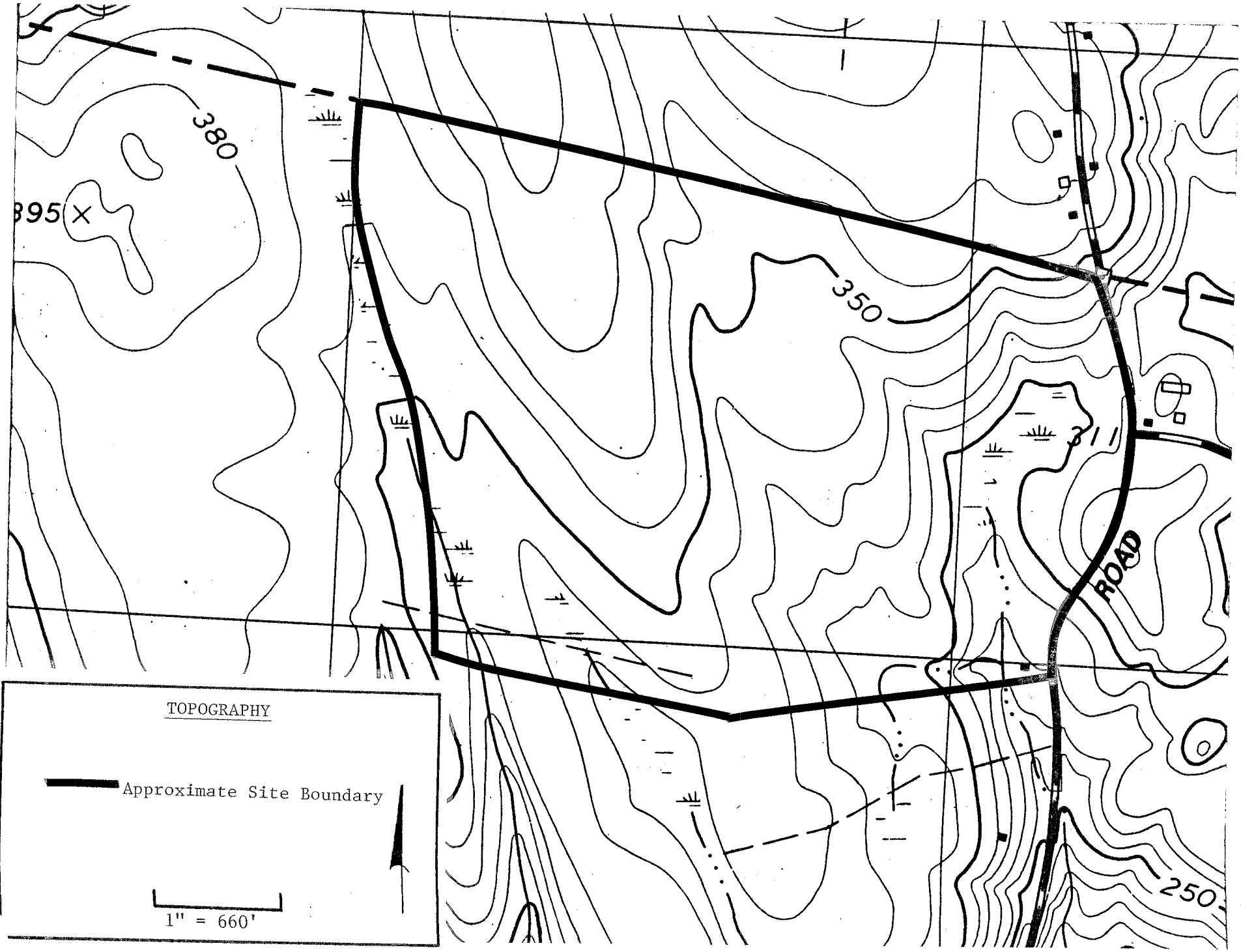
This report contains information about the natural resource base of the site, and discusses concerns and limitations of the two types of subdivision proposals.

2. LAND USE AND TOPOGRAPHY

The nearly rectangular shaped subdivision site consists of about 213 acres. It is located in the northeast corner of Sprague. The site abuts private, undeveloped land and the Canterbury Town Line on the north, Westminister Road and the Lisbon Town Line on the east and private, undeveloped lands on the south and west.

The site and vicinity historically have been used for agricultural and residential purposes. The presence of open fields and stonewalls transecting the site verify its agricultural past. A review of a 1934 air photo indicates that the entire eastern half was open farmland, except for the wetland areas. The western part was and is currently characterized by wooded land. Changes in area land use since the 1934 air photo, include a decrease in farmed acreage, an increase in forested land, and an increase in residential development.

The site is located at the southern limits of a streamlined hill with topographic saddles at the western and eastern limits. Site elevations range from about 390 feet above mean sea level at the northern limits to about 280 feet below mean sea level at the southeast corner. Slopes generally range from gentle to moderate (3-8%) across the site.


