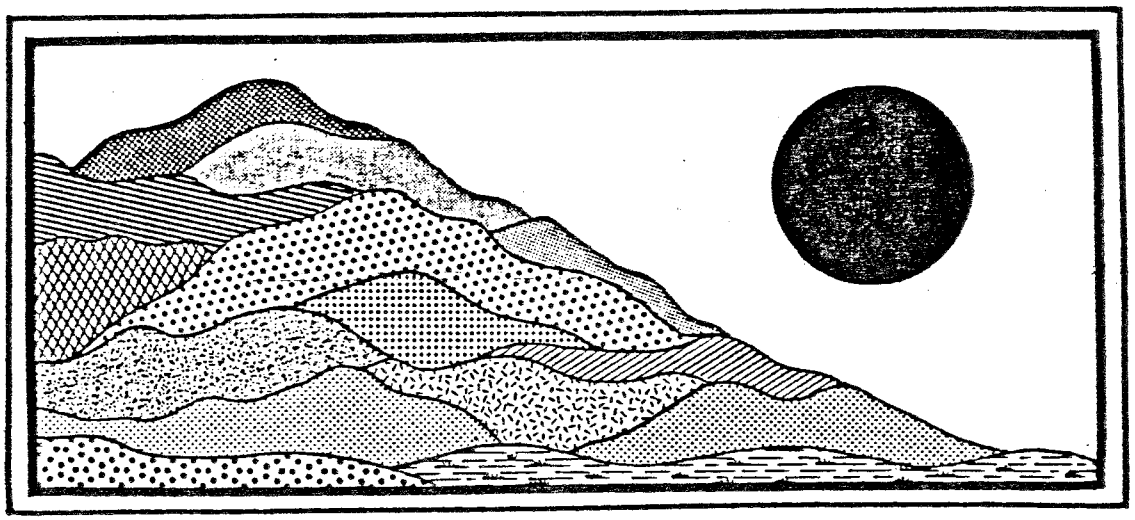
MEADOW GATE
(SUNSHINE VALLEY)

LEDYARD, CONNECTICUT

JULY 1987



ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

MEADOW GATE
(SUNSHINE VALLEY)

LEDYARD, CONNECTICUT

Review Date: MAY 14, 1987

Report Date: JULY 1987

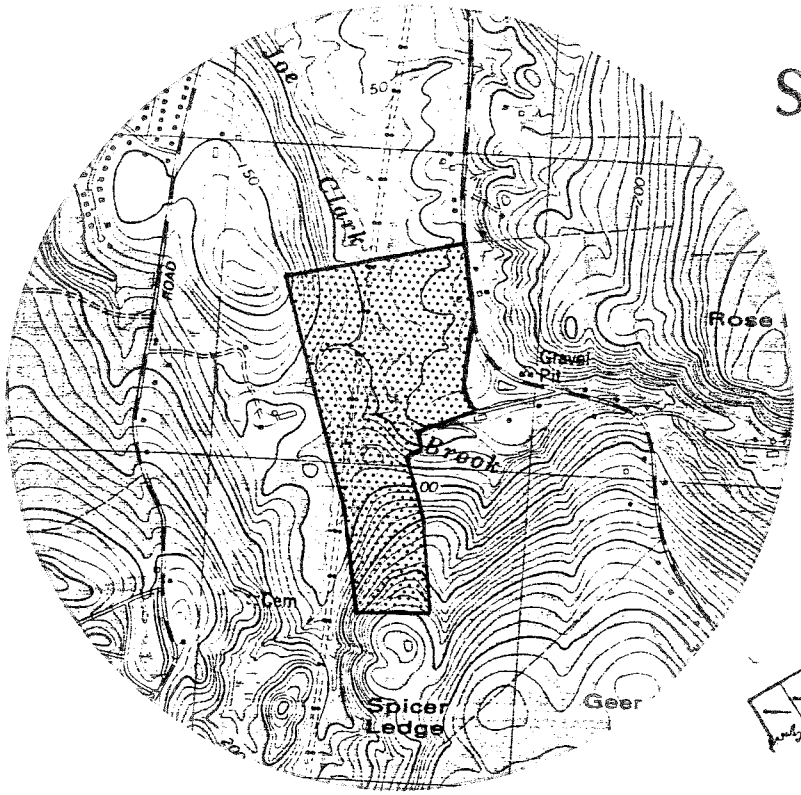
RC&D

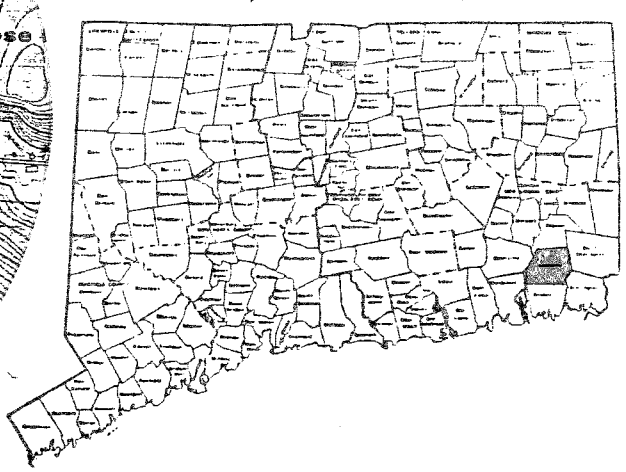
ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

Site Location

MEADOW GATE DEVELOPMENT
(Sunshine Valley)

LEDYARD, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

THE MEADOW GATE DEVELOPMENT

(Sunshine Valley)

LEDYARD, CONNECTICUT

This report is an outgrowth of a request from the Ledyard Planning Commission to the New London County 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 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 Thursday, May 14, 1987. Team members participating on this review included:

Don Capellaro	--Sanitarian - Connecticut Department of Health
Brian Murphy	--Fisheries Biologist - Connecticut Department of Environmental Protection
Elizabeth Rogers	--Soil Conservationist - U.S.D.A., Soil Conservation Service
Elaine Sych	--ERT Coordinator - Eastern Connecticut Environmental Review Team
Bill Warzecha	--Geologist - DEP, Natural Resources Center
Judy Wilson	--Wildlife Biologist - Connecticut Department of Environmental Protection

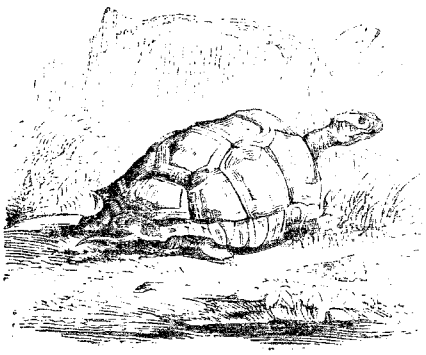
Prior to the review day, each team member received a summary of the proposed project, a list of the Town's concerns, location maps, topographic map, soils map and a report relating to soil types and the potential for on-site sewage disposal systems. During the field review the team members were given information concerning plans for the proposed development. The Team met with, and were accompanied by the Zoning and Inland Wetland Officer, the property owner and the developer. 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 this proposed subdivision and commercial/ office development.

