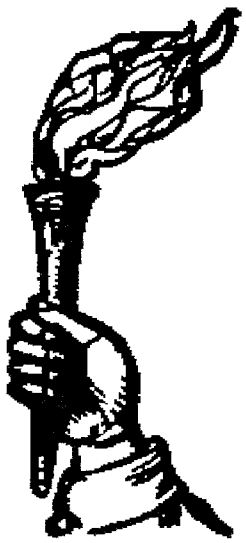
Signal Hill Subdivision

North Stonington and Stonington Connecticut
April 1990



Eastern Connecticut Environmental Review Team Report

Eastern Connecticut Resource Conservation and Development Area, Inc.

Signal Hill Subdivision

North Stonington and Stonington Connecticut

Review Date:February 27, 1990

Report Date: April 1990

Eastern Connecticut
Environmental Review Team

Eastern Connecticut
Resource Conservation
and Development Area
P.O. Box 70, Route 154
Haddam, Connecticut 06438
(203) 345-3977

ENVIRONMENTAL REVIEW TEAM REPORT
ON

SIGNAL HILL SUBDIVISION

NORTH STONINGTON & STONINGTON, CONNECTICUT

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

The ERT met and field checked the site on Tuesday, February 27, 1990. Team members participating on this review included:

Patrice Beckwith	**Soil Conservationist** **USDA - Soil Conservation Service**
Nick Bellantoni	**State Archaeologist** **CT Museum of Natural History**
Steve Hill	**Wildlife Biologist** **DEP - Eastern District Headquarters**
Pete Merrill	**Forester** **DEP - Patchaug State Forest**
Brian Murphy	**Fisheries Biologist** **DEP - Eastern District Headquarters**
Richard Serra	**Regional Planner** **Southeastern CT Regional Planning Agency**
Elaine Sych	**ERT Coordinator** **Eastern CT RC & D Area, Inc.**
Bill Warzecha	**Geologist/Sanitarian** **DEP - Natural Resources Center**

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, and a soils map. During the field review the Team members were given overall and detailed plans. The Team met with, and were accompanied by several members of the North Stonington Planning and Zoning Commission, a member from the North Stonington Garden Club, the Stonington Assistant Town Planner, a neighboring property owner, and representatives from the applicant's engineering firm. 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 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 Council hopes you will find this report of value and assistance in making your decisions on this proposed subdivision.

If you require additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
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1. Location, Project Description and Zoning

The proposed subdivision site, about 153 acres in size, is bisected in the central parts by the North Stonington/Stonington town line. Approximately 90 acres in the northern parts are located in North Stonington and the remaining 62.5 acres in the southern parts lie within Stonington. Jeremy Hill Road, which the property borders on the east, will provide primary access to the site. On the north, south and west the site is bordered mainly by wooded land. Hay fields also border the site on the west.

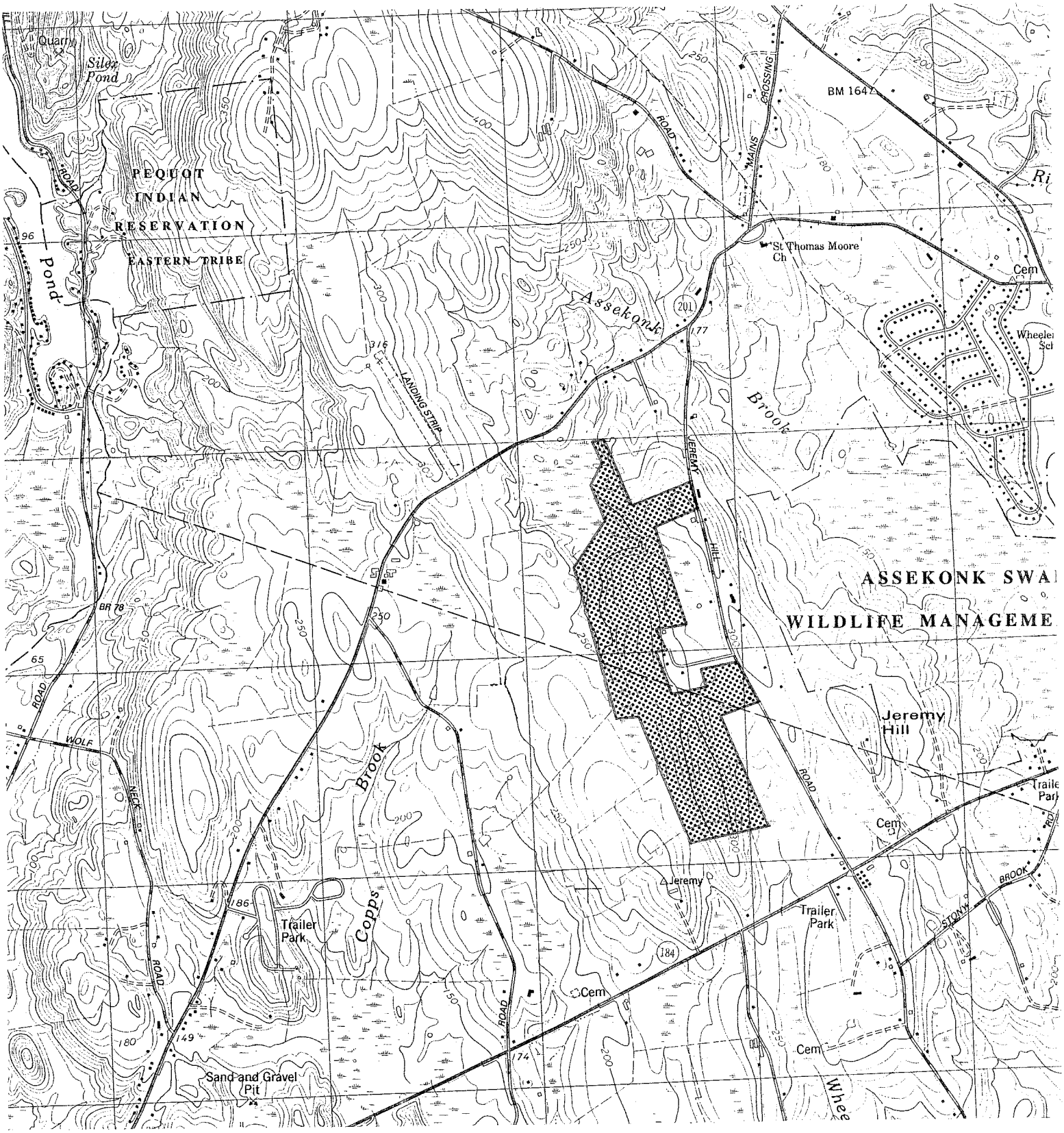
Present plans indicate that the parcel of land will be subdivided into 51 single-family house lots (21 in Stonington and 30 in North Stonington). The lots will be accessed by a loop road and 4 cul-de-sacs that total about 1.5 miles. Each lot in the subdivision would be served by an individual on-site septic system and well. A total of 38 acres of open space is proposed for the subdivision. The principal open space area parallels a stream valley along the western boundary. About 24 percent of the site comprises regulated wetland soils; (±15 acres in Stonington and ±21.2 acres in North Stonington).

The site can be divided into two zoning classifications: RR-80 in Stonington and R-60 in North Stonington. The RR-80 zone in Stonington allows single-family homes on lot sizes of at least 80,000 square feet or about 2 acres, while the R-60 zone in North Stonington allows single-family homes on lot sizes of 60,000 square feet or about 1.5 acres. Average lot sizes for the combined subdivision (North Stonington and Stonington) is 2.03 acres.

LOCATION MAP

Scale 1" = 2000'

Approximate Site



2. Land-Use

A review of air photos by the Team's geologist for the site and vicinity indicates that the area has historically been used for agricultural and residential purposes. The air photo's reviewed, which included the years 1934, 1965, 1970, 1975, 1980 and 1985, are available for inspection at the Department of Environmental Protection's Natural Resources Center in Hartford. Except for wooded land along the site's western border, the 1934 air photo indicates that the majority of the site was pasture land. The stone walls that transect the site also give testimony to its agricultural past. Where possible, every effort should be made to preserve the stone walls. Although the site and vicinity is still characterized by agricultural and residential land uses, recent trends, particularly since 1975, have resulted in a decrease in farm land, an increase in wooded land and an increase in residential properties.

Jeremy Hill Road is characterized by low density (1.5 - 2.0 acre) residential land uses. The North Stonington Bible Church, Inc. is bounded by proposed Lots 9-11, 46 and 47 on the east. In the vicinity of Lots 14, 15, 44 and 45 the topsoil and possibly subsoil was stripped and stockpiled in a few locations. The purpose of this work nor when it was done is known.

3. Topography

The site encompasses two streamlined hills (probably drumlins) which are located west of Jeremy Hill. The main axes for the hills, which were molded by glacier ice as it advanced through the region, are orientated in north-south direction. Site topography is characterized primarily by moderate slopes but there are some relatively flat and steeply sloping areas. Steepest slopes occur in the northern parts where ledgerock is at or near ground surface and on the east and west side of the drumlin at the southern limits. Relatively flat to gentle areas occur in the central parts. Site elevations range from about 230 feet above mean sea level in the northern wetland and rise to about 320 feet above mean sea level on the crest of the drumlin hill in the southern parts.

The proposed road layout avoids the steepest slopes on the site and, for the

most part, has been laid out to cross slopes and conform to the contours rather than perpendicular to them. However, there are a few places where earth cuts and fills will be required in order to construct roads and/or driveways.

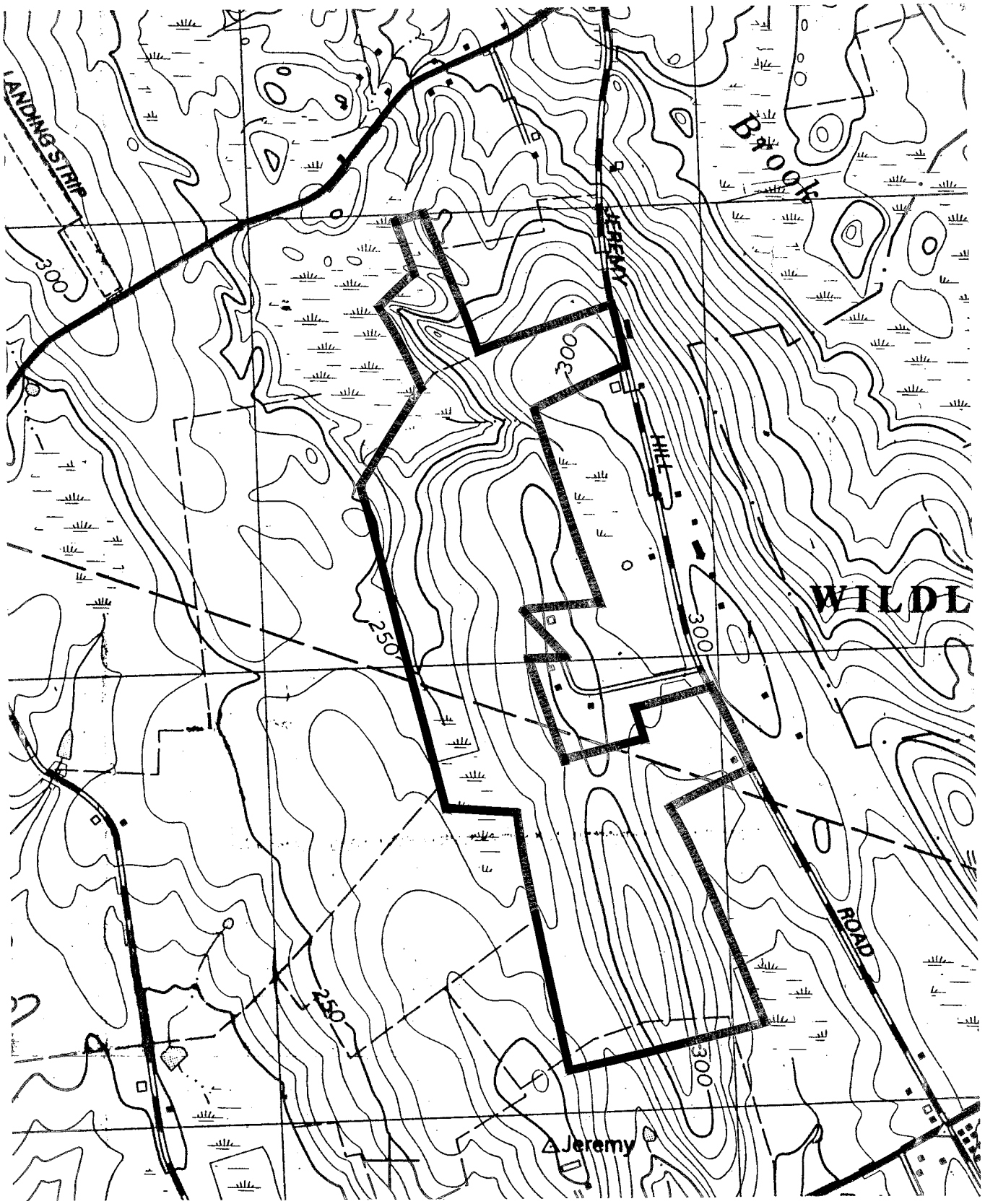
Soil mapping data indicates that the majority of the site is covered by soils characterized by a "hardpan". The "hardpan" layer is a tightly compacted soil zone that generally occurs 2-3 feet below ground surface. It is typically characterized by low permeabilities, which causes a seasonally high water table condition. As such, deep cuts into hardpan soils can be extremely difficult to stabilize due to seepage of water over the hardpan layer. This creates an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to slump. Once this begins, the slope is very difficult to stabilize. Even with good vegetative cover, it is almost impossible to keep these soils from slumping. For this reason, cut areas should be properly stabilized as soon as possible. Seepage control will probably be required where cut sections extend below the water table.

