Sleepy Hollow Extension Subdivision

East Lyme, Connecticut

December 1990 December 1990 December 1990

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Sleepy Hollow Extension Subdivision

East Lyme, Connecticut

Review Date: October 22, 1990

Report Date: December 1990

THE EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM

THE EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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ENVIRONMENTAL REVIEW TEAM REPORT
ON

Sleepy Hollow Extension Subdivision
East Lyme, Connecticut

This report is an outgrowth of a request from East Lyme Conservation Commission to the New London 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 Monday, October 22, 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*
Emery Gluck	*Forester* *DEP - Cockaponsett State Forest*
Brian Murphy	*Fisheries Biologist* *DEP - Eastern District Headquarters*
Nancy Murray	*Senior Environmental Analyst* *DEP - Natural Diversity Data Base*
Paul Rothbart	*Wildlife 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 full plans and drainage calculations. The Team met with, and were accompanied by the Town Environmental Planner, the Chairman of the Conservation Commission, the owner/developer and his engineer and a concerned citizen. 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
P.O. Box 70
Haddam, Connecticut 06438
(203)345-3977

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1. Location, Zoning and Land-Use

The site, about 180 acres in size, is located on Oswegatchie Hill in eastern East Lyme. It abuts a medium-density residential subdivision on the west, and wooded, undeveloped land on the north, east, and south. Access to the site will ultimately be available via Sleepy Hollow Road, Stone Cliff Drive and Damon Heights.

The site is located in a RU-40,000 zone. Permitted uses include mostly medium-density residential. The minimum lot size for residential purposes is 40,000 square feet or about 1 acre. It is understood that any activity within 50 feet of regulated wetlands requires a permit from the East Lyme Conservation Commission.

The Team's geologist reviewed air photos for the site and vicinity that were taken in 1934 and every 5th year beginning in 1965 to 1990. Except for periods of timber harvesting, the site has remained basically the same since 1934. Surrounding land uses include mainly single-family residential and wooded, undeveloped land.

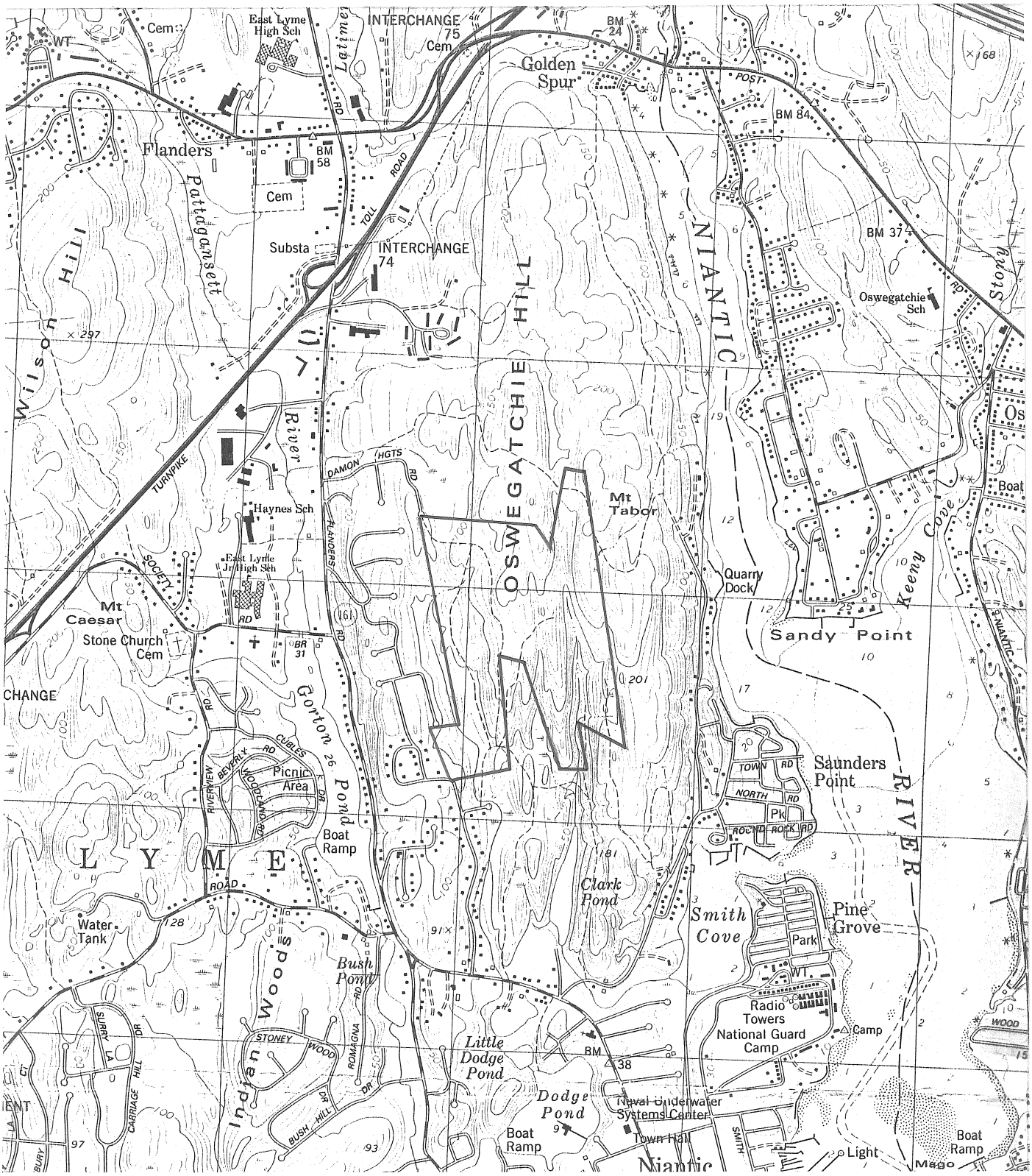
The proposed project, which will be phased, consists of 31 building lots, 1 acre in size or more. These lots occur on the west flank of Oswegatchie Hill and comprise about 78 acres. Due to generally hostile conditions (steep slopes, shallow to bedrock soils), the eastern and central parts of the site are not very favorable for development. There are no development plans at the present time for this part of the site.

Present plans indicate the proposed residential subdivision will be accessed by a paved road which is ±1 mile and will contain approximately 9 acres of open space. The proposed access road will need to cross 100 feet of wetlands. Additionally, two driveway crossings of wetlands, about 15-20 feet are proposed for Lots 6 and 7. Grading for the proposed access road will also impact on-site wetlands in two areas. Each house lot will be served by an individual on-site septic system and tied into the East Lyme Water Company.

LOCATION MAP

Scale 1" = 2000'

——— Approximate Site Boundary for the Entire Parcel



2. Topography

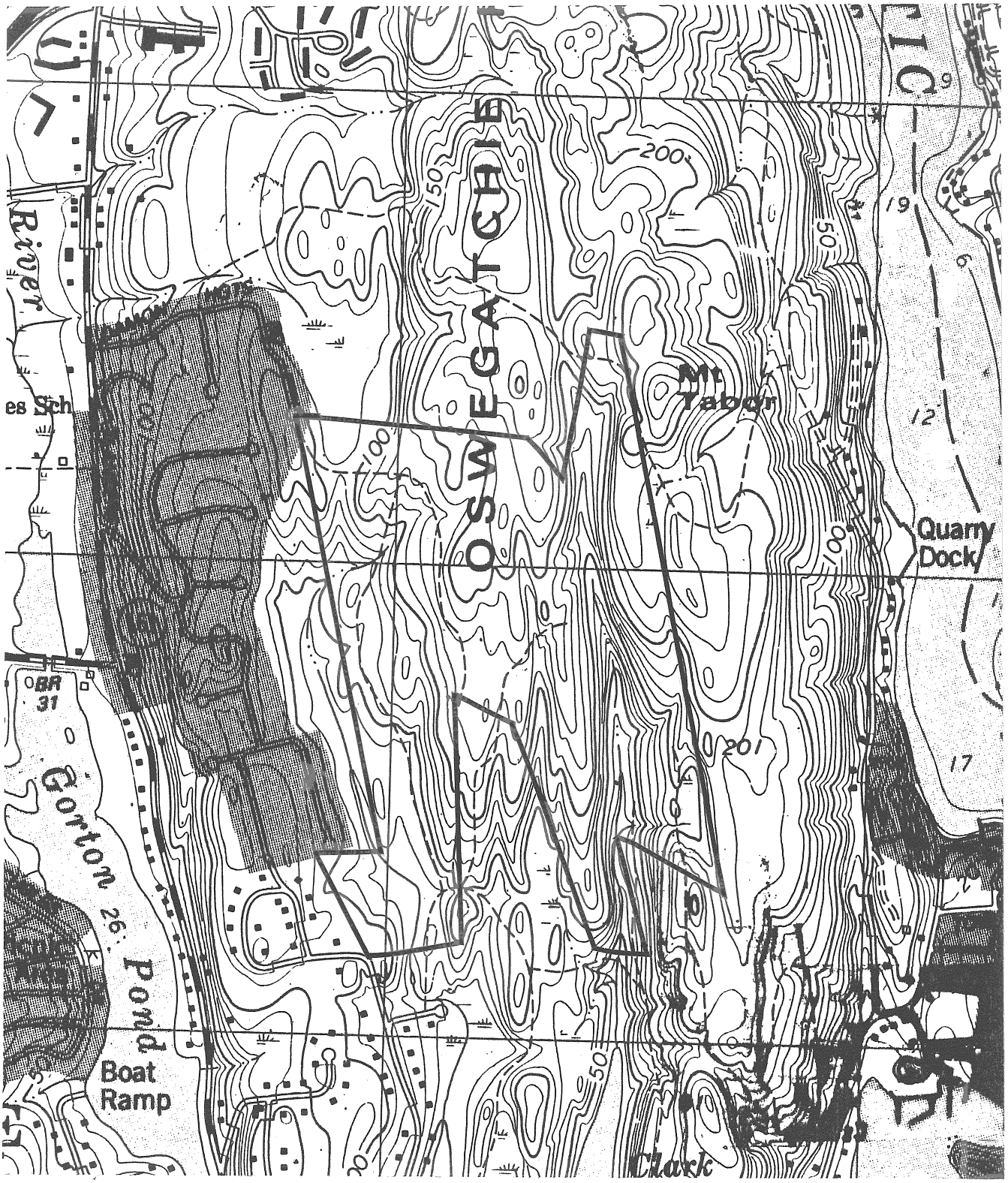
The site is located on Oswegatchie Hill and Mount Tabor in eastern East Lyme. Both hills are controlled by the underlying bedrock which is at or near ground surface throughout the parcel. Slopes range from gentle to very steep. Areas of steep slopes occur primarily on either side of the narrow drainageway in the eastern parts and along the rear parts of proposed Lots 6-9. Areas of flat and gentle slopes occur along the main axis of Oswegatchie Hill in the central parts and in the southwest corner. Numerous bedrock exposures were observed on the crests and flanks of steeper hills on the site. Areas of large surface boulders also occur in places.