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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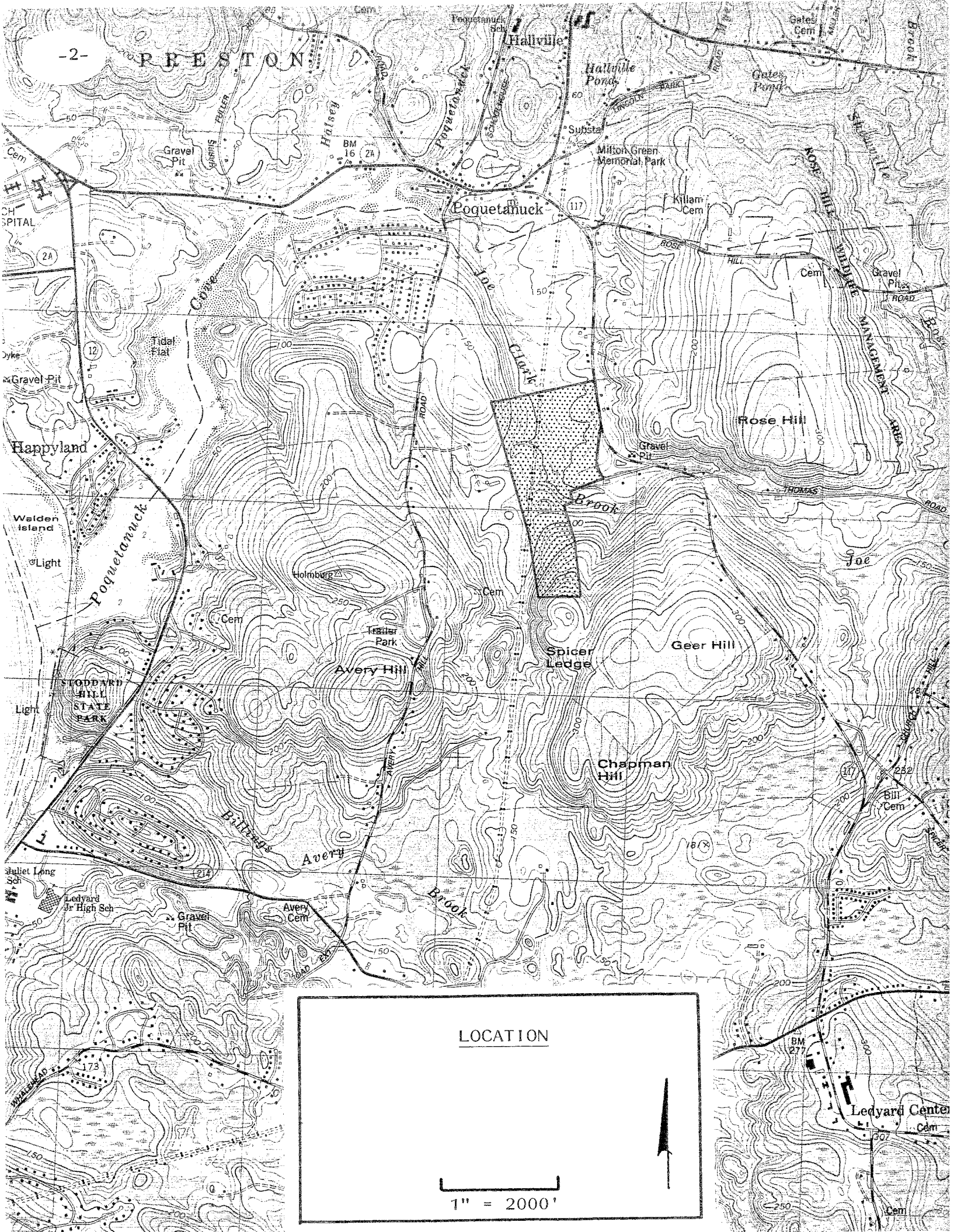
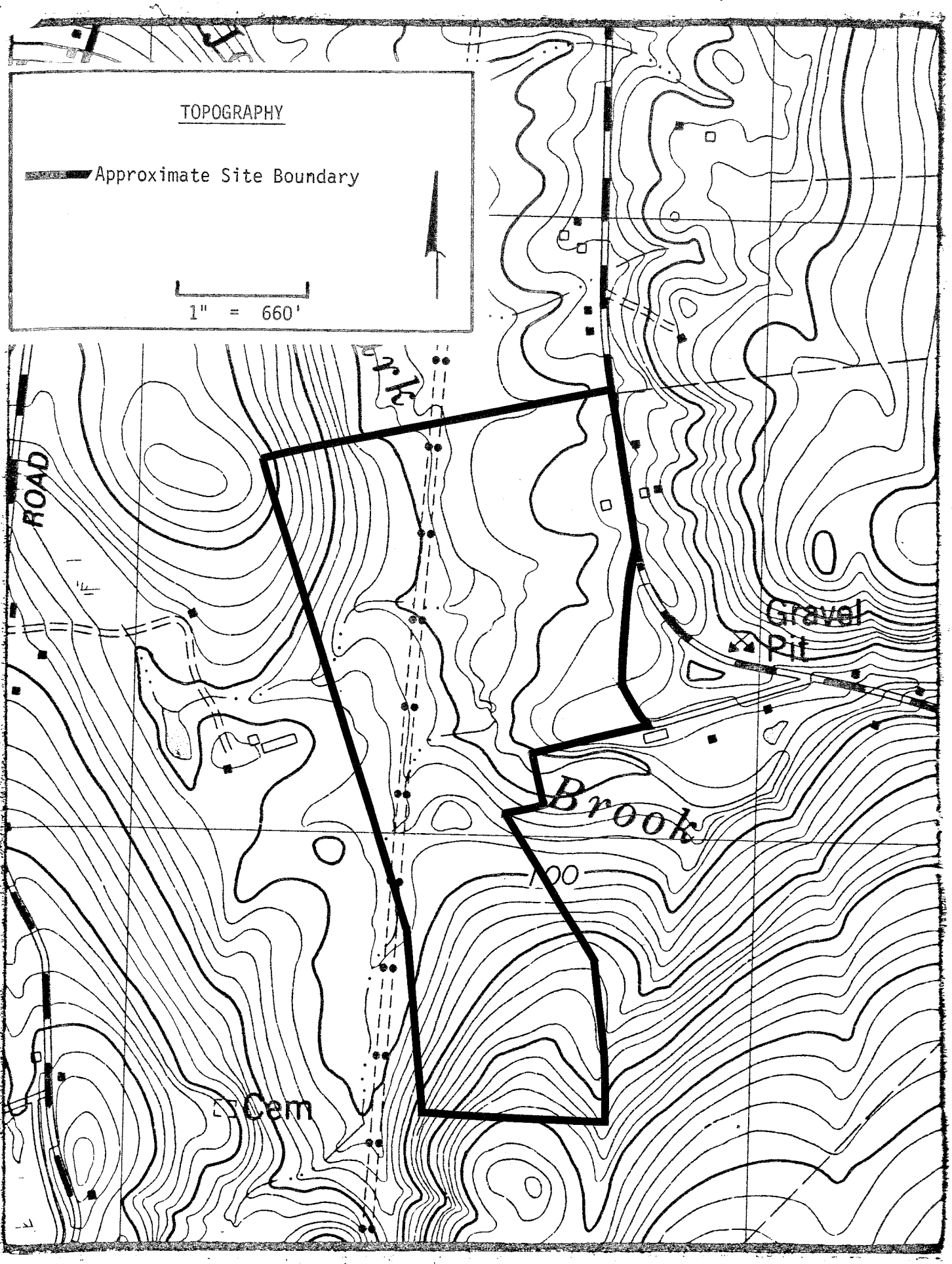

PRESTON
Hallville
Hallville Pond
Gates Pond
Gates Cem
Poquetanuck Sch
Halsey
Poquetanuck
Gravel Pit
BM 16 (2A)
Substa
Milton Green Memorial Park
Poquetanuck
Killam Cem
Cem
Gravel Pit
Tidal Flat
Gravel Pit
Happyland
Walden Island
Light
Holmburg
Cem
Cem
Trailer Park
Avery Hill
Spicer Ledge
Geer Hill
Rose Hill
Gravel Pit
Clark
Brook
Joe
Brook
Chapman Hill
Bill Cem
STODDARD HILL STATE PARK
Light
Juliet Long Sch
Ledyard Jr High Sch
Gravel Pit
Avery Cem
Billings
Avery
Brook
Ledyard Center
Cem
BM 277
Cem
LOCATION
1" = 2000'

1. INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to assist the Ledyard Planning Commission in reviewing a proposed residential subdivision and industrial/commercial development. The Commission requested the review for information on the natural resource base of the site and limitations, concerns and recommendations concerning the proposed development.