Since shallow to bedrock soils are not widespread on the site the potential for significant blasting is not expected.

TOPOGRAPHIC MAP

Scale 1" = 1000'

Approximate Site Boundary



4. Geology

The site lies entirely within the Old Mystic topographic quadrangle. A bedrock geologic (Map I-1524, by R. Goldsmith) for the quadrangle has been published by the U.S. Geological Survey. Only preliminary surficial geologic information exists for the quadrangle. Nevertheless, soil mapping data, deep test hole information and the unpublished Surficial Materials Map of Connecticut were utilized for the surficial geology section of this report.

Bedrock Geology

Bedrock is not well exposed on the site. The principal outcrop area occurs at the northern limits of the northern drumlin hill. Steep slopes characterize these areas. Ledgerock was encountered at depths less than 6 feet in only 8 of the 117 deep test holes excavated on the site for on-site sewage disposal exploration. These 8 test holes, which ranged in depths between 4 feet and 6 feet below ground surface were excavated on Lots 8, 22, 23, 29 and 33, and coincide with published soil and geologic mapping information.

Except for a very small area of the site's northern limits, the bedrock underlying the site is identified as Potter Hill Granite Gneiss. It is described as a gray to pinkish-gray granitic gneiss composed of the minerals quartz, feldspar, and biotite. At the site's northern limits, the Potter Hill Granite Gneiss is in contact with a gray to pinkish-gray medium- to coarse-grained rock referred to as a porphyritic quartz monzonite. No development is proposed in the area underlain by the latter rock type.

Most homes in North Stonington and Stonington which are not served by public water supply mains rely on the underlying bedrock as a source for domestic water. Present plans indicate that each lot in the proposed subdivision will rely on the underlying bedrock as a source of water.

Surficial Geology

Overlying the crystalline, metamorphic rock on the majority of the site is a

glacial sediment called till. The till sediments were deposited by glacial ice as it moved across the bedrock surface from north to southeast. In general, it consists of an olive-gray to tan mixture of sediments ranging in size from clay particles to large boulders, but predominantly contains sand and silt. According to the New London County Soil Survey, the texture of the till on the site ranges from generally sandy, stony and loose in the upper few feet and shallow to bedrock areas (northern parts) to a siltier, and more compact ("hardpan") variety throughout the remainder of the site. In general, deep test hole information supplied to Team members revealed that the texture of till on the site ranged from silty sand and gravel to very tight medium sand and silt.

The exact depth of the till is unknown on the site but it ranges from zero in rock outcrop areas in the northern parts and may exceed 60 feet below the crest of the drumlin in the southern parts.

The till soils on the site, particularly where they are characterized by a high percentage of silt, fine sand and clay and a shallow (1.5-3 feet below ground surface) compact soil zone will be an important design constraint for on-site sewage disposal. These areas are likely to be prone to a seasonally high water table condition that is perched above the "hardpan" layer. This is due to slow permeability of the "hardpan" layer. (See **Sewage Disposal** section) Till soils that contain high percentages of silt, fine sand and/or clay can also make the soil susceptible to erosion and surface water degradation.

The plans distributed to Team members indicate regulated wetland soils overlie till and bedrock primarily along the site's western border but also at the northern end of the site and in open space #2 area. Except at the northern limits of the site, the applicant's certified soil scientist has identified the regulated wetland soils on the site as Rn (Ridgebury-Leicester-Whitman extremely stony fine sandy loams) soils.

The Rn soils mentioned in the preceding paragraph have been mapped as an undifferentiated unit comprising Ridgebury-Leicester-Whitman soils. All three soils are very deep, loamy soils that formed in glacial till. The Ridgebury and Whitman soils develop in the compact glacial till while the Leicester soils develop in the more friable till. They range from poorly drained (Leicester and Ridgebury) to very poorly

drained (Whitman). In general, the Ridgebury, Leicester and Whitman soils are nearly level or gently sloping soils found in drainageways and low-lying positions of till covered uplands.

The major concern of these soils from an engineering standpoint focuses on a seasonally high water table. A high water table condition is at or near ground surface in the Leicester and Ridgebury soils generally between November and May. In the Whitman soils, a high water table condition, at or above ground surface, occurs September through June.

At the site's northern limits, regulated wetland soils have been identified as Ce (Carlisle Muck) soils. They are characterized as nearly level, very poorly drained soils which generally occur in pockets and depressions of floodplains, stream terraces, outwash plains and glacial till uplands. Typically, the Carlisle soil has black and dark reddish-brown, muck organic deposits to a depth of 60 inches or more. The Carlisle soil has a high water table near or above the surface for most of the year. As such, it is poorly suited for development. Also, the organic material does not support foundations. If drained, the organic layers shrink and subside. For these reasons, as well as others, the areas covered by Ce soils should not be developed or disturbed.

It is understood that both towns (North Stonington and Stonington) regulate any activity that takes place within a 100 foot distance of regulated wetland soils. The proposed plan calls for three (2 in North Stonington, 1 in Stonington) wetland road crossings of the Rn soils that total about 340 feet. At all three locations, the proposed road follows an existing old dirt farm road. Utilizing these existing crossings will help to minimize the disturbance to the wetlands in comparison with locating a through road in another alignment crossing an undisturbed part of a wetland.

Since the Rn soils are regulated under Connecticut Inland Wetland and Watercourses Act, Connecticut General Statutes Section 22a-36 through 22a-45, inclusive, any activity, such as road crossings and placement of fill material that impacts wetlands will require a permit from the local inland wetland agencies. Before the agencies act on the proposals they should fully understand the function of the wetland in the area of the crossing with regard to potential impacts of the

activity on the wetland. As such, details on all road crossings should be provided to the towns for review purposes including, pipe sizes, amount and type of fill material to be used, area of impact, and the presence of important biologic or ecologic features in the area. Also, "feasible and prudent alternatives" that minimize the number of road crossings or re-configuration of roads keeping them entirely out of wetland areas should be investigated by the developer. (Also, refer to **Soil Resources** section)

Any wetland road crossings that are allowed by either town's agency should be conducted during the summer when water tables are generally at their lowest. This will help to minimize the chance for surface water degradation to on and off site streams.

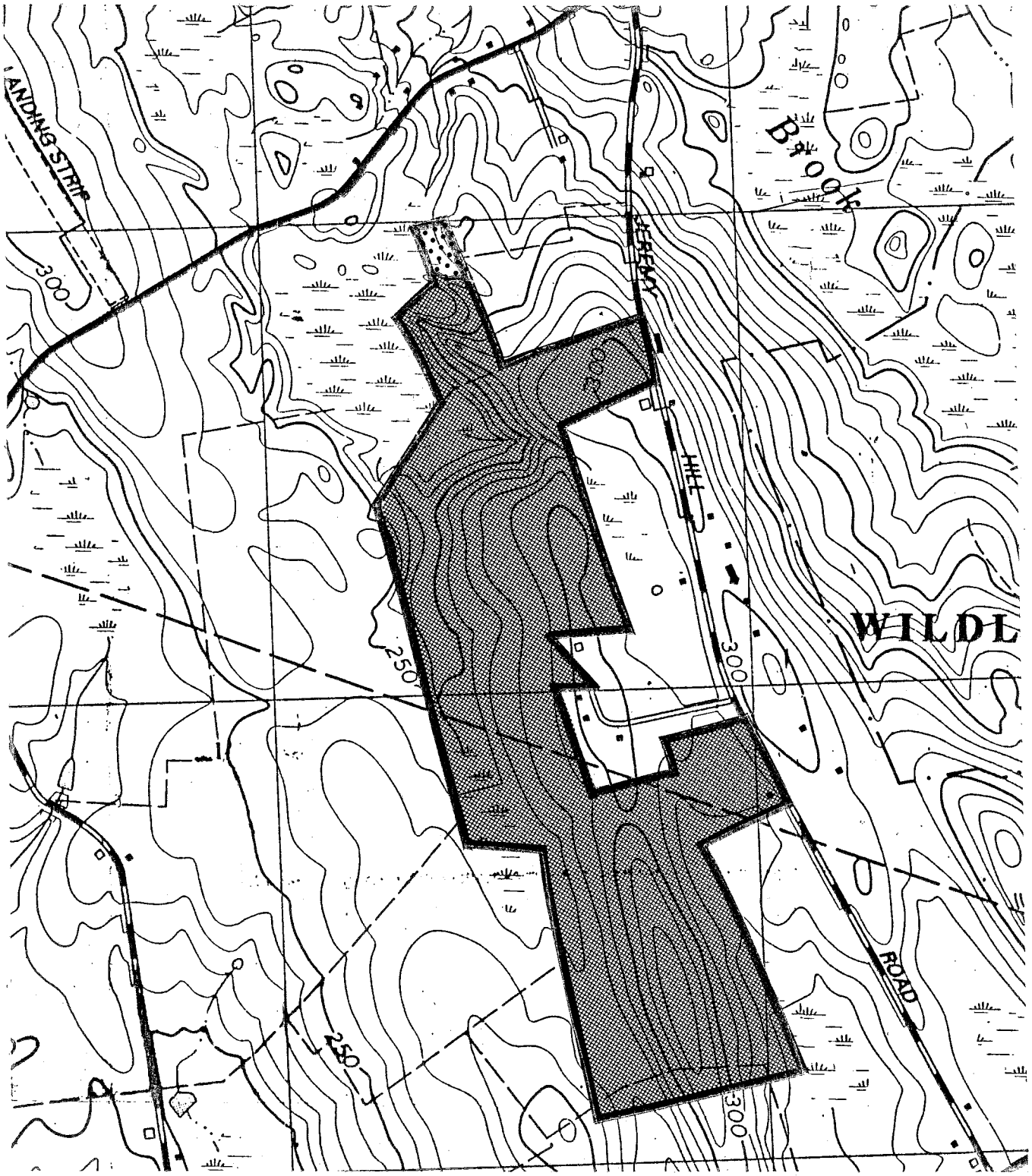
As mentioned earlier, the topsoil and possibly subsoil zone was stripped from an unknown surface area that occurs primarily on Lots 14 and 15 in North Stonington and on Lots 44 and 45 in Stonington. It appears that the man-made disturbance included removing the original soil (topsoil and subsoil layers) materials down to the "hardpan" layer. Based on visual observations made during the field walk, the soils in this area appear to have a seasonal high water table at or near the soil surface and support hydrophytic vegetation. It is strongly suggested that the applicant's soil scientist re-check this area to determine whether or not the hydrology has been changed to the extent that the soils now have an aquic soil regime (saturated conditions). If this area has been modified so that it supports an aquic soil regime, then it will be a regulated wetland area. Since present plans indicate that development i.e., homes, septic systems, roads and driveways are proposed in this area, there is a serious concern that water related problems may occur such as wet basements, hydraulically impaired septic systems, and frost heaving. (Also, see **Sewage Disposal** section)

