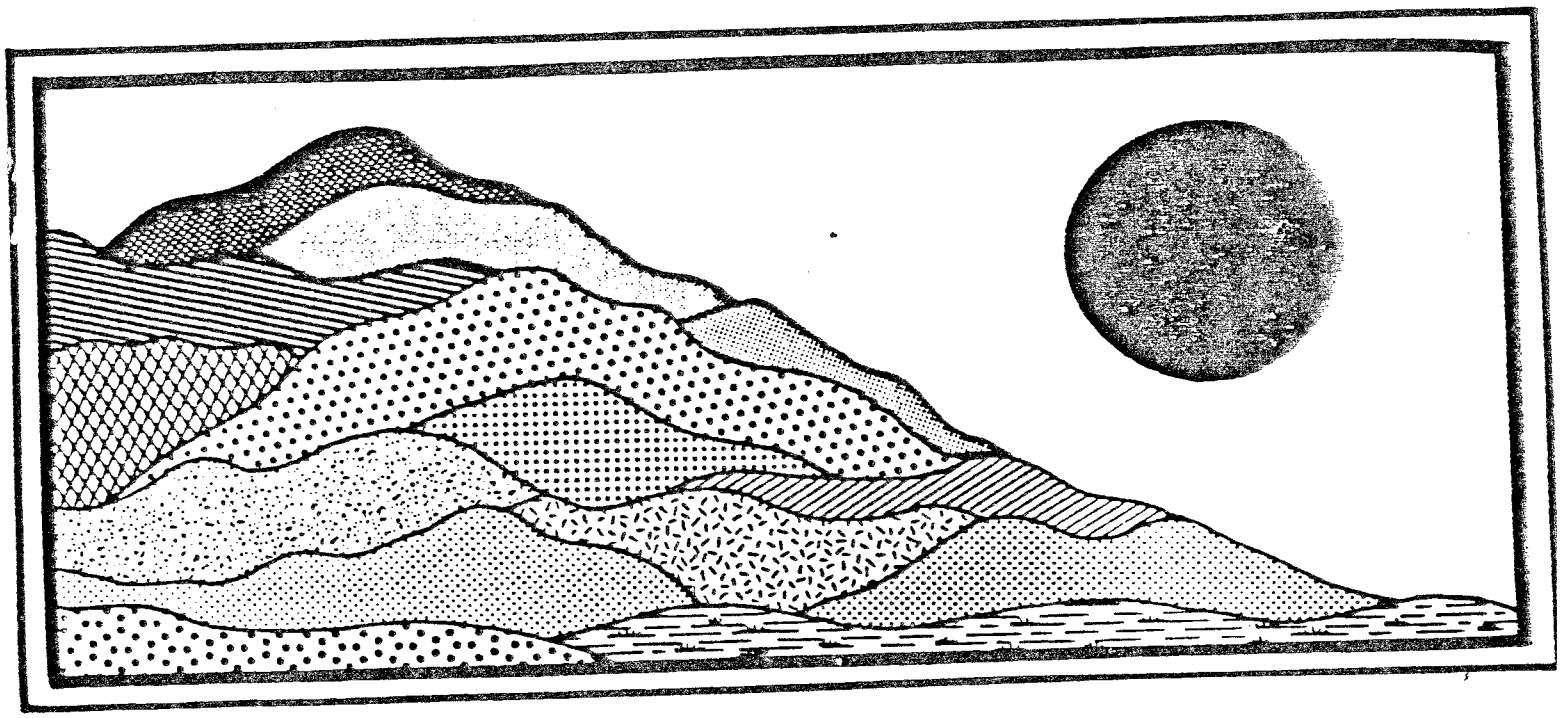
Tollgate Acres I & II

Bozrah, Connecticut

June 1986



ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Tollgate Acres
I & II
Bozrah, Connecticut

Review Date: MAY 6, 1986

Report Date: JUNE 1986

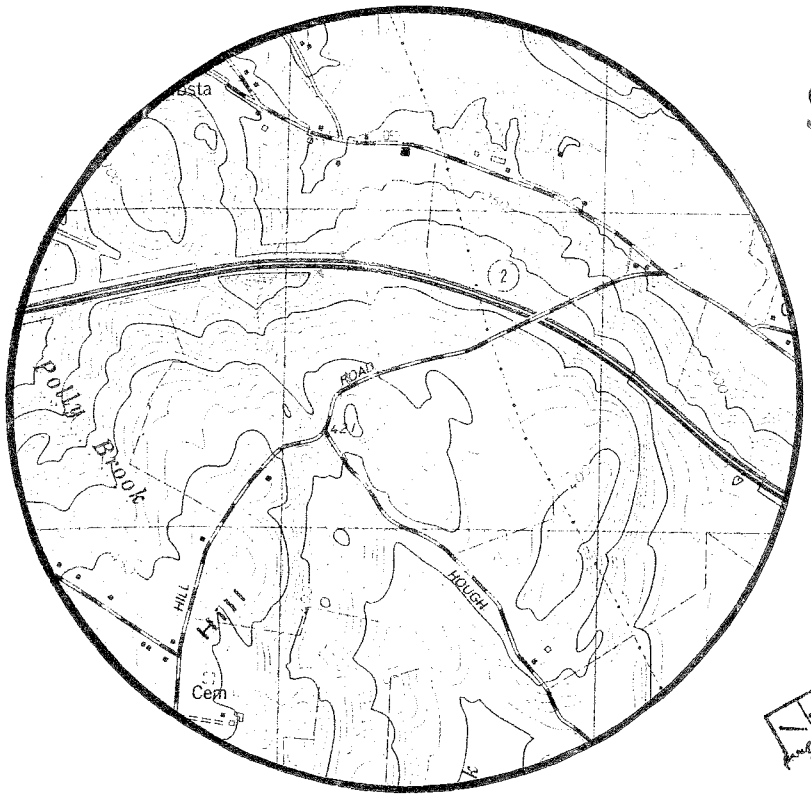
RC&D

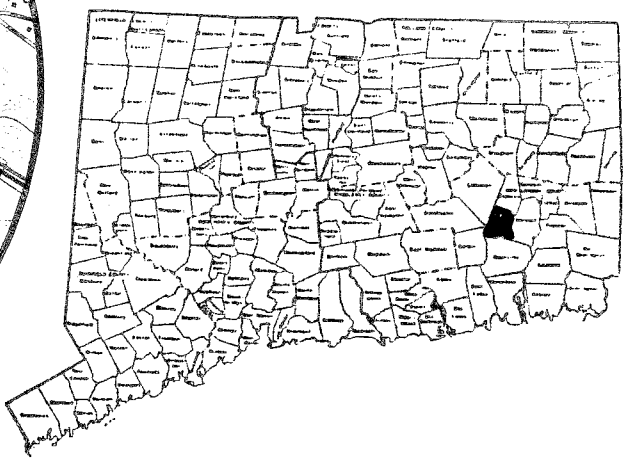
ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

Site Location

TOLLGATE ACRES I & II

BOZRAH, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

Tollgate Acres I & II

Bozrah, Connecticut

This report is an outgrowth of a request from the First Selectman of Bozrah and the Planning and Zoning Commision to the New London County Soil and Water Conservation District. (S&WCD) referred this request to the Eastern Conencticut Resource Conservation and Development (RC&D) Area Executive Committee 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 May 15, 1986. Team members participating on this review included:

Don Capellaro	- Sanitarian - Connecticut Department of Health
Maria Martinez	- Soil Conservationist - U.S.D.A. Soil Conservation Service
Charles Storrow	- Regional Planner - Southeastern Connecticut Regional Planning Agency
Elaine Sych	- ERT Coordinator - Eastern Connecticut RC&D Area
Bill Warzecha	- Geologist - DEP, Natural Resources Center
Judy Wilson	- Wildlife Biologist - Connecticut Department of Environmental Protection

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 soils map and a topographic map. During the field review the team members were given site plans. The Team met with, and were accompanied by the First Selectman, the Planning and Zoning Chairman, the engineers and developers of the subdivision. 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 subdivisions.