The property, of ± 109 acres, is located on the west side of Route 117 in the area of Bolduc Drive. Until this year it was an active farm with one sizable field area planted with corn. The parcel is characterized by an open expanse of valley-meadow land which is bisected (S-N) by Joe Clark Brook. Overhead power lines also cross the property in the same general direction as the brook. A barn is located near Route 117, and the terrain in this area toward the brook has a slight slope. On the west side of the brook the terrain rises gradually becoming steep toward the north west corner. On the adjoining northerly property a relatively large area has been excavated (fill material) into the water table. A stream from other property at the upper west side flows into the site and joins Joe Clark Brook. Further south and parallel with the power lines there is another entering stream. The hillside in the narrower, wooded, southern portion of the parcel rises steeply and apparently consists of rocky terrain with some rock outcrops. The upper part of adjoining land in this area is identified as Spicer Ledge on the geological topographic survey map. It is in this area toward Geer Hill (more easterly) that there is a town refuse disposal site and a privately operated septage disposal area.

It is understood the property in question is divided into two zones, one being a general industrial zone and the other a low density residential (60,000 square foot lots) zone. According to the owners and development firm, Land Systems, Inc. of Simsbury, they are seeking a zone change for approximately 13 acres near Bolduc Drive. The industrial zone would be changed to medium density (40,000 square feet) residential. Cluster housing or condominiums would probably be constructed in this area, if a zone change is given. It is also understood the developers plan to have a ± 45 lot residential subdivision. Acreage would be left for an undetermined commercial/office/industrial development.

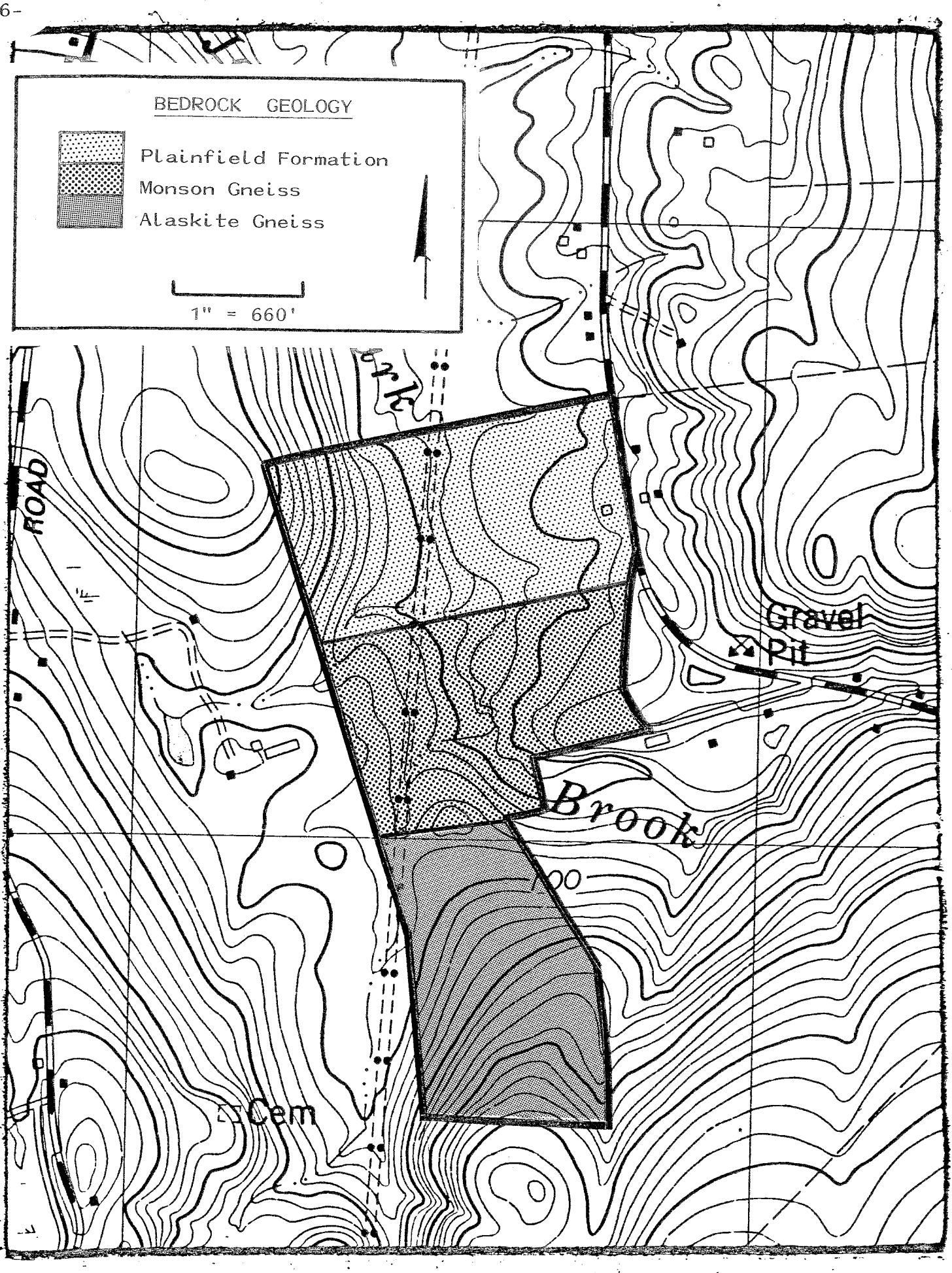

TOPOGRAPHY
Approximate Site Boundary
1" = 660'
ROAD
Gravel Pit
Brook
Cem

2. TOPOGRAPHY AND SETTING

The former Clark Farm property is located in the northwest corner of the Town of Ledyard. The + 102 acre tract is bounded in the east by Route 117 and Bolduc Drive. Joe Clark Brook, a north flowing tributary to Poquetanuck Cove bisects the site. The major wetland areas on the site parallel this streamcourse. A high tension power line traverses the westcentral parts.

Approximately half of the parcel is comprised of former agricultural fields while the remainder is predominantly wooded land. The land surface in the fields is characterized by gently rolling terrain sloping mainly toward Joe Clark Brook. The northwest corner and southern limits of the site rise moderately to level areas, which are off the property.

The lowest elevation on the site, about 40 feet above mean sea level parallels Joe Clark Brook. The highest elevation on the site, about 200 feet above sea level is found at the southern limits near Spicer Ledge.


BEDROCK GEOLOGY
Plainfield Formation
Monson Gneiss
Alaskite Gneiss
1" = 660'
ROAD
Gravel
Pit
Brook
Cem

3. GEOLOGY

This entire site lies within the Uncasville topographic quadrangle. A bedrock geologic map and a surficial geologic map for the quadrangle by Richard Goldsmith has been published by the U. S. Geological Survey. These maps are GQ-576 and GQ-138, respectively.