BEDROCK GEOLOGIC MAP

Scale 1" = 1000'

Porphyritic Quartz Monzonite

Potter Hill Granite Gneiss

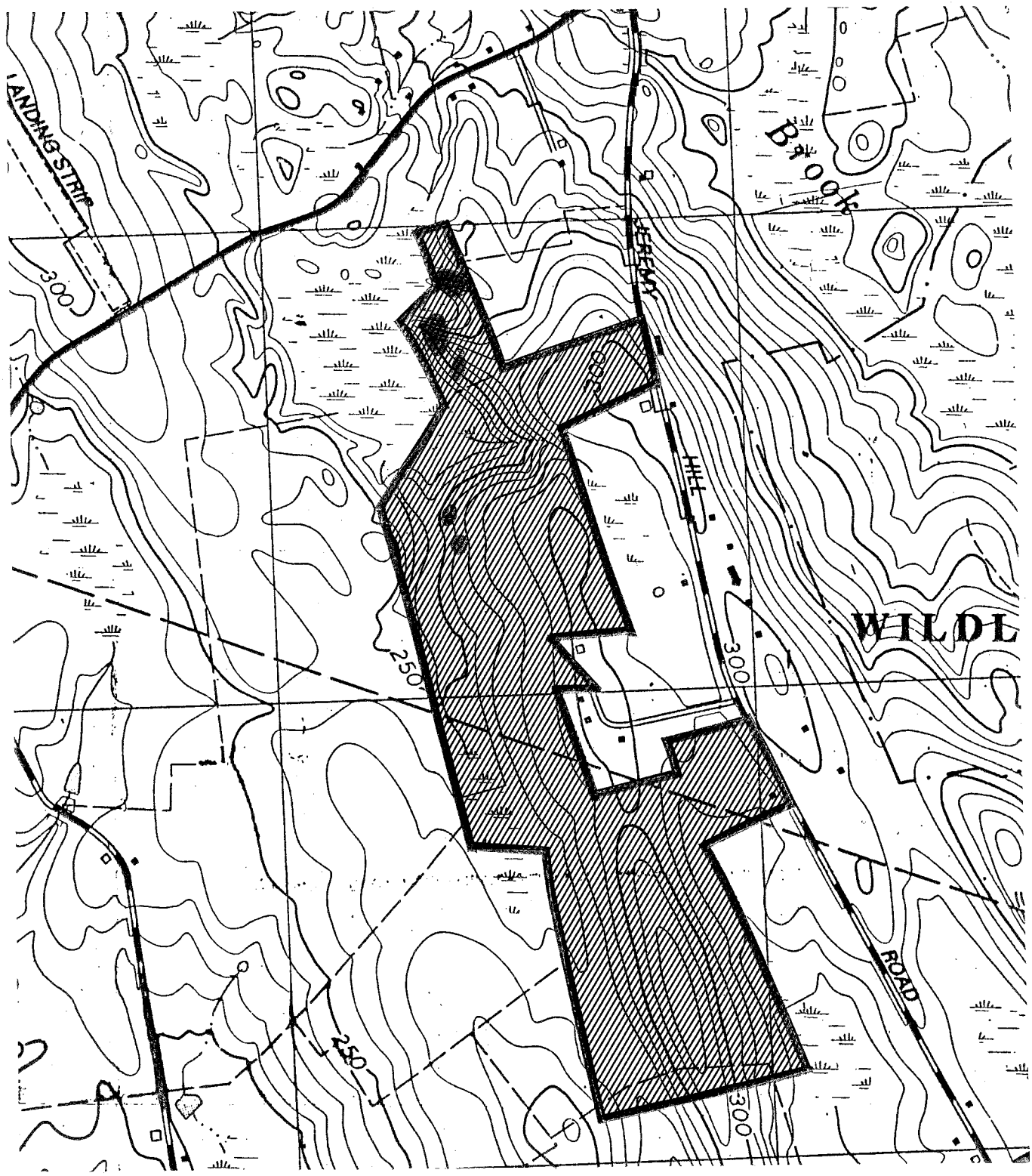


SURFICIAL GEOLOGIC MAP

Scale 1" = 1000'

Glacial Till

Areas where bedrock is at or near the ground surface



5. Soil Resources

Soils and Project Design

A good portion of the site is located on Woodbridge soils and to a lesser extent on Paxton soils. These soil types are similar in that they both exhibit a seasonably high water table. There is slow to very slow permeability in the substratum. The water table and the permeability are the two major factors influencing the suitability of development.

Homes with a basement would need subsurface curtain drains to remove the excess water in the wet season. There is generally enough slope to carry away the water. As with any drains, the water should be channeled only to a safe outlet. The Paxton soils have been rated as having a medium potential for septic tank absorption fields, where the Woodbridge has a low potential. Soils with a slow percolation rate (30-60 min/in) due to a restrictive soil layer (hardpan) would need an engineered design as it has been identified as an area of special concern by State regulations. Corrective measures would include designing larger areas to distribute sewage effluent, and installing curtain drains and drainage swales to intercept water flowing towards the leaching field. A layer of material could be added to increase the distance to the water table. In areas where the slope approaches 8% or more (lots 25, 26, 27), there is a concern that effluent will break out on the slope. Engineering considerations must be taken to accommodate for this hazard. In the area of lot 28, the soils are mapped as Hinckley. Hinckley soils are characterized as being excessively well drained soils. In this case there may not be the retention necessary to renovate sewage effluent before it reaches the wetlands to the east. In all cases, on- site inspection and testing will dictate the level of design.

Areas that exhibit considerably high water tables are lots 2, 3, 4, 7, and 8. Lots 14, 15, and 45 have water near to the surface due apparently to the removal of a portion of the topsoil.

In areas where there is a considerable amount of wet conditions, a larger area is necessary to renovate the sewage effluent. In this case, the proposed lot sizes would not be sufficient to accommodate both on-site septic and on-site wells.

There were some special concern areas on the site. Although these soils do not show the "typical" wetland soil characteristics of mottling, they may be areas of special concern which would need further investigation. One area would be the outflow of water from the wetlands on lot numbers 5 and 6. The water flow may not be channelized, but it may flow regularly. There is also a question of pockets of soil types that appeared to be wet that were not identified on the plan. These pockets are located in the vicinity of lots 41, 42 and 43 and again on lots 14 and 15. Further on-site investigation would be needed to determine if these areas are wetlands or more detailed information on these soils can be provided by the consulting soil scientist who mapped the area for this project.

The wetlands crossing at lot 5 is an area of concern. The proposal is to remove the existing road crossing. This crossing consists of 20 feet of unconsolidated material over a brook. The developer proposes removal of this fill material to establish a safer crossing for street traffic. The removal of material would create a large and adverse impact on the water course. It may be possible to place a reinforcement structure that would "bridge" the unstable area and be keyed in on the solid ground. This would minimize the disturbance of removing the material and then replacing large amounts of fill in its place. There is no evidence that the water is impounded or that the flow is inhibited on the upstream side of the structure.

Two more wetland crossings are proposed near the town line at Jeremy Hill Road. On the site walk, the wet areas did not appear to be breached in the first crossing as depicted on the site plan. The fill material used in the farm road may have disturbed the continuity of the wetland soils, but the wet conditions still exist. There would need to be special care to minimize impact of the wetlands and to continue to allow free flow of the water movement under the road.

In the soils descriptions for the test pits, soils are described as to texture, porosity and structure, and for the presence of water, roots or bedrock among other things to a depth of 60 inches. Beyond this depth a bedrock geology map should be referenced. Terms such as "silty" refer to soil texture. "Tight" and "very tight" silt refers to soils that have a impervious layer or hardpan. This was caused by glaciers compacting the subsurface layers of the soil. This hardpan layer is typical of the

Woodbridge and Paxton soil series found on the site. "Boney" soils are soils that contain stones. In the area of test pits 9 and 10 (lot 4), for instance, boney was used to describe the Charlton-Hollis soil. This soil type has been described as having up to 10% rock outcropping and up to 8% stones on the surface. The shaley ledge on lot 22 (test hole 57) is in a Canton and Charlton soil series. It appears that the parent material or bedrock is close to the surface of the soil. It appears that ledge was encountered at 36" below the soil surface.

There does not appear to be a hazard to the farming operation to the west of the proposed subdivision. There is a drainage convergence between the two parcels. Runoff from this site will outlet into low lying wetlands which divides the properties and will not cause any increase in runoff on the abutting property.

Sediment and Erosion Control Plan

The proposed sediment and erosion control measures have not been outlined on the site plan. The amount of potential impact on wetlands is great on this site and specific protection measures are required to be outlined. A typical house lot sketch would be the minimum.

The narrative describes two wetland crossings proposed. On the site walk there appeared to be at least four wetlands or wet area crossings that would need to be addressed (between lots 5 & 6, 31 & 13, and on the open space at Jeremy Hill Road). The details of the amount of disturbance and specific sub-base requirements over wetland soils should be addressed. The first wetland crossing proposes removing 20 feet of existing fill, placing a pipe and refilling the gorge with suitable fill. This will create a large negative impact on the wetlands. A Connecticut DEP Water Diversion Permit will be needed as well as notification to the Army Corps of Engineers. Investigation of other methods of bridging between the area of stable ground and building the road atop the undisturbed land is warranted.

The narrative makes reference to the Connecticut Guidelines for design of control measures. Although the Connecticut Guidelines should be followed, it is inadequate to reference them for a site plan. Specific details, as they pertain to this site, should be fully outlined in the plan.

Refer to the enclosed checklist for sediment and erosion control measures that should be included in the plan.

Storm Water Drainage

The drainage calculations, as submitted, do not constitute a complete plan. The Connecticut Guidelines, chapter 8-68 on detention basins should be followed. According to chapter 8 and the TR-55 manual, the design specification requires that the applicant must analyze all storm frequencies to determine the overall affect. The town will then be able to review the information and determine the effects of the design frequency.

There are details on only two of the three detention ponds proposed. Detention basins shall be maintained to a good stand of grassed vegetation. Brush or woody vegetation would reduce the capacity of the basin. Detention pond "D" proposes that the invert of the pipe be 0.3 feet above the bottom of the basin. This would not allow for the settling of debris and sediment expected in a basin over time. Proper maintenance on the structure is important to the life and function of the basin. The outflow of the basin is proposed on 12.5% slope from basin "C" and 10% slope from basin "D". This is considered an unsafe outlet. Complete details of the outlet would be necessary to prove safe outflow. A solid pipe to an energy dissipater on a safe slope is an alternative. Another alternative would be to line the outlet channel with rip rap. Details on the emergency spillway are unclear. The erosion and sediment control measures for the basin areas are not described in the plan.

Refer to the enclosed TR-55 checklist for the items which should be included in the drainage calculations.

CHECKLIST FOR REVIEWING TR-55 ANALYSIS

SCS-CT-ENG-HYD1-Trial
April 1988

U.S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE
STORRS, CONNECTICUT

This form should be used in conjunction with Chapter 9 of the Connecticut Guidelines for Sediment and Erosion Control to develop Hydrologic Reports.

This form should also be used with TR-55 (2nd edition) released in June 1986 which provides other hydrologic procedures not noted in Chapter 9.