380
395
350
ROAD
250
TOPOGRAPHY
Approximate Site Boundary
1" = 660'

3. GEOLOGY

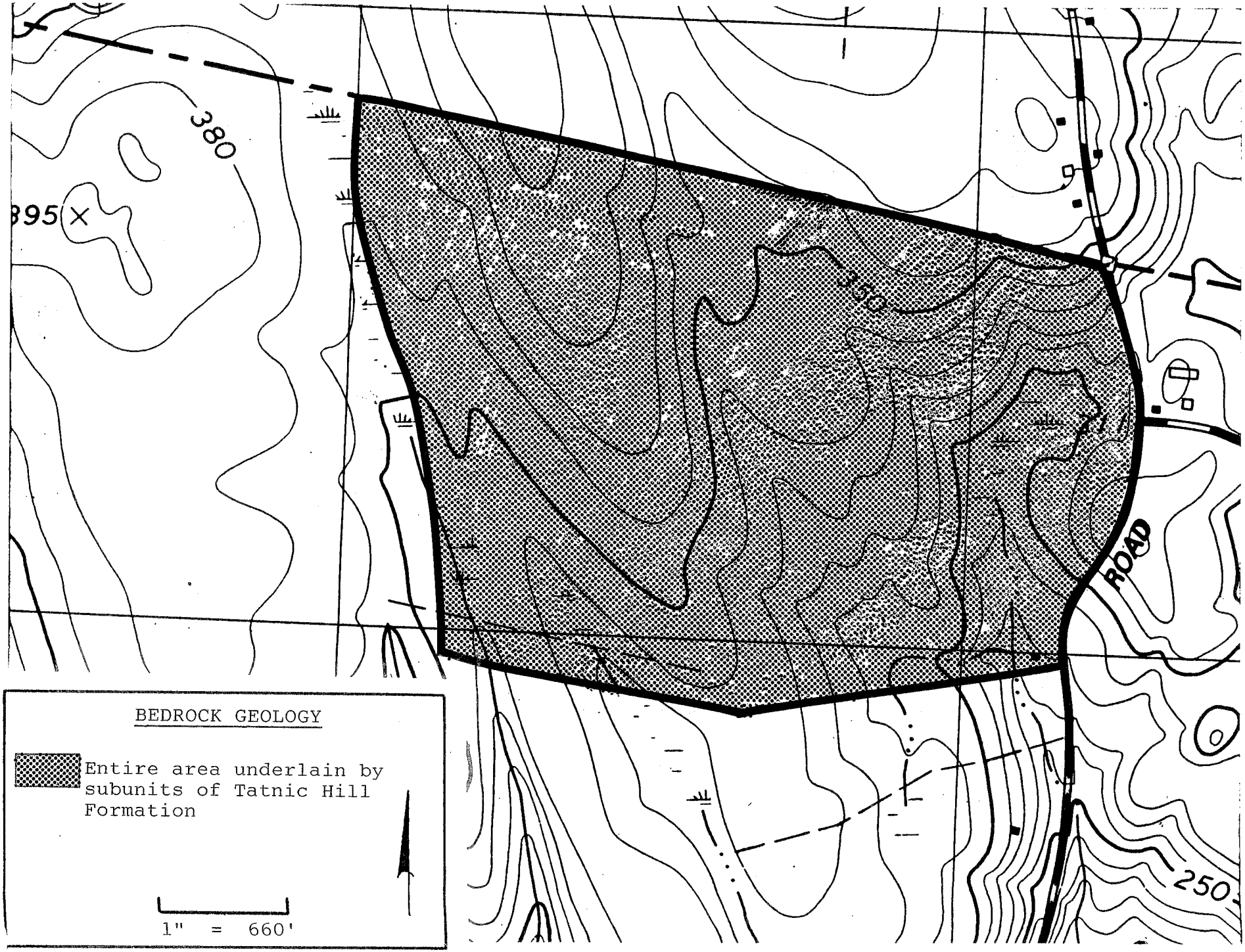
The subdivision site is located in the Scotland topographic quadrangle. A bedrock land surficial geology map (GQ-392 by H. Robert Dixon and C. E. Shaw) for the quadrangle has been published by the U. S. Geological Survey. The Team's Geologist referenced the Soil Survey for New London County for the surficial geologic materials section of this report and John Rodger's Bedrock Geological Map of Connecticut, 1984.

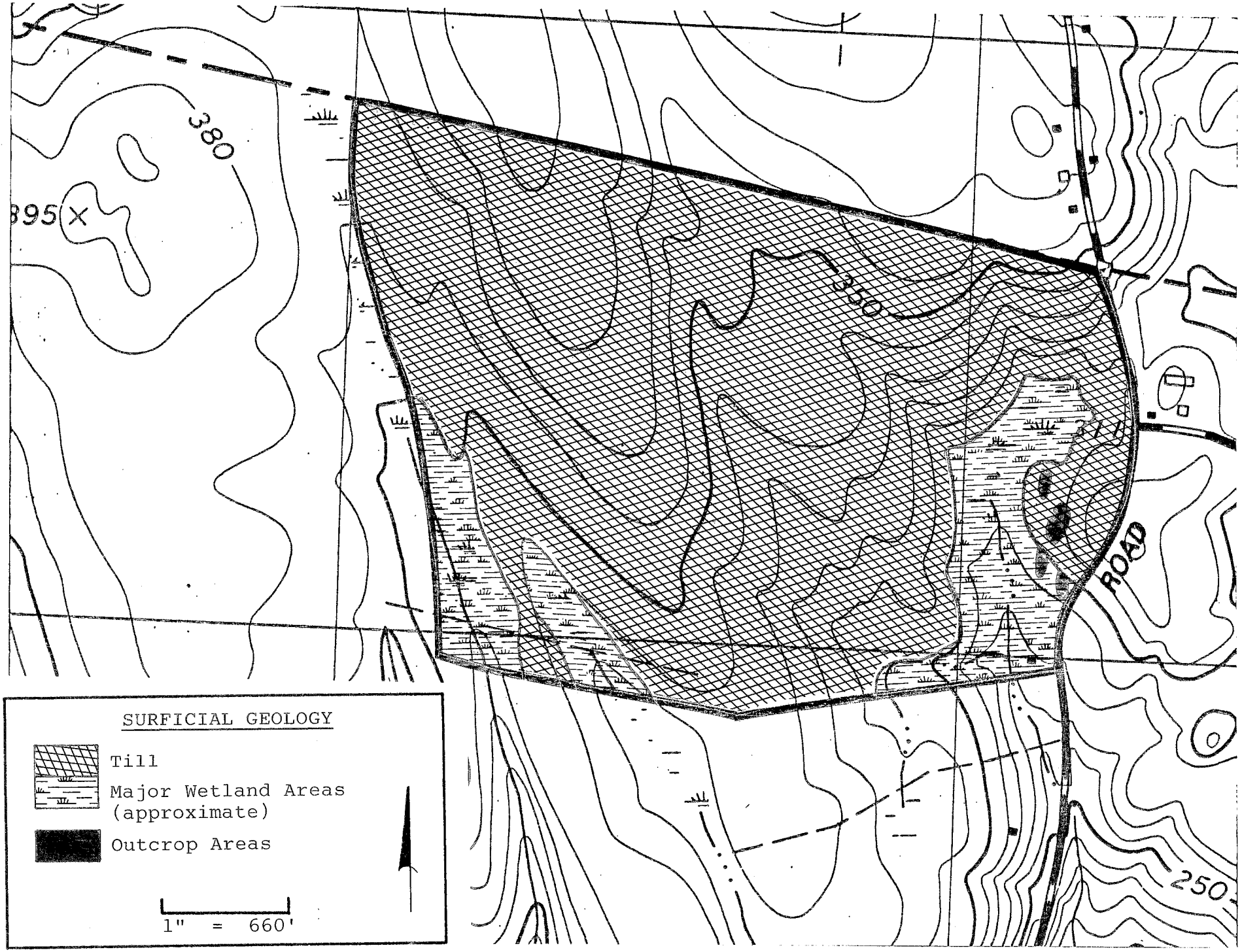
The site encompasses the southern end of a geologic feature known as a rock core drumlin; a large, streamlined hill consisting of ground-up rock material (till) plastered by moving glacial ice onto a core of crystalline bedrock.