According to map GQ-576, three east/west trending belts of very old (Proterozoic geologic time period, about 570-2,500 million years old) rock underlie the site. Goldsmith identifies these rock units as the following; (1) an alaskite gneiss; (2) Monson Gneiss and (3) a Plainfield Formation subunit.

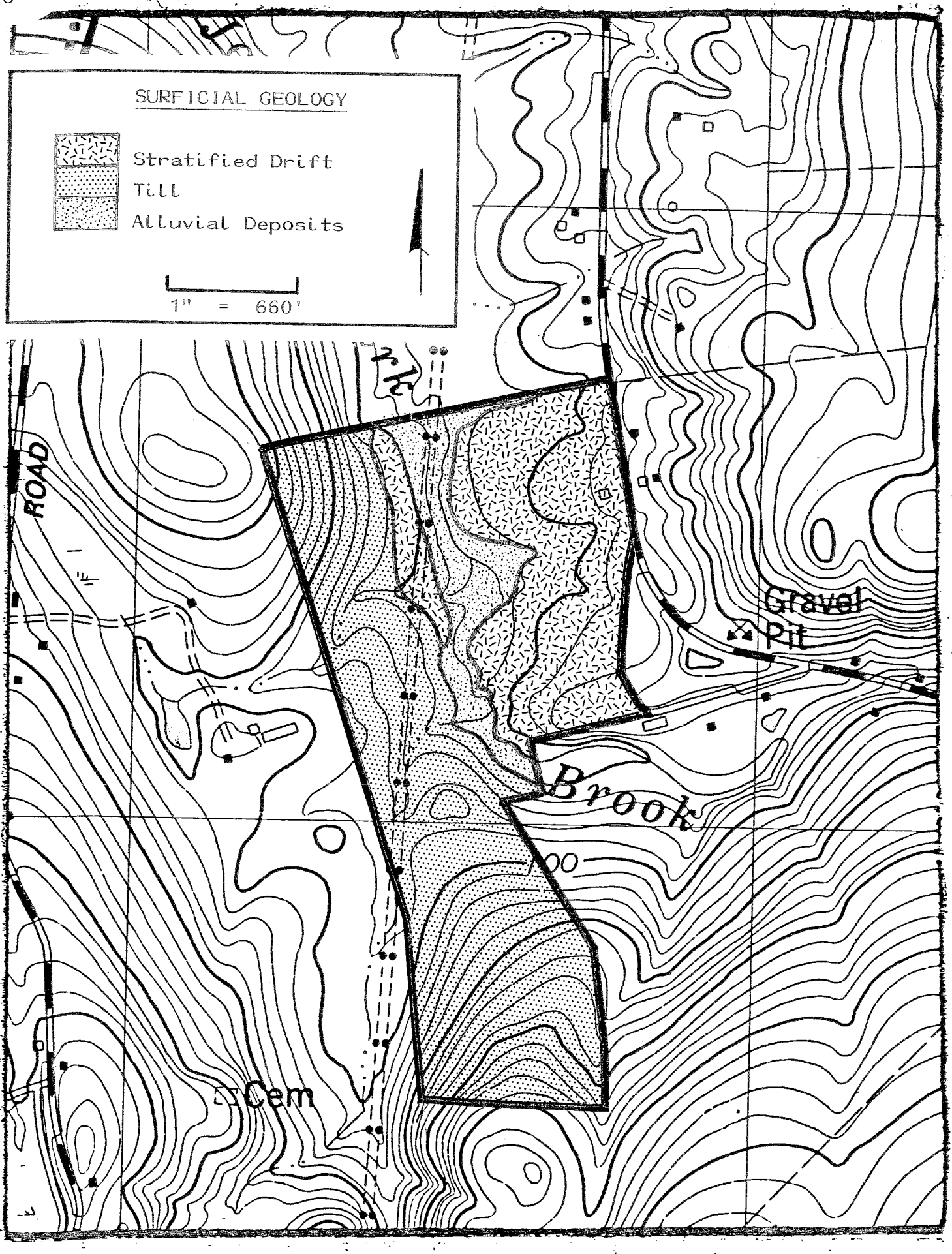
The alaskite gneiss, which underlies the northern parts of the site, consists of a light pink to gray, fine to coarse grained rock. The adjective "alaskitic" in the preceding sentence means that the rock orginally formed from molten material at considerable depth in the earth's crust and that it contains a high percentage of light-colored minerals. In other words, it has a granite-like composition.

The central parts of the site are underlain by Monson Gneiss. These rocks are described as indistinctly layered, fine-grained gneiss that contains the minerals hornblende, biotite quartz and plagioclase.

The final rock type on the site, found in the southern parts, is a subunit of Plainfield Formation. It consists of interlayered thinly-bedded quartzites (quartz-rich rocks formed by the re-crystallization of sandstone), mica schist and dark gray gneiss.

The terms "gneiss" and "schist" used above are textural terms. Both rock types are metamorphic rocks; that is, rocks formed under great heat and pressure within the earth's crust. "Gneisses" are characterized by distinct banding which occurs due to alternating light-colored, granular minerals with dark-colored platy or elongated minerals. "Schists" characteristically contain a fairly high percentage of platy, flaky or elongated minerals which result in a slabby or layered rock.

The bedrock structure has strongly influenced the shape of the landforms and drainage patterns on the site. Goldsmith identifies a north-south trending fault line that bisects the central parts of the site. The term 'fault' is given to a zone of rock fracture in the earth's crust caused by the movement of one mass of rock against another. This mapped fault, which is inactive,


SURFICIAL GEOLOGY
Stratified Drift
Till
Alluvial Deposits
1" = 660'
ROAD
Gravel Pit
Brook
100
Cem

is in close proximity to and generally parallels Joe Clark Brook on the site. It should be noted that watercourses commonly follow fault zones because the rock has been "chewed up" (fractured) which allows it to be easily eroded by earth processes such as erosion, glacial and water action. The layering of platy, flaky and elongated minerals in the rock units dip moderately northward.

According to deep test hole information for subsurface sewage in the southeast corner, the bedrock surface was not encountered at depths ranging between 8 to 10 feet. Source: Synopsis of Field and Laboratory Investigations Assessing the Soil Characteristics and the Potential for On-Site Sewage Disposal at Meadow Gate Development Route 117 Ledyard, CT by Geotoxi Associates, Inc. May 1987. Although stand pipes were observed elsewhere on the site, subsurface information regarding these test holes was not made available to Team members.

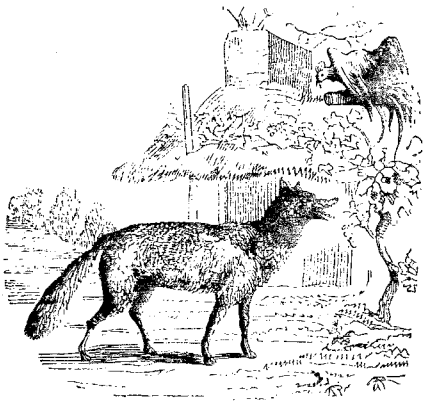
Based on available mapping data, it appears that the shallowest depths to bedrock are in the northeast corner. The deepest depths which are probably between 10 and 40 feet are found in Joe Clark Brook valley.

It seems likely that single detached residential development of the site would need to derive their domestic water source from the underlying bedrock. In terms of a public or community water supply, the sand and gravel deposits in Joe Clark Brook may have potential for yielding large volumes of water to a well. This will be discussed in detail in the Water Supply Section of this report.