If you require any additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 198
Brooklyn, CT 06234

(203) 774-1253

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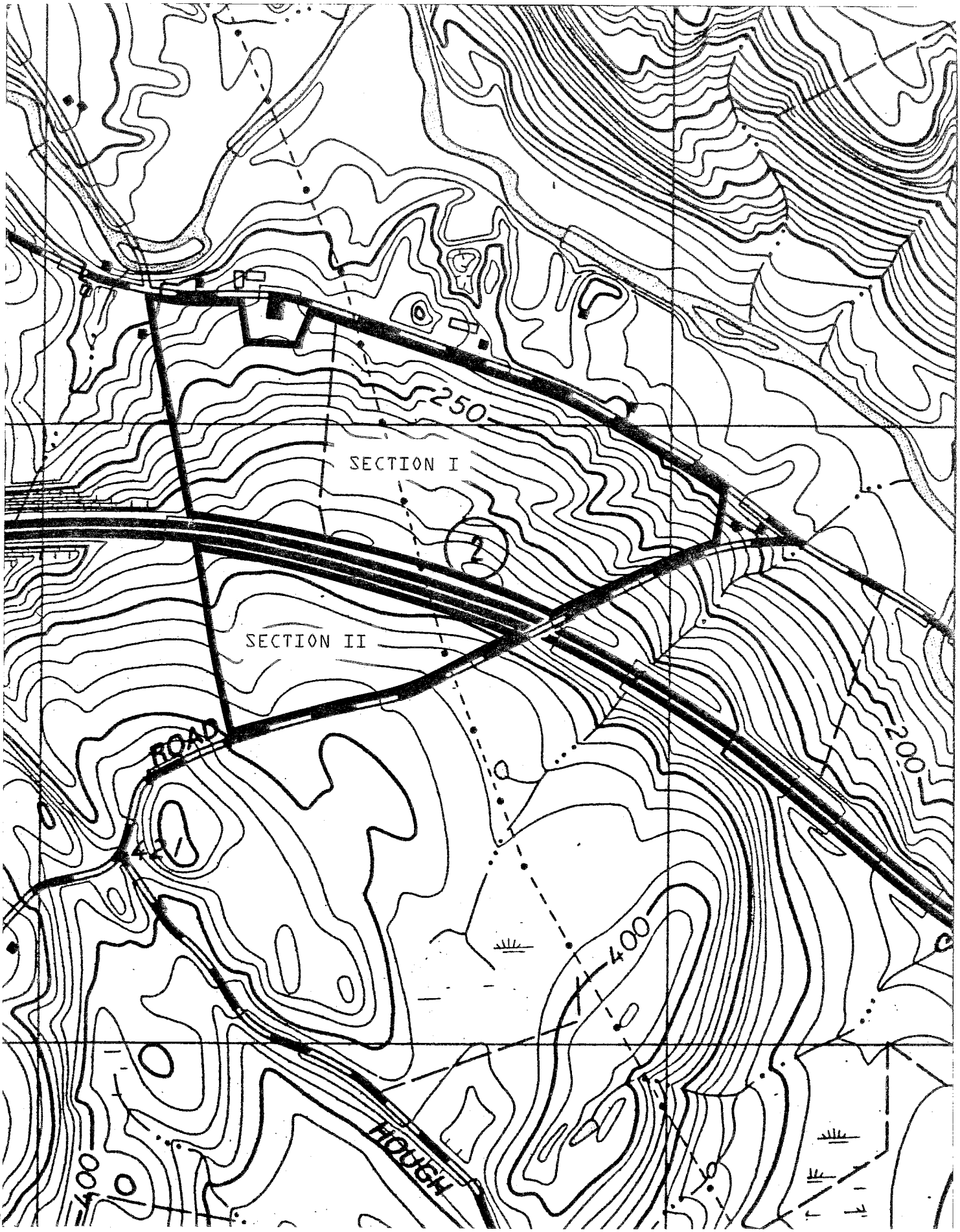
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SECTION I
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SECTION II
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1. INTRODUCTION

The Bozrah Planning and Zoning Commission has asked for Environmental Review Team assistance in reviewing the proposed Tollgate Acres I & II subdivision.

It is understood the property consists of two (2) parcels having a combined acreage of approximately 82 acres of mostly pasture land (some wooded) and open fields. The two (2) parcels are located between Norwich-Colchester Road (Route 608) and Route 2 and Route 2 and Bashon Hill Road. Apparently this acreage was part of a large farm (Sullivan) with the homestead located on Route 608. Although the homestead does not consititute a part of the actual lower subdivision, several of the proposed lots would be around the existing large house.

Subdivision plans prepared for Mystic Land Company, the owners, by Towne Engineering, Inc. indicate the property is to be subdivided in two (2) sections. The lower portion which is situated between Route 608 and Route 2 with a small area along Bashon Hill Road would have a total of 17 lots on some 63 acres. The chief features of the parcel are the steeply rising terrain towards a north to south direction and a City of Norwich water main easement which runs parallel with Route 608 near the front of the property. Drainage from the property eventually enters the Yantic River which is located north of Route 608.

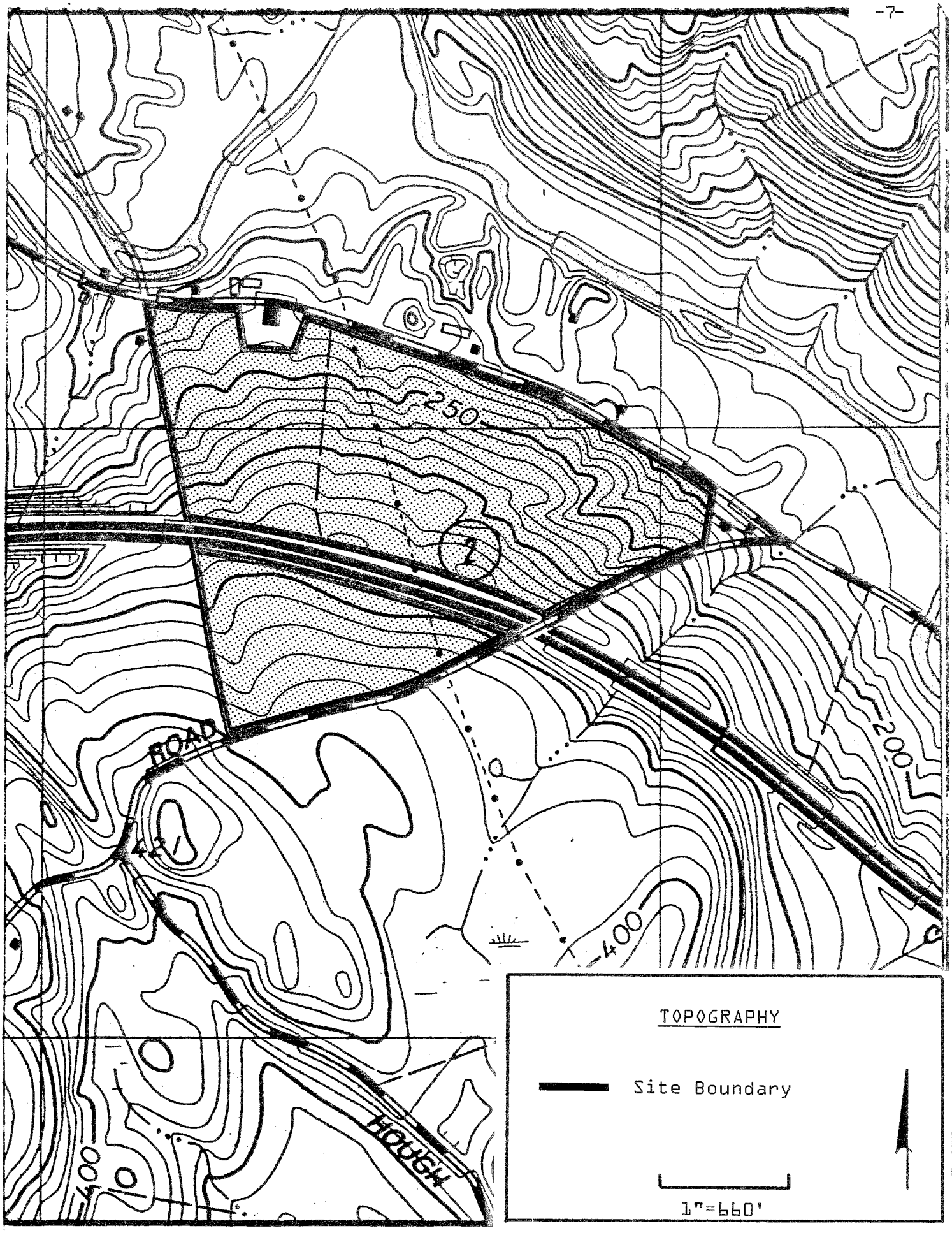
Section II, the higher parcel along Bashon Hill Road to Route 2 consists of approximately 19 acres and would have a total of 5 lots. The chief features of the more moderate sloping terrain are: The Connecticut Light and Power easement towards the east side and a large wetland area at the west end.

It is understood that two (2) zoning districts exist. The minimum size lot required in Section I (larger parcel) would be 40,000 square feet while in Section II, lots would need to have at least 60,000 square feet. All proposed lots exceed the minimum requirements with only several in Section I being close to one (1) acre.