CHECKLIST FOR REVIEWING REPORTS USING TR-55 ANALYSIS

PROJECT: Signal Hill Subdivision LOCATION: Jeremy Hill Road

BY: McDonald & Sharpe DATE: 2/27

1. * Watershed Map at a scale of 1" = 500' or larger. Show watershed boundary, subarea boundaries, and subarea names or numbers. (Optional - show Tc, CN, and Drainage Area for each subarea on the map). Contour maps must include some additional area outside the property line boundaries.

2. * Large scale map showing different soils within each subarea and subarea boundaries. May also be used to measure drainage areas. Could also show Tc calculation path used for each subarea.

3. * Tabulation sheet or computer printout showing Curve Number and Time of Concentration calculations for each subarea. Drainage areas, Hydrologic Soils Groups, and Land Use areas should be documented from soils maps or other references.

4. * Tabulation sheet showing calculations and equations used for any storage estimates to design a detention basin or other misc. calculations.

5. _____ TR-55 printout showing graphical or tabular peak discharge calculations. Include printouts for both pre-development and post development conditions. The printout showing the design of a detention basin should be included. These printouts should document the zero discharge increase for all required storms.

6. _____ The written report should state the initial conditions and storm frequencies to be analyzed. Include a summary table showing the pre-development, post development, and designed system peak discharges for all design frequencies. Show a sketch of the structure outlet system with elevations and dimensions.

Items with an * should be included.

E&S CONTROL PLAN WORKSHEET

This is a guide for the development and review of erosion and sediment control plans. Local commissions should be consulted for regulatory requirements concerning erosion and sediment planning.

Checked ( ) items are those that have been provided on the current erosion and sediment control plan. Items identified with a star (*) should be incorporated into final plans.

Name of development Signal Hill Subdivision

Materials received Subdivision Plan and Drainage Calculations

Total Area 152 Location Jeremy Hill Road, North Stonington

Engineer NcDonald & Sharpe

Date Received 2/27/90 Site Visit 2/27/90 Reviewed by SCS

Submitted by North Stonington Planning and Zoning

NARRATIVE SECTION DESCRIBING:

_____ The development
* Major land uses of adjoining areas
* The number of [redacted] acres to be disturbed in the project
* The schedule of grading and construction activities including start and completion dates
_____ Application sequence of all E&S control measures
_____ The design criteria for all proposed E&S control measures
_____ Construction details and installation procedures for all proposed E&S control measures
* The operations and maintenance program for all proposed E&S control measures
_____ The name of the person or organization that will be responsible for the installation and maintenance of the E&S control measures
_____ Organization or person responsible for maintenance of permanent measures when project is completed. Measures include: _____

A SITE PLAN AT A SUFFICIENT SCALE SHOWING:

Natural Features

_____ Existing topography
_____ Existing vegetation
_____ Soils information, including test pit data if available
_____ Identification of wetlands, watercourses, major drainage ways and water bodies on the site
_____ Name of soil scientist who performed wetlands delineations and flag numbers
_____ Rock outcrop areas
_____ Seeps, springs
_____ Major aquifers
_____ Floodplains (100 year) and floodways
_____ Channel encroachment line (DEP permit required)
_____ Coastal zone boundary
_____ Public water supply watershed boundaries
* Possible Army Corps Sec. 404 or Sec. 10 Permit Areas (Contact Corps at 1-800-343-4789)

Project Features

_____ The location of the proposed development
_____ A plan legend
_____ Adjacent properties
_____ Property lines
_____ Lot lines and setback lines
_____ Lot and/or building numbers
_____ Planned and existing roads
_____ Proposed structures
_____ Location of existing and planned utilities
_____ Location of wells and septic systems
_____ Proposed topography
_____ North arrow

Clearing, Grading, Vegetative Stabilization

_____ The sequence of grading, construction, and sediment and erosion control activities
* The location of and construction details for all proposed E&S control measures
_____ Recommended measures include _____
_____
_____
_____ Limits of disturbed areas
* Extent of areas to be graded
* Disposal procedure for cleared material
_____ Location of stockpiled topsoil and subsoil
_____ Temporary erosion control method for protection of disturbed areas when time of year or weather prohibit establishment of permanent vegetative cover
_____ Seedbed preparation (including topsoiling specifications)
_____ Fertilizer and lime application rates
_____ Mulch application rate
_____ Mulch anchoring measures

Drainage System

* Existing and planned drainage pattern
* Drainage areas used in design of storm water management system
* Size and location of culverts and storm sewers
Drainage calculations for review by town engineer
* Storm water management measures and construction details
* Groundwater control measures (footing drains, curtain drains)
* Planned water diversions and dams (DEP permit may be required)

House Site Developments

* Sediment and erosion control measures for individual lot development

Additional Comments

SOILS MAP

Scale 1" = 1320'

——— Approximate Site Boundary

Soils Descriptions

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

These gently sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 1 8 percent of the surface. Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity of these soils is moderate. Runoff is medium. These soils warm up and dry out rapidly in the spring. The soil is strongly acid or medium acid. These soils are not suited to cultivated crops. These soils are suited to trees.

These soils are in capability subclass VIs.

CdC - Canton and Charlton extremely stony fine sandy loams, 3 - 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 - 25 percent of the surface. Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity of these soils is moderate. Runoff is medium or rapid. These soils warm up and dry out rapidly in the spring. They are strongly acid or medium acid. These soils are not suited to cultivated crops. The hazard of erosion is moderate or severe. These soils are suited to trees.

These soils are in capability subclass VIIs.

CdD - Canton and Charlton extremely stony fine sandy loams, 15 - 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 - 25 percent of the surface. Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity of these soils is moderate. These soils warm up and dry out rapidly in the spring. They are strongly acid or medium acid. These soils are not suited to cultivated crops. The hazard of erosion is severe. These soils are suited to trees. Steepness of slope is a major limitation for community development.

These soils are in capability subclass VIIs.

*** Ce - Carlisle muck

This nearly level, very poorly drained soil is in pockets and depressions of flood plains, stream terraces, outwash plains, and glacial till uplands. The Carlisle

soil has a high water table near or above the surface for most of the year. Permeability is moderately rapid. The available water capacity is high. Runoff is slow. The soil is strongly acid through slightly acid. This soil is not suited to cultivated crops. This soil is poorly suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. This soil is generally not suited to community development.

This soil is in capability subclass VIw.

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

This moderately 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 - 8 percent of the surface. Permeability of the Charlton soil is moderate or moderately rapid, the available water capacity is moderate. Permeability of the Hollis soil is moderate or moderately rapid above the bedrock, the available water capacity is low. Runoff of these soils is rapid or very rapid. These soils warm up and dry out rapidly in the spring. They are strongly acid or medium acid. These soils are not suited to cultivated crops. The Hollis soil has a shallow rooting depth and is droughty. These soils are suited to trees. Windthrow is common on the Hollis soil because of the shallow rooting depth. The major limiting factors for community development are steepness of slope, shallow depth to bedrock, and rock outcrops.

These soils are in capability subclass VIIs.

**** HkC - Hinckley gravelly sandy loam, 3 - 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 suited to trees.

This soil is in capability subclass IVs.

HrD - Hollis-Charlton-Rock outcrop complex, 15 - 45 percent slopes

This moderately steep to very steep complex consists of somewhat excessively drained and well drained soils and rock outcrop on glacial till uplands. Stones and boulders cover 1 - 8 percent of the surface. Permeability of the Hollis soil is moderate or moderately rapid above the bedrock, the available water capacity is low. Permeability of the Charlton soil is moderate or moderately rapid, the available water capacity is moderate. Runoff of these soils is rapid or very rapid. These soils

warm up and dry out rapidly in the spring. They are strongly acid or medium acid. The soils in this complex are not suited to cultivated crops. The soils in this complex are suited to trees. Windthrow is common on the Hollis soil because of the shallow rooting depth. The major limiting factors for community development are the steep slopes, shallow depth to bedrock and rock outcrop.

The soils in this complex are in capability subclass VIIs.

**** PbC - Paxton and Montauk fine sandy loams, 8 - 15 percent slopes**

These sloping, well drained soils are on drumloidal, glacial till, upland landforms. Permeability of the Paxton soil is moderate in the surface layer and subsoil and slow or very slow in the substratum. 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 in these soils is moderate. Runoff is rapid. These soils warm up and dry out rapidly in the spring. Unless limed, it is strongly acid or medium acid. These soils are suited to cultivated crops. The hazard of erosion is severe. These soils are suited to trees. The major limiting factor for community development is the very slow, slow, and moderately slow permeability in the substratum.

These soils are in capability subclass IIIe.

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

These gently sloping, well drained soils are on drumloidal, glacial till, upland landforms. Stones and boulders cover 1 - 8 percent of the surface. Permeability of the Paxton soil is moderate in the surface layer and subsoil and slow or very slow in the substratum. 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 of these soils is moderate. Runoff is medium. These soils warm up and dry out rapidly in the spring. Unless limed, they are strongly acid or medium acid. These soils are not suited to cultivated crops. The hazard of erosion is moderate. These soils are suited to trees. The major limiting factor for community development is very slow, slow, and moderately slow permeability in the substratum.

These soils are in capability subclass VIs.

PeC - Paxton and Montauk extremely stony fine sandy loams, 3 - 15 percent slopes

These gently sloping to sloping, well drained soils are on drumloidal, glacial till, upland landforms. Stones and boulders cover 8 - 25 percent of the surface. Permeability of the Paxton soil is moderate in the surface layer and subsoil and slow or very slow in the substratum, 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, unless limed, it is very strongly acid or medium acid. The available water capacity for these soils is moderate. Runoff is medium or rapid. These soils warm up and dry out rapidly in the spring. These soils are not suited to cultivated crops. The hazard of erosion is moderate or severe. These soils are suited to trees. The major limiting factor for community development is the very slow, slow, and moderately slow permeability in the substratum.

These soils are in capability subclass VIIs.

***** 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 - 25 percent of the surface. The Ridgebury and Leicester soils have a seasonal high water table at a depth of about 6 inches. The Whitman soil has a high water table at or near the surface for most of the year. Permeability of Ridgebury and Whitman soils is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The Ridgebury and Whitman soils are strongly acid through slightly acid. Permeability of Leicester soil is moderate or moderately rapid, it is very strongly acid through medium acid. Runoff for the Ridgebury and Leicester soil is very slow or slow. Whitman soil runoff is very slow, or the soil is ponded. The available water capacity for these soils is moderate. These soils are not suited to cultivated crops. The erosion hazard is slight. These soils are suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. The major limiting factors for community development are the high water table and the slow or very slow permeability in the substratum.

These soils are in capability subclass VIIs.

SxB - Sutton extremely stony fine sandy loam, 0 - 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 - 25 percent of the surface. The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is not suited to cultivated crops. The hazard of erosion is slight or moderate. This soil is suited to trees. The major limiting factor for community development is the seasonal high water table.

This soil is in capability subclass VIIs.

*** WxA - Woodbridge fine sandy loam, 0 - 3 percent slopes**

This nearly level, moderately well drained soil is on drumloidal, glacial till, upland landforms. 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 slow. This Woodbridge soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is well suited to cultivated crops. The hazard of erosion is slight. This soil is suited to trees. The major limiting factors for community development are the seasonal high water table and the slow or very slow permeability in the substratum.

This soil is in capability subclass IIw.

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

This gently sloping, moderately well drained soil is on drumloidal, glacial till, upland landforms. The Woodbridge soil has a seasonal high water table at a depth of about 18 inches. It has moderate permeability in the surface layer and subsoil and slow or very slow permeability in the substratum. The available water capacity is moderate. Runoff is medium. This soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is well suited to cultivated crops. Artificial drainage helps to dry the soil earlier in the spring. The hazard of erosion is moderate. This soil is suited to trees. The major limiting factors for community development are the seasonal high water table and slow or very slow permeability in the substratum.

This soil is in capability subclass IIw.