Overlying bedrock along the western half the parcel is a glacial sediment called till. Till, consisting of a non-sorted, non-stratified mixture of rock particles of widely varying shapes and sizes, was deposited directly from glacier ice without substantial re-working by meltwater. The texture of most of the till in the above area is sandy, very stony and, generally, loose. Another variety of till, which becomes siltier and more compact with depth may be found in the northwest corner and in some western parts of the site.

Overlying bedrock in Joe Clark Brook valley and in eastern parts of the site is another glacial sediment called stratified drift. The major components of stratified drift are sand and gravel. These deposits were laid down by glacial meltwater streams as the glacier retreated from the region. These deposits are very porous and where saturated are capable of producing large volumes of water to gravel-packed wells.

Overlying the stratified drift deposits along Joe Clark Brook are post-glacial sediments called alluvium. "Alluvium" consists of silt, sand and gravel in flood plains. Because these areas are subject to flooding and are wet throughout most of the year they hold low potential for development purposes.



4. SOILS

PRINCIPAL LIMITATIONS AND RATINGS
FOR BUILDING SITE DEVELOPMENT

Soil name and map symbol	Dwellings with basements	Local roads and streets	Lawns and landscaping
#AfB - Agawam	Slight	Slight	Slight
CdC - Canton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
Charlton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
CdD - Canton	Severe-slope	Severe-slope	Severe-slope
Charlton	Severe-slope	Severe-slope	Severe-slope
CrC - Charlton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
Hollis	Severe-depth to rock	Severe-depth to rock	Severe-thin layer
*Ln - Limerick Variant	Severe-flooding, wetness	Severe-flooding wetness, frost action	Severe-flooding, wetness
#MyB - Merrimac	Slight	Slight	Slight
*Rc - Raypol	Severe-wetness	Severe-wetness, frost action	Severe-wetness
*Rn - Ridgebury	Severe-wetness	Severe-wetness, frost action	Severe-wetness
Leicester	Severe-wetness	Severe-wetness, frost action	Severe-wetness
Whitman	Severe-ponding	Severe-frost action, ponding	Severe-ponding
*Ro - Rippowam	Severe-flooding, wetness	Severe-flooding, wetness, frost action	Severe-flooding, wetness
#Sg - Sudbury	Severe-wetness	Moderate-wetness, frost action	Moderate-wetness
SxB - Sutton	Severe-wetness	Moderate-frost action,wetness	Moderate-wetness large stones

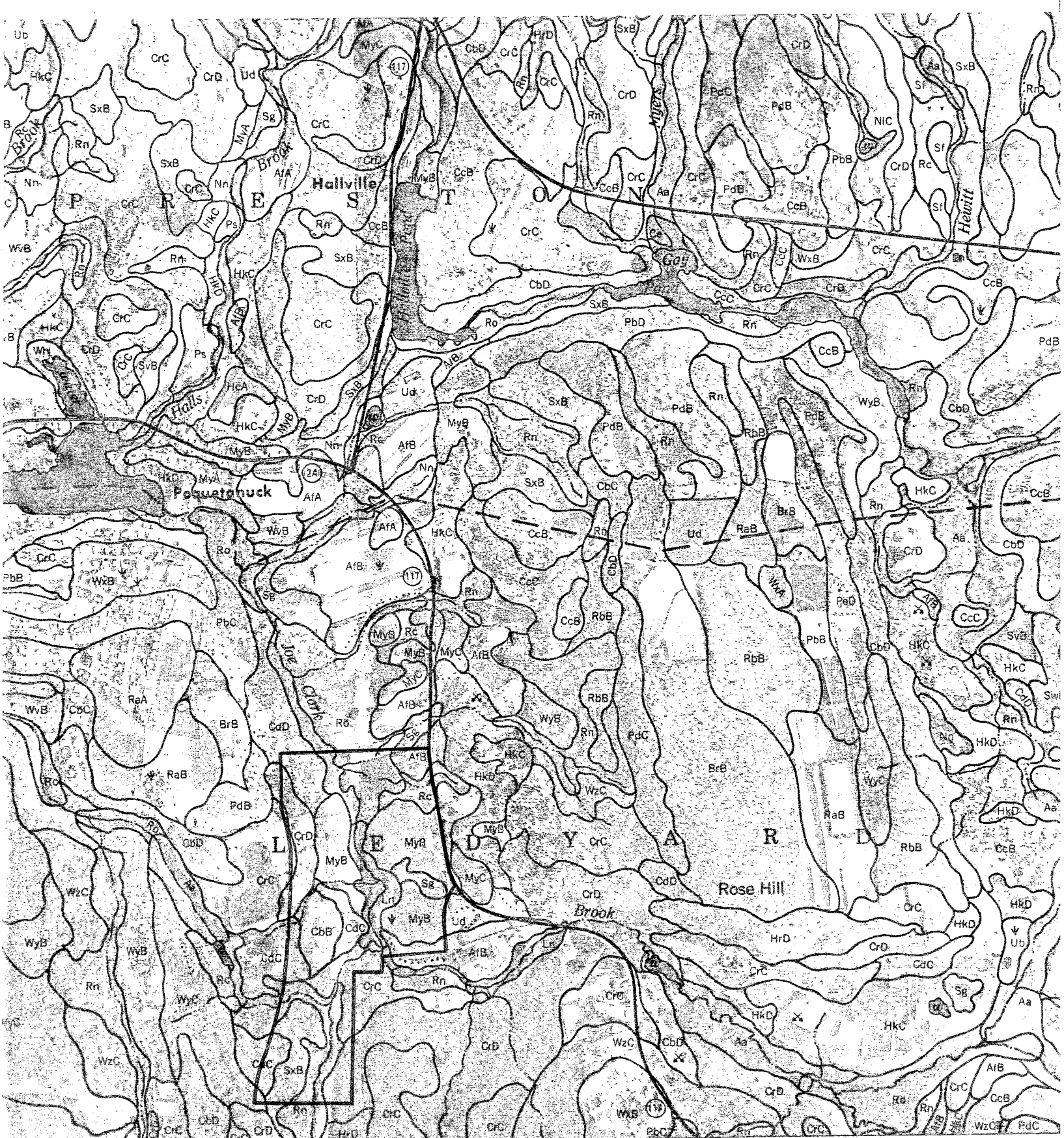
* Designated inland wetland soil by Public Act 155
\# Prime farmland soil

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' Soil Survey Sheet #47



PRINCIPAL LIMITATIONS AND RATINGS
FOR BUILDING SITE DEVELOPMENT

Soil name and map symbol	Dwellings with basements	Local roads and streets	Lawns and landscaping
#AfB - Agawam	Slight	Slight	Slight
CdC - Canton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
Charlton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
CdD - Canton	Severe-slope	Severe-slope	Severe-slope
Charlton	Severe-slope	Severe-slope	Severe-slope
CrC - Charlton	Moderate-slope	Moderate-slope	Moderate-slope, large stones
Hollis	Severe-depth to rock	Severe-depth to rock	Severe-thin layer
*Ln - Limerick Variant	Severe-flooding, wetness	Severe-flooding wetness, frost action	Severe-flooding, wetness
#MyB - Merrimac	Slight	Slight	Slight
*Rc - Raypol	Severe-wetness	Severe-wetness, frost action	Severe-wetness
*Rn - Ridgebury	Severe-wetness	Severe-wetness, frost action	Severe-wetness
Leicester	Severe-wetness	Severe-wetness, frost action	Severe-wetness
Whitman	Severe-ponding	Severe-frost action, ponding	Severe-ponding
*Ro - Rippowam	Severe-flooding, wetness	Severe-flooding, wetness, frost action	Severe-flooding, wetness
#Sg - Sudbury	Severe-wetness	Moderate-wetness, frost action	Moderate-wetness
SxB - Sutton	Severe-wetness	Moderate-frost action,wetness	Moderate-wetness large stones