The drumlin materials or till consist of a non-sorted mixture of clay, silt, sand, gravel and boulders. These materials were collected and transported by glacial ice, which formerly occupied the region. They were deposited by the ice moving across the hill of rock from the north to the south/southeast. A result of this mode of deposition is a relatively shallow "hardpan" or zone of compact soil below the weathered and rooted surficial soil zone. Geologists call this variety of till "lodgement till". According to soil mapping data, this variety of till (hardpan) covers most of the site. Because of the compact soil zone (substratum) which is slowly permeable, a seasonally high water table characterizes these soils. Although some deep test hole exploration for subsurface sewage disposal has been conducted on the site, the data was not available to Team members. Therefore, the exact thickness of the till is unknown. Geologic mapping data suggests that it is probably 15 feet thick or more in places.

The bedrock geology of the Scotland quadrangle has been well-described by H. Roberta Dixon and E. E. Shaw in map GQ-396. The rock core of the hill is identified as subunits of the Tatnic Hill Formation. In general, these rocks are described as highly deformed, gray to dark-gray, medium grained gneiss and schist. It should be pointed out that the Tatnic Hill Formation was intruded by younger rocks called pegmatites. They are typically medium to coarse grained and composed largely of light-colored minerals (quartz, feldspar and micas). The pegmatites are more resistant to erosion than the surrounding gneisses and schists, and, therefore, commonly occur as outcrops. Pegamite outcrops occur along the eastern limits of the site.

The terms **gneiss** and **schist** used above refer to the textural aspects of the rock.


380
395
350
ROAD
250
BEDROCK GEOLOGY
Entire area underlain by subunits of Tatnic Hill Formation
1" = 660'


380
395
350
310
ROAD
250
SURFICIAL GEOLOGY
Till
Major Wetland Areas
(approximate)
Outcrop Areas
1" = 660'

"Schist" is a term given to a rock, which under high pressure and temperature conditions was altered in such a way that most of its mineral constituents were aligned parallel to each other. Parting surfaces are usually numerous and give a rock a slabby appearance.

"Gneiss" is a term given to a rock in which light-colored minerals alternate with layers of dark colored minerals. This mineral arrangement gives the rock a banded appearance.

4. SOILS AND WETLANDS

Both subdivision plans (conventional and cluster) propose the crossing of wetlands. The 59 lot plan proposes four wetland crossings and the 86 lot proposes two. At the time of the field review the wetlands had not been delineated in the field. The wetlands should be flagged by a certified soil scientist and surveyed onto the site plan. The 59 lot subdivision plan proposes to incorporate all but a small portion of inland wetlands in individual house lots. It is recommended that a larger portion of wetlands remain as open space. The cluster develpment proposes to leave a large area of wetlands as open space. However, this development will have a high population density and provisions should be made to protect wetlands from adverse impacts, especially in the wetlands adjacent to lots 75-79.

CrC-Charlton-Hollis fine sandy loams, very rocky, 3 to 15 percent slopes

This gently sloping to sloping complex consists of somewhat excessively drained and well drained soils on glacial till uplands. Rock outcrops cover up to 10 percent of the surface. Stones and boulders cover 1 to 8 percent of the surface. The soils of this complex are so intermingled on the landscape that it was not practical to separate them in mapping at the scale used. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is medium or rapid. Charlton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Hollis soil is moderate or moderately rapid above the bedrock. The available water capacity is low. Runoff is medium or rapid. Hollis soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

These soils are not suited to cultivated crops. Stoniness and rock outcrops generally make the use of farming equipment impractical. The Hollis soil has a shallow rooting depth and is droughtly. The hazard of erosion is moderate to severe. These soils are in capability subclass VIs.

PdB. Paxton & Montauk very stoney fine sandy loams, 3 to 8 percent slopes.

Gently sloping well drained soils of drumlordal, glacial till and upland land forms. Stones & boulders cover 1 to 8 percent of the surface mapped areas and consists of Paxton soil or Montauk soil or both. They can be mapped together because there is little differentiation in use and management.