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

This nearly level to gently sloping, moderately well drained soil is on drumloidal, glacial till, upland landforms. Stones and boulders cover 1 - 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. The hazard of erosion is moderate. This soil is suited to trees. The major limiting factors for community development are the seasonal high water table and the slow or very slow permeability in the substratum.

This soil is in capability subclass VIs.

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

This sloping, moderately well drained soil is on drumloidal, glacial, upland landforms. Stones and boulders cover 1 - 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 rapid. 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. The hazard of erosion is moderate. This soil is suited to trees. The major limiting factors for community development are the seasonal high water table and the slow or very slow permeability in the substratum.

This soil is in capability subclass VIs.

*** - Prime Agricultural Farmland**
**** - Farmland of Statewide Importance**
***** - Wetlands**

6. Hydrology

The site can be divided roughly into three subwatershed areas. The majority (±115 acres) of the site drains either to the wetlands located along the western border or to wetland areas located in the open space areas at the northern limits. Water in the wetlands is routed northward to Assekonk Brook, a Shunock River tributary. Approximately 28 acres in the southeast corner of the site forms the headwaters for Wheeler Brook, an Anguilla Brook tributary. Finally, about 10 acres in the southwest corner drains to an unnamed tributary to Copps Brook.

Except for the watercourse that drains the ±10 acres in the southwest corner, surface waters draining the site have not been classified by the Connecticut Department of Environmental Protection and, by default, are considered class A water resources. Class "A" water resources may be suitable for drinking, recreational or other uses and may be subject to absolute restrictions on the discharge of pollutants, although certain discharges may be allowed. The southwest corner of the site is located within an area designated as a public water supply watershed. Surface and groundwater for this part of the site drains to Palmer Reservoir, a public water supply watershed operated by Connecticut American Water Company-Mystic Valley District. As such, surface water emanating from this part of the site is considered "AA". Class "AA" surface waters are regulated similarly to "A" water resources. This area includes parts of Lot 37 and open space at the site's southern limits.

The construction of 51 house sites, ±1.5 miles of new road and driveways will increase the amount of runoff during periods of rainfall. Runoff increases can also result from soil compaction, removal of vegetation and placement of other impervious surfaces such as sidewalks and patios.

The plans indicate that road drainage for new roads will be intercepted by catch basins and piped to various discharge points. These discharge points should be located outside of wetlands and properly protected with energy dissipaters. Present plans indicate that a 15 inch reinforced concrete pipe and 6 inch underdrain pipe will be constructed beneath the proposed Deerfield Lane. The purpose of the 15 inch pipe is to capture road runoff from Deerfield Lane that flows easterly towards Jeremy

Hill Road and route it back to a discharge point near the cul-de-sac on Joshua Latham Road. This is being done to eliminate stormwater discharges to Jeremy Hill Road which may cause or further aggravate existing road drainage problems. In places the pipe may be 15 feet or more below ground surface. Bedrock, which requires blasting, may be encountered during the excavation of this trench. The trenches will also act as a conduit (subsurface drain) for groundwater that flows towards it, since back filled material is likely to be more permeable than the surrounding hardpan.

The two main concerns with increased runoff are the potential for flooding and streambank erosion/surface water degradation. In order to maintain post-development flows at pre-development flow rates, the stormwater plan includes the construction of 3 detention basins. By utilizing these detention basins, peak flow discharges for the 50-year storm event will be maintained at or below existing flows for each subwatershed area. Design of the proposed detention basins shall be in accordance with the Detention Basin (DB) Standard contained in the Connecticut Guidelines for Soil Erosion and Sediment Control (1985, as amended) and checked by the respective town engineers. A plan of operation and maintenance shall be prepared for use by the owner, or others responsible for the system, to ensure that each component functions properly. This information should be included on the plan.

A detailed and site-specific soil erosion and sediment control plan should be developed and implemented for the project in order to protect wetlands and watercourses on- and off-site. The presence of silty soils and moderately steep slopes will increase the potential for soil erosion and sediment problems. The erosion and sediment control plan should include a narrative report that describes the phasing and scheduling of clearing, tree cutting, stockpiling of earth materials, limits of disturbed areas and land restoration. Utilization of silt fencing, haybales, anti tracking pads, and filter berms will help prevent off-site transport of sediments, turbid water and complaints from neighboring properties.

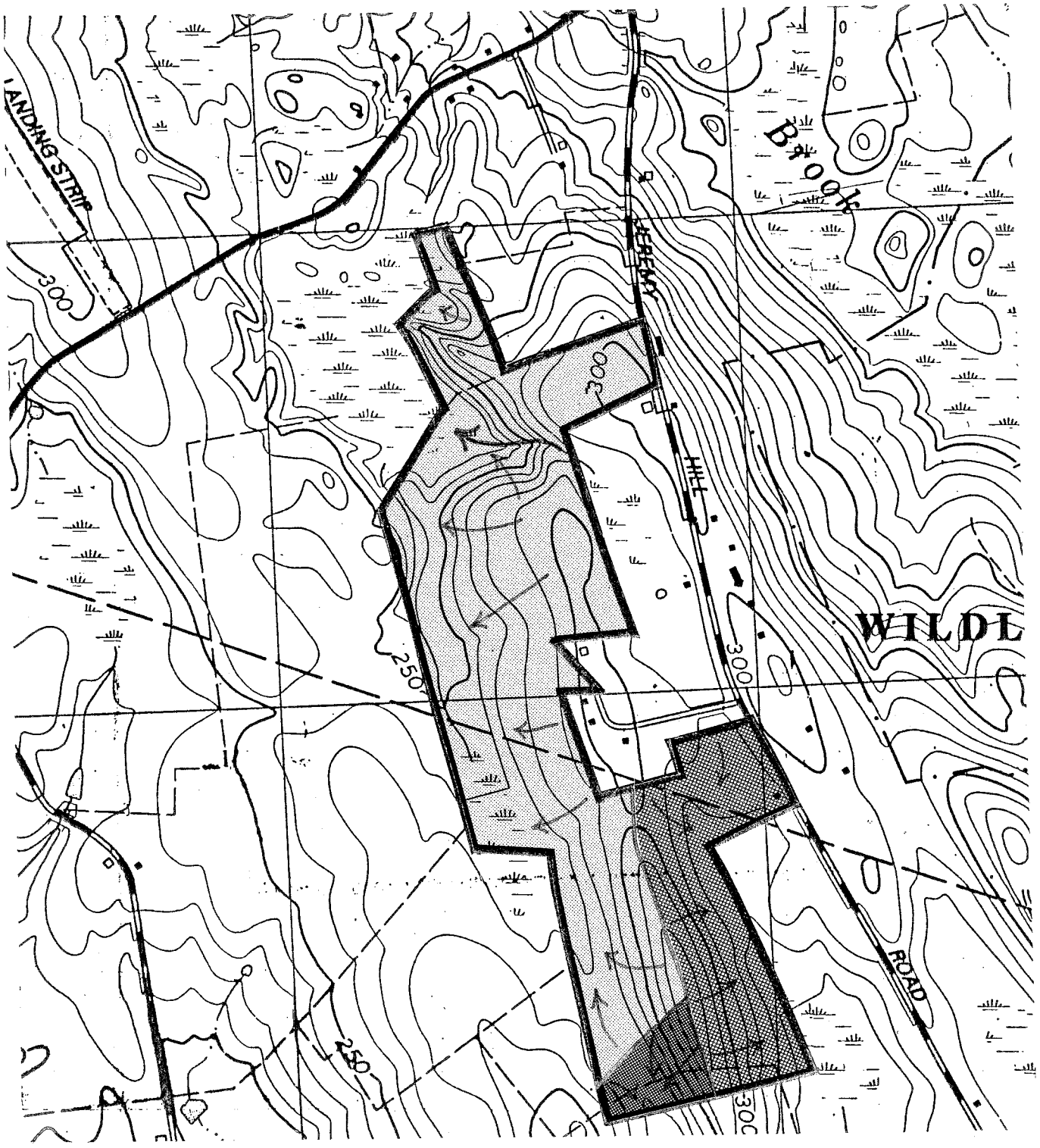
The proposed detention basins can be designed to serve a dual function, that also includes sediment retention. This would be especially beneficial during the construction period. The basin will permit stormwater to still causing sediments and nutrients to settle out of suspension. Consideration will need to be given to the

maintenance of and access to the basin(s) which should be included on the soil erosion and sediment control plan. If this cannot be accomplished then temporary off-line sediment ponds should be constructed for trapping sediment. Also, certain grasses and shrubs can be planted in the basin which encourages physical, chemical and biological removal of precipitated and dissolved stormwater contaminants. These processes are accomplished by both nutrient uptake and by surface absorption of particles by sediments and micro-organisms.

WATERSHED BOUNDARY MAP

Scale 1" = 1000'

Portion of site that drains to Assekonk Brook
Portion of site that drains to Copps Brook
Portion of site that drains to Wheeler Brook
Direction of surface flow



7. Water Supply

The water supply for each lot in the proposed subdivision would be derived from 6 inch diameter drilled wells with steel pipe cased firmly into solid rock and completed as open boreholes in the underlying granitic gneiss.

A typical well depth for a bedrock well ranges between 150 and 300 feet. The Team's geologist reviewed well completion reports for 25 bedrock wells drilled along Jeremy Hill Road in North Stonington and Stonington, which ranged between 140 feet and 500 feet. However, the average depth for the 25 wells was about 231 feet.

Although the underlying bedrock is not known to be a prolific aquifer, Water Resources Bulletin #15 (Lower Thames and Southeastern Coastal River Basins) which the site lies within, suggests that 9 out of 10 bedrock wells yield at least 3 gallons per minute. There latter statistics were based on 2,000 well completion reports for wells drilled in the region from 1959-1965. According to the 25 well completion reports reviewed by the Team's geologist, well water yields ranged between 1.5 gallons per minute to 30 gallons per minute. The average yield of these wells was over 10 gallons per minute. Included with this section of the report is a table showing the yield, depth and respective town for domestic wells drilled along Jeremy Hill Road. The well completion reports reviewed date back to 1970.

Because lot sizes are relatively large (exceed 1.5 acres or more) and because a high portion (about 95%) of the renovated domestic wastewater will percolate downward to recharge the underlying bedrock via on-site sewage disposal systems (this underscores the need for careful siting, installation and maintenance of on-site septic systems), the annual groundwater usage for the site should not exceed annual groundwater recharge. As long as the underlying bedrock is fractured and capable of transmitting water to drilled wells, the bedrock aquifer can be expected to adequately meet the water demands of the proposed residential subdivision. For the most part, a separation distance of about 200 feet or more between neighboring wells was accomplished on the proposed lots located in North Stonington. **(Note: detailed plans, which show well locations for the proposed lots in Stonington were not available on the review day.)** As such, each well will have about 1 acre of recharge

or about 595 gallons of water per day. A family of five would use about 375 gallons per day or 75 gallons per person per day. The computations made in the preceding two sentences assumes a recharge rate of about 8 inches per year for an upland till covered site. Present plans indicate that wells serving Lots 1 and 2 and 8 and 9 are fairly close (about 50 feet). It appears that these well locations could be shifted on the lot without too much of a problem enabling greater separation distances. This should be investigated.

Each well should ideally be located on a relatively high portion of the lot, properly separated from the sewage disposal system or any other potential pollutant (e.g., storm drains, etc.) and in a direction opposite the expected direction of groundwater movement.

All wells should be cased with steel pipe into the underlying metamorphic bedrock. In order to provide adequate protection of the quality of bedrock water, all wells will need to be properly installed in accordance with all applicable State Public Health Code and Connecticut Well Drilling Board regulations. In addition, the town sanitarians will need to inspect and approve well locations.

The natural quality of groundwater should be satisfactory. The granitic gneiss underlying the site is not known to cause significantly high levels of iron and/or manganese in well water. However, if elevated, these minerals may lower the overall water quality of drinking water. Therefore, in some cases, it may be necessary to provide suitable treatment filters.

