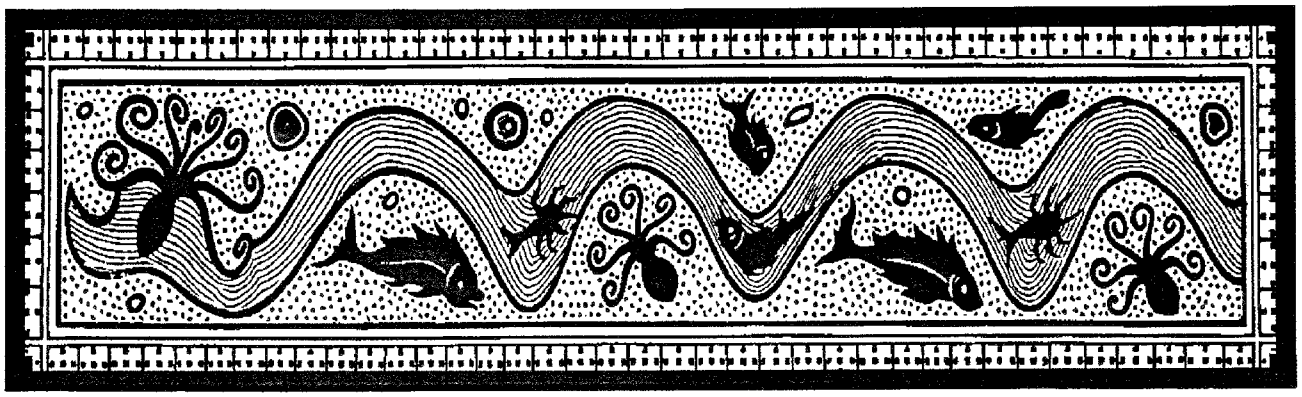
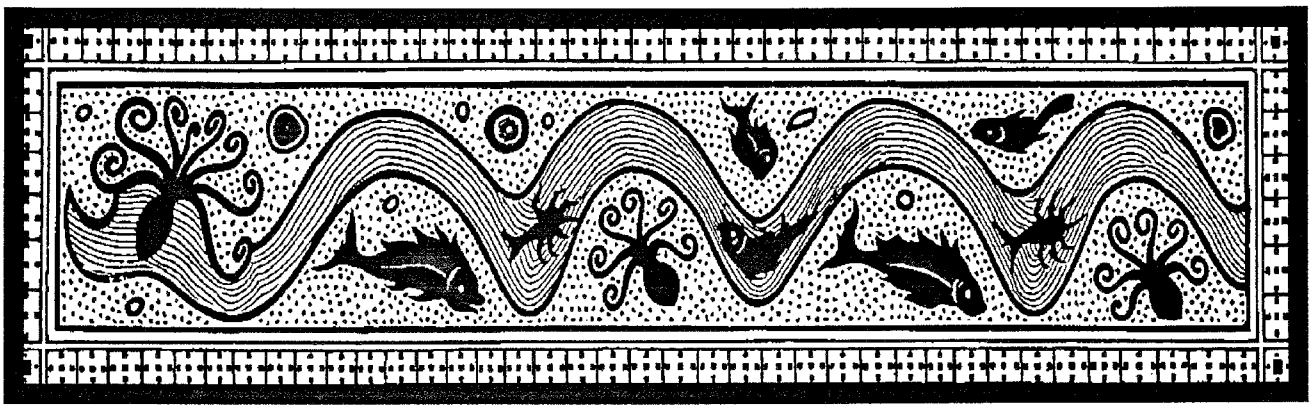


River Edge Subdivision

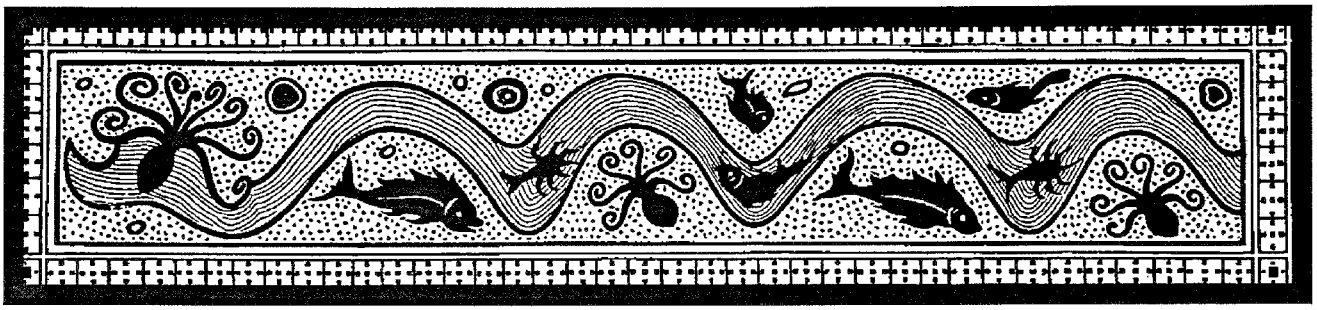
Haddam, Connecticut

November 1989

EASTERN CONNECTICUT
ENVIRONMENTAL
REVIEW TEAM
REPORT



EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.



River Edge Subdivision Haddam, Connecticut

Review Date: September 26, 1989
Report Date: November 1989

Eastern Connecticut
Resource Conservation and Development Area, Inc.
Eastern Connecticut
Environmental Review Team
P.O. Box 70, Route 154
Haddam, Connecticut 06438
203-345-3977

ENVIRONMENTAL REVIEW TEAM REPORT
ON

RIVER EDGE SUBDIVISION
HADDAM, CONNECTICUT

This report is an outgrowth of a request from the Haddam Planning and Zoning Commission to the Middlesex 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, September 26, 1989. Team members participating on this review included:

Nicholas Bellantoni	**State Archaeologist** **CT Museum of Natural History**
Steve Hill	**Wildlife Biologist** **DEP-Eastern District Headquarters**
Tom Ladny	**Soil Conservationist** **USDA-Soil Conservation Service**
Dawn McKay	**Zoologist** **DEP-Natural Diversity Data Base**
Brian Murphy	**Fisheries Biologist** **DEP-Eastern District Headquarters**
Robert Rocks	**Forester** **DEP-Cockaponsett Forest Headquarters**
Elaine Sych	**ERT Coordinator** **Eastern CT R C & 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 plans and additional information. The Team met with, and were accompanied by the Haddam Planning Consultant, the applicant and his engineers and biological

consultant. 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

Table of Contents

Table of Maps

1. Location and Land Use

The site, which is 46.37 acres in size, is located southeast of the Haddam Neck section of Haddam. It abuts Rock Landing Road, which will provide access to the site on the east, the Connecticut River and its accompanying floodplain on the south and west and private, undeveloped land that is wooded on the north.