Maximum and minimum elevation on the site are 250 feet above mean sea level and 50 feet above mean sea level, respectively.
In general, the proposed subdivision roads, driveways and house foundations have been designed to avoid the steep, bedrock controlled areas. Nevertheless, due to the site's irregular topography, some cutting and filling will be unnecessary for roads, for example near Lots 12 and 13 and for driveways that are constructed perpendicular to hilly areas. Because of the shallow to bedrock conditions that characterize the site, even shallow excavations may encounter competent rock that requires blasting. This type of work will increase site engineering and development costs. Therefore, every effort should be made to avoid these areas (steep slopes, shallow bedrock) which will help to minimize the need for blasting and rock removal. On the other hand, rock cuts for roads/driveways may help reduce site grading in steeper areas since rock is generally stable along nearly vertical slopes while unconsolidated slopes cannot usually be more than 2:1 (horizontal : vertical).

TOPOGRAPHIC MAP

Scale 1" = 1000'

——Approximate Site Boundary for the Entire Parcel



3. Geology

The site is located entirely in the Niantic quadrangle. A bedrock geologic map (GQ-575, by Richard Goldsmith) and a surficial geologic map for the quadrangle have been published by the Connecticut Geological and Natural Survey.

As mentioned earlier, bedrock is at or near ground surface (10 feet or less in most places) throughout the site. Goldsmith (GQ-575) identifies three rock formations on the parcel; 1) a biotite granitic gneiss, 2) an Alaskite gneiss, and 3) a Plainfield Formation subunit. The western two thirds of the site which includes the proposed 31 residential building lots is underlain by a granitic gneiss that is gray and medium-grained. Its principal minerals include quartz, oligoclase, microcline and biotite. The term "granitic", used above, means the rock is igneous (formed from molten magma) and formed at a great depth in the earth's crust. They typically are light colored due to a high percentage of light colored minerals such as quartz, oligoclase and microcline. From an economic standpoint, the biotite granitic gneiss underlying the western two thirds of the site has potential for rip-rap and has been used for building stone.

Bedrock underlying the eastern two thirds of the site comprises an alaskite gneiss and Plainfield Formation subunit. A narrow, north/south trending band of rock comprising the Plainfield Formation is aligned with the drainageway in the eastern parts. It is described as an interlayered gneiss and schist which contains the minerals biotite, quartz, and feldspar. Due to its textural (schistosity) components, regional structure, and presence of weak minerals compared to the surrounding rock all of which make it susceptible to erosion, the rock beneath the drainageway in the eastern parts was gouged out by overriding glacial ice. Flanking both sides of the Plainfield Formation in the eastern parts are two narrow bands of a rock known as alaskite (a light colored rock with a granite-like composition) gneiss. It is described as a orange-pink to light-gray, fine to medium grained granitic gneiss.

Gneisses are crystalline rocks that have undergone metamorphism (geologically altered by great heat and pressure in the earth's crust). The term gneiss refers to the textural and structural aspects of the rock. Gneisses tend to be banded rocks characterized by alternating layers of granular (light-colored) minerals and platy or flaky (dark-colored) minerals. Schists are also metamorphic rocks but are recognizable by the presence of abundant platy, flaky and elongate minerals that give the rock a slabby appearance.

Overlying bedrock across the site is a relatively thin blanket (generally 10 feet or less) of unconsolidated sediments of glacial origin called till. Till consists of sediments that range in size from clay to large boulders, but is predominantly sand, silt and gravel. Based on soil mapping data, the texture of most till on the site is sandy and loose. The till sediments were deposited by glacial ice as it moved across the bedrock surface from north to south/southeast.

According to the site plans distributed to Team members the boundaries for regulated wetland soils on the site were flagged in the field by a certified soil scientist and their boundaries superimposed onto the plan. They generally parallel the narrow, north-south trending drainageways on the site.

The wetland soils are identified as Ridgebury, Leicester and Whitman extremely stony fine sandy loams. This undifferentiated group contains soils that range from poorly drained (Ridgebury and Leicester) to very poorly drained (Whitman). They occur in drainageways and depressions on the till covered site in areas that are generally flat. The soil texture and presence of soil mottling indicates a seasonally high groundwater table condition.

In general, the seasonally high water table is about 6 inches below ground surface in the Ridgebury and Leicester soils and at or near ground surface in the Whitman soils. The primary engineering concerns with these wetland soils are the seasonally high water table and a slowly permeable substratum approximately 1.5 feet below ground surface in the Ridgebury and Whitman soils. Most of these wetland areas provide good habitat for wetland plants and wildlife and perform important hydrologic functions.

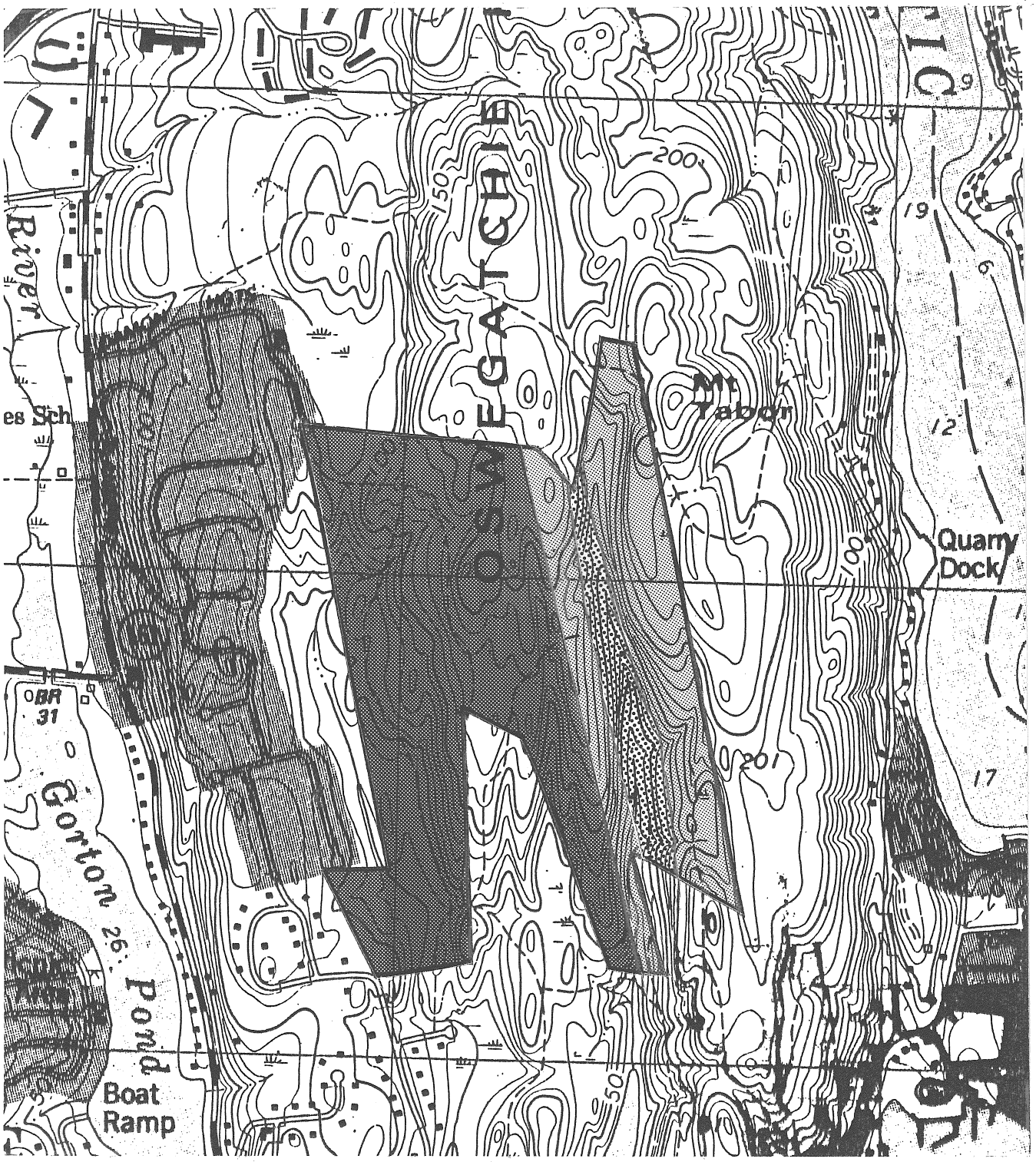
Based on present plans, the applicant has made a conscientious effort to minimize impacts to regulated wetland soils on the site by aligning the access road to avoid wetlands. Where wetland crossings are unavoidable, relatively narrow points were chosen. Reducing the wetland driveway crossing on Lots 6 and 7 to one will help reduce potential adverse impacts to the wetlands.