2. TOPOGRAPHY AND SETTING

A. Section I

The proposed Tollgate Acres subdivision (Section I) comprises 63.52 acres in the northern parts of Bozrah. It is bordered on the south by Route 2; on the east by Bashon Hill Road; and the north by Route 608 and on the west by properties under private ownership. Proposed access to the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ROAD
HOUGH
2
TOPOGRAPHY
Site Boundary
1"=660'

17 lot subdivision will be accomplished mainly by individual or shared driveways via Route 608. Although no major watercourses are visible on the site, several seasonal watercourses flow in topographic swales throughout the parcel. Water flow in these channels is mainly during the spring and winter months. Flowing water was visible in several of these channels during the field review. These areas are comprised of regulated inland-wetland soils and, as a result, the applicant has had their boundaries identified in the field by a certified soil scientist. These boundaries have been superimposed on the site plan. Maximum and minimum elevations on the site are about 340 feet and 200 feet above mean sea level, respectively.

B. Section II

Section II of the Tollgate Acres subdivision is located southwest of Section I and consists of 18.61 acres. Present plans indicate that five (5) lots are desired by the applicant for the site. The lots would range in size from 2.02 acres to 8.51 acres.

The parcel of land is pie-shaped and lies between Bashon Hill Road and Route 2. The land slopes gently towards Route 2.

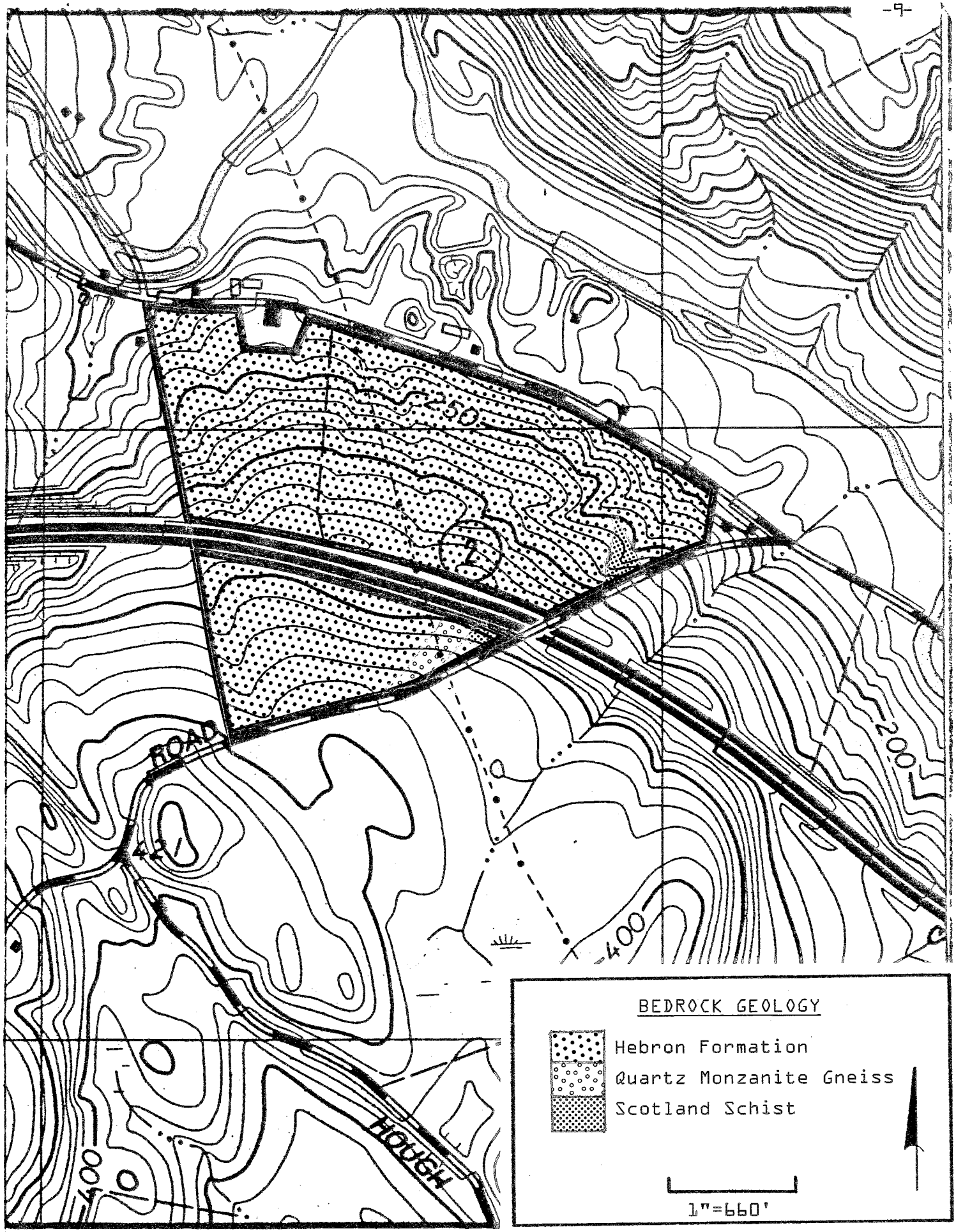
Section II also lies within the Fitchville quandrangle. Therefore, the Team's geologist referenced the same geologic maps mentioned in the geology section of the report for Tollgate Acres, Section I.

3. BEDROCK AND SURFICIAL GEOLOGY

A. Section I

The site is located at the northern end of Bashon Hill. Bashon Hill is a geologic feature known as an upland rock and till drumlin. Typical drumlins are stream-lined, oval-shaped topographic features which consist of ground-up rock material plastered by moving glacial ice onto a core of crystalline bedrock. The long axis of the hill parallels the direction of past ice movements. The direction of the long axis on Bashon Hill is southeast. Glacial striae or grooves were inbedded on the bedrock surface by moving glacial ice at the southern part of the property near Route 2. These grooves are also an indicator of direction for past ice movements. The glacial grooves on the site also point in a southeast direction.

A glacial sediment called till covers the entire site. A colloquial term given to till based soils is "hardpan". It is so-called because of a compact zone generally encountered at about two (2) feet or less below ground surface. Penetrating this "hardpan" zone is very difficult with hand tools.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ROAD
HOUGH
BEDROCK GEOLOGY
Hebron Formation
Quartz Monzanite Gneiss
Scotland Schist
1"=660'

Till consists of ground-up rock particles of varied shapes and sizes. These particles were deposited directly from glacier ice without being reworked by meltwater streams emanating from the glacier ice. In the first couple of feet, the till is often relatively sandy and friable, with moderate permeability. Stoniness is also characteristic of this zone. At depths between 2 to 4 feet and greater, the till commonly becomes silty, very compact, and only slightly permeable. Since groundwater tends to travel slowly through this compact zone, an elevated (perched) groundwater table often results.

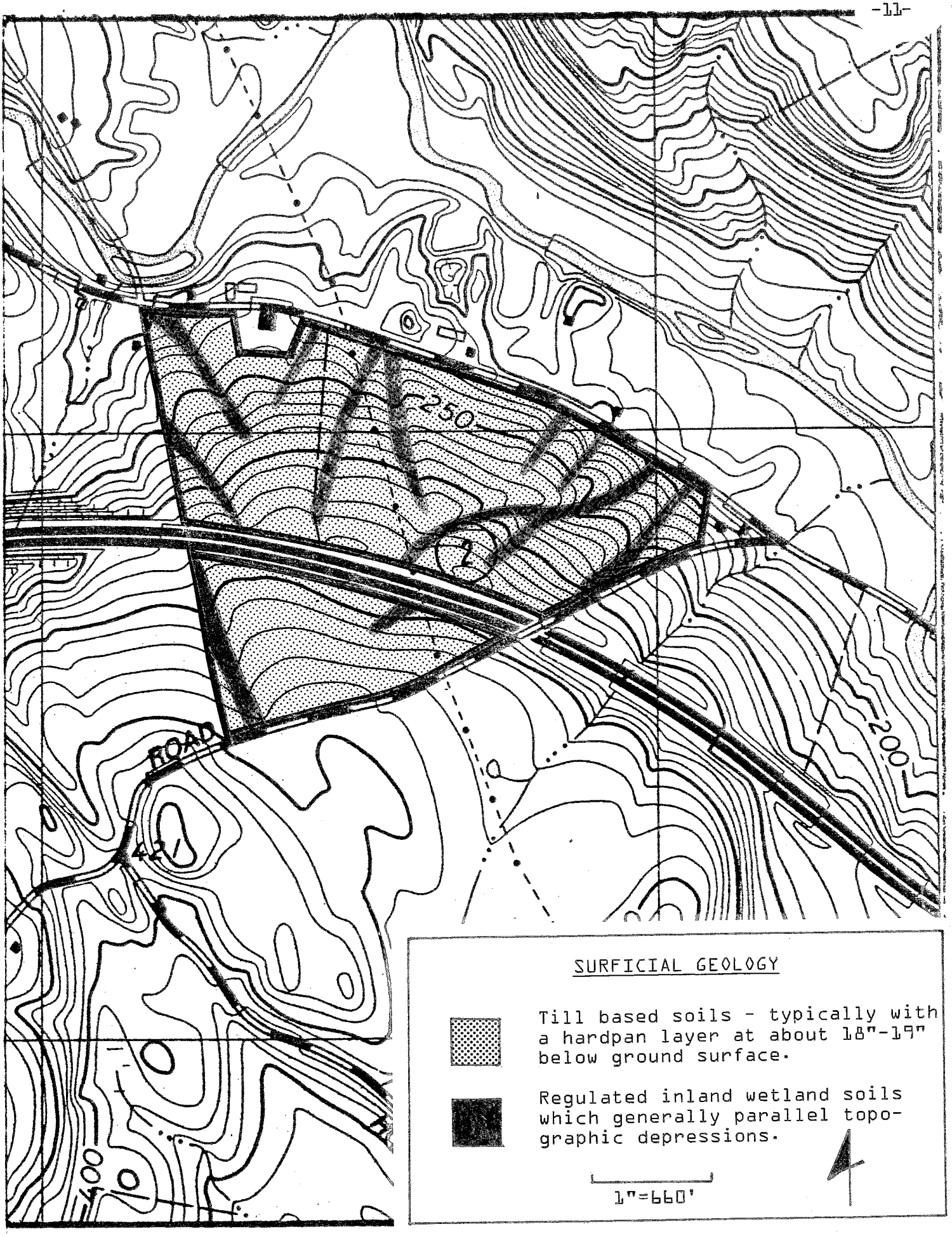
Based on the soil information supplied by the project engineer, the till soils throughout the site meet the description discussed above. None of the 51 deep test pits excavated throughout the site, which range between 7 and 8 feet, encountered the bedrock surface. Generally speaking, thicker till deposits are often found on the north sides of upland hills, while the southern parts are generally more rugged and have thin soil coverage. This appears to be the case in Section I. The exact thickness of the till soils on the site is unknown, but probably ranges between 10 and 20 feet.