According to the Water Quality Classification Map of Connecticut, (Murphy, 1987) groundwater beneath the site and vicinity is classified by the Department of Environmental Protection as GA which means that it is suitable for private drinking water supplies without treatment.

Table 1

Summary of Area Domestic Water Supply Wells Along Jeremy Hill Road, Stonington/North Stonington, Connecticut

Well-No.	Town	Total Depth of Well in Feet	Well Yield (gallons per minute)
1	Stonington	300	5
2	Stonington	145	5
3	Stonington	200	12
4	Stonington	220	8
5	Stonington	165	5
6	Stonington	300	2
7	Stonington	259	1.5
8	North Stonington	200	4
9	North Stonington	325	3
10	North Stonington	245	4
11	North Stonington	280	25
12	North Stonington	200	30
13	North Stonington	200	30
14	North Stonington	240	5
15	North Stonington	125	7
16	North Stonington	200	10
17	North Stonington	140	20
18	North Stonington	500	6
19	North Stonington	260	6
20	North Stonington	225	20
21	North Stonington	200	25
22	North Stonington	200	6
23	North Stonington	220	5
24	North Stonington	200	6
25	North Stonington	225	6

8. Sewage Disposal

In order to determine subsurface sewage disposal feasibility for the proposed subdivision site, the applicant's engineer excavated a minimum of 2 deep test holes per lot. Deep test pits were generally excavated 6 to 9 feet, and typically encountered topsoil, a few inches to 1 foot thick, a subsoil layer existing of fine loamy sands, 1.5 feet to 2.0 feet thick then glacial till. It is not known if this work included percolation tests on each lot. Perc hole locations and results should be shown on the plan once this work is completed.

From a subsurface sewage disposal standpoint, several items of concern were noted by examining deep test hole data and include the following; **(1)** relatively shallow depth to seasonally high groundwater and soil mottling observed in numerous deep test pits; **(2)** moderately steep slopes in the northern and southern parts; and **(3)** 5 lots (8, 22, 23, 29 and 33) where bedrock was observed at depths of less than 6 feet below existing grade. Additionally, the soil types that occur on the site plan are classified as severe for sewage disposal purposes by the Soil Conservation Service (Soil Survey for New London County).

As stated earlier, the land area encompassed, in part, by Lots 14, 15, 44 and 45 has stripped soil solum and is an area of special concern particularly with respect to on-site sewage disposal. The concern here is that the soil solum was removed to or in proximity to the slowly permeable "hardpan" zone. Because of the high water table condition and hydrophytic plants observed in this area during the field walk, the Team's sanitarian questions the use of this area for on-site sewage disposal. This area should be checked by a certified soil scientist to determine its extent, and whether or not there is a presence of an aquic moisture regime. Also, provisions should be made for installation of groundwater monitoring pipes to facilitate water level monitoring during this forthcoming spring period. It seems likely that further testing which includes significant site improvements is warranted for this area before it is approved for building.

Based on soil testing data information distributed to Team members on the review day, the most common limiting factor observed on the majority of lots is the seasonal high water table. Except for the lots on the crest of the hill (central parts)

where nearly flat slopes occur, the site lends itself for the installation of groundwater intercepting drains which will hopefully help protect septic systems from the seasonal high groundwater table. It is also likely that a high percentage of the septic systems serving these lots will require select fill material to elevate bottoms sufficiently above the "hardpan" layer, and be relatively large in size and spread out over the contours to enhance lateral dispersal.

Shallow to bedrock conditions exist primarily in the northern limits of the site and the east flank of the drumlin at its northern end. As such, additional test holes may be required to confirm site suitability on some lots in this area to ensure that the prescribed 4 foot separation distance can be maintained between the bottom of the leaching trenches and the bedrock surface.

While limiting factors such as high groundwater table and shallow to bedrock conditions can be addressed by detailed engineering design and additional soil testing, the actual testing areas available for sewage disposal on a number of lots are limited by very high water tables and/or proximity to wetlands, for example Lots 41-45 in Stonington and Lots 14 and 15 in North Stonington. The applicant's engineer will need to demonstrate to the Town sanitarian that septic system installation is permissible on these lots. Ideally, wide lots would be preferable in the areas characterized by shallow "hardpan" layers and high groundwater tables so that leaching trenches can be spread out across the contours to encourage lateral dispersal rather than stacking the trenches close to one another. This will also permit greater separating distances from wetland areas. Lots 33, 39 and 40 appear to be most affected by narrowness.

If thorough testing of any proposed lot fails to identify a satisfactory leaching area and unsuitable conditions as identified in Section 19-13-B103c(a)(3) exist, the lot should be combined with adjacent property or otherwise removed. It seems likely that some of the proposed lots may require some adjustment.

Due to the soil types, groundwater conditions and shallow to bedrock areas, it is probable that a high percentage of the proposed lots will require detailed plans prepared by a registered professional engineer. This work should be done prior to issuance of building permits for each of the lots in the subdivision.

The Team's sanitarian encourages that the applicant strive for gravity fed systems versus pumped septic systems. If a septic system requires a pump, it should be noted on the subdivision map.

As mentioned earlier in the report, cut areas may be required in some places. Careful planning for septic system installation is critical in these areas to prevent partially treated effluent from breaking-out at the cut embankment, since it is likely to travel along the slowly permeable "hardpan" layer. A minimum setback of 50 feet from the embankment edge should be maintained under such circumstances.

Where topography permits building foot drains should be installed around all foundations. This will help to prevent wet basements. On some lots, it may be possible to connect building foot drains with curtain drains.

9. Vegetation

OF I-II

Old field seedlings and saplings, most trees under 4 inches in diameter. As with most old field sites there are a number of trees and shrubs invading. Species noted include: smooth and staghorn sumac, American elm, white ash, pignut hickory, black cherry, red cedar, scarlet oak, black birch, sugar maple, gray dogwood, flowering dogwood, highbush blueberry, blackberry, and autumn olive. Also present were many grasses and lesser forbs.

OF II

Old field saplings, most trees are in the 2 to 4 inch category. There is more red cedar and oak in this lot and few of the lessor shrubs like blueberry, blackberry, and bayberry.

OF II-III (a)

Old field (a) is heavy to red maple and white ash, 1 to 4 inch saplings and a few larger red cedars, willows and red maples. Understory species include multiflora rose, blueberry, bayberry and scattered mountain laurel. This site has a seasonal high water table which will limit the size the trees may obtain and will be a definite factor in wind firmness. Because of the high water table there are many annual shrubs.

OF II-III (b)

This is a much dryer area than (a) and the trees tend to be a little larger. In addition to the red maple, red cedar, white ash there is sassafras, black cherry, black oak and white pine. There is more undergrowth that also includes, climbing bittersweet, autumn olive, multiflora rose, bayberry, blueberry and seedlings of the tree species.

RM III

These are pole sized (4-10 inches) stands that are predominantly red maple with a few American elm, black cherry and yellow birch present. The dominant

understory species is spice bush, but vibernums, blueberry, sweet pepperbush and even grasses are present.

RM III - IV

These red maple stands contain mainly pole size trees, but also many trees over 12 inches, although most of the larger trees are of very poor form. The understory is a very heavy stand of spice bush with some high bush blueberry and arrow wood.

SW IV

This is a plantation of poorly formed white pine. Most of the trees are over 12 inches in diameter, but multi-stemmed because of past insect attack. Some white ash, black oaks and sassafras have invaded along with the bittersweet. This is a very dense stand with little or no undergrowth

SH III

Softwood - Hardwood pole sized. These are red cedar stands with lots of red maple and black birch interspersed. This is fairly new growth as the red cedar is an early invader of old field sites. There are a few black oak, black gum and white ash stems intermingled. Although the canopy is quite dense there are a few thin patches that allow enough light in to support some green brier, multiflora rose and barberry.

MH III

Mixed Hardwood pole sized (4-10 inches). This is a fairly dense stand of blackbirch and red maple with some areas where there is a lot of sugar maple mixed in. Other species noted were tulip poplar, mockernut and shag bark hickories, a few red cedar and sassafras. Although much of the stand is fairly open there are places of dense stands of reproduction of sugar and red maple. There is also some blue beech and mountain leaf viburnum is fairly common. There are a few larger trees mostly along the wetland that appear to have been left when this area was cut 25 - 30 years ago. These are poorly formed trees and many have hollows suitable for wildlife, but usually are of little timber value.

MH III-IV

Mixed hardwood of pole size and larger, this is a very interesting area with many stems of 8 - 14 inches and interspersed with large oaks and sugar maples, some as large as 50 inches in diameter. Other species includes black birch, black and white oaks, shagbark and mockernut hickory, red maples and yellow birch. There is maple and birch reproduction in the understory as well as hornbeam, and flowering dogwood.

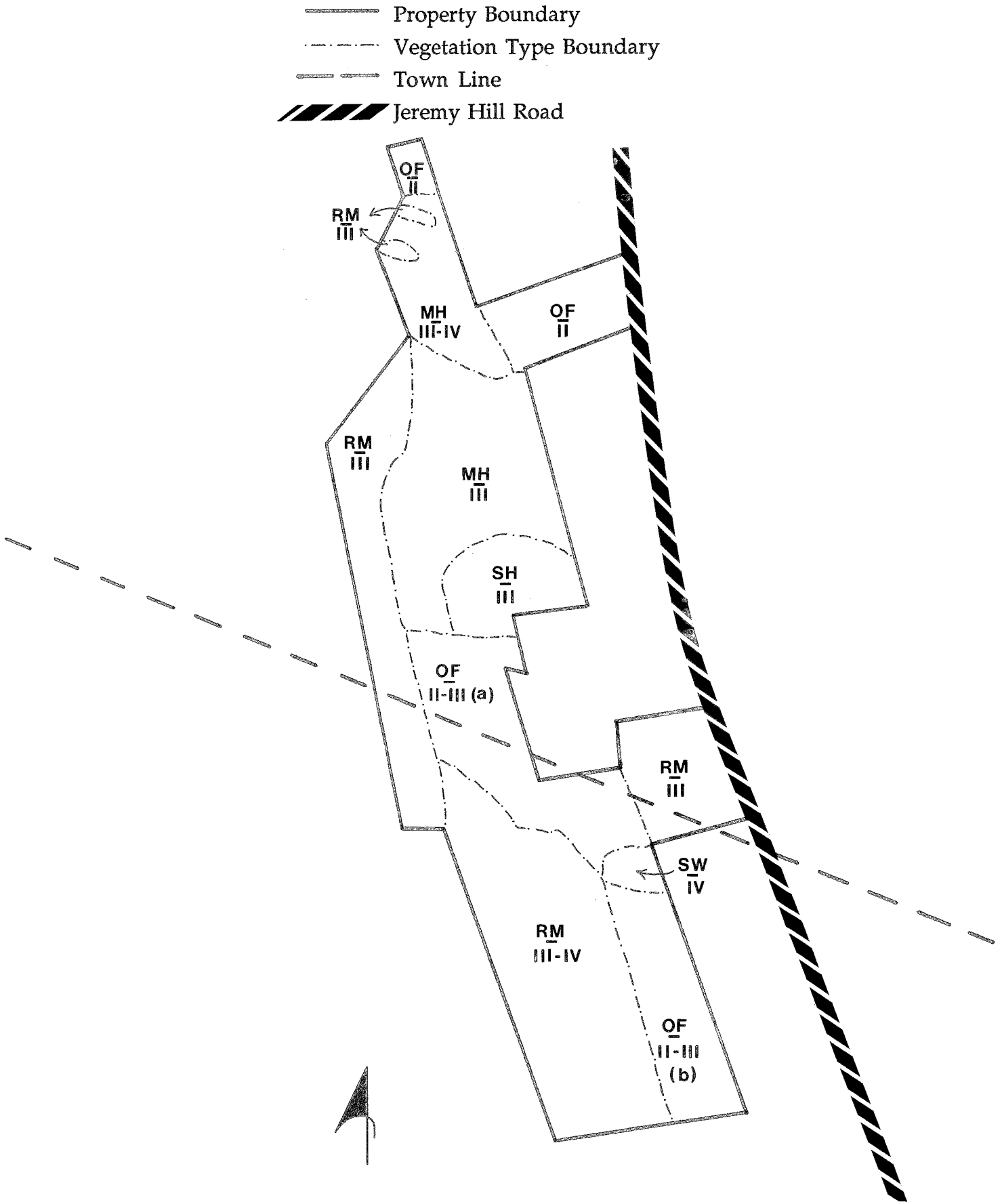
The two stands that would be most adversely affected by the proposed development are the RM III are the MH III-IV. The first (RM III) are on wetland soils for the most part and will only be indirectly affected if more than normal water flows into this area and wetlands. An increase of as little as 1 inch in the permanent water level in these areas would have a real detrimental effect and cause considerable mortality in the stand. As long as no roads are cut into these stands to open them up, windthrow should only be a local problem, taking only a clump of trees here and there.