Although undesirable, wetland road and driveway crossings are feasible but only if they are properly engineered. They should be constructed adequately above the surface elevation of the wetlands. This will allow for better drainage of the road and decrease the frost heaving potential. Road construction through wetlands should be done during the dry time of year and should include provisions for effective erosion and sediment control. Any unstable, organic or mucky material should be removed and replaced with a permeable road base material. A pipe that is properly sized should be located in the area of the proposed crossing to avoid altering the water levels on the upstream side of the road/driveway.

BEDROCK GEOLOGIC MAP

Scale 1" 1000'

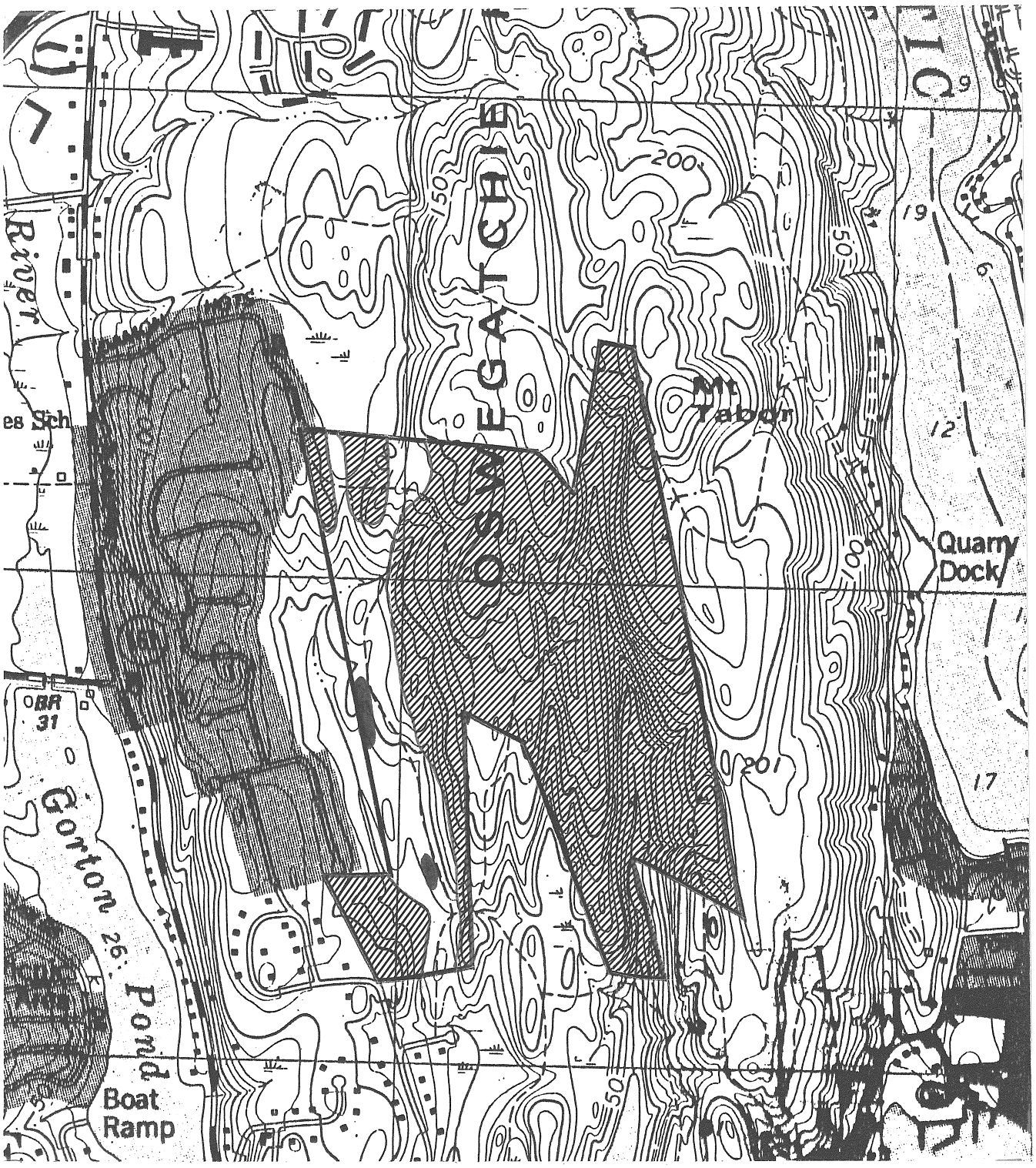
Biotite Granite Gneiss
Alaskite Gneiss
Plainfield Formation



SURFICIAL GEOLOGY MAP

Scale 1" = 1000'

Till
Thin Till (Bedrock at or near ground surface)
Single Outcrop



4. Soil Resources

The soils on the site are very rocky Charlton-Hollis and Hollis-Charlton rock outcrop complexes. The slopes are steep and the hazard for erosion is severe. Bedrock is also a limiting factor for excavation and septic system design. Increasing the area of investigation to utilize the deepest soils for septic system design and an engineered system will be necessary. The soils in phase I are mainly (CbB) Canton-Charlton and (Rn) Ridgebury Leicester and Whitman extremely stony. The CbB soil mapping units are generally favorable to site development. The terrain becomes less desirable in phase II.

There will be extensive grading and some blasting necessary to construct roads and houses. Special care must be given to the installation and maintenance of the sediment and erosion control measures.

The sediment and erosion control plan, as outlined is near complete and will provide adequate erosion control during construction. Erosion control measures were not outlined on some of the house lots (lot 4, encroachment of wetlands at road crossing on lot 3, and lot 7). These measures would be necessary to insure protection of fragile wetland ares. The project should be phased as proposed with each phase stabilized before moving to the next phase. The plan names the contractor as the field representative. The name of the person responsible for the sediment and erosion control should be stated and a contact address and telephone number furnished to the town. The town commissions should utilize the Materials for Use in Improving Erosion and Sediment Control Plan Implementation, five tools to improve plan implementation as prepared by the Council on Soil and Water Conservation.

The storm water drainage calculations were not submitted to this office for review. The Soil Conservation Service is available to review the TR-55 method for calculating storm water drainage.

The eastern half of the property was not investigated at the time of the site visit. No development is proposed there at this time. The landscape appears to be prohibitive for development, the slopes are excessive and the soils are shallow and bedrock influenced.

Soil Descriptions

* CbB - Canton and Charlton fine sandy loams, 3 - 8 percent slopes

These gently sloping, well drained soils are on glacial till upland hills, plains, and ridges. 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 in these soils is moderate. Runoff is medium. This soil warms up and dries out rapidly in the spring. These soils are well suited to cultivated crops. The hazard of erosion is moderate. These soils are suited to trees.

These soils are in capability subclass IIe.

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

This gently sloping to sloping complex consists of somewhat excessively drained and well drained soils on glacial till uplands. Rock outcrops cover up to 10 percent of the surface. Stones and boulders cover 1 - 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. The runoff of this complex is medium or rapid. It warms up and dries out rapidly in the spring. It is strongly acid or medium acid. These soils are not suited to cultivated crops. The hazard of erosion is moderate to severe. These soils are suited to trees. Windthrow is common on the Hollis soil because of the shallow rooting depth. The major limiting factor for community development is the shallow depth to bedrock.
These soils are in capability subclass VIs.

HrC - Hollis-Charlton-Rock outcrop complex, 3 - 15 percent slopes

This gently sloping to sloping 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 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 to severe. These soils is 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 shallow depth to bedrock in many places, and rock outcrop. The Hollis soil is droughty.

These soils are in capability subclass VIIs.

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.

***** 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.

Rp - Rock outcrop-Hollis complex

This gently sloping to very steep complex consists of Rock outcrop and a somewhat excessively drained soil 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. Runoff is medium through very rapid. Hollis soil warms up and dries rapidly in the spring. It is strongly acid or medium acid. This complex is not suited to cultivated crops. The hazard of erosion is severe. This complex is poorly suited to trees, but is better suited to trees than to most other uses. Windthrow is common on the Hollis soil because of the shallow rooting depth. The major limiting factors for community development are the shallow depth to bedrock and rock outcrop.

This complex is in capability subclass VIIs.

SwB - Sutton very 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 1 - 8 percent of the surface. The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum. This soil is not suited to cultivated crops. 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 VIs.

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

SOILS MAP

Scale 1" = 1320'

——— Approximate Site Boundary

5. Blasting Concerns

A major consideration with respect to the widespread presence of shallow to bedrock soils on the site is the potential for blasting. It seems likely that there is a good chance that where bedrock is encountered during excavation for roads, house foundations and/or driveways blasting will be necessary. Blasting requires great care and the strict supervision by persons experienced with modern blasting techniques to ensure no damage occurs to surrounding properties from undue seismic shock or airblast. If blasting is necessary, a pre-blast survey should be implemented with this activity focusing on the residential subdivision west of the site. A pre-blasting survey radius that ranges between 500 and 1,200 feet is generally used. The exact pre-blasting survey radius for the site will depend upon the blasting requirements for the site, geology, and the density of homes and other structures in the area.