The Team's geologist referenced the surficial geologic map (Map GQ-485, by Fred Pessl) published by the U. S. Geological Survey and the "Soil Survey for New London County", Connecticut for the above discussion.

Bedrock does not break the ground surface on the site, but it has been exposed in a road cut along Route 2 near the southern boundary. The bedrock geology of the site has been well described in a report entitled "Petrochemistry and Bedrock Geology of the Fitchville Connecticut Quadrangle" by George L. Snyder (U. S. Geologic Survey Bulleting 1161-I, 1964). The rock core for most of Bashon Hill, including the proposed subdivision is identified as the Hebron Formation and consists of a layered, fine grained greenish-gray, calc-silicate rock; purplish-brown nonresistant calcareous schist; and brown noncalcareous schist. Snyder also identifies another rock type in the eastern parts of the site and refers to it as Scotland Schist. This rock formation weathers easily and contains a high percentage of iron bearing minerals. Undoubtedly, the latter will effect the quality of water withdrawn from bedrock wells that tap Scotland Schist.

The term schist mentioned above refers to a crystalline, metamorphic rock (a rock geologically changed by great heat and pressure).

As indicated earlier, the on-site test hole work has demonstrated that the depth to bedrock exceeds 7 feet or more on most of the site. Therefore, it should not pose any major problems in terms of the proposed subdivision(s). Since the underlying bedrock will be the source of water to houses in the proposed subdivision, it will effect the quantity and quality of the water withdrawn from the bedrock wells. This will be discussed further in the Water Supply section of this report.



SURFICIAL GEOLOGY

Till based soils - typically with a hardpan layer at about 18"-19" below ground surface.

Regulated inland wetland soils which generally parallel topographic depressions.

1"=660'

B. Section II

The site is underlain mainly by the same rock type (Hebron Formation) that underlies Section I. These rocks have been well described in the geology portion of the report for Section I. Therefore, interested persons should reference this part of the report for the rock description. It should be noted that Snyder has indicated another rock type underlying the site in the east central parts along Bashon Hill Road. He describes the rock as a quartz monzonite gneiss, which intruded the Hebron Formation as molten magma (an igneous). Following its intrusion, the igneous rock was subjected to metamorphic processes (great heat and pressure). The process changed the rock into a gneiss. The rock is described as a uniform white to gray, medium grained gneiss, composed of the minerals microcline, oligioclase, quartz, muscovite, and biotite.

According to deep test hole information, which ranged between 87 inches and 97 inches below ground surface, bedrock was not encountered during excavation of the hole.

The differences in the composition of the rock types mentioned earlier should not have any impact on the proposed subdivision. Like Section I, the underlying bedrock will influence the quality and quantity of drilled wells which will need to tap the underlying bedrock (See Water Supply section of report).

Bedrock in Section II is covered entirely by glacial till. It is basically the same variety of till which covers most of Section I. Based on deep test hole information supplied by the project engineer, the soils on the site are characterized by a hardpan layer or compact zone at about 19 inches below ground surface. This results in a seasonally high groundwater table and relatively slow permeability rates in the compact zone.

Overlying the till-based soils on Lots 1 and 5 are regulated inland-wetland soils. These soils which generally occupy seasonally wet topographic depressions on the lots, have been field checked by a certified soil scientist and their boundaries superimposed on the subdivision plan. Because water saturates these soils mainly during the winter and spring months, and because the soils may be unstable in places, these areas hold very little potential for development. Any activity involving the filling modification or disturbance on wetland soils will be subject to permit by the Town's Inland-Wetland Commission.

4. GEOLOGIC DEVELOPMENT CONCERNS

A. Section I

The major geologic limitations found in Section I of the proposed subdivision include (1) areas of moderate to steep slopes (2) the presence of compact

till-based soils which commonly results in seasonally high groundwater tables and which have slow percolation rates in the compact zone (Note: The compact zone is usually encountered at about one and a half feet below ground surface); and (3) the presence of seasonally wet soils that generally parallel the intermittent watercourses on the site.

These geologic limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems serving homes constructed in the subdivision, since public sewers are not available.

Mottling, which was observed in all of the deep test holes at relatively shallow depths excavated in Section I, indicates that the site experiences a seasonally high water table. Mottling is a term given to a rust-colored stain that occurs in the soil resulting from a perched watertable. The latter is due mainly to the relatively low permeability of the hardpan zone. Because of the seasonally high water table present throughout the site and because of the slow permeability rating in the compact zone, all lots in Section I will require properly planned and engineered septic systems. Preliminarily, it appears that septic systems may require filling, as well as the possible installation of curtain drains to intercept groundwater so that it does not interfere with the leaching system. Also, it is wise to spread the leaching trenches out parallel to the contours, rather than stacking them up on top of one another.

Because 75 percent of the lots in Section I are greater than two (2) acres or more, it seems likely that this would give the applicant's engineer greater flexibility for finding a suitable area for a sewage disposal system than, for instance, one (1) acre lots. However, if some of the geologic limitations mentioned earlier predominate on a particular lot, finding a suitable area for the installation of the sewage disposal system may still be problematic, even with the larger lot sizes.

Once septic systems are engineered and approved by the proper authorities, i.e., state and local health department, it is important that the system be installed by a state licensed installer, installed according to the finally approved design specifications and, also, be properly maintained (e.g., pumped regularly (3-5 years) by the homeowner.

In summary, it appears that only if septic systems are carefully designed and constructed, can the geologic constraints mentioned earlier be surmounted.

The moderate to steep slopes, particularly along Route 608 present problems in terms of driveway grades. If proper engineering measures are not taken, severe gullying and erosion will occur on unpaved drives accumulating unwanted sediment onto Route 608 and, ultimately, into the Yantic River. It should be pointed out that the DEP has classified the surface water for the section of the Yantic River just north of the site, as class Bc. A class B stream is suitable for bathing or other recreational purposes, agricultural uses, certain industrial processes and cooling; excellent fish and wildlife habitat; good aesthetic value. The subscript c means the water can support cold water fisheries, i.e., trout. (See Hydrology Section of this report for further discussion).

One other potential problem is apparent with regard to the driveways, because the slopes are located on the north side and because the slopes shade sunlight from the site, one may expect ice accumulation on and at the ends of the driveways during the winter. These ice patches may be dangerous for the subdivision residents and possibly for other drivers on Route 608. Unless this potential problem can be properly addressed by the project engineer in his storm drainage sytems, perhaps an alternative access road system should be considered. For example, one possible alternative would be to access the property via Bashon Hill Road with a cul-de-sac to service the property. Homes could be constructed on the north and south side of the road. This alternative would require realignment of the present lot layout and probably would require more wetland crossings. The pros and cons of all possible alternatives will have to be weighed either way.