Permeability of the Paxton soil is moderate in the surface layer and slow in the substratum. The available water capacity is moderate. Runoff is medium. Soil warms up and dries rapidly in the spring. Soil is strongly Accel.

Permeability of Montauk soil is moderate on the surface and slow in the substratum. Water capacity is moderate. Runoff is medium. Soil warms up and dries out rapidly. Soil is also acidic.

Soils are not conducive to cultivation because of stoniness, erosion is moderate. The limiting factor for development is slow permeability in the substratum.

PdC,- Paxton and Montauk - very stoney, fine sandy loams- 8 to 15 percent slope

Sloping, well drained soils are drumloidal, glacial till, upland landforms. Stones cover 1 to 8 percent of the surface. The soils are mapped together because there is no major difference in use and management.

Paxton and Montauk soils both have moderate permeability in the surface and subsoil layers and slow permeability in the substratum. Both soils have a moderate water capacity and rapid runoff. The soils warm up and dry out rapidly in the spring. Unless limited, both soils are acid.

These soils are not suitable for cultivation. The hazard of erosion is severe. The major limiting factor for community development is the slow permeability of the substratum.

Rn - Ridgebury, Leicester, and Whitman - extremely stoney, fine sandy loams

Nearly level, very poorly drained soils in drainageways and depressions of glacial till upland hills, ridges, plains and drumloidal landforms. Stones and boulders cover 8 to 25 percent of the surface. These soils were mapped together because there was no major difference in use and management.

Ridgebury and Leicester soils have a seasonal high water table at a depth of 6 inches. Permeability is moderately rapid in the surface layer and slow in the substatum. The water capacity is moderate. Runoff is slow. The soils are strongly acid.

Whitman soil has a high water table,at or near the surface, most of the year.Permeability, available water capacity, runoff, and acidity is similar to the Ridgebury and Leicester soils.

These soils are not suited for cultivation. The limiting factor for community development include a high water table with slow permeability.

SwB-Sutton very stony fine sandy loam, 0 to 8 percent slopes

This nearly level to gently sloping, moderately well drained soil is on upland glacial till plains, hills, and ridges. Stones and boulders cover 1 to 8 percent of the surface. The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is not suited to cultivated crops. Stones and boulders make the use of farming equipment difficult. This soil is in capability subclass VIs.

WxB-Woodbridge fine sandy loam, 3 to 8 percent slopes

This gently sloping, moderately well drained soil is on drumloidal, galcial till, upland landforms. The Woodbridge soil has a seasonal high water table at a depth of about 18 inches. It has moderate permeability in the surface layer and subsoil and slow or very slow permeability in the substratum. The available water capacity is moderate. Runoff is medium. This soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid in the surface layer and subsoil and strongly acid thorough slightly acid in the substratum. This soil is well suited to cultivated crops. This soil is in capability subclass IIw.

WyB - Woodbridge very stony fine sandy loam, 0 to 8 percent slopes

This nearly level to gently sloping, moderately well drained soil is on drumloidal, glacial till, upland landforms. Stones and boulders cover 1 to 8 percent of the surface. Typically, this Woodbridge soil has a very dark brown, fine sandy loam surface layer 6 inches thick. The subsoil is yellowish brown, light olive brown, and grayish brown, mottled fine sandy loam and sandy loam 22 inches thick. The substratum is very firm, brittle, olive sandy loam to a depth of 60 inches or more. The Woodbridge soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is medium. This Woodbridge soil warms up and dries out slowly in the spring. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is in capability subclass VIs.

WyC - Woodbridge very stony fine sandy loam,
8 to 15 percent slopes.

This sloping, moderately well drained soil is on drumloidal, glacial, upland landforms.

Typically, this Woodbridge soil has a very dark brown, fine sandy loam surface layer 6 inches thick. The subsoil is yellowish brown, light olive brown and grayish brown, mottled fine sandy loam and sandy loam 22 inches thick. The substratum is very firm, brittle, olive sandy loam to a depth of 60 inches or more.

The Woodbridge soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is rapid. This Woodbridge soil warms up and dries out slowly in the spring. This soil is in capability subclass VIs.