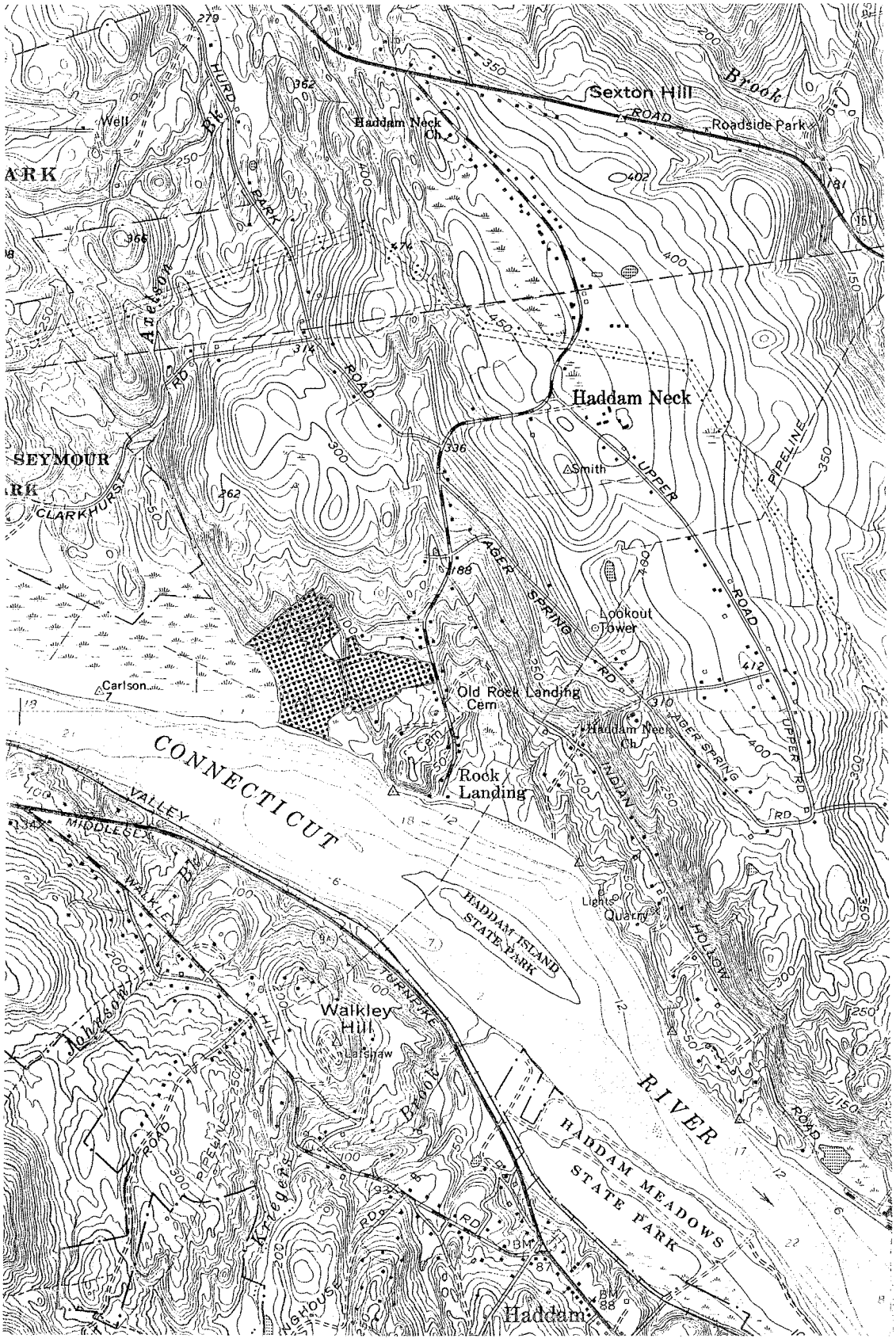
According to present plans, the mostly wooded parcel would be subdivided into 8 building lots, one of which has an existing house on it. Each lot would be served by an individual on-site septic system and water supply well.

The site is located in a zone that permits single family homes on lots of at least 2 acres or 80,000 square feet. All lots in the proposed subdivision exceed the 2 acre minimum requirements. Several residential homes, mostly on Rock Landing Road, characterize land use in the area. A review of a 1934 air photo which depicts pasture land on the site and visual observations of relic stone foundations (probably farm buildings) in the eastern parts during the field walk gives testimony to the site's agricultural past.