It should be pointed out that the latter route would eliminate crossing the City of Norwich's Department of Public Utilities water transmission line with driveways. The 30" water transmission line bisects the northern edge of the property in an east-west direction.

A final concern regarding steep slopes, particularly those on till-based soils, is that steep slopes of excavations slump when wet.

Based on the subdivision plan, it appears interior driveways will cross some of the seasonal wetland areas within the parcel. Wetland crossings are generally feasible provided they are properly designed (e.g., culverts are properly sized and installed, permeable road base fill material is used). The roads should be constructed at least 1.5 feet and preferably two (2) feet above the surface elevation of the wetlands. This will allow for better drainage of the roads and decrease the frost heaving potential of the road. It is recommended that any road construction through wetland areas be done during the dry time of the year with adequate provisions for effective erosion and sediment control. Detailed plans for any proposed road crossing through wetlands should first be submitted to the proper Town authorities and commission for their review, comment and final approval prior to beginning any construction.

B. Section II

The major geologic limitation found in Section II is the presence of compact glacial till which covers the entire site and a high percentage of inland-wetland soils. Also, there is a possibility of encountering bedrock at shallower depths in certain parts of Lot 5, for example, if the proposed leaching system location is changed.

These limitations pose the greatest problem in terms of on-site sewage disposal. All lots will require special designed septic systems by a professional engineer registered in the state. The specially designed septic system will require approval of the town and possibly state health departments. Because lots are 2 acres in size or larger and because the subdivision is low density it is not expected that any water quality problems will arise,

particularly if septic systems are properly designed, installed and maintained.

Regulated inland-wetland areas on lots 1 and 5 hold low potential for development purposes and, therefore, should be avoided.

Further information on sewage disposal can be found in Section 7, Sewage Disposal.

5. HYDROLOGY

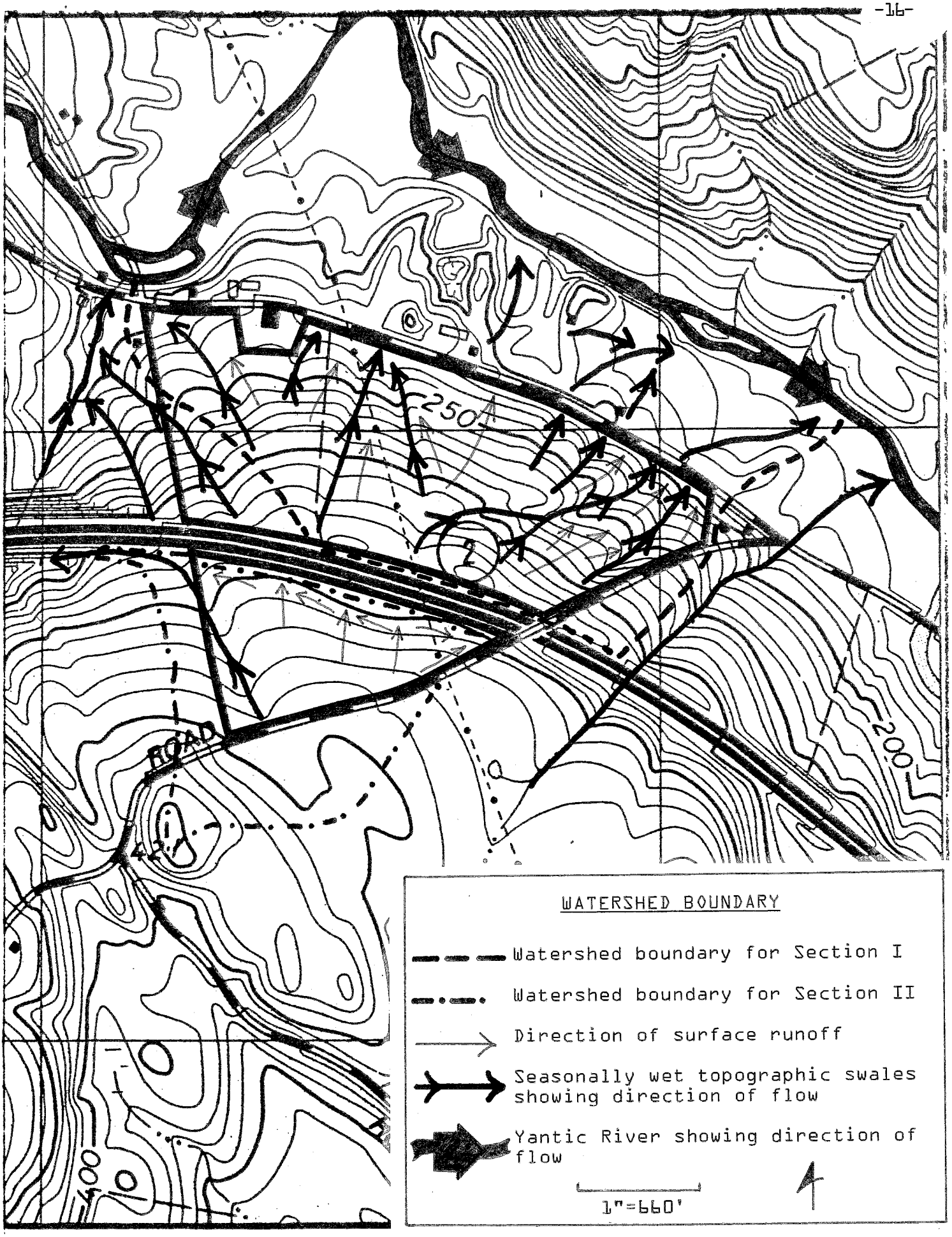
A. Section I

All of Section I drains north/northeasterly into the Yantic River. Surface and groundwater on the site flow generally downslope toward discharge points such as the intermittent drainage channels or it takes the form of sheetflow directly to Route 608. Once it reaches Route 608, water is routed through culverts under the road and is ultimately transported via streamcourses to Yantic River. Yantic River lies about 875 feet north of the northern property boundary.

Development of Section I as planned would be expected to cause some increases in runoff. These increases would arise mainly from the creation of impervious surfaces such as roof tops, driveways, patios, etc., over otherwise pervious soils. Because of the large drainage area of Yantic River, there should be no noticeable impact on the river's normal flow rates. In addition, the density of the proposed subdivision is not that high. Nevertheless, as a matter of policy, the applicant's engineer should formulate a stormwater management plan, which includes pre and post-development runoff calculations. Once the project engineer compiles this information, it can then be determined whether or not post-development runoff increases will require stormwater detention. Close examination of the pipes passing under Route 608 is warranted to determine if they will be able to handle post-development flows without causing any flooding problems or ice problems during winter months on the road.

The driveways into the lots fronting Route 608 may become a source of pollution, however. Water flowing down the driveways during rainy periods or snow melt could carry sand, salt, oils and other debris ultimately into the river. Because some of the lots in this area will be sharing driveways this should help reduce the risk of pollutions.

It seems likely that the major risk from the driveways would be sand. Although salt and oil may be introduced into the streamcourses feeding Yantic River, the quantities would probably be small and the contaminants would be likely to move through the tributary and river system. Because driveways would be constructed on moderate to steep slopes, sand will be washed quickly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WATERSHED BOUNDARY
Watershed boundary for Section I
Watershed boundary for Section II
Direction of surface runoff
Seasonally wet topographic swales showing direction of flow
Yantic River showing direction of flow
1"=660'

down the slope, across the road (Route 608) and into the streamcourse leading to Yantic River. This would lead to the accumulation of sand in tributaries to Yantic River and Yantic River itself. Perhaps some type of sediment trap could be designed for the end of driveways to prevent sand from crossing Route 608. The design specifications for this potential erosion sediment control measure should be incorporated into the stormwater management or erosion and sediment control plan.

B. Section II

As in the case with Section I, Section II also lies within the Yantic River watershed. Based on a cursory inspection of Section I, surface and to a large extent groundwater flows downslope towards Route 2. Once surface runoff reaches Route 2, most of it is intercepted by culverts along the road or by a paved depression and routed westward to an unnamed tributary to Yantic River. It appears that surface runoff from Lot 5 is intercepted by road drainage along Route 2 and is transported eastward to another tributary to Yantic River.

Although some increases in runoff might be expected by the proposed development in Section II, the density is low enough so that no major problems are anticipated as a result. As a matter of policy, the applicant's engineer should submit to the Town for their review, a sound erosion and sediment control plan.