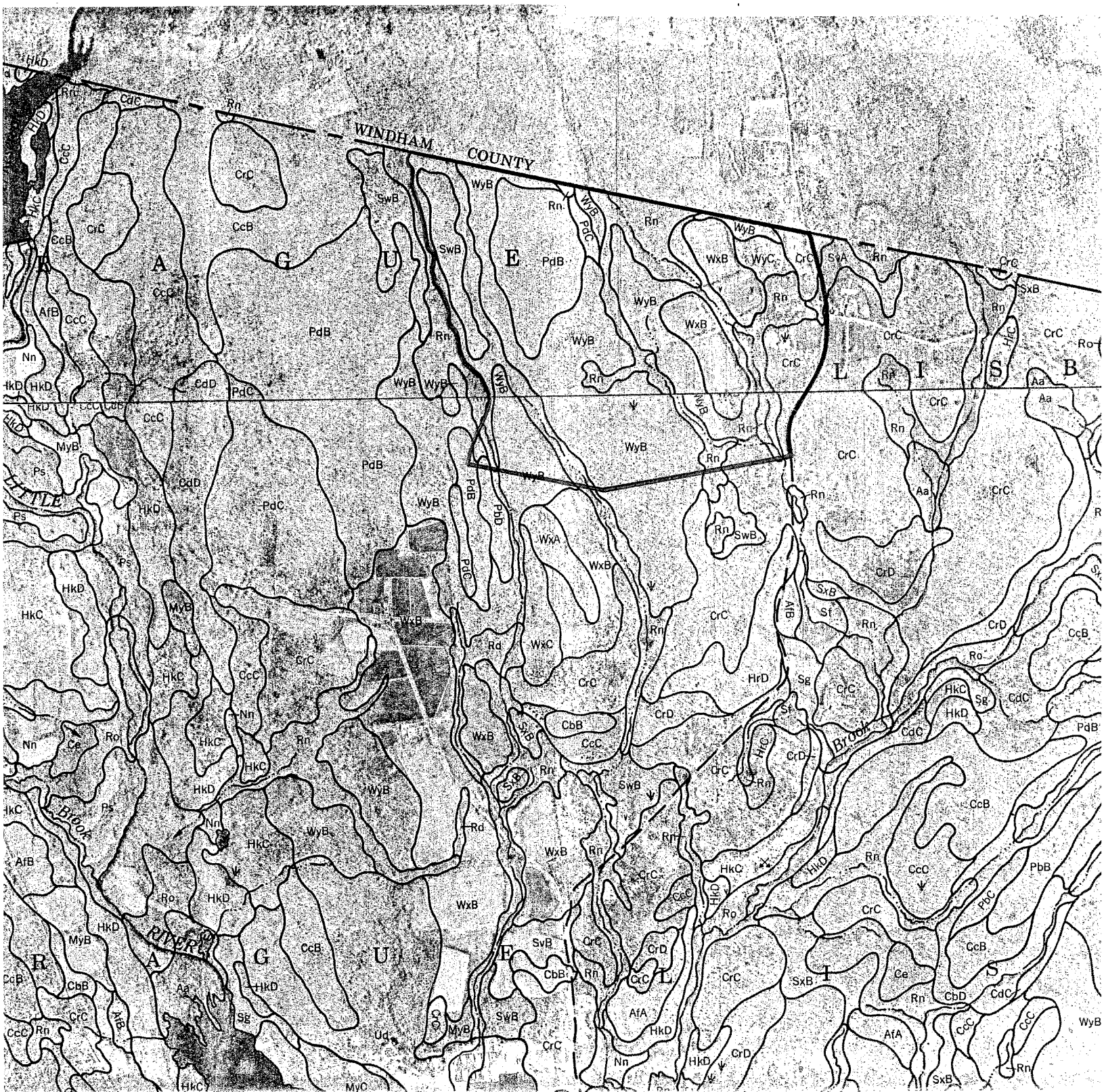
United States Department of Agriculture

Soil Conservation Service

New London County USDA-SCS
562 New London Turnpike
Norwich, CT 06360
887-4163

Scale 1" = 1320'

Approximate Site Boundary



ERT - SPRAGUE, CT. - Limitations

Soil Symbol	Soil Name	BUILDING SITE DEVELOPMENT: Dwellings w/o Basements	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Footnotes
PdB	Paxton & Montauk	Moderate wetness	Moderate: Frost action, wetness	Moderate: Large Stones	Medium: Slow perc rate	
PdC	Paxton & Montauk	Moderate slope, wetness	Moderate: slope, frost action, wetness	Moderate: slope, large stones,	Medium Slow perc rate	
CrC	Charlton Hollis	Moderate: Slope,	Moderate: Slope,	Moderate: slope, Large Stones	Medium, very high no concerns	
Rn	Ridgebury	Severe: Wetness	Severe: Wetness, Frost Action,	Severe: Wetness.	Very Low** Depth to water table	2
SwB	Sutton	Moderate Wetness	Moderate: Frost Actiom, wetness,	Moderate, Large stones, wetness	Low, Depth to water table.	
WxB	Woodbridge	Moderate wetness	Severe: Frost action	Moderate wetness	low, slow perc rate	1
WyB	Woodbridge	Moderate Wetness	Severe: Frost action,	Moderate Large Stones wetness	low, slow perc rate	
WyC	Woodbridge	Moderate: slope, wetness,	Severe: Frost Action	Moderate: slope, Large Stones, wetness,	low, slow perc rate	

(1) = Prime Farmland. (2) = Wetlands. * = See description of the map unit for composition and behavior characteristics.

5. HYDROLOGY

Drainage from most of the site flows generally southward to unnamed tributaries to Old Stone Mill Brook. Old Stone Mill Brook is a tributary to the Little River. Approximately 120 acres in the western portion of the site drains southward to Papermill Pond. This streamcourse is unnamed.