LOCATION MAP

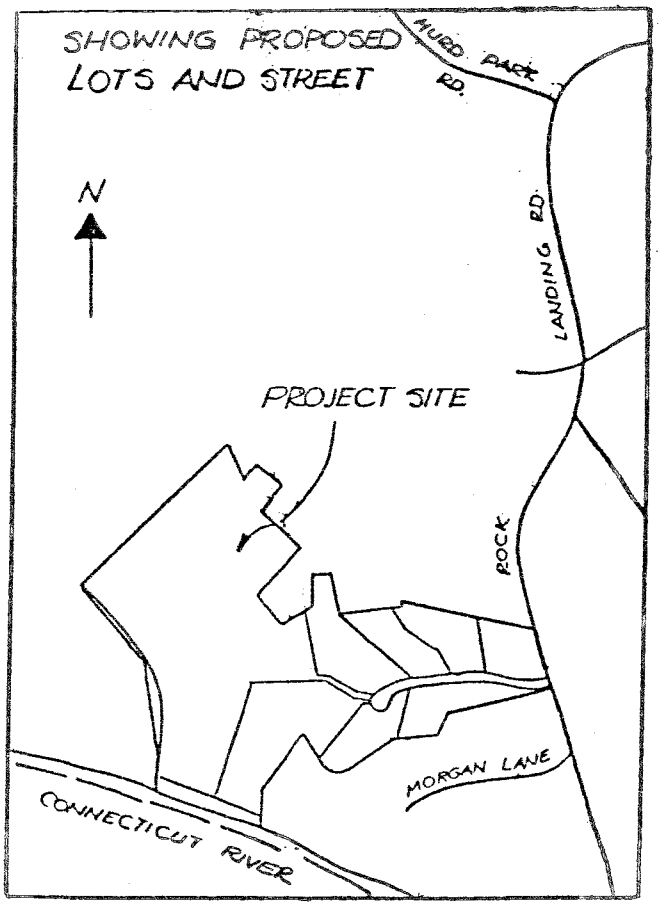
Scale 1" = 2000'

Approximate Site



LOT AND STREET LAYOUT

Scale 1" = 1000'



2. Topography

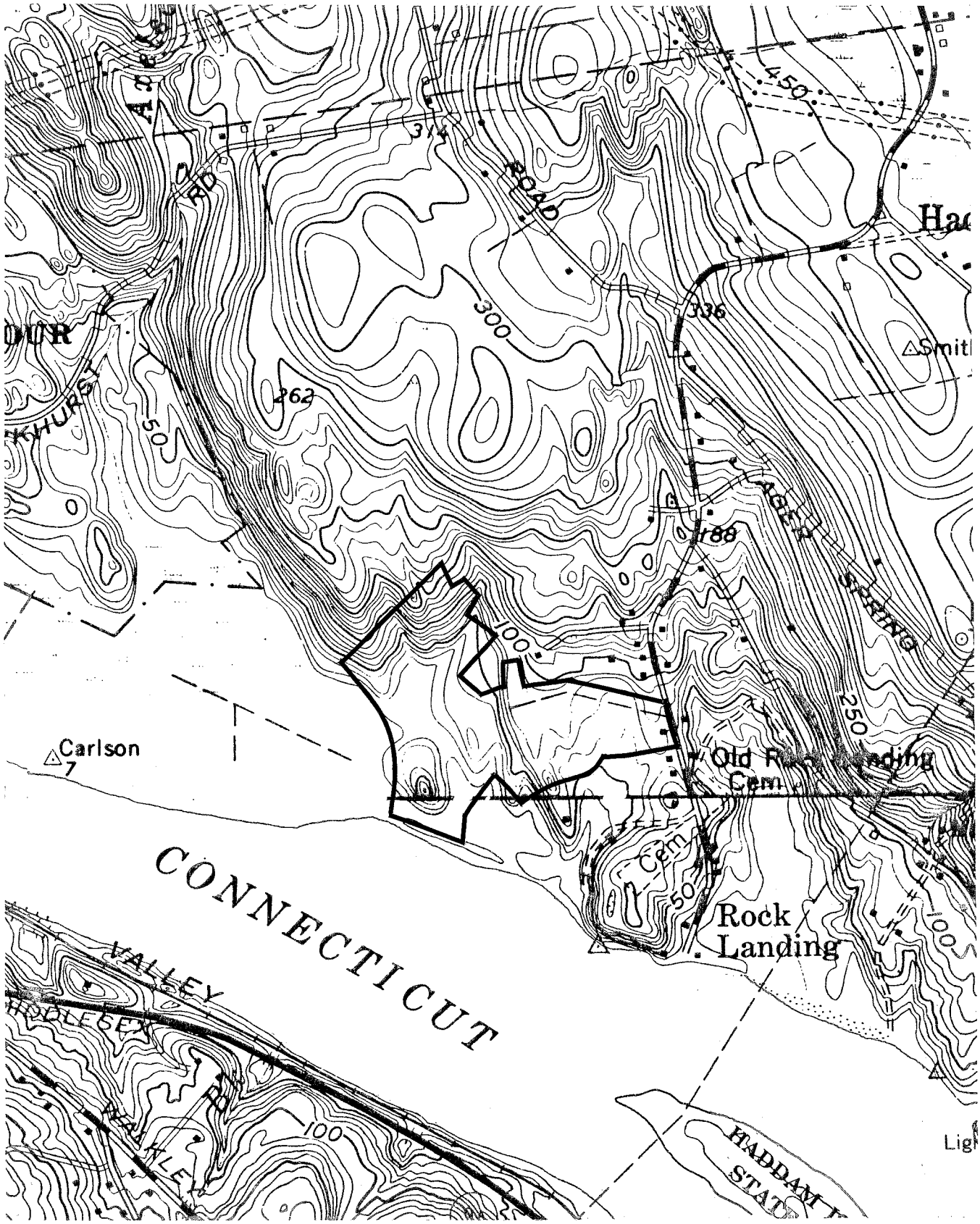
The site is located north of the Connecticut River and its floodplain, largely on bedrock controlled terrain. The dominant land features on the site include rock-cored hills whose main axes are orientated in a northwest-southeast direction. The site topography, which is controlled by the underlying bedrock, varies generally from gentle slopes to areas of steep slopes. The steepest slopes are concentrated in the northern and central parts of the site and are associated with areas of shallow to bedrock soils and rock outcrops. Gentle to moderate slopes occur in the westcentral and eastern half of the site.

Maximum and minimum elevations on the site range from about 160 feet above mean sea level to about 10 feet above mean sea level.

TOPOGRAPHIC MAP

Scale 1" = 1000'

Approximate Site Boundary



3. Geology

Bedrock Geology

The site is located entirely in the Middle Haddam topographic quadrangle. No surficial or bedrock geologic map has been published to date for the quadrangle. Nevertheless, there are unpublished versions of these maps on file and available for review at the Department of Environmental Protection's Natural Resources Center in Hartford. In addition to the unpublished maps, the Team's geologist also referenced the Soil Survey for Middlesex County, the unpublished Surficial Materials Map of Connecticut, 1985, Stone et. al. and the Bedrock Geological Map of Connecticut, 1985 by John Rodgers.