6. WATER SUPPLY

Although there are a limited number of dwellings or buildings along Route 608 which have the availability of the Norwich Water Supply, the proposed subdivisions would be serviced by private on site wells. The existing 30 inch water main which crosses the front portion of Section I is the main transmission line for bringing water to the City of Norwich from the Deep River Reservoir in Colchester. The conceptual layout for individual wells indicate locations towards the upper or high side of lots and in a direction away from the normally expected groundwater flow from any probable source of pollution. Wells for single family houses would have a required withdrawal rate of under 10 gallons per minute to meet normal daily needs and, therefore, a minimum separating distance of 75 feet between a well and a sewage disposal system or other potential source of pollution, (such as an in-ground fuel storage tank is to be maintained). Soils in the area are not particularly porous or fast draining although slopes are quite steep on some of the lots. The most congested area is in Section I along Bashon Hill Road and Route 608 as to lot sizes, wetlands, wells and sewage disposal systems.

It would be expected that wells be of the drilled type which generally afford more protection of the water source, provide for more reliable yield and allow for some flexibility in location. The yield will usually be suffi-

cient for a single family house although at times it may be necessary to build in or provide more storage capacity. Also, if objectionable mineral components are encountered to a sufficient level, appropriate treatment facilities should be installed as part of a water system.

It seems likely that wells would have to tap the underlying bedrock aquifer. Wells drilled in bedrock generally supply small but reliable yields of groundwater. However, 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 expensive geophysical testing of predicting the yield of a well drilled in a specific location. Because fractures in the rock generally occur within the first 100 to 150 feet of the surface, it has been shown that the probability of increasing the yield of a well decreases with depth below this level.

Each well should ideally be located on a relatively high portion of a lot, properly separated from the sewage disposal system or any other potential pollutant (e.g., fuel oil storage tanks, ect.) and in a direction opposite the expected direction of groundwater movement. Of particular concern are some portions of the site which have areas of moderate to steep slopes. If wells are located on the down gradient side of steep driveways which may require heavy salting, there is a chance the well may become contaminated with elevated sodium levels.

In the Shetucket River Basin, 134 wells tapping crystalline bedrock (i.e., gneisses, schists, etc.) were surveyed for Connecticut Water Resources Bulletin No. 11. Of these, approximately 90 percent yielded 3 gallons per minute or more. A well yield of 3 gallons is generally satisfactory for most domestic uses.

The natural quality of groundwater should be satisfactory. There may be sufficient amounts of iron and/or manganese minerals in the Hebron Formation and Scotland Schist to 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.

It seems likely that if septic systems are properly engineered and installed, separating distances in the Public Health Code complied with, and in view of the hardpan zone over bedrock throughout the site, that these should provide satisfactory protection of wellwater quality from the bedrock aquifer.

7. SEWAGE DISPOSAL

Sewage disposal in this small and rural town depends upon the installation of private on site subsurface sewage disposal systems.

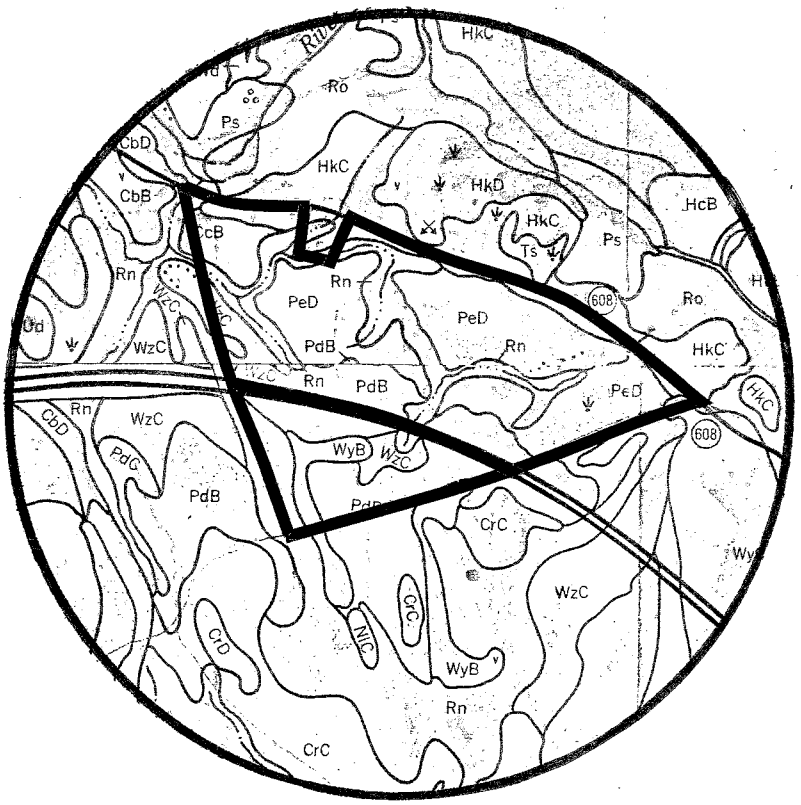
In general the soils on the property, at least in the upper layers, appear to be relatively permeable. However, there is evidence (soil mapping data,

United States Department of Agriculture

Soil Conservation Service

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

Soil Survey Sheets 18 & 28 Scale 1"=1320'



ERT REPORT

MYSTIC LAND CO. SUBDIVISION, BASHON HILL ROAD & RT. 2
BOZRAH, CT.

Soil Symbol	Soil Name	Shallow Excavations	Dwelling w/o Basement	Dwelling w/ Basement	Local Roads & Streets	Lawns & Landscaping	Septic Tank Absorption Fields
CeB	Canton	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Moderate: slope	Moderate: slope	Slight
"	Charlton	Moderate: slope	Moderate: slope	Moderate: slope	Moderate: slope	Moderate: slope	Slight
HkC	Hinckley	Severe: cutbanks cave	Moderate: slope, large stones	Moderate: slope, large stones	Moderate: slope, large stones	Severe: small stones	Severe: Poor filter
PdB	Paxton	Moderate: dense layer, wetness	Moderate: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: Large stones	Severe: percs slowly
"	Montauk	Moderate; dense layer, wetness	Moderate: wetness	Moderate: wetness	Moderate: frost action, wetness	Moderate: large stones	Severe: percs slowly
PeD	Paxton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: Slope Percs slowly
"	Montauk	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: Slope Percs slowly
WyB	Woodbridge	Severe:	Severe: wetness	Moderate: wetness	Severe: wetness	Severe: frost action	Severe: percs slowly wetness
WzC	Woodbridge	Severe: wetness	Moderate: slope, wetness	Severe: slope, wetness	Severe: frost action	Moderate: slope, large stones, wetness	Severe: percs slowly wetness
"	Rainbow	Severe: wetness	Moderate: slope, wetness	Severe: slope wetness	Severe: frost action	Moderate: slope, large stones, wetness	Severe: percs slowly wetness

NOTES:

Slight: When soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome.

Moderate: When soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations.

Severe: When soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

CcB-Canton and Charlton very stony fine sandy loams, 3 to 8 percent slopes

These gently sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 1 to 8 percent of the surface. These soils were mapped together because there are no major differences in use and management. Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is medium. This soil warms up and dries out rapidly in the spring. The soil is strongly acid or medium acid.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is medium. This 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. Stones and boulders make the sue of farming equipment difficult. These soils are in capability subclass VIs.

HkC-Hinckley gravelly andy loam, 3 to 15 percent slopes

This gently sloping and sloping, excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. The available water capacity is low. Runoff is medium or rapid. Hinckley soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is suited to cultivated crops. Hinckley soil is droughty, and irrigation is needed. The hazard of erosion is moderate or severe. This soil is in capability subclass IVs.

PdB-Paxton and Montauk very stony fine sandy loams, 3 to 8 percent slopes

These gently sloping, well drained soils are on drumloidal, glacial till, upland landforms. Stones and boulders cover 1 to 8 percent of the surface. These soils were mapped together because there are no major differences in use and management. Permeability of the Paxton soil 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. Paxton soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid.

Permeability of the Montauk soil is moderate or moderately rapid in the surface layer and subsoil and slow or moderately slow in the substratum. The available water capacity is moderate. Runoff is medium. Montauk soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid.

These soils are not suited to cultivated crops because stoniness makes the use of farming equipment difficult. These soils are in capability subclass VIs.

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 bounders cover 1 to 8 percent of the surface. 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 not suited to cultivated crops because of stoniness. This soil is in capability subclass VIs.

WzC-Woodbridge and Rainbow extremely stony soils, 3 to 15 percent slopes

These gently sloping and sloping, moderately well drained soils are on drumloidal, glacial till, upland landforms. Stones and boulders cover 8 to 25 percent of the surface. 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 or rapid. Woodbridge soils warm up and dry out slowly in the spring. They are strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum.

The Rainbow 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 high. Runoff is medium or rapid. Rainbow soils warm up and dry out slowly in the spring. Thety are strongly acid or medium acid.

These soils are not suited to cultivated crops because of stoniness. These soils are in capability subclass VIIs.

engineer's soil test results) of a high seasonal groundwater table over much of the parcels. The perching of water is the result of a relatively shallow compact layer, mostly in the range of 24-30 inches, which is not very permeable and restricts internal drainage. Coupled with moderate to steep slopes subsurface drainage as well as surface water would tend to flow laterally, following the natural contours. In cases where there is an underlying layer of compact or hardpan like soil, groundwater can usually be controlled by the use of curtain or intercepting drains and careful surface grading and drainage.