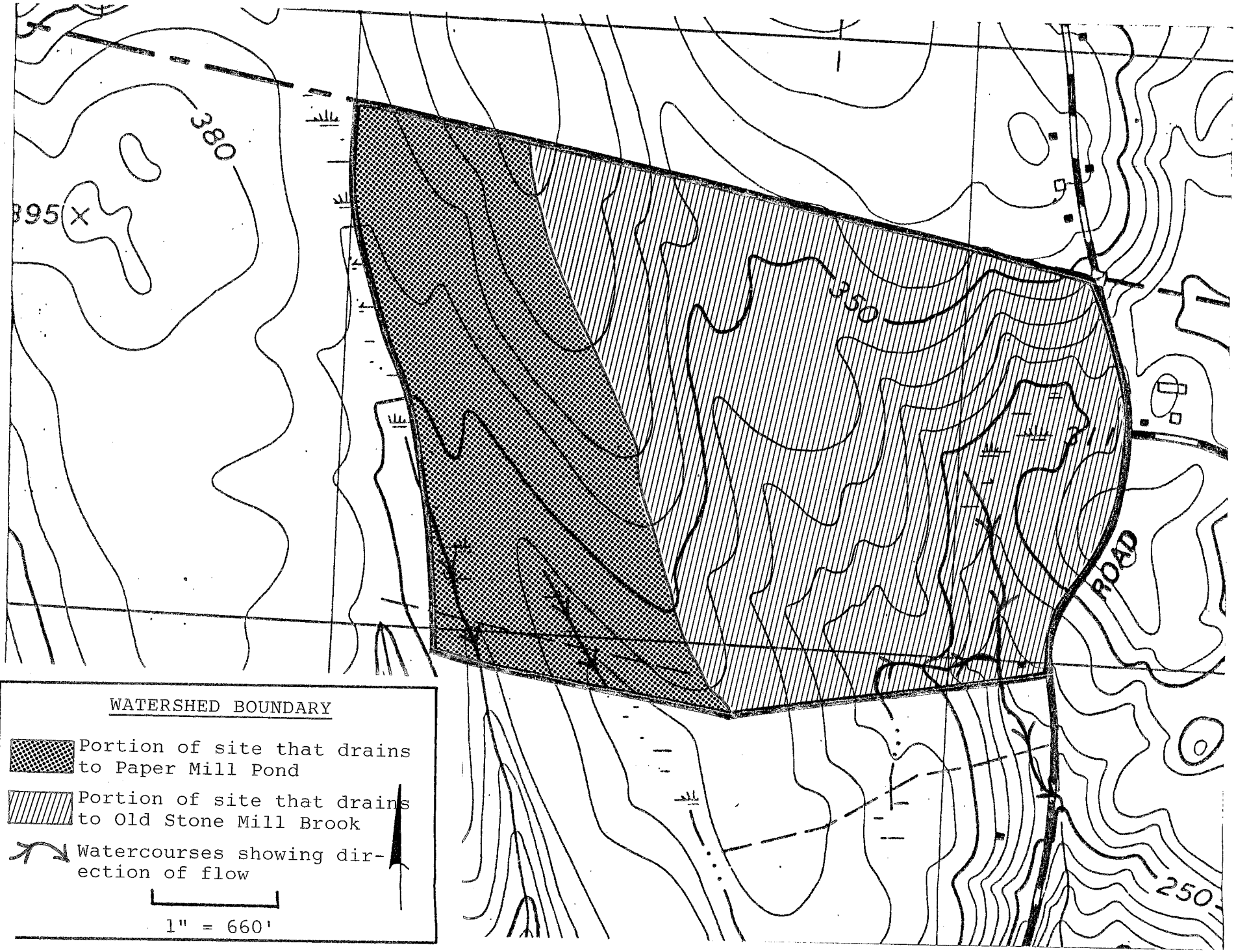
According to the Soil Survey for New London County, the site's principal wetland areas are relatively narrow and parallel the intermittent watercourses on the site. There are a least two roughly, circular, peaty/mucky wetland areas in the eastern portions. The inland-wetlands on the site have not been mapped to date. It is suggested that a certified soil scientist map the wetlands. The boundaries should be flagged and numbered sequentially and then surveyed onto the plan map. The soil scientist should then review and sign a statement on the map(s) certifying that the information is substantially correct. The certification statement should be similar to the following: "The wetland soils on this site were identified in the field using the criteria required by Connecticut P.A. 72-155 as amended by Conn. P.A. 73-571, Connecticut P.A. 87-338 and P. A. 87-533. The boundaries of these soils and of identified watercourses are accurately represented on the plot plan." This statement should be signed by the soil scientist who performed the field work.

Based on the distribution of wetland soils on the site, it appears that the interior road system under either proposal would require crossing regulated wetland soils.

Since these areas are regulated under Chapter 440 of the Connecticut General Statutes, any proposed activity that impacts regulated areas must be approved by the Sprague Inland-Wetlands Commission. In reviewing a proposal, the Commission will need to determine the impact that the proposed activity will have on the wetland. If the Commission feels that the regulated area is serving an important hydrologic or ecologic function and that the impact of the proposed activity will be severe, they may deny the activity altogether or, at least, require measures that would minimize the impact.

All wetland crossings should be accompanied by an erosion and sediment control plan. If approved, wetland crossings should be constructed during the dry time of the year.

Development of the site would lead to increases in runoff and, unless mitigation techniques were employed, to increases in the peak flood flows in nearby streamcourses. Therefore, once plans become more definite, it is suggested that the applicant be


380
395
350
ROAD
250
WATERSHED BOUNDARY
Portion of site that drains to Paper Mill Pond
Portion of site that drains to Old Stone Mill Brook
Watercourses showing direction of flow
1" = 660'

required to submit a stormwater management plan which includes pre-and post-development computations. These computations are an assessment of downstream effects and plans for control of stormwater. They should be developed using the appropriate method selected from Chapter 9 of the Connecticut Guidelines for Soil Erosion and Sediment Control (1985). Designs for sediment basins and stormwater detention basins must also use the criteria and standards found in the Guidelines.

The applicant's engineer should compare the advantages and disadvantages of a conventional subdivision and the "cluster" subdivision. It would seem likely that the "cluster" type would probably lead to a lower percentage increase in runoff since more than half of the site would be left natural versus the conventional subidivision. Also, the "cluster" development would be concentrated over a smaller area, thereby, easier to control. On the other hand, this suggests that runoff would be concentrated in one area and, therefore, will require careful erosion-control measures.

Every effort should be made to protect watercourses and wetlands on and off the site. Therefore, it is strongly recommended that a comprehensive erosion and sediment control plan be developed covering construction on each lot under either plan. Disturbed areas should be kept to a minimum under the plan. finally, all downstream culverts should be carefully examined to insure that they can handle post-development flows. (Please refer to Section 6 **EROSION AND SEDIMENT CONTROL** for further comments and recommendations.)

6. EROSION AND SEDIMENT CONTROL

If one of the proposals is accepted an erosion and sediment control plan should be prepared for the project and include the following:

A. A narrative describing:

1. The development;
2. The schedule for grading and construction activities.
3. The design criteria for proposed soil erosion and sediment control measures and storm water management facilities.