* Designated inland wetland soil by Public Act 155
\# Prime farmland soil

SOIL POTENTIAL RATINGS FOR SEPTIC TANK ABSORPTION FIELDS (continued)

Soil name and map symbol	Potential Rating	Concerns	Corrective Measures	Additional Considerations
Rn - Ridgebury & Leicester	Very Low	Depth to water table	Curtain drain and fill	Access to drainage outlet
Ro - Rippowam	Extremely Low	Fast perc rate, depth to water table, flooding		Drainage needed. Access to drainage outlet unlikely.
Sg - Sudbury	Low	Fast perc rate, depth to water table	Fill. Double separating distance between wells and leach fields	
SxB - Sutton	Low	Depth to water table	Fill, curtain drain and drainage swale	Access to drainage outlet

* Designated inland wetland soil by Public Act 155
\# Prime farmland soil

AfB - Agawam fine sandy loam, 3 to 8 percent slopes

This gently sloping, well drained soil is on stream terraces and outwash plains. Permiability of the Agawam 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. Unless limed, the soil is strongly acid or medium acid. This soil is well suited to cultivated crops. This soil is in capability subclass IIe.

CdC-Canton and Charlton extremely stony fine sandy loams 3 to 15 percent slopes

These gently sloping and sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 8 to 25 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 or rapid. The Canton soil warms up and dries out rapidly in the spring. It 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 or rapid. The Charlton 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 use of farming equipment impractical. These soils are in capability subclass VIIs.

CdD-Canton and Charlton extremely stony fine sandy loams, 15 to 35 percent slopes

These moderately steep to steep, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 8 to 25 percent of the surface. 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 very rapid. The Canton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

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

These soils are not suited tocultivated crops. Stones and boulders make the use of farm equipment impractical. The hazard of erosion is severe. These soils are in capability subclass VIIs.

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.

CrD-Charlton-Hollis fine sandy loams, very rocky 15 to 45 percent slopes

This moderatly steep to steep 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. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is rapid or very 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 rapid or very 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 make the use of farming equipment impractical. The Hollis soil has a shallow rooting depth and is droughty. These soils are in capability subclass VIIs.

Ln - Limerick Variant Silt Loam

This nearly level, poorly drained soil is on flood plains along major rivers and streams. Typically, this limerick variant soil has a very dark brown, silt loam surface layer 8 inches thick. The subsoil is grayish brown, dark grayish brown, and dark gray, mottled loamy fine sand and silt loam 28 inches thick. The substratum is grayish brown gravelly coarse sand to a depth of 60 inches or more.

The limerick variant soil has a seasonal high water table at a depth of about 6 inches. It is subject to frequent flooding. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is high. Limerick variant soil warms up and dries out slowly in the spring.

This soil is poorly suited to community development because of flooding and wetness. This soil is in capability subclass IIIW.

MyB-Merrimac sandy loam, 3 to 8 percent slopes

This gently sloping, somewhat excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Merrimac soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is medium. Merrimac soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. It is droughty during the drier periods in summer. This soil is in capability subclass IIs.

Rc-Raypol silt loam

This nearly level, poorly drained soil is on stream terraces and outwash plains. The Raypol soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is high. Runoff is slow. Raypol soil warms up and dries out slowly in the spring. It is very strongly acid or strongly acid above a depth of 40 inches and strongly acid through slightly acid below a depth of 40 inches. This soil is suited to cultivated crops. This soil is capability subclass IIIw.

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

These nearly level, poorly drained and very poorly drained soils are 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 are no major differences in use and management. The Ridgebury soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is very slow or slow. Ridgebury soil warms up and dries out slowly in the spring. It is strongly acid through slightly acid.

The Leicester soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is very slow or slow. Leicester soil warms up and dries out slowly in the spring. It is very strongly acid through medium acid.

The Whitman soil has a high water table at or near the surface for most of the year. Permeability is moderate or moderately rapid in the surfacelayer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is very slow, or the soil is ponded. Whitman soil warms up and dries out very slowly. It is very strongly acid through slightly acid.

These soils are not suited to cultivated crops. Stoniness makes the use of farming equipment impractical. These soils are in capability subclass VIIs.

Ro - Rippowam fine sandy loam

This nearly level, poorly drained soil is on flood plains of major streams, rivers, and their tributaries.

Typically, this rippowam soil has a black, fine sandy loam surface layer 8 inches thick. The subsoil is dark grayish brown and dark gray mottled fine sandy loam 27 inches thick. The substratum is dark grayish brown gravelly coarse sand to a depth of 60 inches or more.

The rippowam soil has a seasonal high water table at a depth of about 6 inches. It is subject to frequent flooding. Permeability is moderate or moderately rapid in the surface layer and subsoil, and rapid or very rapid in the substratums. The available water capacity is moderate. Runoff is slow. Rippowam soil warms up and dries out slowly in the spring. This soil is poorly suited to community development because of flooding and the seasonal high water table. Areas used for onsite septic systems require extensive filling, special design and installation. This soil is in capability subclass IIIW.

Sg-Sudbury sandy loam

This nearly level to gently sloping, moderately well drained soil is on outwash plains and stream terraces. Slopes range from 0 to 5 percent. The Sudbury soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is slow or medium. Sudbury soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. This soil is in capability subclass IIw.

SxB-Sutton extremely 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 8 to 25 percent of the surface. The Sutton soil has a seasonally 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 because stoniness makes the use of farming equipment impractical. This soil is capability subclass VIIs.

5. HYDROLOGY

As mentioned earlier, Joe Clark Brook bisects the central parts of the site in a northerly direction. Joe Clark Brook, which drains an area of 3.35 square miles or 2,144 acres ultimately empties into Poquetanuck Cove. It should be noted that a few small tributaries in the western parts flow in an easterly direction to Joe Clark Brook.

According to DEP's Water Quality Classification publication, the surface water quality of Joe Clark Brook is B/A. This means that the brook is suitable for bathing, other recreational purposes, agricultural uses, certain industrial processes and cooling; excellent fish and wildlife habitat; good aesthetic value. DEP's goal is to upgrade the stream to an 'A' standard. This means, the water in the stream may be suitable for drinking water supply (Class A); may be suitable for all other water uses including bathing; shellfish resource; character uniformly excellent; and may be subject to absolute restrictions on discharge of pollutant. The 'B' classification is obviously a result of the active septage lagoon and landfill in the Geer Hill section of the watershed.

Both residential and industrial development of the site would increase the amount of runoff during periods of rainfall. These increases would result from soil compaction, removal of vegetation, and placement of impervious surfaces (roofs, driveways, public areas, etc.) over the soil. Since the industrial uses would tend to require more impervious surface area (as for parking lots and bigger buildings), the runoff increases for that type of development would tend to be higher than for residential development. Efforts should be made in either case to protect Joe Clark Brook from sand and other road and parking lot debris.

Also, because the Town has a requirement that post-development flows not exceed pre-development, the developer of the site should supply the Town with a detailed storm water management plan which includes hydrologic calculations. It is likely that the Joe Clark Brook flood plain would serve as a natural runoff control area for some increased runoff flows from the site. However, this will depend upon the ultimate density and type of development that occurs on the site. A sound erosion and sediment control plan should accompany the storm water management plan.