6. Hydrology

The western half of the site, about 90 acres drains overland to the unnamed streamcourse that flows in the long narrow drainageway in the east-central parts. From its intersection with the southern property line, the streamcourse flows about 1,250 feet into Clark Pond. The outlet stream for Clark Pond flows directly to Smith Cove which is above Niantic Bay. The eastern half of the site, about 90 acres drains to the unnamed streamcourse that flows through the southwest corner of the site. It originates in the northwest corner of the site and is fed by several drainage swales that emanate from the western parts. The unnamed watercourse is tributary to Dodge Pond and the Pataguanset River.

The surface waters on the site have not been classified by the Department of Environmental Protection (DEP) Water Compliance Unit and are presumed Class A water resources by default. Class A water resources may be suitable for drinking, recreational or other uses and may be subject to restrictions on the discharge of wastes, although certain discharges may be permitted. It should be pointed out that the unnamed streamcourses on the site which are Class A water resources discharge to streamcourses that are classified as B/A (unnamed feeder stream to Patagaunset River) and class SB/SA (Smith Cove). The 'S' before 'B' and 'A' in the preceding sentence indicates a saline water. A Class "B/A" water resource indicates that currently the water is known or inferred to be degraded. "B/A" resources are generally suitable for recreational, agricultural or certain industrial uses such as process or cooling water. It is the State's goal to improve, through management, the water quality to that of an "A" resource (see above). Class "B/A" and "SB/SA" are regulated similarly.

The Department of Environmental Protection's Water Quality Classification Map of Connecticut, J.E. Murphy, 1985, indicates that groundwater beneath the entire site is Class "GA". A Class "GA" water resource means that it is suitable for private drinking water supplies without treatment.

Development of the site as proposed will lead to some increases in the amount of runoff during periods of precipitation. These increases will result from soil compaction, removal of vegetation and placement of impervious surfaces such as roof tops, driveways and patios. The principal concerns with regard to increased

runoff is the potential for flooding problems to downstream areas, streambank erosion and surface water degradation.

In order to assess potential hydrologic impacts in the overall drainage patterns resulting from the proposed subdivision as well as to size road culverts at wetland/stream crossings, the applicant's engineer used a methodology (Rational Method) prescribed in the Connecticut Soil Erosion and Sediment Control Handbook. It was determined that no post-development control structure (detention basin) for controlling increased peak flows from the site are needed. Instead, it appears that the subdivision will rely on the natural detention capabilities of wetlands on the site to help maintain post-development runoff conditions. Close examination of all downstream culverts is warranted to ensure that post-development flows do not cause any flooding problems. For the benefit of Commission members and town engineer, a narrative that explains the pre- and post-development drainage conditions should accompany supporting calculations.

Due to the site conditions (e.g., moderate to steep slopes), the amount of land disturbance anticipated for the development, the potential to degrade surface water on- and off-site during development is high. Therefore, it is imperative that erosion and sediment (E&S) control measures be properly installed and maintained. The town must police E&S control measures on a regular basis. E&S controls should be left in place until each phase of construction is stabilized through one growing season. A detailed E&S control plan that is properly enforced will minimize the chance for surface water degradation.

During the construction period, control measures, including silt fences, haybales, temporary/permanent sediment basins which permit settling time for suspended solids, anti-tracking devices, energy dissipaters and minimizing land disturbance, should be used to minimize environmental damage to on- and off-site wetlands and watercourses. The Connecticut Guidelines for Soil Erosion and Sediment Control (1985, as amended) should be closely followed with respect to the E&S control plan.

There exists a potential for degrading surface water on and off-site following development of the property by road and driveway runoff, floating solids, road salt, oils, greases and road sand. Best Management Practices (BMP's) should be developed and implemented to minimize this potential problem. Examples of such practices include: **(1)** using catch basins equipped with hooded outlets and sumps for trapping sediments and floatables; **(2)** implement a regular maintenance program that includes cleaning catch basins and road sweeping following the winter months; and **(3)** restrict de-icing salt application to a lean 7:1 sand-salt mix ratio. In order to protect surface and groundwater resources on and near the site, consideration should also be given to prohibiting the use of underground fuel storage tanks in the subdivision.

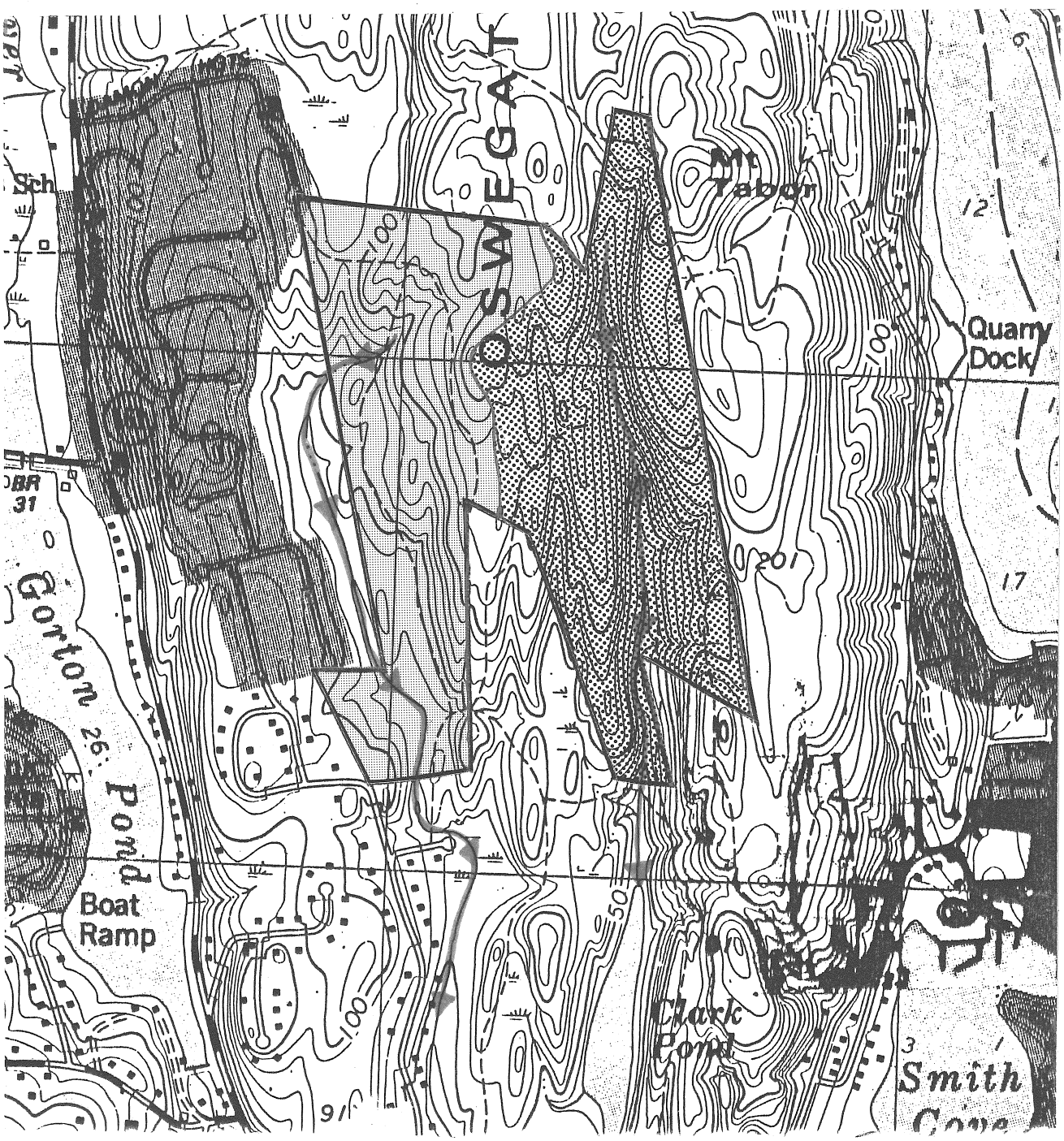
WATERSHED BOUNDARY MAP

Scale 1" = 1000'

Portion of the site that drains to an unnamed tributary to Little Dodge Pond, Dodge Pond, and the Pataguanset River.

Portion of the site that drains to Clark Pond and ultimately Smith Cove.

Watercourses showing direction of flow.



7. Future Development Potential From a Geologic Viewpoint

Team members were asked to comment about the potential for residential development in the central and eastern parts of the site. Based on examination of soil mapping data, geologic maps and air photos, the physical limitations (shallow to bedrock soils, steep slopes, wetlands/watercourses) which characterize the western parts of the parcel also appear to be the major limiting factors for residential development in the central and eastern parts. Although these areas may be developable (probably only at a very low density), topographic and geologic conditions would make it a very poor and undoubtedly expensive choice. In order to overcome the limitations, it seems likely that a large expenditure of capital would be required with a possibility that only a few lots might be approved.

8. Water Supply

Public water facilities made available by the East Lyme Water Company are accessible to the site. However, there is a possibility that lots beyond Phase I may need to be served by a pressure boosting pump station in order to secure adequate water pressure for houses constructed at higher elevations in the subdivision. This will need to be evaluated further. Although the underlying bedrock aquifer may be capable of yielding sufficient amounts of water to a domestic well (2-3 gallons per minute), connection to the municipal water supply system would reduce the risk of groundwater contamination to individual on-site wells, particularly in view of the widespread shallow to bedrock conditions that characterize the site and the need to install on-site septic systems on lots only one acre or more in size. Experience has shown that well pollution is frequently a problem in shallow to bedrock areas especially where there are a number of building lots involved, each served by an on-site septic system.

9. Sewage Disposal

Since municipal sewers are not presently available to the project site an individual on-site sewage disposal system will be required for each lot.