Bedrock outcrops are exposed on the site mainly in the western and southern parts of the site. For the most part, these outcrop areas coincide with areas where shallow to bedrock soils (CrC and HpE) occur.

Two, north-south trending belts of crystalline, metamorphic rock that alternate with each other occur on the site. They bisect the site in a north-south direction. Underlying the westcentral and eastern limits of the site is the Collins Hill Formation. These rocks consist of a gray, rusty-weathering, medium to coarse-grained schist. The central and western parts of the site are underlain by the upper member of the Middletown Formation which consists of light gray, rusty-weathering gneiss and granofels. Pegmatites, a light-colored, very coarse-grained rock composed mostly of quartz and feldspar, occur as parallel and cross-cutting veins and lenses on the upper member of the Middletown Formation in the western parts.

Present plans indicate that the underlying crystalline, metamorphic bedrock will be the principal aquifer serving domestic wells drilled on the site. Therefore, it will influence water quality and quantity (See Water Supply Section). Also, the presence of shallow to bedrock soils (where the depth to ledge rock is 5 feet or less) will be a constraint in terms of on-site sewage disposal.

Blasting

The presence of shallow to bedrock soils suggests that blasting may be required in certain places in order to construct foundations, roads and/or driveways and to install electric utility lines. In consideration of nearby homes, any blasting that takes place on the site should proceed only with great care and under the strict supervision of persons experienced with the latest blasting technology. Every effort should be to use blasting techniques that reduce the chance for undue seismic shock and airblast.

Undue seismic shock and airblast may do damage to nearby buildings, adversely affect water quality and quantity to nearby bedrock wells and make surface water turbid in the immediate blasting location area. In order to establish background data and minimize unwarranted damage claims, a pre-blast survey of surrounding properties should be considered. It is understood that background data that includes pump tests and water quality tests have been collected for several residential wells in the area.

There are certain blasting techniques that can be used that will minimize the environmental effects of blasting in area, but this will depend upon the blasting requirements and geology of the site. It might be wise to conduct a geotechnical study, that includes borings to determine the amount of blasting required and the texture and nature of the underlying bedrock.

If there is a need to blast bedrock and the blasted rock is used for construction purposes e.g. rip-rap, fill material, etc. on or off the site it might be wise to determine its potential for producing acid mine drainage when in contact with water. Both rock units may contain minerals that could lower the overall quality of water it comes in contact with and ultimately the aquatic habitat. There are tests that can be conducted to determine the acid mine drainage potential of the rock. These tests should be considered if blasted rook is used for construction purposes on or off site, particularly if it comes in contact with surface and ground water. (See Water Supply Section)

Surficial Geology

Unconsolidated materials overlying bedrock on the site may be described as the surficial geology of the area. Glacial sediments, called till and stratified drift cover the site. Till covers the northwest limits and central parts of the site. It also covers the rock-cored knoll in the southern parts. Till is a glacial sediment composed of rock particles ranging in size from small clay particles to large boulders that were deposited directly by glacier ice. The textural components of the till are not sorted. For example, fine grained particles are intermixed with coarse grained particles.

In consideration of soil mapping data, the texture of the majority of till on the site is sandy, stony to very stony and friable. However, deep test hole information supplied by the applicant indicates that in places, a silty, compact till was encountered. High groundwater tables and mottling (an indicator of seasonally high water tables) were noted in these holes. Additionally, moderately slow percolation rates were recorded in the area of these soils. All of these conditions (high ground water tables, shallow mottling and moderate to slow percolation

rates) will be a constraint with respect to development of the site, particularly on-site sewage disposal.

The till probably does not exceed 10 feet in most places on the site.

The other type of glacial sediment found on the site is stratified drift. Sand and gravel are the major components of stratified drift. Stratified drift covers the westcentral and eastern limits of the site. These sediments were laid down by glacial meltwater during ice retreat.

According to percolation test information the sand and gravel covering the site is rapidly permeable. A concern with rapidly permeable soils is the possibility for ground water contamination by partially treated septic tank effluent. (See Sewage Disposal Section)