6. GEOLOGIC DEVELOPMENT CONCERNS

According to the Ledyard Zoning District Map distributed to Team members the site can presently be divided into two (2) zones; (1) I-2, which is an industrial district zone with a minimum lot size of 80,000 square feet and (2) R-60, which is a low density residential district with minimum lot size 60,000 square feet. The I-2 zone lies east of Joe Clark Brook on the site. The remaining parts of the site are zoned R-60.

According to Town officials, the applicant wishes to change part of the present I-2 zone to a R-40 zone. A R-40 zone is a medium density residential district with minimum lot sizes of 40,000 square feet. It should be pointed out that cluster Residential Developments may be permitted in a R-40 or R-60 zone but would be subject to certain conditions specified in Section 3.5 Cluster Residential Development of Zoning Regulations Town of Ledyard. One of these conditions would be the installation of a community water system (also see Water Supply Section). A community septic system would probably also be required for cluster residential development. It should be pointed out that municipal water and sewer lines are not available to the property. As a result, on-site septic systems and wells would be required.

It seems likely that waste water generated by cluster type development would exceed 5,000 gallons/day. As a result it would require design by a professional engineer and review by the State Department of Environmental Protection. Based on preliminary data and soil mapping, the sandy and gravelly soils in the eastern parts appears to be favorable for community on-site sewage disposal, but additional soil testing would be required to complete a final design.

The major geologic limitation on this site in terms of industrial or residential development includes (1) the presence of alluvial soils paralleling Joe Clark Brook; (2) till based soils which may have seasonally high water tables and (3) the highly porous nature of the sand and gravel deposits in the eastern parts. Although the moderate slopes in the northwest corner and southern limits may be a problem in terms of development of the site, they should not be a difficult obstacle to overcome.

As mentioned earlier in the report, the alluvial or regulated soils on the site should be avoided where possible. It seems likely that Joe Clark Brook and its accompanying floodplain would need to be crossed in order to gain access to the western parts of the site. Although undersirable, wetland road crossings are feasible provided

they are properly engineered. The road should be constructed adequately above the surface elevation of the wetlands. This will allow for better drainage of the road and also decrease the frost heaving potential of the road. Road construction through wetlands should preferably be done during the dry time of the year, and should include provisions for effective erosion and sediment control. If regulated soils are crossed, every effort should be made to cross them in areas where the least amount of disturbance would be required. For example, it would be most advantageous to utilize the former farm roads that provided access to the west side of Joe Clark Brook. Finally, culvert(s) should be properly sized and located so as not to alter the water levels in the wetlands or cause flooding problems.

The presence of highly porous soils and till soils with seasonally high water tables will weigh heaviest in the potential for installation of on-site sewage disposal systems. Because sandy and gravelly deposits are relatively poor filters, any pollutants such as septic effluent and/or industrial wastes that are disposed of directly or otherwise and make their way into the ground will have little opportunity to be renovated by the soil components. This undoubtedly poses a potential threat to on-site wells(s), since a public water supply line is not available to the site. On the other hand, natural dilution by infiltrating precipitation should be increased due to the highly permeable nature of the sand and gravel. See Sewage Disposal Section)

The seasonally high water table associated with till-based soils can also interfere with proper functioning of a septic system. Special design is required for septic systems when groundwater is 36" or less below ground surface.

From a groundwater protection standpoint, it seems likely that low to medium density (1 to 1-1/2 acre lots) residential development would be of less risk to the groundwater beneath the site than industrial use of the land, particularly in view of the highly porous soils in the eastern parts and the unavailability of public water and sewers. Finally, extensive soil testing must be conducted in the areas desired for R-40 zoning to determine whether or not a 40,000 square foot lot can support an on-site septic system and well and meet all necessary state and local regulations. According to the Zoning Districts Map most of the surrounding land in the area is presently zoned R-60.

7. EROSION AND SEDIMENT CONTROL

An erosion and sediment control plan should be prepared when the site plan is designed. The plan should contain the following information:

A. A narrative describing:

1. the development
2. the schedule for grading and construction activities including:
   a. start and completion dates
   b. sequence of grading and construction activities
   c. sequence for installation and/or application of soil erosion and sediment control measures
   d. sequence for final stabilization of the project site
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 and erosion and sediment control measures and storm water management facilities

B. A site plan map at a sufficient scale to show:

1. the location of the proposed development and adjacent properties
2. the existing and proposed topography including soil types, wetlands, water courses and water bodies
3. the existing structures on the project, if any
4. the proposed area alterations including cleared, excavated, filled or graded areas and proposed structures, utilities, roads and, if applicable, new property lines

The Soil Conservation Service working through the New London County Soil and Water Conservation District is available to review the Erosion and Sediment Control Plan at the Town's request. (887-4163)

8. WATER SUPPLY

It seems likely that if the site was developed for detached single family houses on 60,000 and/or 40,000 square foot lots, the underlying bedrock would be the most suitable aquifer for such wells. With large lots, there is usually no particular reason why on-site well supplies could not be properly located and constructed. In this particular parcel, it is noted that a considerable portion of the land area to be developed consists of well drained to somewhat excessively drained soil. It is with such soils that conditions are not particularly favorable for filtering and renovating sewage effluent or other potential sources of pollution which normally benefits from the soil environment as a means of treatment. Where soils are determined to be excessively fast (percolation rate faster than one inch/minute) in the area of subsurface sewage disposal systems, it is necessary to increase the well separation distance from such systems. This distance is doubled from the normal minimum of 75 feet. Also, any underlying ledge rock must be at a greater distance below the bottom area of sewage leach systems. If such precautions are followed when conditions warrant, adequate protection should be afforded water supplies. Of course this is one reason for having large lots, so that there is greater flexibility for locating suitable areas for the on-site facilities.

In general, properly located and constructed drilled wells will afford the greatest protection against potential sources of pollution. Yields are usually adequate for single family residential use. However, wells that penetrate the underlying rock formation may have excessive minerals (usually iron or manganese) in the water. Unless appropriate treatment is provided, water quality objections will rise.

According to the Groundwater Availability in Connecticut, 1978 by Daniel B. Meade, the sand and gravel deposits in the Joe Clark Brook valley are thought to be coarse grained, but further hydrogeologic studies would be required in order to verify this. Areas underlain by satuated, coarse-grained deposits may be capable of yielding moderate to very large amounts of water (50-2,000) gallons per minute. Many other hydrogeologic factors such as proximity to a major streamcourse, saturated thickness of the sand and gravel deposits, etc., plays an important role. A well yielding between 50 to 2,000 gallons per minute would no doubt supply land uses such as industrial or clustered residential development that require higher volumes of water. Further testing of this aquifer, which includes test wells, would be required to determine its potential.

In general, wells should be located toward the high side of lots, properly separated from on-site sewage disposal systems or other potential sources of pollution such as buried fuel oil tanks or discharges from on-site water treatment facilities. They must also have adequate separation from watercourses or drains and be protected from surface drainage and erosion proned areas.

If a community water supply is utilized for future development of the site, it will be subject to Connecticut General Statute Section 16-262m. This statute requires that community water supply systems may not begin until the owner has obtained a certificate of public convenience and necessity for the construction or expansion from the Department of Public Utility Control and the Department of Health Services. The telephone number for these agencies are 827-1553 and 566-1253, respectively. They should be contacted as early as possible if a community water supply well is planned.

The natural quality of groundwater within the site is presently classified by DEP as "GA", which means that it is suitable for private drinking water supplies without treatment Source: Water Quality Classification for the Thames Southeast Coastal and Pawcatuck River Basins, DEP, Water Compliance Unit.