Subsurface exploration for on-site sewage disposal feasibility, which included 131 deep test holes and 33 percolation tests, were performed by D.W. Gerwick Engineering. Deep test holes were excavated throughout the western parts of the site and ranged between 1.25 feet to 9.8 feet but the majority were in the 6.5 foot range. In general, the test holes encountered topsoil, 2 inches to 10 inches thick, a brown to redbrown, silty to sandy subsoil then till or bedrock. These subsurface conditions generally coincide with soil and geologic mapping data for the site and vicinity. Ledge rock, which was encountered at depths 7 feet or less, was reported in 54% of the test holes excavated (71 out of 131). Twenty-two percent of the test holes reported bedrock at depths of 5 feet or less, which according to the State Public Health Code constitutes an area of special concern. As such, the shallow soils that characterize the site will be a very important design constraint with regard to on-site sewage disposal.

Numerous deep test holes excavated on the site intercepted a shallow water table condition (36" or less to the groundwater table). Additionally, soil mottling less than 36" from ground surface was commonly reported in the deep test holes. This indicates a potential seasonally high water table condition. The seasonally high water may be due to: **1)** the presence of slowly permeable soil zone that occurs 1.5-3.0 feet below ground surface; and **2)** the undulating nature of the underlying bedrock surface that may create depressional features or basins which collect pockets of groundwater following periods of precipitation during the wet time of year; or **3)** location of the test holes at a low point on the landscape, where the water level is close to the ground surface. Like the shallow to bedrock soil condition, a seasonally high water table condition will also be an important design constraint in terms of on-site sewage disposal. The Public Health Code requires that at least eighteen inches of soil separate the bottom of the leaching system from the maximum groundwater level. Lots indicating seasonally high water table conditions should be monitored through a wet season (spring months).

Because of the shallow to bedrock conditions that include large areas of continuous ledge rock outcrops, there is always a concern for having a sufficiently large suitable area for sewage disposal installation. In order to accurately determine that such an area, in fact, would be available, a sufficient number of deep test holes are needed on individual lots for ledge profile. For a residential septic system, the depth to ledge rock should be determined at 3 or 4 locations within the area of the proposed leaching system; and at one or more locations within the area of the proposed reserve leaching system; and at one or more locations down gradient from the system. On some lots, more than 4 deep test holes will be necessary in order to establish depth to bedrock conditions. There should be no ledge outcroppings within 50 feet downslope of the leaching system. The subdivision plans should include the mapping of ledge outcrops where they are continuous or widespread which will help to ensure that this separation distance is accomplished. Also, consideration should be given to digging a test hole in the area of the proposed septic tank, in order to avoid possible installation problems.

For the purposes of sewage disposal ledge rock would need to be at least 4 feet below the bottom area of any leaching system. The State Health Code prohibits the issuance of sewage disposal permits where there is less than 4 feet of existing soil over ledge rock. This does not mean that no sewage disposal system could ever be built at this location but that the necessary fill must be placed, compacted and tested before the final sewage disposal plan is approved and a building permit issued. This puts the "burden of proof" on the applicant to demonstrate that the site improvements can be made. It should be noted that the State Health Code requires that there be at least 2 feet of natural soil over ledge.

Because of the likelihood of rock being encountered at varying depths, leaching systems no doubt would need to be kept shallow or spread out over a wider area. Ideally lots should be at least 200 feet wide. Depending on contours and septic system placement, it may be difficult, at times, to provide necessary lateral leaching area following natural contours while maintaining all required separating distances.

Because of the shallow to bedrock soils and ledge outcrops that characterize the site, any earth cuts for the access road or driveways are likely to encounter bedrock, quite possibly necessitating blasting. Where an exposed ledge face

occurs down gradient from the rock cut the prescribed 15 foot embankment setback is insufficient. The concern here is that partially treated sewage effluent may break out at the rock cut creating a public health hazard condition. Therefore, it is recommended that a minimum setback of 50 feet (75 feet preferred) be maintained from any rock cut area and any portion of a septic system (including reserve leaching areas) particularly if catch basins for road drainage are in the vicinity.

Due to change in elevations across the site, there is a chance some lots may require that septic tank effluent be pumped to a higher elevation on a particular lot. Every effort should be made to utilize gravity flow septic systems instead of pumped systems, even if it means rearranging lot lines. However, if this is not possible, it is recommended that lots whose septic systems require a pump be so noted on the subdivision plan.

Overall, the site is not well suited for on-site sewage disposal. This is mainly due to the shallow to bedrock soil and seasonally high groundwater table conditions. Additional soil testing is always required when hostile conditions such as shallow to bedrock soils prevail in order to confirm subsurface conditions and site suitability for on-site septic systems. Due to the shallow to bedrock soils on the site, extreme caution needs to be exercised with regard to septic system placement and location of the ledge rock surface. Once all testing and groundwater monitoring is completed, it seems likely that a number of lots may need to be eliminated or combined with adjacent ones to reduce the overall density and provide more assurance for proper sewage disposal and well protection. Because of the hostile subsurface conditions (shallow bedrock soils and seasonally high ground water levels), it is probable that a very high percentage of the proposed lots will require detailed plans prepared by a registered professional engineer.

10. The Natural Diversity Data Base

The Oswegatchie Hill Area is one of 459 site listed as a Natural Area Inventory site (NAI). Being included as a NAI site does not impart any restrictions or provide legal protection, it identifies area that should receive consideration before any proposed development a approved.

Included with this report is a copy of a 1981 update to the NAI file and copies of bird list compiled for the area. (See Appendix) These lists are the result of up to 20 years of observations. A great diversity of species have been observed from the area; this includes observations of migratory and breeding birds.

11. Vegetation

The vegetation of the property is common to the oak-hickory forest found in southern Connecticut. The vegetation can be divided into three forest stands (a mixed hardwood stand, hardwood swamp, and an old field vegetation). The acreage of the forest stands were obtained from aerial photographs and should only be used as estimates.

Vegetation Description

Stand 1 (mixed hardwoods) is a 68 acre mixed hardwood pole (trees 5.1" to 11" in diameter at breast height) and sapling(trees 1.1" to 5" dbh) stand. Scarlet oak, black oak, white oak, chestnut oak, gray birch, aspen , hickory, pitch pine, red maple, black birch, sassafras, American beech, red oak, black gum, and tulip poplar are present. The latter 2 species are primarily found next to the hardwood swamp. The lesser vegetation include mountain laurel, lowbush blueberry, maple leaf viburnum, beech drop, witch hazel, sweet fern, bayberry, dew berry, green briar, wild sassparilla and club moss. The stand originated 30 to 40 years ago after a relatively hot forest fire killed almost all of the trees from the previous stand. A few chestnut oak were able to survive the fire because of their thick bark. These trees are 110 years old and are experiencing a high mortality rate. The fire accounts for the abundance of aspen and mountain laurel as well as the scattered presence of pitch pine.

Most of the overstory trees appear to be relatively healthy but show some early signs of stress. The drier ridges provide a poor site for growing hardwoods while the lower slopes and areas adjacent to the drainage provide an average growing site for hardwoods. Most of the stand appears to be crowded.

Stand 2 (hardwood swamp) is an 8 acre pole stand. Red maple, aspen, sassafras, white oak, chestnut oak, gray birch, black gum, red oak, american elm, white ash, black birch, tulip poplar and yellow birch are present. The understory includes spicebush, clethra, shadbush, swamp azalea, witch hazel, American hornbeam, club moss, skunk cabbage, grape , cinnamon fern, sensitive fern, and green briar.

Most of the overstory trees originated 30 to 40 years ago after the forest fire.

Stand 3 (old field) is a 2 acre sapling stand that is in a power line right of way. Black cherry, red maple, black oak, tulip poplar, hickory, and sassafras are present. The lesser vegetation includes winged sumac, dewberry, multi-flora rose, mountain laurel, bayberry, bittersweet, grape, sweet fern and green briar.

Limiting Conditions/Potential Hazards

The main limiting condition of the forest is the shallow soils and crowded conditions that restricts tree growth in **Stand 1**. Trees growing in these conditions can be expected to have greater stress and reduced vigor. Low vigor trees are more suceptible to insects and disease problems which in turn could lead to a high mortality rate. Mast production (i.e. acorn, hickory nuts,etc.) can be expected to be lower in a less healthy forest. Therefore, less food will be availible for wildlife. Long term aesthetics will also be limited by the health of the forest. Another limiting factor and potential future hazard is the short life span of aspen, which is one of the most abundant species in **Stand 1**. By age 70 or 80 ,the mortality rate for aspen is expected to be extremely high.

Potential hazards include dead trees, dead tree parts and those trees whose roots or trunks have a high probability of failing due to excessive decay or lean. These trees become hazard trees if there is a high risk of injuring people or damaging property. All trees with the above-mentioned characteristics would be hazards if

located within striking distance of a building or along areas of high use such as hiking trails or roads.

Construction activities that occur within the root zones of trees that are to be retained will adversely effect the health of the trees and create future hazard trees. Trees are very sensitive to the condition of the soil within the entire area of their root systems. Road building, filling, and general use of heavy machinery will lead to some degree of soil compaction that will adversely affect the soil moisture and aeration balance. This could lead to the decline in tree health and vigor and may lead to the death of the tree within three to five years. Physical damage to the root system (by excavation) and bark damage allow the introduction of decay organisms and may also result in the decline of tree health. The older and/or larger a tree is the more readily it is affected by the negative impact of construction related activities. The delayed effect of construction activities on trees can create future hazards trees that are expensive to remove once utility lines, roads, and homes are in place.

The creation of openings in the forest (from clearing houselots) will increase the susceptibility of the trees to windthrow at the leeward edge of the openings. Trees adjacent to or in openings that occur on soils with a high moisture content or on windward slopes will be at the greatest tisk for windthrow. These trees are also susceptible to ice storms that may cause considerable crown breakage.