In the MH III-IV the "big" trees are very attractive but not very sound. They are apt to loose sizable limbs so it would not be advisable to build houses too close.

In the rest of the stands the development will chop up the environment, but if present water levels are maintained there should be little problem except where construction has a direct effect on the tree roots where excavation tears the roots or where filling smothers the trees.

VEGETATION MAP

No Scale



10. Wildlife Resources

Habitat Type Descriptions

Habitat types present include open/reverting field, mixed hardwood forest, and wetland/riparian areas. Wildlife species frequenting these areas are listed along with a complete species list of wildlife potentially inhabiting the area.

Open Field: Open land habitat is very beneficial to wildlife. Vegetation provides food as well as structural diversity, creating cover for a great array of wildlife ranging from mice and shrews to deer. Fields also attract numerous insects, a major food item of various wildlife species such as birds and small mammals including bats. Another important feature of fields is the edge created where fields meet forest. This valuable zone for food and cover consists of dense berries, shrubs and grasses. Wildlife utilizing open field habitat include deer, woodcock, woodchuck, fox, raccoon, skunk, mourning dove, bluebirds, eastern kingbirds, mockingbirds, flycatchers, blue and golden-winged warblers, robins, kestrels, red-tailed hawks, eastern screech owls and cottontail rabbits.

Mixed Hardwood Forest: This habitat consists of a variety of hardwood species including red maple, beech, red oak, elm, hickory, white oak and scattered white pine and cedar. Understory vegetation includes witchhazel, elderberry, multiflora rose, grape, blackberry and hardwood regeneration. Wildlife frequenting such habitat types include deer, fox, raccoon, gray , squirrel, woodpeckers (pileated, hairy and downy), ovenbirds, scarlet tanangers, black-throated blue and green warblers, barred owls, broad-winged hawks and various non-game species such as porcupines, shrews, voles and snakes.

Wetland/Riparian Zone: This habitat type consists of various combinations of streams/brooks, open ponds, swamps and small marsh areas. Associated vegetation includes red maple, birch, alder, cattails, dogwood, jewel-weed, spicebush, sweet pepper bush, skunk cabbage, false helbore, duckweed and various grasses and sedges. Wildlife using such sites include deer, fox, raccoon, skunk, muskrat, mink, swallows, red-winged blackbirds, grackles, kingbirds, cedar waxwings, hooded and wilson's warblers, titmice, woodpeckers, wood ducks (forested wetland) and

numerous amphibians and reptiles including water and garter snakes, salamanders, newts and spotted and painted turtles.

Impacts of Development

Wetland/Riparian Zones: Wetlands support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply which allow for a high carrying capacity (Brown et. al. 1978). There are many species that require access to streams or water body margins for survival even though they may spend much of their time in other habitats (Milligan and Raedeke 1986). Part of the food supply for many vertebrates is the high abundance and diversity of insect populations that are typical of wetland ecosystems (Brown et al. 1978). Wetlands provide important habitat for a variety of wildlife species and function as areas for absorption of natural runoff. Any planned diversion of stormwater into wetlands will increase water flow, sedimentation and pollution. This will alter the present ecological structure of the wetland and reduce species diversity. Even though stormwater retention and filtration plans may alleviate some of these problems, the long term effects of stormwater diversion into wetlands tend to be negative. Retention and filtration systems may still allow fine silt and pollutants to enter. Not only are wetlands important to wildlife, they are also important to humans. Various functions of wetlands include flood control, ecological integrity, fish and wildlife habitat, nutrient and sedimentation trappings, educational potential, visual /esthetic quality, recreation, groundwater use potential and botanical sites. There are usually inherent limitations in developing wetlands due to poorly drained and unstable soil types.

Vegetation removal in wetlands may have severe impacts on wildlife, especially reptiles and amphibians. One or several of the cover, food, breeding habitat, and hibernation areas may be altered. Species dependent on specialized habitat are eliminated and more adaptable species are reduced in numbers (Campbell 1973). Barriers, such as roads, to seasonal movement and population dispersal are also serious threats (Campbell 1973). To minimize impact maintain a 100 foot wide buffer zone of vegetation around wetland/riparian areas. This buffer zone will help filter and trap silt and sediments, provide excellent wildlife cover and be an aesthetic and educational asset to the community. Ideally, this buffer should be incorporated into a conservation easement where no alteration of vegetation is

permitted.

Upland Wooded Areas/Open Spaces: Fragmentation of habitat may lead to a decline in species diversity and richness. Wildlife populations will be reduced in proportion to the amount of habitat lost. Sensitive, interior species that require large tracts of undisturbed forest, such as wild turkey, ruffed grouse, veeries, ovenbirds and scarlet tanangers, will no longer occupy the area.

Mitigation of Disturbances

There are several management guidelines which should be considered during the planning process in order to minimize adverse impacts on wildlife:

1. Make use of natural landscaping techniques (avoid and/or minimize lawns and chemical applications) to lessen acreage of lost habitat and possible wetland contamination.

2. Maintain a 100 foot wide buffer zone of natural vegetation around wetland/riparian areas to help filter and trap silt and sediments. These vegetated zones provide excellent wildlife cover and travel corridors.

3. Stone walls, shrubs and trees should be maintained along field borders.

4. During land clearing care should be taken to maintain certain forestland wildlife requirements:

a. Encourage mast producing trees (oak, hickory, beech).
b. Leave 3-5 snag/den trees per acre as they are used by many birds and mammals for nesting, roosting and feeding.
c. Exceptionally tall trees are used by raptors as perching and nesting sites and should be encouraged.
d. Trees with vines (fruit producers) should be encouraged.
e. Brush debris could be windrowed to provide cover for small mammals, birds and amphibians and reptiles.
f. Removal of dead and down woody material should be discouraged where possible. The existence of many wildlife species (salamanders, snakes, mice, shrews and insects) depends on the presence of dead trees (Hassinger 1986).

5. Implementation of backyard wildlife habitat management practices should be encouraged. Such activities involve providing food, water, cover and nesting areas.

On small acreages with many buildings, landscaping can do a great deal to provide habitat and make an area attractive to wildlife. First, leave as many trees as possible around the buildings. This will not only benefit wildlife by providing food, cover and nesting sites (i.e. especially for songbirds), but will also be more aesthetically pleasing for the residents of the development. Plant trees and shrubs which are useful to wildlife and landscaping. Large expanses of lawn with no trees or shrubs present should be discouraged.

Planting shrubs that are less palatable to deer may lessen problems with nuisance deer. Shrubs less palatable to deer include evergreen hybrid rhododendrons, American Holly, Scotch pine, White and Norway Spruce, Japanese cedar, Flowering dogwood, mountain laurel, Common lilac and White pine. Taxus spp. (yews) experience a greater degree of damage as they are preferred winter foods of deer (Conover, 1988).

Wildlife Corridors/Open Space

In any proposed development the delineation of open space/wildlife corridors should be identified early in the planning process. The proper selection of habitats for incorporation into the open space system can make a major difference in the wildlife benefits to be incurred. A variety of habitat types should be retained to increase species diversity. Due to the impracticality of retaining one large area to include all the desired habitats, it is logical for an open space system to be based on a network of corridors. A corridor configuration essentially "hooks up"the different habitats into one contiguous system. This system enables wildlife species to utilize the different habitat components as required. The logical base for the wildlife corridor/open space system are the stream/wetland corridors. Woodlands are of importance to wildlife and the ecotones formed at wetland and woodland edges provide an additional habitat where a dense understory provides cover and screening from human disturbance. There should also be ancillary corridors that extend from this system into, and through, the developed area, thereby encouraging the movement of wildlife into and through the residential development.

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Species List

Species potentially inhabiting habitats of study area.

REPTILES

Common Snapping Turtle
Painted Turtle
Spotted Turtle
Wood Turtle
Eastern Box Turtle
Eastern Worm Snake
Eastern Ribbon Snake
Northern Black Racer
Northern Ringneck Snake
Black Rat Snake
Eastern Milk Snake
Eastern Smooth Green Snake
Northern Redbelly Snake
Eastern Garter Snake

AMPHIBIANS

Jefferson's Salamander
Spotted Salamander
Marbled Salamander
Northern Dusky Salamander
Northern Two-lined Salamander
Northern Spring Salamander
Red-spotted newt
Eastern American Toad
Northern Spring Peeper
Gray Tree Frog
Bullfrog
Green Frog

Four-toed Salamander
Redback Salamander
Slimy Salamander
Mudpuppy
Pickerel Frog
Northern Leopard Frog
Wood Frog

MAMMALS

Opossum
Masked Shrew
Water Shrew
Smoky Shrew
Short-tailed Shrew
Least Shrew
Hairy-tailed Mole
Eastern Mole
Star-nosed Mole
Little Brown Bat
Keen's Myotis
Silver-haired Bat
Eastern Pipistrelle
Big Brown Bat
Red Bat
Hoary Bat
Eastern Cottontail
Eastern Chipmunk
Woodchuck
Gray Squirrel
Red Squirrel
Southern Flying Squirrel
White-tailed Deer
Beaver
Deer Mouse
White-footed Mouse
Boreal Red-backed Vole
Meadow Vole
Woodland Vole
Muskrat
Southern Bog Lemming
Norway Rat
House Mouse
Meadow Jumping Mouse
Wood!and Jumping Mouse
Porcupine
Coyote
Red Fox
Gray Fox
Raccoon
Short-tailed Weasel
Long tailed Weasel
Mink
Striped Skunk
River Otter

BIRDS

Northern Goshawk
Broad-winged Hawk
Rough-legged Hawk
American Kestrel
Ring-necked Pheasant
Wild Turkey

Killdeer
Mourning Dove
Yellow-billed Cuckoo
Eastern Screech Owl
Barred Owl
Short eared Owl
Common Nighthawk
Whip poor-will
Ruby-throated Hummingbird
Red-headed Woodpecker
Yellow bellied Sapsucker
Hairy Woodpecker
Pileated Woodpecker
Eastern Wood-Pewee
Acadian Flycatcher
Red-shouldered Hawk
Red-tailed Hawk
Sharp-shinned hawk

Ruffed Grouse
Northern Bobwhite
American Woodcock

Common Barn-Owl
Great Horned Owl
Long-eared Owl
Northern Saw-whet Owl
Chuck will's-widow
Chimney Swift
Be#ted Kingfisher
Red bellied Woodpecker
Downy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Yellow-bellied Flycatcher
Alder Flycatcher