It should be pointed out that an active septage lagoon and an active and inactive landfill is located south of the site on Geer Hill. The presence of these facilities has led to the degradation of water quality in the area. The Water Classification Map mentioned previously indicates that the groundwater on Geer Hill is classified GB/GAA. A 'GB/GAA';classification means that the groundwater in this area may not be suitable for potable use unless treated because of existing or past land uses, i.e., septage lagoon and landfills. The 'GAA' classification following GB means that DEP's ultimate goal is to upgrade the water quality in this area to a standard which would be suitable for public and private drinking water supplies without treatment.

9. SEWAGE DISPOSAL

The soils on the major portion of the property, are quite permeable with the biggest concern being that they may be excessively porous. When this occurs filtration and renovation of sewage effluent may not be achieved within the normally provided for distances. In such soils leaching systems require special design considerations. In general, the direction of groundwater flow should be known and the lateral separting distances noted to any wells, particularly downgradient, or water courses. Increasing separating distances and keeping leaching systems elevated as much as possible above groundwater will assist in reducing the potential for pollution. Nitrate levels are usually maintained to a satisfactory degree by preventing over development of an area, where sewage effluent can receive adequate dilution by rainfall and mixing with groundwater.

The other area of concern would be where shallow ledge rock may be a potential factor. Because leach system bottoms need to be kept at least 4 feet above ledge rock, adequate lot testing would be needed in order to determine rock profiles and access so that sufficient usable area is available for leaching purposes. There should be at least 4 to 5 feet of soil above ledge. Again the slope of lots and any outcrops of rock downgrade of the potential system areas should be given careful consideration in order to prevent possible surface seepage of effluent. In either of the above cases, it would appear that all or most of the lots would need engineered design systems.

The Team Sanitarian feels that no particular benefits would be derived by changing a portion of the property to a zone allowing greater density.

10. WILDLIFE RESOURCES

This site contains a well-dispersed mix of open hay fields, old fields, seedling/sapling areas, mature mixed forest and areas of alder along the brook and its associated wetlands. This area offers high habitat diversity. In general, the greater the diversity of vegetation, the greater the diversity of wildlife that will inhabit the area. The area offers good to excellent wildlife habitat, typical of abandoned farm situations.

The mixed hardwood forest contains red and black oak, sugar maple, shagbark hickory and white ash. There are a few small stands of American beech. The understory is thick in some places containing cherry, sugar maple and American elm. This area contains a good variety of mast producing species, especially oak, whose acorns are a valuable food to many types of wildlife including deer, squirrels and turkeys. This area also contains some snag and den trees. Snag trees, dead trees, den trees, and trees containing holes in them are a necessary habitat component for such insect eaters as as wood peckers and cavity nesters such as owls.

The old field areas are especially valuable to wildlife since they contain a great mix of vegetative age classes and a mix of species. These abandoned pastures now contain red cedar, honeysuckle, barberry, greenbriar, mulitflora rose and autumn olive. In more open areas, grasses dominate along with meadowsweet. These areas provide both abundant food and cover, and the open grassy areas offer nesting areas for some types of birds. These grassy areas along with the open field areas are good areas of insect production which many young birds are dependent on.

The open fields provide added diversity. They are fine areas for small mammal production such as mice and moles which serve as a food source for predators such as hawks, owls and coyotes.

The wetland associated with Joe Clark Brook offers excellent wetland wildlife habitat. This area would offer suitable habitat to such aquatic mammals as otter and muskrat along with a variety of reptiles and amphibians. The alder swales along the brook would provide good habitat for woodcock. The soft mud along the brook would provide abundant earthworms which form the mainstay of the woodcock's diet.

Since wetlands are important wildlife feeding, nesting and cover areas it is advised that wetland areas be left undisturbed. A buffer strip of a minimum of 100 feet should be left around the wetland perimeters.

Development of this area will impact both wildlife and the wildlife habitat in the area. All developments decrease the amount of habitat available to wildlife, simply because the land will be cleared and occupied by buildings and roads. The quality of the habitat will also decrease because a currently undeveloped piece of land will be broken up by buildings and human activity. The habitat will change because vegetative classes and types will be changed.

Species of birds and mammals that are very sensitive to urban development probably will no longer inhabit this area. Sensitive bird species that might occupy this area include veeries, ovenbirds, and scarlet tanagers. Researchers have found that an undisturbed 60 acre woodland is probably the minimum size necessary to attract the most sensitive forest bird species to an urban area.

Common occurring mammal species inhabitating this area such as deer may be forced out due to the development of this area. Other mammals such as squirrels, racoons, and rabbits that will tolerate certain levels of development will move to open space areas, backyards and may become a nusiance to residents.

11. FISH RESOURCES

Site Description

A 0.5 mile reach of Joe Clark Brook bisects the proposed development site flowing northward into Poquetanuck Cove on the Thames River. The brook is currently classified by the Department of Environmental Protection as "Class B" surface water (swimmable-fishable water).

Gently sloping pasture lands border the brook along its entire eastern edge; open field borders the western edge. Streamside banks are very steep along the northwestern portion of the brook and gradually moderate into low lying wetlands in the southern section.

Water flow is slow moving in this low gradient reach. Brook width varies from 2 to 5 feet and bottom substrate primarily consists of gravel and small rocks. Silt deposition was mainly observed in the southern wetland area which had been traversed by vehicles. Overhead vegetation provides sufficient cover and shading throughout the entire reach.

Several sections of the brook contained dense clusters of filamentous algae attached to bottom substrates. The presence of algae suggests that the brook periodically receives artici-cial source(s) of nutrients. A potential source of nutrient enrichment may be a landfill located upriver from the proposed development.

Fish Population

Joe Clark Brook is annually stocked with yearling brook trout. Other stream species that would be expected to inhabit the brook are blacknose dace, longnose dace, and white sucker. Riffles comprised the dominant fish habitat in this reach. Only a small number of pools were observed. The brook appears to support a diverse group of aquatic insects which serve as the primary food source for fish.

Impacts

The primary impact of development on the fish and aquatic resources would be erosion and deposition of sediments. Increased sediment loads will:

1. Reduce stream pool depth. Pools are important holding and resting habitat for fish.

2. Reduce aquatic insect production. This will ultimately adversely effect fish growth and survival.

3. Reduce fish egg survival. Adequate water flow, free of sediment particles, is required for egg respiration and successful hatching.

Additionally, Joe Clark Brook in this area has no capacity to move fine streambed materials due to its low gradient on the property. Thus any damage effected by sedimentation could be irreversible.

Recommendations for Mitigation

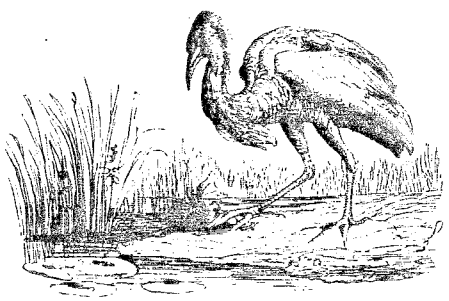
The impact of residential and industrial development on the brook can be minimized by implementing the following precautionary measures:

1. Install and maintain proper erosion/sedimentation control of structures during construction.

2. Provide a 100 foot buffer zone on each side of the brook.

3. Prevent "direct" stream crossings during construction. This will require the construction of bridges or careful control of traffic to one crossing by bridge.

4. Design and install proper storm drains in residential and industrial zones to prevent excessive surface water runoff and flash flood events.



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.