Aesthetic Considerations

The forested lots and proposed conservation land should provide many of the rural amenities for which many home buyers are looking. The aesthetics of a forest depends upon numerous characteristics of the individual trees, the forest as a whole, and the landscape. Some of these characteristics include: size of the trees, density of the forest, variety of forest scenes, tree health, unique or interesting features, amount of dead and down material, depth of view into the forest, and visual attractiveness of the bark texture and leaf and flower color. Generally, forests with large trees and a deep unobstructed view into the woods are most desirable. The dense mountain laurel severely limits visual penetration into wooded landscape, but will provide a good visual screen for privacy between lots. The numerous dead aspen snags expected within 40 years will detract from the aesthetics, but should benefit avian wildlife that utilizes small snags.

Management Considerations

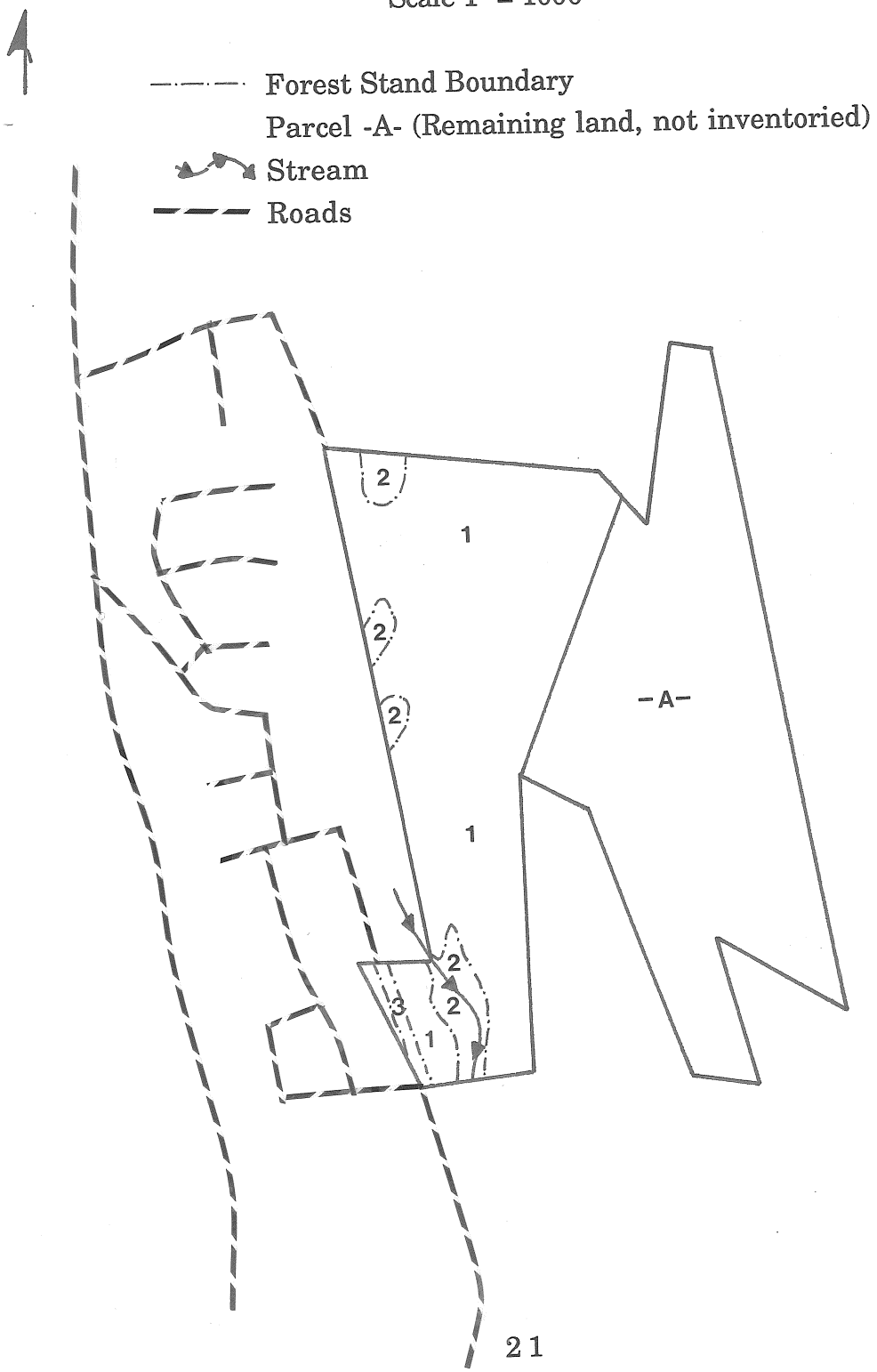
The maintenance and development of healthy vigorous trees and forests should be a major concern in the development and management of the property. In addition to the environmental and aesthetic amenities they provide, the presence of healthy trees increase the value of houselots. A reconnaissance of the trees on the individual houselots should be performed in conjunction with laying out the construction site in order to identify the best candidates to be retained. The trees to be retained should be healthy, free of decay, a long lived species, and a safe distance from construction activity. These trees and their root zones (the area directly under the tree crown) should be protected by flagging off and not allowing construction equipment in that area.

In the open space areas and the remaining forested sections of the house lots, forest management could promote the development of a healthier forest by

reducing crowding in densely stocked stands. A fuelwood thinning that harvests one quarter of the least healthy trees in **Stand 1** would give the residual trees adequate growing space. This will result in an increased growth rate and therefore a larger tree in a shorter time period. The thinning will also stimulate the flowering of mountain laurel by increasing the amount of sunlight reaching the understory.

VEGETATION MAP

Scale 1" = 1000'



12. Wildlife Resources

Habitat Type Descriptions

The project site consists of 75 acres in the town of East Lyme. The following habitat types are present: Mixed hardwoods and wetland/riparian habitat. A detailed listing on avian wildlife use at the site has been compiled by B.Dasinger,PhD. June 29,1990. (Please see Appendix)

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. Aspen was a large component within this type. Understory vegetation includes witchhazel, elderberry, multiflora rose, grape, blackberry and hardwood regeneration. A portion of this habitat type is bisected by a powerline ROW. Vegetation consisted of multiflora rose, staghorn and winged sumac, fox grape, goldenrod, sensitive fern, autumn olive, and hardwood regeneration. Wildlife frequenting such habitat types include deer, fox, raccoon, gray squirrel, woodpeckers (pileated, hairy and downy), ovenbirds, scarlet tanagers, black-throated blue and green warblers, barred owls, broad-winged hawks and various non-game species such as shrews, voles and snakes.

Wetland/Riparian Habitat: This habitat type consists of various combinations of streams/brooks,and swamps. Associated vegetation includes red maple, birch, alder, cattails, dogwood, jewel-weed, spicebush, sweet pepper bush, skunk cabbage, false helbore,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 and numerous amphibians and reptiles including water and garter snakes, salamanders, newts and spotted and painted turtles.

Impacts of Development

Upland Wooded Areas: Fragmentation and loss 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 veeries, ovenbirds and scarlet tanagers may decrease and no longer occupy the area.

Wetland/Riparian Habitat: Wetlands provide important habitat for a variety of wildlife species and function as areas for absorption of natural runoff. Wetlands also support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply which allows for a high carrying capacity (Brown et. al. 1978). Many species 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).

Vegetation removal in wetlands may have severe impacts on wildlife, especially reptiles and amphibians. One or several of the cover, food, breeding 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.

Mitigation of Disturbance

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).

In a small, but heavily developed and highly populated state like Connecticut, available habitat continues to decline on a daily basis. It is critical to maintain and enhance existing wildlife habitat. As the demand for land increases and land is developed, there will be an immediate and lasting negative impact on wildlife. The primary impact is the direct loss of habitat due to buildings, roads, driveways, parking areas, walkways, recreational facilities and other structures. Loss of habitat also occurs where cover is cleared for lawns and landscaping. Additional impact occurs with increased human presence, vehicular traffic and the number of free roaming cats and dogs.

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13. Fish Resources

Site Description

The headwaters of two unnamed streams originate within the 180 acre parcel located on Oswegatchie Hill. The easternmost stream flows into the Niantic River, whereas the westernmost stream is a tributary of the Pattagansett River. One of the primary functions of these headwater stream reaches and their associated wetlands is to provide clean and unpolluted waters to downstream areas of the watershed. Therefore, it is extremely important that any new residential housing development that occurs on this parcel will not directly or indirectly impact the water quality and aquatic resources of local watercourses. This section of the report will address all potential impacts to aquatic resources expected from the development and delineate mitigation measures required to minimize impacts.

Fish Population

Habitat required for yearlong survival of freshwater fishes was not observed in stream stretches that flow through this parcel. Viable habitat exists in downstream reaches of each stream where they enter ponded habitat, Clark and Dodge Ponds. Downstream reaches most likely support fish species that live in these ponds and which seasonally penetrate stream habitat. The exact fish assemblage of Clark and Dodge Ponds is not known; however, the following fish species can be expected to inhabit these ponds: largemouth bass, bluegill, pumpkinseed sunfish, yellow perch, brown bullhead, American eel, and white sucker.

Surface waters of both unnamed watercourses 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.

Impacts

The following impacts to aquatic resources and associated wetlands can be expected if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of site streams through increased runoff from unvegetated areas. During residential housing construction, topsoil will be exposed and susceptible to runoff events especially since surface drainage from the site empties into various watercourses that lie between dominant "hill and knoll" topographical features. Erosion and sedimentation due to construction activities on steep slopes can degrade stream resources 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. Presently, both streams support very sparse aquatic weed communities.