In general subsurface leaching systems should be kept large based on percolating tests in the poorer more compact and less permeable underlying soil layer. Systems should also be kept shallow and spread out along the contour as much as possible to expedite the lateral dispersal of effluent. Because of the probable need for the use of some fill in system construction and due to slope and runoff, procedures to minimize and control erosion during and following construction will need to be implemented.

As most or all of the lots would be in an area of special concern, detailed engineered design plans would need to be prepared for individual sewage systems. Lots will require careful siting in order to accommodate a house and necessary facilities (water and sewage, drains, driveways). For some lots it would appear that the major difficulty might well be in reaching a satisfactory area which is located a considerable distance from one of the roads. Also due to a number of factors, consideration for possible modification of the toal number of lots for the eastern portion of Section I (lots 11 through 15) in order to allow a less crowded arrangement, better spacing and reduced impact on natural conditions should be thought about.

8. SOILS

The proposed Erosion and Sediment Control Plan has been reviewed, and found to be inadequate. A complete new plan should be prepared showing all the driveway details, design, runoff computations and special design measures if the soils have limitations for this purpose. This plan must follow the guidelines in the Erosion and Sediment Control Manual.

9. WILDLIFE RESOURCES

A. Considerations

Development will decrease the amount of habitat simply because the land will be occupied by physical buildings. The quality of the habitat will be decreased because an undeveloped area of land will be broken up with buildings and human activity.

Some species which require larger undeveloped areas will proabably be forced out or will reduce their use of the area. They may be able to move into adjacent undeveloped areas if there is suitable habitat available and the competition with other species already occupying the area is not too great.

Other species which are more adaptable to man's presence may remain. Some new species may even be attracted to the area.

B. Recommendations

If carried out the following wildlife recommendations can help lessen the impact to some species using the area. Some animals will leave the area but others may find it even more attractive after development.

1) Design of Development:

The impact on wildlife of the area which is being developed can be lessened to a small degree if some thought is given to the development. Housing developments can be designed in two (2) basic ways. Houses can be built on larger house lots or they can be built on small lots or in clusters, leaving open space areas. Both designs leave more open space for wildlife as opposed to having small lots and developing the entire acreage.

2) Clearing

When the initial clearing for building is done try to leave as many trees and shrubs as possible, especially those useful to wildlife. Some useful species include:

white oak (Quercus albra)
red oak (Quercus rubra)
black cherry (Prunus serotina)
quaking aspen (Populus tremuloides)
red-osier dogwood (Cornus stolonifera)
apple (Malus spp.)

3) Landscaping

On small acreage with many buildings landscaping can do a great deal to provide habitat and make an area attractive to some species of wildlife. First, leave as many trees as possible around the buildings. This will not only benefit wildlife by providing food, cover and nesting sites (especially for songbirds) but will also be more aesthetically pleasing for the residents of the development.

Leave as many snag trees (standing dead trees) and den trees (trees with holes) as possible. These trees are used by insect eating birds and cavity nesting birds and mammals.

Plant trees and shrubs which are useful to wildlife and landscaping such as:

Japanese barberry (Bergeris bulgaris)
flowering dogwood (Cornus florida)
honeysuckle (Lonicera spp.)
juniper (Juniperus spp.)
bayberry (Myrica pensylvanica)
maple-leaved virburnum (Viburnum acerifolium)
red-osier dogwood (Cornus stolonifera)
American holly (Ilex opaca)
American mountain ash (Sorbus americana)
autumn-olive (Elaegnus umbellata)
winterberry (Ilex verticillata)
American cranberry bush (Veburnum trilobum)
red maple (Acer rubrum)
alternate-leaf dogwood (Cornus alternifolia)

A variety of trees and shrubs should be used. Most species of wildlife need to have cover when they move from place to place. By leaving corridors of vegetation this will allow wildlife to utilize the area and also have access to adjacent areas. Large expanses of lawn with no trees or shrubs present should be discouraged.

Utilizing these recommendations when applicable should allow some species of wildlife to continue using the altered habitat.

10. PLANNING CONCERNS

A. Access

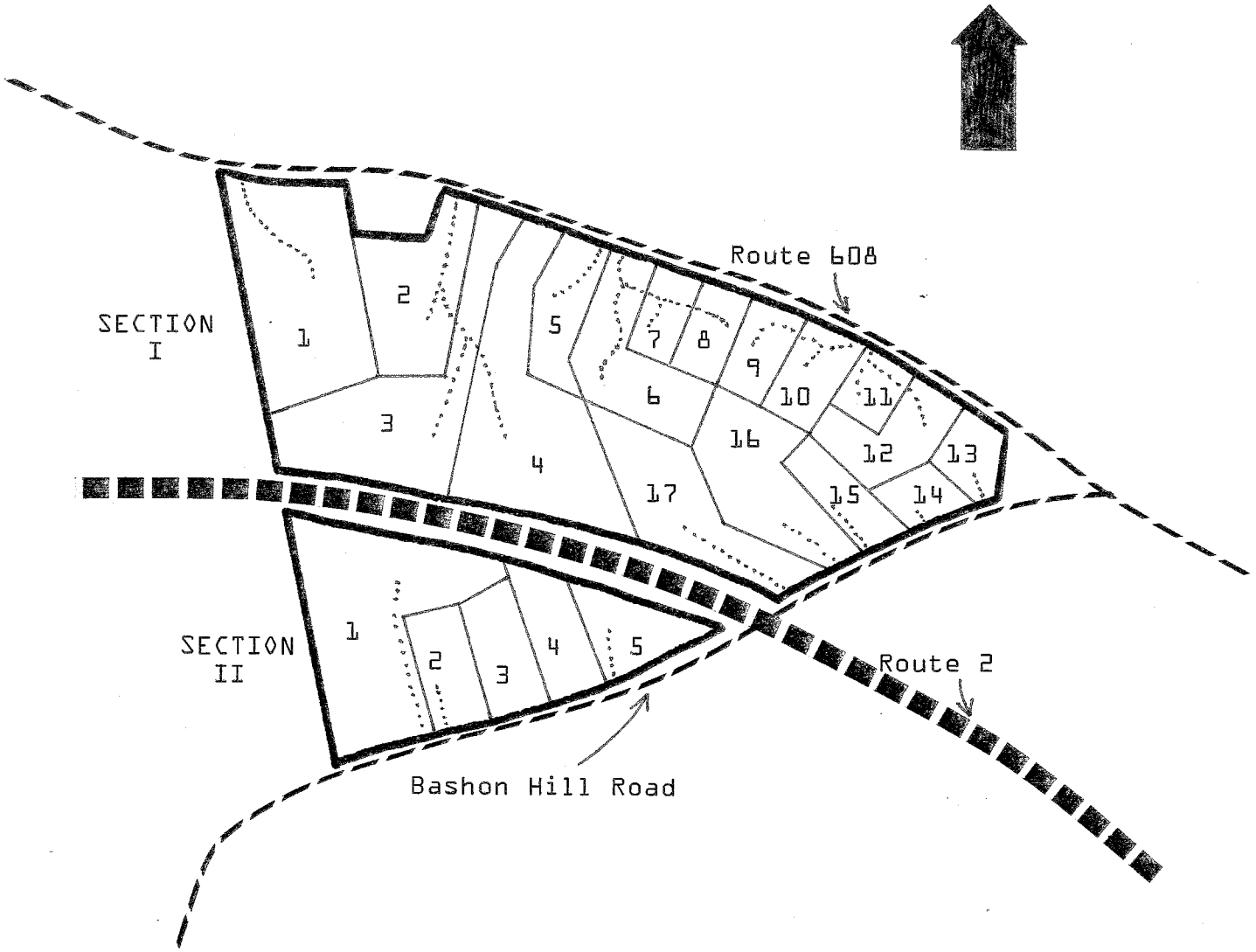
The principal access concerns about this subdivision are centered on the Tollgate Acres Section I proposal, that is, the subdivision which fronts on Route 608 and Bashon Hill Road. Here, the developer proposes to have 12 lots gaining access from Route 608 via a series of driveways. One driveway serves Lot 1; and a second driveway serves Lots 2, 3, and 4; a third serves Lot 5; a fourth Lots 6, 7, and 8: a fifth Lots 9 and 10; and a sixth, Lots 11 and 12. The remaining lots in the subdivision are served by individual driveways from Bashon Hill Road.

All of the driveways on Route 608 must cross the City of Norwich 30 inch water main which is located along the road frontage of the property.