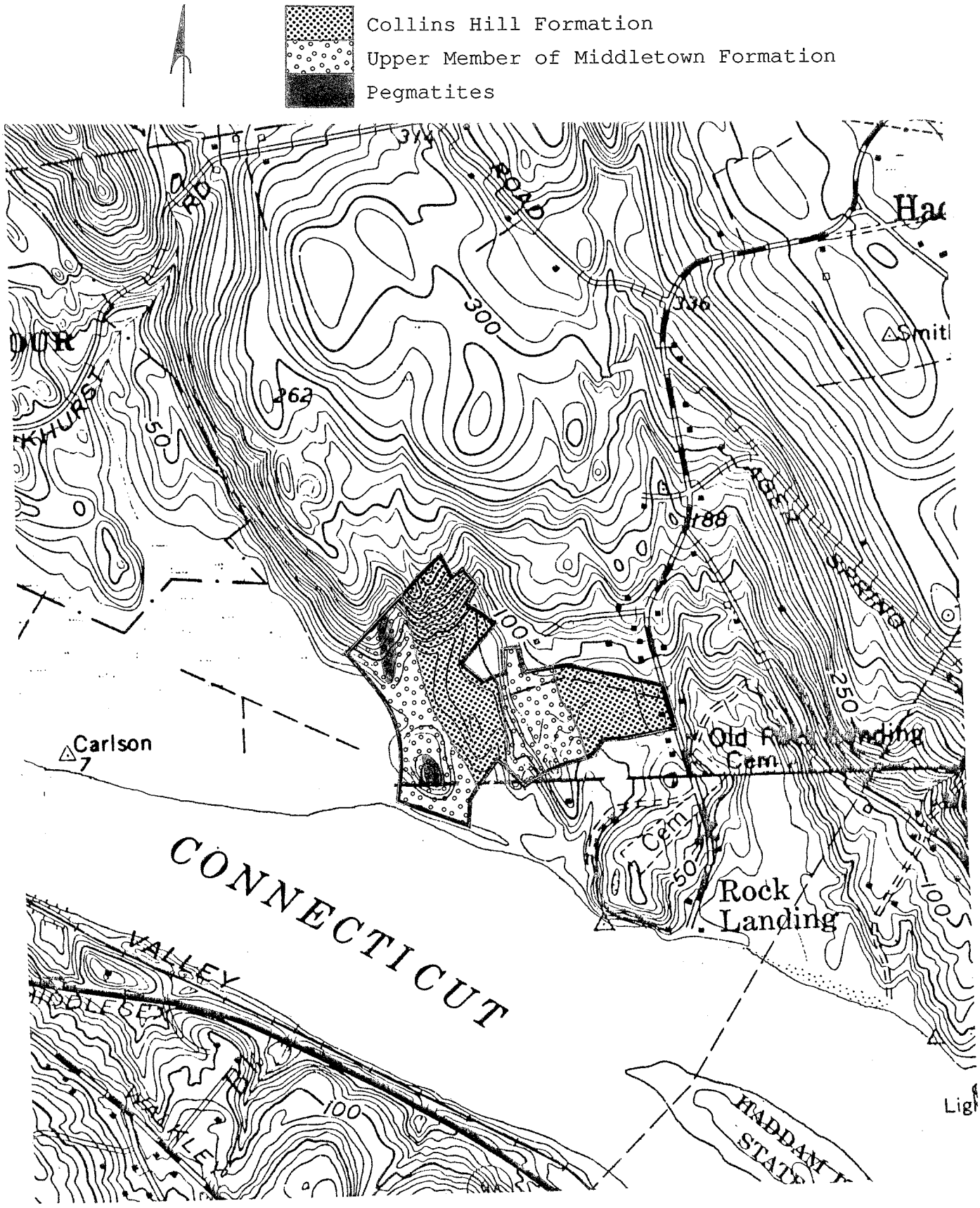
The exact thickness of the stratified drift covering the site is unknown, but it probably does not exceed 10 feet in most places.

Post glacial sediments that overlie stratified drift and/or till include alluvium and wetland soils. The alluvial deposits, which consist of sand, gravel and silt in layers containing variable amounts of organic material are found in the southern parts of the site. They occur in the floodplain of the Connecticut River. Wetland soils mainly parallel small streamcourses in the eastcentral and westcentral parts of the site. Additionally an irregularly shaped pocket of wetlands about a third of one acre in size is located near the end of the proposed Aaron's Hill Road. Based on visual observations made during the field walk and the soil scientist's report, this area was disturbed by man in the past. The activity altered natural soil conditions and disrupted the local drainage.

The applicant's soil scientist delineated and flagged the regulated soils (alluvial and wetland) on the site. Their boundaries were transferred to the subdivision plan by survey methods. Present plans indicate that wetlands will be crossed by Aaron's Hill Road in three areas. Also, a driveway crossing of wetlands is anticipated for Lot 5.