(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 watercourses. A failure of individual septic systems to operate properly (refer to ***Sewage Disposal*** section) may be potentially dangerous to stream environments. Nutrients and assorted chemicals that may be placed in septic systems can 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. Documentation provided to Team Members shows that the unnamed stream that enters Dodge Pond already receives non-point source septic effluent from the existing subdivision. (Leachate and Wastewater Discharge Sources map for the Thames River Basin - CT DEP, Water Compliance, June 1988) Further development on soils unfavorable for septic effluent renovation may exacerbate the existing problem.

3. Aquatic habitat degradation in streams due to the influx of stormwater drainage. Stormwaters emanating from road systems 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. Stormwater drainage can also result in increased stream flows which may lead to streambank erosion.

4. Transport of lawn fertilizers and chemicals to watercourses. Runoff and leaching of nutrients from fertilizers on subdivision lawns may stimulate filamentous algae and nuisance aquatic weed growth in local streams and degrade water quality. Introduction of lawn herbicides can result in "fish kills" and overall water quality degradation.

5. Degradation of wetland habitat. Wetlands serve to protect stream water quality by: (1) controlling flood waters by acting as a water storage basin, (2) trapping sediments from natural and man-made sources of erosion, and (3) filtering out pollutants from runoff before they enter watercourses. Housing development which fragments wetlands due to road crossings and introduces polluted stormwaters, excessive stream sedimentation, lawn fertilizers, and lawn herbicides can negatively impact wetlands by hindering their ability to properly function.

6. Impacts to downstream environments. Any water quality problems and habitat

degradation that occurs within the project site may eventually be observed in downstream areas such as Clark and Dodge Ponds. Increased eutrophication (aging) or nutrient enrichment over time can be expected in downstream ponds if they receive elevated levels of nutrient enrichment. Increased pond aging will result in the creation of dense algae blooms, sediment accumulation, nuisance amounts of aquatic vegetation, and increased production of microorganisms that cause fish disease. The probability of partial or complete fish kills will increase.

Recommended Mitigation Measures

The following mitigation measures should be considered by the Town of East Lyme to mitigate impacts to aquatic resources.

1. It is highly recommended that at the minimum. a 100 foot open space buffer zone be maintained along all wetland boundaries of site streams. This buffer can be an effective mitigation measure at this development location. No construction and 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;0DFW 1985). Impacts such as soil erosion, can be more effectively minimized if these areas are left in their natural condition. These buffers will absorb surface runoff and other pollutants before they can enter aquatic ecosystems.

2. Develop an aggressive and effective erosion and sediment control plan. Install and maintain proper erosion and sedimentation controls during both road crossing and site construction activities. This includes such mitigative measures as filter fabric barrier fences, staked hay bales, and sediment catch basins. Land disturbance and clearing should be kept to a minimum and all disturbed areas should be restabilized as soon as possible. Exposed, unvegetated areas should be protected from storm events.

3. Septic systems must be properly located and designed to effectively renovate septic effluent. Septic effluent can be one of the greatest threats to the ecology of streams and ponds. When septic leach fields are proposed to be located within 100 feet of wetlands or watercourses, it is the Team fisheries biologist's opinion that the town sanitarian should require analyses of phosphate and nitrate transport to ensure that leachate does not interfere with aquatic resources. Doing this may go beyond the standards of the State health code but is warranted to protect surface waters from avoidable sources of eutrophication. The documentation of existing septic effluent problems in the area warrants careful septic site selection for the Sleep Hollow Extension Subdivision. Systems located on steep slopes adjacent to streams are also dangerous due to the increased potential of leachate "breakout". All septic systems should be maintained on a regular basis. Residents should be encouraged to utilize non-phosphate laundry detergents.

4. A detailed stormwater management plan should be devised for town review. The effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch basins. When possible, stormwaters should only be outletted into non-wetland habitat; thus, avoiding direct contact with wetlands. Timely maintenance of catch 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. All work near streams and/or wetlands for the purpose of road construction should take place during low flow periods. This strategy will help minimize the impact to aquatic resources. Reduced streamflows and rainfall during the summer and early fall provide the least hazardous conditions in which to work near sensitive aquatic environments.

6. 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.

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14. Planning Review

This subdivision proposal would create approximately 31 residential building lots and an estimated 4000' of new road in two development phases. The first phase would create 7 residential building lots and approximately 1400' of new road with phase II creating the remaining 2600' of roadway and 24 building lots.

The area of the proposed development is presently zoned rural residential requiring a minimum lot size of 40,000 square feet.

The Regional Development Plan depicts this general area as being suitable for low density uses which are defined as residential uses at less than one unit per 1.5 acres, agricultural, open space, recreational, and water supply uses. This classification is due to the development limitations of the area. These limitations include wetlands, bedrock soils,and steep slopes.

The Town of East Lyme Plan of Development depicts the Oswegatchie Hill area as suitable for low density development and recommends (p.9) that the zoning designation in this area be changed from RU-40 (40,000 square feet) to RU-80 (80,000 square feet). The reasoning for this recommendation, again, is the development limitations of the area.

The Town Plan of Development also recommends (p.65) that a new connector road be established ,between Sleepy Hollow Road and Damon Heights Road as development occurs, for traffic improvement.

Traffic

The proposed development has the potential to generate the following trips to and from the site each day:

	LOTS	TRIPS	A.M. PEAK	P.M. PEAK
Phase I	7	65	5	7
Phase II	24	223	18	24
Total	31	288	23	31

(National Cooperative Highway Research Program Report 187)

Connecticut Department of Transportation Traffic logs for 1988 and 1989 show the Average Daily Traffic on Route 161 in the vicinity of the proposed subdivision as follows:

LOCATION	1988	1989
Roxbury Rd. to Ind. Park Rd.	16,600	16,800
Ind.Park Rd. to I-95.	21,200	21,500

Generally Route 161 has the capacity to handle the additional trips generated by the proposed subdivision. The ease of travel on Route 161 has decreased over the past year with the increased traffic volumes necessitating the present road widening under construction between Industrial Park Road and Route 1.

Review of ConnDOT accident numbers for the time period 1986 - 1988 shows that accident numbers are relatively high along the Route 161 corridor coinciding with the high traffic volumes.

Accident numbers at roads intersecting with Route 161 in the vicinity of the proposed subdivision were also relatively high during this time period. At the intersection of Laurel Hill Drive and Route 161 the number of accidents was 14. At the intersection of Damon Heights Road and Route 161 the number of accidents was 7.

In addition to the large traffic volumes which contribute to congestion and accident probability the road geometrics also contribute to the problem. Poor intersection geometrics probably contribute to more of the accidents than the traffic volumes. Improving the intersections may require additional traffic signalization as road improvements may be financially prohibitive.

Summary

Generally, the additional traffic flow generated by the proposed 31 lots should not have an adverse impact on the adjacent roads. A complete traffic study should be submitted with an application for subdivision.

The proposal has two major wetland crossings. One crossing is in the vicinity of proposed lots 3 and 5 which would be the extension of Sleepy Hollow Road and one other crossing for the driveways to access lots 6 and 7. The significance of the wetland area to be crossed by the extension of Sleepy Hollow Road could determine other road layout alternatives.

Any proposed wetland crossing to access the area of lots 6 and 7 with a driveway should be minimized in size (reduced from two drives to one) to minimize impact on the wetland.

The drainage flow from this development will be directed into the wetland areas which will then flow southwesterly to Little Dodge Pond and then to the Pataguanset River.

Drainage structures within the drainage path should be reviewed as to there ability to handle the additional flow. The drainage review will indicate whether on-site detention should be required.

The provision of public water to the subdivision is a major asset to overcoming the severe development limitations of the area.

The location of the proposed open space should be beneficial to the area as it is proposed to be contiguous to existing Conservation Trust property.

15. Archaeological Review

A review of the State of Connecticut Archaeological Site Maps and Files indicates no prehistoric sites in the proposed project area. However, it is noted that a series of Native American camp sites do exist along the western bank of the Niantic River. One archaeological site, which has been destroyed by earlier residential development, was located to the immediate south of the project area near Gorton Pond.