Willow Flycatcher
Eastern Phoebe
Eastern Kingbird
Purple Martin
Northern Rough-winged Swallow
Cliff Swallow
American Crow
Black capped Chickadee
Red-breasted Nuthatch
Brown Creeper
House Wren
Marsh Wren
Northern Mockingbird
Eastern Bluebird
Gray cheeked Thrush
Hermit Thrush
American Robin
Ruby crowned Kinglet
Cedar Waxwing
Loggerhead Shrike
White-eyed Vireo
Yellow-throated Vireo
Philadelphia Vireo
Blue-winged Warbler
Tennessee Warbler
Nashville Warbler
Yellow Warbler
Yellow-rumped Warbler
Magnolia Warbler
Black-throated Blue Warbler
Pine Warbler
Palm Warbler
Blackpoll Warbler
Black and White Warbler
Prothonotary Warbler
Ovenbird
Louisana Waterthrush
Connecticut Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breasted Chat
Northern Cardinal
Indigo Bunting
Rufous-sided Towhee
Chipped Sparrow
Vesper Sparrow
Fox Sparrow
Lincoln's Sparrow
White throated Sparrow
Dark-eyed Junco
Red-winged Blackbird
Rusty Blackbird
Brown-headed Cowbird
Northern Oriole

Least Flycatcher
Great Crested Flycatcher
Horned Lark
Tree Swallow
Bank Swallow
Blue Jay
Fish Crow
Tufted Titmouse
White-breasted Nuthatch
Carolina Wren
Winter Wren
Gray Catbird
Brown Thrasher
Veery
Swainson's Thrush
Wood Thrush
Golden-crowned Kinglet
Blue-gray Gnatcatcher
Northern Shrike
European Starling
Solitary Vireo
Warbling Vireo
Red-eyed Vireo
Golden-winged Warbler
Orange-crowned Warbler
Northern Parula
Chestnut-sided Warbler
Black-throated Green Warbler
Cape May Warbler
Blackburnian Warbler
Prairie Warbler
Bay-breasted Warbler
Cerulean Warbler
American Redstart
Worm-eating Warbler
Northern Waterthrush
Kentucky Warbler
Mourning Warbler
Hooded Warbler
Canada Warbler
Scarlet Tanager
Rose-breasted Grosbeak
Dickcissel
American Tree Sparrow
Field Sparrow
Sharp-tailed Sparrow
Song Sparrow
Swamp Sparrow
White-crowned Sparrow
Bobolink
Eastern Meadowlark
Common Grackle
Orchard Oriole
Pine Grosbeak

Purple Finch
Red Crossbill
Common Redpoll
American Goldfinch
House Sparrow
House Finch
White-winged Crossbill
Pine Siskin
Evening Grosbeak

*** Connecticut Wildlife checklist of birds, mammals, reptiles and amphibians.**

11. Fish Resources

Site Description

One unnamed perennial stream, a tributary of Assekonk Swamp Brook, flows through the parcel under consideration for subdivision development. This section of the report will address all major impacts to aquatic resources and delineate mitigation measures required to minimize impacts.

The unnamed watercourse is best characterized as a small headwater stream in the area of the proposed development. A small shallow pond, as evidenced by a breached dam, had once existed on the stream's mainstem. One of the primary functions of this brook is to provide clean and unpolluted waters to downstream areas of the watershed. Stream waters meander and are slow moving, a characteristic of "low gradient" stream sections. Fish habitat is mainly in the form of shallow pools. Bottom substrates are largely comprised of fine sands and small gravels. Instream cover is the form of fallen trees and other woody debris. Riparian areas are primarily comprised of wetland habitat.

Surface waters of the brook are classified by the Department of Environmental Protection (DEP) as "Class A". Designated uses for this classification are: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses.

Fish Population

The unnamed watercourse would be expected to support a warmwater fish population complex in the area of the proposed development. Fish species expected to inhabit this section of the brook are: chain pickerel, white sucker, fallfish, and sunfish species. Stream habitat more suitable for the survival of coldwater species such as native brook trout exist near the stream's confluence with Assekonk Swamp Brook.

Impacts

The following impacts to the unnamed watercourse can result during the construction of the proposed subdivision if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of watercourses through increased runoff from unvegetated areas : During construction topsoil will be exposed and susceptible to runoff events, especially if suitable erosion and sediment controls are not properly installed and maintained. Erosion and sedimentation due to construction has long been regarded as a major cause of stream degradation. Excessive sediment deposition could damage aquatic ecosystems in the following ways:

(A) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of sediment is required for fish egg respiration and successful hatching.

(B) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog spawning gravels causing fish to disperse to other areas.

(C) Sediment reduces the survival of aquatic insects. Since aquatic insects are important food items in fish diets, reduced insect populations levels will adversely affect fish growth and survival as fish expend excess energy locating prey.

(D) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can result in reduced population levels.

(E) Turbid waters impair normal gill function and feeding activities of fish. High concentrations of sediment can cause mortality by clogging gills.

(F) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic weeds (CT DEP 1989). Eroded soils contain plant nutrients such as phosphates and nitrates. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.

(G) Sediment contributes to the depletion of dissolved oxygen (CT DEP 1989). Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

2. Percolation of septic effluent into the watercourse : A failure of individual septic systems to operate properly (refer to **Sewage Disposal** section) may be potentially dangerous to stream environments. It appears that successful renovation of septic effluent on this site will require very careful planning due to site soils and a high water table. Nutrients and assorted chemicals that may be placed in septic systems may enter stream waters in the event of a septic system failure or infiltrate the groundwater during the spring when water tables are near the surface.

3. Aquatic habitat degradation due to the influx of stormwater drainage : Stormwaters from road systems and detention basins can contain a variety of pollutants that are detrimental to aquatic organisms. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts, and coarse sediment. Nutrients in stormwater runoff can fertilize stream waters causing water quality degradation. Additionally, fine silts in stormwaters that remain in suspension for prolonged periods of time often cannot be effectively removed from roadway catch basins and/or stormwater detention basins. Accidentally spilled petroleum based chemicals or other toxicants can precipitate partial or complete fishkills if introduced in high concentrations.

4. Transport of lawn fertilizers and chemicals to the watercourse: Runoff and leaching of nutrients from fertilizers on lawns will stimulate filamentous algae growth in the local watercourse and degrade water quality. Introduction of lawn herbicides can result in "fish kills" and overall water quality degradation. Rooted or floating aquatic vegetation may proliferate in slower moving stream reaches.

5. Impacts to downstream environments : Any water quality problems and habitat degradation that occurs within this area will eventually be observed in downstream areas of this brook and Assekonk Swamp Brook.

Recommendations

1. It is recommended that at the minimum, a 100 foot naturally vegetated buffer be maintained along the wetland boundary of the unnamed watercourse : No construction nor alteration of existing habitat should be allowed in this zone.

Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984; USFWS 1986; ODFW 1985). These buffers will absorb surface runoff and other pollutants before they can enter wetlands, ponds, and stream ecosystems.

2. ***Install and maintain proper erosion and sedimentation controls during site construction activities :*** Past stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis. Proper installation and maintenance of these devices is critical to environmental well being. Regular monitoring of erosion and sedimentation controls by the town and on-site construction engineers is the key to proper erosion and sedimentation control performance.

3. ***Properly design and locate individual septic systems (refer to Sewage Disposal section) :*** It is critical that all septic systems be placed in areas that will effectively renovate septic effluent, especially since the development site contains a high water table. It is the recommendation of the Team's fisheries biologist that septic systems not be installed within the 100' buffer zone (see recommendation #1). The addition of septic effluent to streams can be one of the greatest threats to stream ecology. Septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure. Residents should be encouraged to utilize nonphosphate laundry detergents.

4. ***The development team should submit detailed stormwater management plans for town review :*** The effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch basins and stormwater detention basins. When possible, stormwaters should only be outletted into non-wetland habitat; thus avoiding direct contact with wetlands. Timely maintenance of catch and detention basins is of critical importance. Roadway catch basins should be regularly maintained to minimize adverse impacts to riverine/wetland habitats. The use of road salt to deice roads should be minimized when possible.

5. Limit liming, fertilization, and the introduction of chemicals to subdivision lawns : This will help abate the amount of additional nutrients to aquatic resources. Non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

References

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12. Planning Concerns

The Regional Development Plan designates the area proposed for subdivision as suitable for "Low Density Uses", which are residential uses at less than one unit per 1.5 acres, agriculture, open space, recreational, and water supply uses. This classification is primarily a result of the soil characteristics of the area.

Local zoning requirements in both towns also recognize the sensitive natural resources of the area. Property to the west of this parcel in the Town of North Stonington, and property to the south of this parcel in the Town of Stonington is designated for residential development at a density of one unit per 80,000 square feet. To the east of this parcel in the Town of North Stonington property contains an overlay designation of an "Aquifer District". At least one lot on the proposed Deerfield Drive seems to be located within this district and accordingly must comply with the requirements of Section 406 of the zoning regulations.

The proposed subdivision would create fifty-one (51) residential building lots. Thirty (30) of these lots would be located within the Town of North Stonington while the remaining twenty-one (21) lots would be located within the Town of Stonington. The proposed subdivision would contain new residential streets with two access points onto Jeremy Hill Road. Both of these access points are located within the Town of North Stonington due to the parcels available road frontage. The North Stonington subdivision regulations require a minimum sight distance of 350 feet at these intersections. Review of the plan indicates that this minimum distance is complied with. Field inspections also found the sight distance at both proposed intersections to be adequate with the consideration that brush and tree clearance should be completed within the Jeremy Hill Road right-of-way. The North Stonington subdivision regulations also stipulate the minimum and maximum acceptable road grade. The proposed road grade at the intersection of Deerfield Road and Jeremy Hill Road of 4 percent reflects the State of Connecticut Department of Transportation standard and is less than the maximum of 8 percent permitted by the North Stonington subdivision regulations.

The coordination between the Towns of North Stonington and Stonington is especially important due to the development proposal occurring within both towns.

There are a number of layout concerns. There is the length of the proposed roadway and where it will terminate, underground utilities, wetland crossings to permit road construction as proposed, drainage system, and sidewalks. Additionally, a significant layout component is designating lot property lines to coincide with the town boundary.

With regard to the drainage system the proposal depicts three detention basins located on individual lots. Minimum lot sizes are created to reflect, in part, the carrying capacity of the general soil types of the area. Reducing this minimum lot size to incorporate a drainage system is counterproductive to the zoning designation. Additionally, detention basins will detain water for short periods of time which may create additional location constraints for septic system, well and structure. An additional major concern is the maintenance of the basin. Access must be provided to the basins for maintenance purposes.

Maintenance of facilities within this subdivision in general is a major concern. The items of concern in addition to the drainage system (detention basins), are sidewalks, and roads. Typically detention basin maintenance is a town responsibility as it is part of the drainage system. Also, sidewalks, if required by town regulation and constructed within the street right-of-way, are a town maintenance responsibility. Both sidewalks and detention basins present maintenance and liability situations which are best addressed in a town ordinance, and without clear direction from an ordinance or regulation may present future problem areas for a town. Emergency vehicle access also must be considered.

Due to the above concerns subdivisions which cross town lines should be designed so as not to create access problems for a town by demanding excessive travel across town boundaries for required town services. While the proposal does not seem to represent such a situation it does represent a situation which should be reviewed by all applicable town departments from both towns for input prior to application submittal to the various land-use commissions. Such departmental review should include, at a minimum, the Fire Department, Public Works Department and the Selectman's Office. The submittal of the application should be made simultaneously to both both towns to permit maximum coordination and cooperation.

Traffic

The fifty-one residential building lots have the potential to generate approximately 474 trips to and from the site per day. This would result in a A.M. peak hour volume of approximately 38 trips and a P.M. peak hour volume of approximately 52 trips to and from the site per day.

Road capacity of rural routes similar to Jeremy Hill Road is estimated at approximately 1000 vehicles per hour per day.* This volume would represent a unstable but steady traffic flow situation. While there are no traffic counts available for Jeremy Hill Road visual experience during field inspection indicates that the volumes are relatively low and that there is adequate capacity on Jeremy Hill Road to handle the additional flow that would be generated by the proposed development. The Commission(s) may want to request a traffic assessment from the applicant.

* National Cooperative Highway Research Program Report 187.

13. Archaeological Review

This section of the report was not complete at the time of printing. It will be sent as a separate letter to the requesting commission when it is completed. Any questions should be directed to Dr. Nicholas Bellantoni, State Archaeologist at 486-5248.

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil 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 region.

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

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

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

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