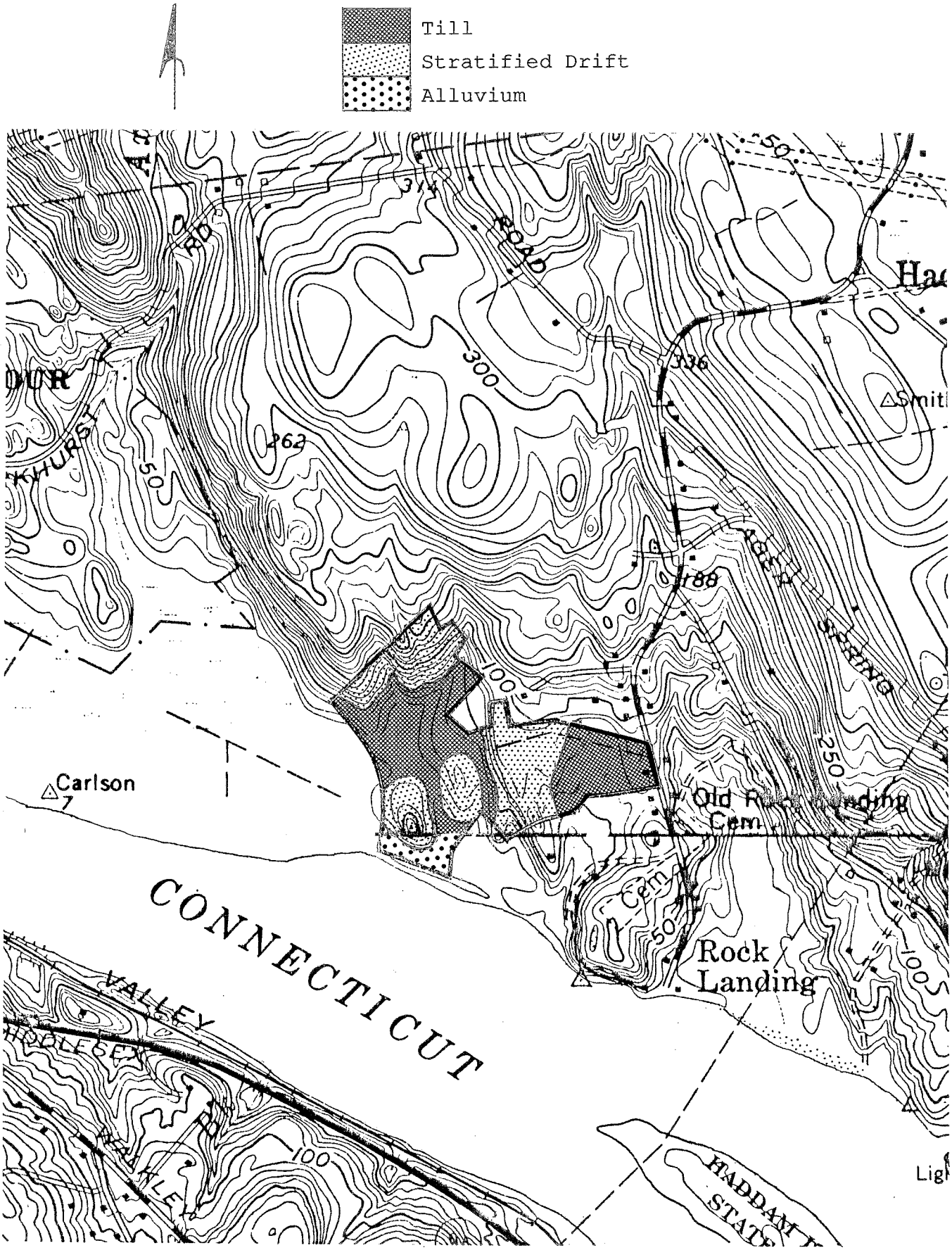
BEDROCK GEOLOGIC MAP

Scale 1" = 1000'



SURFICIAL GEOLOGIC MAP

Scale 1" = "1000'



4. Soils

The soils for this property are predominantly upland glacial till except for those soils immediately adjacent to the Connecticut River. The upland soils consist primarily of Charlton and Hollis soils that are so intermingled that they are designated as complexes. For these complexes, the first soil named is the dominant soil in that mapping unit. Charlton soils typically are deep, well drained soils while Hollis soil typically is shallow (0-2') to bedrock. The soil scientist for the project has also introduced Chatfield soil to these complexes. This soil is moderately well drained and it typically is 20-40" deep above bedrock.

Sudbury sandy loam occurs in the eastern third of the property and it is a moderately well drained soil located in slight depressions of broad outwash terraces and narrow stream valley. This soil does have a wetness problem and needs artificial drainage to help dry it out. It only has fair potential for development due to a high water table. Much of the Sudbury soil is included with the flagged wetlands.

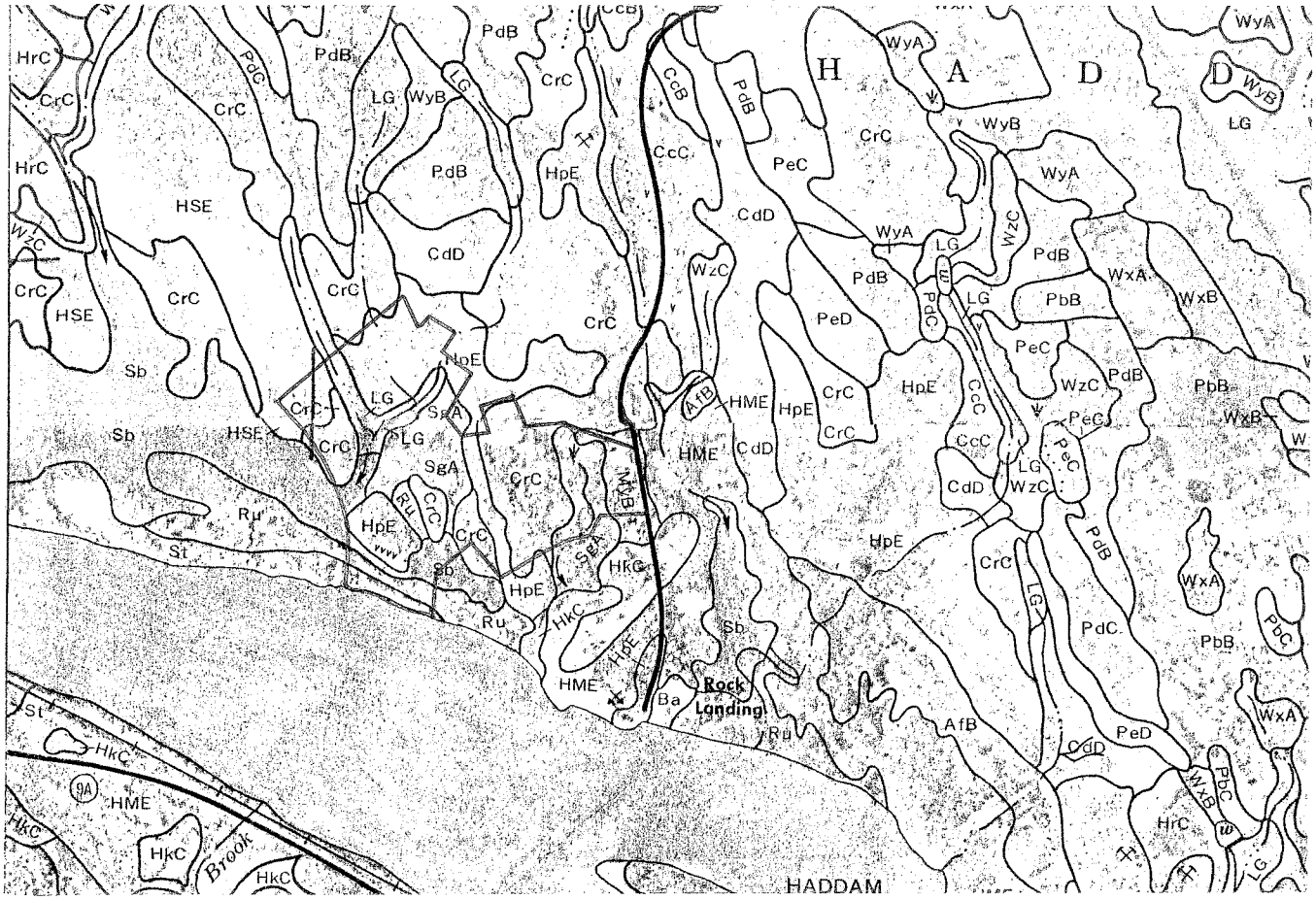
The wetland soils are primarily LG-Leicester Ridgebury and Whitman extremely stony fine sandy loams in the uplands and Rumney, Saco, and Sudbury sandy loams located along the Connecticut River and in the flood zone. The upland wetlands transverse the property in a southerly direction towards the river. They function primarily as drainage for the uplands.