4. The construction details for proposed soil erosion and sediment control measures and storm water management facilities.
5. The installation and/or application procedures for proposed soil erosion and sediment control measures and storm water management facilities.
6. The operations and maintenance program for proposed soil erosion and sediment control measures and storm water management facilities.

B. A site plan showing:

1. The location of the proposed development and adjacent properties.
2. The existing and proposed topography including soil types, wetlands and water bodies.
3. The proposed area alterations including cleared, excavated, filled or graded areas and proposed structures, utilities and roads.
4. The location of and design details for all proposed soil erosion and sediment control measures and storm water management facilities.

7. GEOLOGIC LIMITATIONS TO DEVELOPMENT

The occurrence of compact till ("hardpan") throughout the site will be a major hindrance to development. As mentioned earlier, the substratum of the till commonly has slow permeabilities, which results in a seasonally high water table. Under the conventional subdivision plan, engineered septic systems would probably be required on most lots to overcome the environmental limitations, but soil testing would need to verify this. Because lot sizes would be large (2 acres or more), the design engineer would have some flexibility for locating septic systems. Proper fill material and/or the combination of curtain drains (groundwater intercepting drains) are the common design criteria used to address the presence of a relatively shallow "hardpan" and its effect on the seasonal perched water table. Nevertheless, lot-by-lot soil testing will be required and it is expected that difficulties will be encountered on some lots, particularly those that are adjacent to mapped wetlands or at the eastern limits where bedrock outcrops occur. This may possibly require some re-alignment of the preliminary lot layout distributed to Team members. The latter could result in a reduction of lots.

It is very important to excavate a sufficient number of deep test holes on those lots characterized by shallow bedrock. This will allow for a good profile of the bedrock surface. In general, a depth of at least 4 or 5 feet above bedrock is desirable, so that the bottom of the leaching trenches would essentially be constructed in existing soils.

Under the "cluster" plan, the development would be served by municipal sewers which would eliminate the need for on-site septic systems. The availability of municipal sewers will help to allay the hydrogeologic concerns mentioned earlier. However, the sewer line would have to be extended from the village of Hanover, a considerable distance from the project site. In addition, it would traverse private property (the need to secure right-of-ways), regulated wetlands, the Little River, and compact soils. It will also probably require a pumping station and zone change. As a result, it seems likely that the extension of the sewer line to this rural area would undoubtedly be inordinately expensive or not possible. The applicant's technical staff will need to carefully evaluate the economics of both proposals.

It is understood that the purpose of extending the municipal sewer would allow the reservation of ± 150 acres of open space in the western half of the site. From a standpoint of open space, it seems likely that the eastern part with its open fields would have more amenity value and better accessibility (from Water Street). Also, if the cluster development occurred at the western limits, the sewer line would not have to be extended as far, and the "cluster" development concept (comprised of half acre lots) would not be as visible from Water Street thus providing a vegetative buffer. A high density development of homes in a concentrated area would obviously detract from the rural nature of this area. On the other hand, access roads would need to cross more regulated wetland areas. These concerns as well as others to be discussed in later parts of the report need to be carefully considred by Town and applicant before a decision is made on the project.

8. WATER SUPPLY

Since no public water supply facilities would be available to the site, residential development under either plan would have to be served by on-site wells. Each lot in the subdivision would presumably be served by individual wells. The only practical source of groundwater would be the bedrock aquifer. As mentioned earlier in the ***GEOLOGY*** section, the bedrock consists of gneisses and schists.

Wells drilled in bedrock generally supply small but reliable yields of groundwater. Since the yield of a given well depends upon the number and size of water bearing fractures that it intersects and since the distribution of fractures in bedrock is irregular, there is no practical way, outside of drilling the well to predict the yield of a well drilled in a specific location. Because fractures in the rock generally occur within the first 100 to 150 feet below the surface, it has been shown that the probability of increasing the yield of a well decreases with depth below this level. In some places, well or wells may need to penetrate 40 feet of till before reaching the bedrock surface.

Regionally, the quantity of water that can be withdrawn from bedrock is dependent on the amount of recharge from precipitation and the ability of the aquifer to transmit water. According to Water Resources Bullletin #31 (Lower Connecticut River Basin), the amount of recharge from precipitation is estimated to average from 8 to 10 inches per year.

The Team's Geologist made a comparison of proposed water demand and groundwater recharge for the conventional subdivision. Based on conservative estimates, it is expected that gorundwater recharge (about 8 inches/year) will be about seven times the gross water demand of the subdivision. It should be noted that this does not account for septic tank recharge, which no matter how distasteful it may sound,plays a very important role in the groundwater budget. As such, there should be no major problems with changes in the groundwater budget under the conventional subdivision plan. Also, developing the site under the conventional subdivision plan (2 acre lots) will allow flexibility for conservatively separating neighboring wells. This will help to reduce the chance for mutual interference by neighboring wells during pumping periods.

Under the "cluster" development, municipal sewers would serve the proposed subdivision. Since on-site septic systems will not be used, renovated effluent from septic systems will not be available for groundwater recharge. As mentioned in the preceding paragraph, renovated wastewater plays an important role in the groundwater budget.

The question that needs to be answered is whether or not the loss of available recharge by domestic wastes to the municipal sewer line will adversely effect the ability of proposed on-site bedrock wells, particularly for low yielding wells, during droughty periods and/or over long periods of time. Another concern that should be addressed is the possible impact to the local water table, streamcourses and wetlands. Since there is much undeveloped land in the vicinity of the site and sewers will

be available to the areas once the line is extended, the question of groundwater recharge becomes a significant one. One then begins to see the importance of sewer avoidance particularly when municipal water mains are not in the vicinity. Another potential concern with the cluster development is that wells would need to be spaced fairly closely together. Experience has shown that a well spacing of 200 feet or greater is sufficient to avoid mutual interference. Such a spacing will be difficult with half acre lots.