Of these driveways, the most workable appears to be that serving Lots 2, 3, and 4. Here the grades from the highway into the property are relatively flat and the Norwich water line is located a sufficient distance to the north of the property line to permit ramping up to provide adequate cover over the water line. Here also the sight lines along the highway are relatively good.

LOT LAYOUT AND DRIVEWAYS*

Not to Scale



*See subdivision plans for Tollgate Acres I&II for accurate lot lines and driveway locations.

At all the other driveway locations on Route 608, the water line is, according to the plan, about 25 feet from the front property line. It seems questionable whether or not there is adequate distance to properly grade the driveway in order to provide a relatively level place for a car to stand before entering the highway, and then having an acceptable slope and still be able to get over the water line. Also, while at all of these driveway locations adequate sight distances along the highway appear to be achieveable, at the driveways serving Lots 5 through 12, it would seem necessary to cut down some large trees. Here, care would have to be taken so as not to disrupt the steep banks between the property and the road and thus cause an erosion problem. In summary, from the driveway serving Lot 5 eastward to Bashon Hill Road, vehicular access of any kind to the property appears difficult. This is not so along Bashon Hill Road or at the location of the proposed driveway serving Lots 2, 3, and 4.

In addition, there are obvious problems with this scheme in the provision of emergency services, and the questions of maintenance responsibility among the homeowners served by any given driveway.

While it is recognized that construction of a road or roads to Town standards would have an adverse effect on the rural character of the neighborhood, this consideration seems outweighed by the difficulty of access. It is suggested that a plan could be devised with most of the lots served by two (2) cul-de-sac public roads. One would connect with Route 608 at the proposed location of the driveway for Lots 2, 3, and 4, and would serve all lots west of the Connecticut Light and Power right-of-way with the possible exception of Lot 1. The other cul-de-sac would enter the property from Bashon Hill Road. Alternatively, a road could be constructed connecting the two access points.

At the Tollgate Acres Section II subdivision on the south side of Route 2, there are no special access problems.

B. Traffic

An Estimate of trip generation and the resultant traffic impact of the Tollgate Acres Section II subdivision has been calculated. The plan for this development shows 12 lots with access into Route 608 and 5 lots with access to Bashon Hill Road. ConnDOT data* indicate that a single-family house in a subdivision can be expected to generate 10.6 vehicle trips per day. By trip is meant a vehicle arriving at or leaving the property. For example, a housewife going to the grocery store would make two (2) trips: one on leaving and one on returning. Thus, the twelve lots served by Route 608 would generate 10.6 times 12 or 127.2 trips per day on the average, and the five lots served by Bashon Hill Road would generate 53 trips. Thus, the entire development would generate a total of 180.2 trips per day on the average. We will assume a worst case scenario, where all of these trips utilize Route 608. ConnDOT's 1985 Traffic Log of State-Numbered Routes and Roads indicates an Average Daily Traffic (ADT) on this segment of Route 608 of 1,000 vehicles per day.

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*Trip Generation Study of Various Land Uses, ConnDOT, 1974.

Using ConnDOT's methodology, the theoretical capacity of a rural two-lane highway can be calculated to be 2,000 vehicles per hour. In calculating highway volume to capacity ratio, the Department uses the "30th Highest Hour" hourly traffic figure of 12% of the ADT, which in this case, would be 120 vehicles (12% x 1,000 vehicles). Thus, the current volume to capacity ratio can be estimated at 120 / 2,000 or .06. If we add the 180.2 daily trips from the subdivision, we have an ADT of 1,180 vehicle trips per day, an hourly volume of 147 trips, and a volume to capacity ratio of about .07. Thus, the traffic increase will have an insignificant effect on the highway.

The impact of the Tollgate Acres Section II subdivision has not been calculated, since its effect would be even smaller than that of Section I.

11. SUMMARY

NOTE: This is a brief summary of the major points, concerns, and recommendations of the Team. You are strongly urged to read the entire report and to refer back to the specific sections in order to obtain all the information about a certain topic.

GEOLOGIC DEVELOPMENT CONCERNS

Section I

- The major geologic limitations found in Section I include (1) areas of moderate to steep slopes (2) the presence of compact till-based soils which commonly results in seasonally high groundwater tables and which have slow percolation rates in the compact zone and (3) the presence of seasonally wet soils that generally parellel the intermittent water courses on the site. These limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems.

- All the lots in Section I will require properly planned and engineered septic systems.

- In Section I it appears that septic systems may require filling, as well as the possible installation of curtain drains to intercept groundwater so that it does not interfere with the leaching system.

- It would be wise to spread the leaching trenches out parallel to the contours, rather than stacking them up on top of one another.

- If some of the geologic limitations mentioned predominate on a particular lot find a suitable area for the installation of the sewage disposal system may be problematic, even with the large lot sizes.

- Only if the septic systems are carefully designed and constructed can the geologic constraints be surmounted.

- The steep to moderate slopes, particularly along Route 608 present problems in terms of driveway grades. Without proper engineering measures severe gullying and erosion will occur on unpaved drives accumulating unwanted sediment onto Route 608 and ultimately the Yantic River.

- Another potential problem with regard to the driveways is the accumulation of ice on and at the ends of driveways during the winter. These ice patches may be dangerous for the residents and possibly for other drivers along Route 608. Unless this potential problem can be properly addressed by the project engineer perhaps an alternative access road system should be considered.

- A final concern is that steep slopes, particularly those on till-based soils, when excavated have a tendency to slump when wet.

- Wetland crossings for driveways are feasible provided they are properly designed. The roads should be constructed at least 1.5 feet and preferably 2 feet above the surface elevation of the wetland. It is recommended that construction through wetland areas be done during the dry time of the year.

Section II

- The major geologic limitations found in Section II are the presence of compact glacial till, a high percentage of inland wetland soils and the possibility of encountering bedrock at shallower depths in certain parts. These limitations may pose a problem in terms of subsurface sewage disposal.

- Regulated inland-wetland areas on lots 1 and 5 hold low potential for development purposes and should be avoided.

HYDROLOGY

Section I

- The applicant's engineer should formulate a stormwater management plan which includes pre and post-development runnoff calculations. With this information it can be determined if the post-development runoff increases will require stormwater detention.

- Close examination of the pipes passing under Route 608 is warranted to determine if they can handle post-development flows without causing flooding or ice problems.

- There is a risk of pollution from the driveways because of sand, salt, oils and other debris being carried ultimately to the Yantic River. Sand would seem to be the major problem because it could lead to the accumulation of sediment in the tributaries to the Yantic River and the Yantic River itself. Perhaps some kind of sediment trap could be designed for the end of driveways to prevent sand from crossing Route 608.

Section II

- No major problems are anticipated with regard to runoff.

WATER SUPPLY

- Of particular concern are some portions of the site which have areas of moderate to steep slopes. If wells are located on the down gradient side of steep driveways which may require heavy salting, there is a chance that the well may become contaminated with elevated sodium levels.

SEWAGE DISPOSAL

- Lots will require careful siting in order to accommodate a house and necessary facilities (water, sewage, drains and driveways).

- Due to a number of factors, consideration for possible modification of the total number of lots for the eastern portions of Section I (lots 11--15) in order to allow a less crowded arrangement, better spacing and reduced impact on natural conditions should be looked into.

SOILS

- The proposed Erosion and Sediment Control Plan is inadequate.

WILDLIFE RESOURCES

- Development will decrease the amount of habitat simply because the land will be occupied by physical buildings.

- The quality of the habitat will be decreased because of buildings and human activity.

- There are wildlife recommendations which can help lessen the impact to some species using the area. (See part 9 of report)

PLANNING CONCERNS

- It seems questionable whether or not there is adequate distance to properly grade the driveways in order to provide a relatively level place for a car to stand before entering the highway, and then having an acceptable slope, and still be able to get over the City of Norwich 30 inch water main.

- It would seem necessary to cut down some large trees to provide adequate sight distances for some driveways. Care should be taken not to disrupt the steep banks and cause an erosion problem.

- It appears that from the driveway serving lot 5 eastward to Bashon Hill Road, vehicular access of any kind to the property is difficult. This is not so for Bashon Hill Road or the driveway proposed to serve lots 2, 3 and 4.

- Other problems with regard to driveways are (1) the provision of emergency services and (2) the question of maintenance responsibility among the homeowners.

- It is suggested that a plan could be devised with most of the lots served by two cul-de-sac public roads, or a connecting road entering from Bashon Hill Road to Route 608.

- There are no special access problems for Section II.

- The traffic increase from Sections I and II would have an insignificant effect.

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, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, 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 area.

The Team is 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, sanitary landfills, commercial and industrial developments, sand and gravel operations, 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 officials 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. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, a statement identifying the specific areas of concern the Team should address, and the time available for completion of the ERT study. 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 regarding the Environmental Review Team, please contact Elaine A. Sych (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.