The AQ - Aquents soil is a disturbed wetland soil which still exhibits a high seasonal water table and it can be expected to support hydrophytic vegetation. The degree of the disturbance and/or fill varies and it can only be determined by a site investigation. Because the cul-de-sac is proposed for construction above this soil, it is recommended that a soils investigation be

conducted/requested by the town to determine if the fill material is suitable as a base for the road. It could not be substantiated that all alternatives were explored by the developer to avoid the filling of this wetland.

SOILS MAP

Scale 1" = 1320'



SOILS LEGEND

CrC - Charlton-Hollis very stony fine sandy loams (f.s.l.), 3-15% slopes

HpE - Hollis-Charlton extremely stony f.s.l., 15-40% slopes

HSE - Hollis-Rock outcrop complex, 15-40% slopes

***LG - Leicester, Ridgebury, and Whitman extremely stony f.s.l..

MyB - Merrimac sandy loam, 3-10% slopes

***Ru - Rumney fine sandy loam

***Sb - Saco silt loam

*SgA - Sudbury sandy loam, 0-5% slope

***St - Suncook loamy sand

* Prime farmland soil

*** Inland-wetland soil

5. Erosion and Sediment Control

Public Act 83-388, An Act Concerning Soil Erosion and Sediment Control mandates what information is required on a site plan for erosion and sediment control. The checklist of this required information appears in chapter 4 of the Connecticut "Guidelines for Soil Erosion and Sediment Control" and it is provided on the Erosion and Sediment Control Plan Worksheet developed for Middlesex County. This worksheet has been completed (see worksheet) and it is clear that the proposed erosion and sediment control plan for this development is not complete. The narrative section is absent as well as the information which details the clearing, grading and vegetative stabilization.

In addition, there was several areas of concern that need to be addressed due to potential problems that may occur. They are:

- The long sloping driveways present severe erosion and sedimentation potential, especially during the construction phase of the driveway and the house. Efforts will be needed to address this problem and it is recommended that measures such as temporary diversions, sediment basins, erosion control blankets to cover embankment cuts and speedy paving should be utilized. Directing runoff from the driveway originating from the house site is an important sediment control measure.

- Erosion and sediment control for individual house site development is recommended.

- Temporary sediment basins, constructed in strategic locations outside of wetlands should be considered.

- Due to the relatively small density, it was determined that a stormwater detention basin is not necessary, and it would

alter the natural wetland system unnecessarily.

- The flag numbers for the wetland boundaries were not included on the site plans. This is helpful for field checking wetland boundaries.

- The drainage outlet and its path of travel from the AQ-Aquents wetland where the cul-de-sac is proposed has not been defined on the site plans. Runoff from the wetland and the catch basin outlet could affect the septic system in Lot 7 depending on its flow path. Also, additional runoff could create an unstable situation along its flow path causing accelerated erosion.

- Proper installation and maintenance of sediment barriers around catchbasins is imperative.

- Erosion control blankets are recommended for the banks of the road where it crosses the wetlands for added protection against sedimentation.

- Proper installation and maintenance of all erosion and sediment control measures is important in order to achieve proper site protection. Quickly established temporary and permanent vegetative cover will allow for the greatest protection at the least cost. Temporary vegetative cover for all topsoil and spoil piles is recommended.

The sloping nature of the entire site presents many varied and challenging situations where proper erosion and sediment control planning and implementation is necessary. The town may consider bonding for this aspect of the proposal under new state regulations for wetland protection. Elimination of off-site affects is a high priority that must be dealt with seriously for any type of development on the site.

Middlesex County Soil and Water Conservation District, Inc.
Extension Center - Route 154 - Haddam, Connecticut 06438 - Phone (203) 345-3219

EROSION AND SEDIMENT 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 control 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 River Edge Subdivision
Materials received Subdivision Site plans sheets 1-11 of 11, revised to 9/6/89; Test pit log sheets (12); completed ERT request form; conservation easement - draft form; drainage calculations from Carruthers Engineering; environmental assessment from Envirotech Planning Services, dated 3/16/89; Detention Basin Planting Plan
Total Area 46.4 Ac. 8 lots Location Rock Landing Rd.
Engineer Carruthers Engineering
Date Received 9/26/89 Site Visit 9/26/89 Reviewed by T.F. Hadley
Submitted by Haddam Planner

★ NARRATIVE SECTION DESCRIBING: This section needs to be completed as part of the plan
___ The development
___ Purpose of activity
___ The number of total acres and acres to be disturbed in the project
___ The schedule of grading and construction activities, including:
  ___ Start and completion dates
  ___ Sequence of grading and construction activities
  ___ Application sequence of all E & S control measures
___ The design criteria for all proposed E & S control measures
✔ Construction details for all proposed E & S control measures
✔ 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.

==========

A SITE PLAN AT A SUFFICIENT SCALE SHOWING:

Natural Features

✔ Existing topography
✔ Soils information, including test pit data if available
✔ Identification of wetlands, watercourses and water bodies on the site
★ Name of soil scientist who performed wetlands delineation and flag numbers
✔ Major drainageways and drainage areas
✔ Rock outcrop areas
✔ Seeps, springs
___ Major aquifers
✔ Floodplains (100 yr.) and floodways
___ Channel encroachment line (DEP permit)
✔ Existing vegetation
___ Coastal zone boundary
★ Gateway or Connecticut River Assembly zone

Project Features

- ✓ The location of the proposed development
- ✓ Adjacent properties
- ✓ Major land uses of adjoining areas
- ✓ Property lines
- ✓ Lot lines and setback lines
- ✓ Lot and/or building numbers
- ✓ Planned and existing roads
- ✓ Location of existing and planned utilities
- ✓ Location of wells and septic systems.
- ~ Proposed topography
- ✓ North arrow
- ✓ A plan legend

Clearing, Grading, Vegetative Stabilization

- ✱ The sequence for installation and application of all E & S control measures
- ✱ The sequence of grading and construction activities
- ✱ The location of and construction details for all proposed E & S control measures