Ideally, each well should be located on a relatively high portion of a lot, properly separated from the sewage disposal system, sewer lines and any other potential pollutant (e.g., fuel oil storage tanks, etc.) and in a direction opposite the expected direction of groundwater movement. They should all be cased with steel pipe into the underlying bedrock. In order to provide adequate protection of the quality of the bedrock water, all wells will need to be properly installed in accordance with applicable State Public Health Code and Connecticut Well Drilling Board regulations. In addition, the Town Sanitarian for the town will need to inspect and approve well locations.

According to Water Resources Bulletin #15, (Lower Thames and Southeastern Coastal River Basins) which encompasses the site, 9 out of 10 bedrock wells yield at least 3 gallons per minute. In general, a yield of 3 gallons per minute is desired for domestic purposes.

The natural quality of groundwater should be satisfactory. The schists and gneisses beneath the site may have elevated amounts of iron and/or manganese minerals which would lower the overall quality. If elevated iron and/or manganese levels are present in the water, it may be necessary to provide suitable treatment filters.

Groundwater in the area is classified by the DEP as GA, which means that it is suitable for private drinking water supplies without treatment.

9. PLANNING CONCERNS

The Regional Plan of Development depicts the general area this parcel is located in as suitable for "Low Density Uses" which are residential uses at less than one unit per 1.5 acres, agriculture, open space, recreational and water supply uses. The extensive wetland soils and topography of the area contribute to this use classification.

The zoning classification of surrounding properties in neighboring towns is low density residential. Specifically, property in the Town of Lisbon is zoned for 60,000 square foot residential lots while property in the Town of Canterbury is zoned for 80,000 square foot residential lots.

Traffic

Review of traffic count data available for state routes from the State of Connecticut Department of Transportation (ConnDOT) for the years 1979 and 1987 indicates the following traffic flow patterns:

The Average Daily Traffic (ADT) on Route 138 between Route 97 and Versailles Road has been stable during this time period.

The ADT between Versailles Road and the Lisbon Town Line has increased by 200 vehicles during this same time period.

The ADT on Route 660 between the Norwich/Sprague Town Line and River Road has increased significantly by some 2400 vehicles, while between River Road and Route 138 the ADT has remained approximately the same.

The above count data depicts increased traffic flow in Sprague on Route 660 south - River Road - Hanover - Versailles Road. Also increased traffic flow from the Lisbon Town Line on Route 138 - Inland Road - Water Street - Potash Hill Road area.

*Site Traffic Generation**

Convention Lot Layout:

The proposed 59 lots could generate approximately 549 trips to and from the site per day. This would result in an A.M. peak of 44 trips and a P.M. peak of 60 trips to and from the site per day.

Concern exists for the number of curb cuts onto Water Street. All lots should access proposed roads where posible. Lots which do not front on the proposed roads should utilize combined driveway aprons onto Water Street where possible. Based

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upon the preliminary plan lots 6, 7, 2 and 3 could access the proposed new roadway. Lots 4 and 5 could have a combined driveway apron while lot 1 would access Water Street.

The general location of the proposed new roads on Water Street seem to have adequate sight distance at each intersection.

Water Street is a narrow road with a width of approximately 18 feet. It also has a number of vertical and horizontal alignment changes along its length in town that create hazards for traffic flow, and as traffic flow is increases the hazards will be accentuated.

Cluster Lot Layout:

The proposed 86 lots could generate approximately 800 trips to and from the site per day. This would result in an A.M. peak of 64 trips and a P.M. peak of 87 trips to and from the site per day.

The same concern exists for the number of curb cuts onto Water Street as in the conventional layout. The number of lots fronting Water Street increases with this layout and accordingly the number of potential conflict points. Lots 1, 80, 86 and 51 could access proposed new roads while the access for lots 81, 82, 83, 84 and 85 onto Water Street should be reviewed for combined driveway aprons where possible.

The sight clearance distance of the general location of the proposed new road intersections onto Water Street seems to be poor south of the southern intersection and north of the northern intersection.

The same concerns exist for the impact onto Water Street as listed under Convention Layout.

Site Development Limitations

The primary site development limitations from a planning perspective are, the extent and location of wetland streambelts on the parcel, and the present geometrics of Water Street.

The approximately 50 acres of wetlands are located such that the parcel is divided into three non-wetland sections. Gaining access to the non-wetland areas other than the area adjacent to Water Street, which is also the smallest area, will require disturbance of some wetlands.

Conceptually such site characteristics represent a situation in which a cluster development is more appropriate. A cluster development can utilize buildable areas while preserving significant natural features. The construction phase can experience energy savings typically as a result of street length and utility installations.

This particular site may not benefit from a cluster development. While the street length could be some 2400 feet less than the preliminary conventional layout plan, the sites sewer utilities would have to be extended from the Hanover area and on-site wells would have to be utilized, resulting in a large concentration of water supply wells in a relatively small area.

The traffic impact on Water Street from either development must be reviewed in greater detail due to the narrow road width and many vertical and horizontal alignment changes which represent traffic hazards. A complete traffic study should be submitted with any final development application of this size in this section of town.

Another transportation issue is the number of curb cuts onto Water Street including new roads. The number should be kept at a minimum in order to reduce potential conflict points.

With either preliminary plan development concept there seems to be a number of proposed lots which may be questionable for development due to the expanse of wetland soils within their boundaries. Since the cluster development plan has remaining land available lot configurations could be redesigned and perhaps relocated further into the interior of the parcel. This would require additional road and another wetland crossing. Accordingly this may further reduce any cluster development benefit.

About The Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialsits, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area --- an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

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 reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

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 town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.