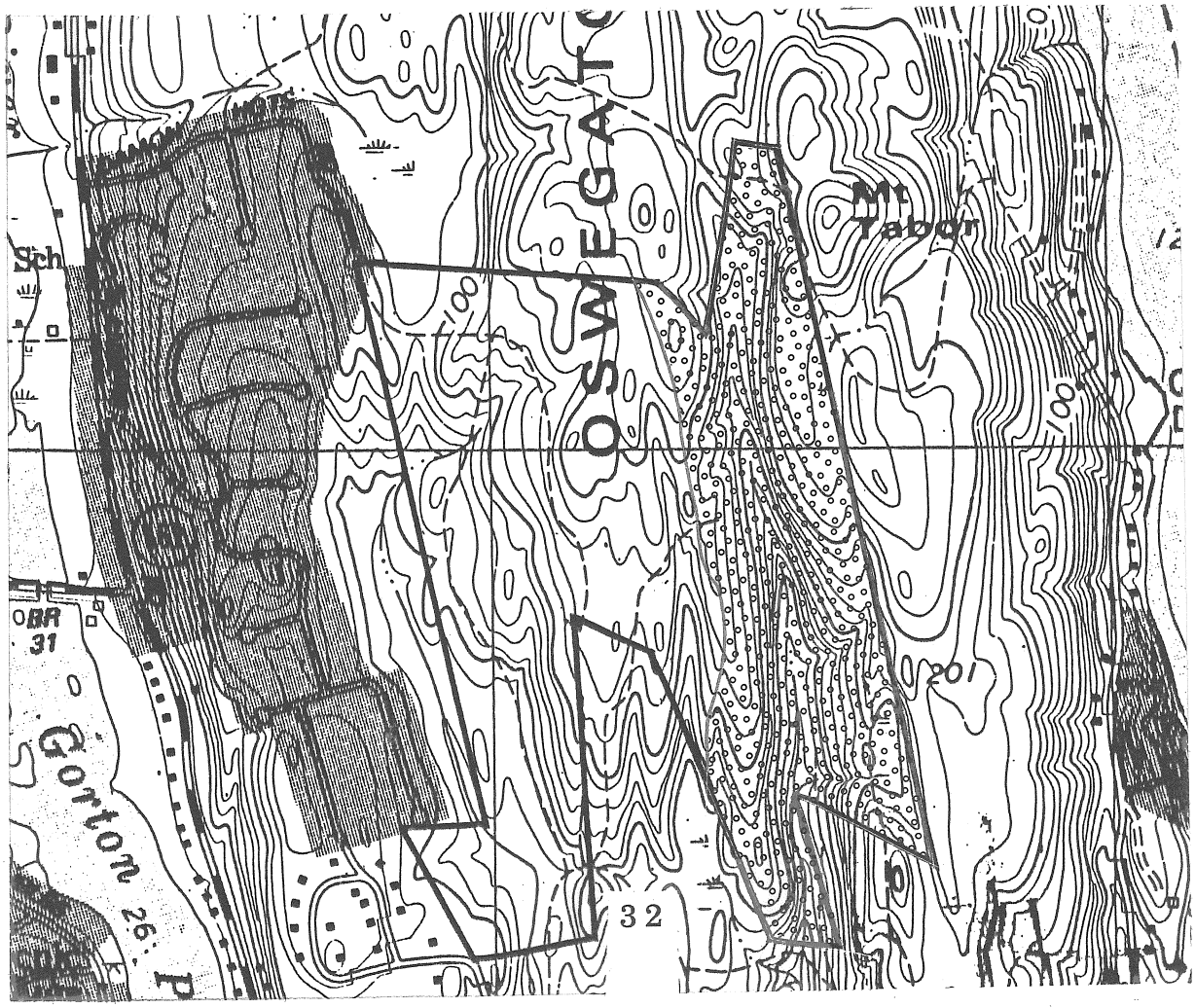
On-site inspection of the project area indicates that the most sensitive area for the location of prehistoric occupations occurs in the eastern portion along the steep ravine and near the summit of Mt. Tabor (See map). The ravine contains outcroppings of bedrock that could have been used to shelter groups of hunters and gatherers. The top of the ridge would provide less severe slopes for possibly

larger settlements overlooking the ravine to the west and the river to the east. Current development plans do not include this portion of the project area. As a result, no testing is required. However, if plans change and the eastern portion is to be developed, we highly recommend an archaeological reconnaissance survey to locate and identify any cultural resources that might exist.

In the area of proposed development open perk holes were examined and the ground disturbance around them. No signs of artifacts or feature stains that might indicate a past cultural activity were revealed. The poorly drained soils of the Ridgebury, Leicester and Whitman complex that extends the north-south length of the project area and the 15 - 45 degree slope of the well-drained soils lacking ledge outcrops are suggestive of a low-to-moderate potential for prehistoric settlements.

In summary, although sections of the Town of East Lyme have the remnants of many prehistoric and early historic archaeological sites, the western portion of the project area has a low-to-moderate potential for Native American occupation. This ranking is based on site distribution analysis and environmental factors such as, poorly drained soils, degree of slope, and the lack of ledge outcroppings. However, the eastern portion of the project area has a greater potential for prehistoric archaeological sites. Proposed subdivision plans will not impact this area, however, if development plans change, an archaeological survey is highly recommended to locate and preserve all cultural resources which might exist.

AREA OF ARCHAEOLOGICAL SENSITIVITY



Appendix

CNAI # 314

Natural Heritage Data Sheet

TOWN East Lyme

1. Area Name: Oswegatchie Hill

2. Date: 9/4/81 Person: Fran Hallahan Affiliation: NRC

3. Location Co.: New London Quad: Niantic

Coord: 41°22' N; 72°12' W to 41°20'

Aerial Photo Numbers (1980): 67-3653,3654,3655 3656,3657

Ecoregion: Eastern Coastal

4. Acreage: 1,500 (approx)

5. Classification: Major 1° BFL VIA Minor

6. Significance: Local X State Regional (or greater)

Description of the natural area's significance:

A remarkably diverse site close to an urbanized area. Communities found include uplands, wetlands, a pond, talus slopes, pitch pine, and undeveloped shoreline.

7. General Ecological Description:

The talus slope at the southern base of Mt. Tabor is bouldery and supports a pitch-pine/bear oak community. The uplands are forested with mixed hardwoods, with mature hemlock communities on the ledges. Mt. laurel is also abundant in this area.

The ledges and the talus slopes offer prime snake habitat. The rugged shoreline supports various shorebird species and a crow rookery.

8. Owners: Number of many private ownerships

Name, Address and/or telephone # _____ % or acreage owner

9. Status (include existing and surrounding land use, whether the area is protected and if so, what portions and how?):

Although the central portion remains undisturbed, the eastern side of the hill has been extensively developed since 1973. Some further development has taken place along the western shoreline. Although a municipal recreation field lies adjacent to Clark's pond, The pond is largely undisturbed (though eutrophic) and is not used.

10. Threats((include only those existing or imminent):

11. Educational or Scientific Use:

The great diversity of habitats within a small area makes this a potentially prime educational site. The talus slopes and pitch pine community might be of research interest.

12. Management

A. Existing:

Wildlife stocking	____	Mowing	____
Selective logging	____	Herbicide or pesticide use	____
Animal population control	____	Other	extensive trail system
Controlled burning	____		

B. Recommended: (to maintain or restore natural conditions; include any desireable legal or administrative actions)

Protection of the area, including Clark's pond, its watershed, and the central to northwestern section of the hill is recommended.

13. References or contact people:

Dr. Joe Peoples Geol. Dept. Wesleyan Univ., Middletown, CT 06457

Surficial geology of the Niantic Quad -GQ #329 (on file at NRC)
Bedrock Geology of the Niantic Quad -GQ #575 (on file at the NRC)

BIRDS OF OSWEGATCHIE HILL 1970-1990

Pied-billed Grebe
Double-crested Cormorant
Great Blue Heron
Green-backed Heron
Black-crowned Night-heron
Mute Swan
Snow Goose
Canada Goose
Wood Duck
American Black Duck
Mallard
Ring-necked Duck
Hooded Merganser
Turkey Vulture
Osprey
Northern Harrier
Sharp-shinned hawk
Cooper's Hawk
Northern Goshawk
Red-shouldered Hawk
Broad-winged Hawk
Red-tailed Hawk
Rough-legged Hawk
American Kestrel
Merlin
Perigrine Falcon
Ring-necked Pheasant
Ruffed Grouse
Northern Bobwhite
American Coot
Killdeer
Solitary Sandpiper
Spotted Sandpiper
American Woodcock
Laughing Gull
Herring Gull
Great Black-backed Gull
Rock Dove
Mourning Dove
Black-billed cuckoo
Yellow-billed Cuckoo
Eastern Screech Owl
Great Horned Owl

Winter Wren
Golden-crowned Kinglet
Ruby-crowned Kinglet
Glue-gray Gnatcatcher
Eastern Bluebird
Veery
Gray-cheeked Thrush
Swainson's Thrush
Hermit Thrush
Wood Thrush
American Robin
Gray Catbird
Northern Mockingbird
Brown Thrasher
Cedar Waxwing
European Starling
White-eyed Vireo
Philadelphia Vireo
Solitary Vireo
Yellow-throated Vireo
Warbling Vireo
Red-eyed Vireo
Blue-winged Warbler
Tennessee Warbler
Orange-crowned Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Black-and-white Warbler
American Redstart
Worm-eating Warbler
Ovenbird
Northern Waterthrush

Barred Owl
Northern Saw-shet Owl
Common Nighthawk
Chuck-will's-widow
Whip-poor-will
Chimney Swift
Ruby-throated Hummingbird
Belted Kingfisher
Red-bellied Woodpecker
Yellow-bellied Sapsucker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Olive-sided Flycatcher
Eastern Wood-Pewee
Yellow-bellied Flycatcher
Acadian Flycatcher
Alder Flycatcher
Least Flycatcher
Eastern Phoebe
Great Creasted Flycatcher
Eastern Kingbird
Purple Martin
Tree Swallow
Northern Rough-winged Swallow
Bank Swallow
Barn Swallow
Blue Jay
American Crow
Fish Crow
Black-capped Chickadee
Tufted Titmouse
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper
Carolina Wren
House Wren

Louisianna Waterthrush
Connecticut Warbler
Common Yellowthroat
Hooded Warbler
Wilson's Warbler
Canada Warbler
Yellow-breasted Chat
Scarlet Tanager
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
Rufous-sided Towhee
American Tree Sparrow
Chipping Sparrrow
Field Sparrow
Vesper Sparrow
Savannah sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Dark-eyed Junco
Red-winged Blackbird
Eastern Meadowlark
Rusty Blackbird
Common Grakle
Brown-headed Cowbird
Northern Oriole
Purple Finch
House Finch
Red Crossbill
White-winged Crossbill
Common Redpoll
Pine Siskin
American Goldfinch
Evening Grosbeak
House Sparrow

Andrew and Bruce Dasinger
12 Stone Cliff Drive
Niantic, CT 06357 (203)739-2693

Bird lists also on file:
Craig 1978
Atkins 1980's

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.