  Measures needed are: Sediment and erosion controls needed for driveways and house lots, temporary detention basins sediment
- ✱ Limits of disturbed areas
- ✓ Extent of areas to be graded
- ✓ All proposed structures
- ✱ Disposal sites for cleared material
- ✱ Location of stockpiled topsoil and subsoil
- ✱ Temporary erosion protection for stockpiles
- ✱ Areas to be vegetatively stabilized
- ✱ Temporary erosion control protection of disturbed and/or cleared areas
- ✱ Temporary erosion protection when time of year or weather prohibit establishment of permanent vegetative cover
- ✱ The sequence for final stabilization of disturbed areas
- ✱ Amount of topsoil to be spread (depth in inches)
- ✱ Seedbed preparation
- ✱ Seeding mixture, rates, and seeding dates
- ✱ Fertilizer and lime application rates
- ✱ Mulch application rate
- ✱ Mulch anchoring measures

Drainage System

- ✱ Existing and planned drainage pattern (✱ - drainage from "A&" wetland not shown
- ✓ Size and location of culverts and storm sewers
- ✓ Drainage calculations for review by town engineer
- ✓ Stormwater management measures and construction details
- ___ Groundwater control measures (footing drains, curtain drains)
- ___ Planned water diversions and dams (DEP permit)

House Site Development

- ✱ Sediment and erosion control measures for individual lot development

Additional Comments

See report

6. Hydrology

The site is located entirely in the Connecticut River drainage basin. At its mouth near Old Saybrook, the river drains an area of about 11,262 square miles or 7.2 million acres. The most remote part of the site is only about 2,000 feet from the Connecticut River and its floodplain.

The principal streamcourses visible on the site are located in the westcentral and eastcentral parts of the site. The latter streamcourses, which are unnamed and which merge east of Lot 8 are tributary to the Connecticut River. Prior to discharging to the River, the water in the streamcourse is impounded by a stone/masonry dam south of the site which forms a small basin. In addition to the larger streamcourses mentioned above, the site development plan made available to Team members delineates several other small, intermittent streamcourses on the site.

The streamcourses mentioned above have not been classified by the Department of Environmental Protection but are presumed to be class "A" water resources by default. A class "A" water resource may be suitable for drinking, recreation or other uses and may be subject to absolute restrictions on the discharge of pollutants, although certain discharges may be permitted. The Connecticut River is classified as "SB" which indicates that the water quality is known to be degraded probably by industrial, municipal and agricultural type discharges. The "S" preceding "B" above means the water is saline (brackish).

Development of the site for residential purposes would be expected to increase the amount of runoff during periods of runoff but these increases would probably be very small. They would result from soil compaction, removal of vegetation and placement of impervious surfaces (roofs, driveways and roads) over the soil. Because the density of homes proposed is low and because the site

is located in proximity to the Connecticut River the increase in post-development runoff should not be significant. From a flooding standpoint, runoff from the site, which can be divided into three sub-watershed areas could probably be outletted to properly protected discharge points without causing any adverse impacts to the downstream areas. It will, of course, be necessary to properly size the storm drainage system on the site to adequately handle post-development stormwater runoff. The hydrologic report made available to Team members indicates that the increase in runoff from the site for the 25-year storm event for two (A & B) of the sub-watershed areas analyzed will be less than 2%. The third sub-watershed (C) area has an immeasurable increase in post-development runoff conditions. In addition, because of the site's low position in the watershed and low potential to cause flooding problems to downstream areas, it does not appear that on-site detention is necessary.

The other concern with increased runoff is the potential for stream channel erosion and siltation problems. The presence of till soils, which may have a high silt and clay content and moderately steep slopes indicates a potential for stream channel erosion and siltation problems. A carefully designed and implemented erosion sediment control plan will be required in order to maintain the existing water quality of runoff from the site. The plan should be developed using the criteria contained in the Connecticut Guidelines for Soil Erosion and Sediment Control. In order to protect on and off site surface water quality, it might be wise to consider discharging stormwater to shallow sediment ponds with outlet control structures (energy dissipators). This type of basin would provide settling time for the removal of suspended solids. It is expected that from time to time, sediment may need to be removed from the basins. Therefore, access to these areas should be made available for maintenance vehicles.

The proposed project calls for two wetland road crossings (between Lots 2 and 8) and one wetland driveway crossing (on Lot 5). Approximately 60 linear feet of wetlands will need to be crossed for these crossings. Additionally, a substantial wetland filling will occur in wetlands at the end of proposed Aaron's Hill Road.

According to the plan made available to Team members, the wetland soils in the area of the first two road crossings along Aaron's Hill Road comprise Leicester, Ridgebury and Whitman very stony, fine sandy loam (Lg) soils.

This undifferentiated group consists of poorly drained (Leicester and Ridgebury) and very poorly drained (Whitman) soils that commonly occur in drainageways and depressions in upland, till covered areas. Slopes in these areas range from flat to gentle. Generally speaking, a seasonal high water table, about 6" below ground surface characterizes the Ridgebury and Leicester soils. The seasonal high water table is near the surface in the Whitman series. The major engineering concern for the Lg soils is the presence of the seasonal high water table. Additionally, a slowly permeable substratum (about 16-20" below ground surface) occurs in the Whitman and Ridgebury soils.

The remaining wetland disturbance (at the of end of Aaron's Hill Road and on Lot 5) will take place in areas mapped by the applicant's soil scientist as Aquents. According to a report prepared by Environmental Resources Associates, these soils have been disturbed by man. Additionally, "they are in places that have less than 2 feet of fill over naturally occurring poorly or very poorly drained soils; or they are located where the naturally occurring wetland soils have been mixed to the extent that the natural soil layers are no longer identifiable; or the original soil materials have been excavated to the ground water table. These soils have a seasonal high water table within 20 inches of

the soil surface, have an aquic moisture regime, and can be expected to support hydrophytic vegetation."

Although undesirable, wetland crossings are feasible, provided they are properly engineered. The road should be constructed adequately above the surface elevation of the wetlands. This will allow for better drainage of the road and 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. Culverts should be properly sized and located so they do not alter the water levels in the wetlands or cause flooding problems.

Since there is a possibility that fill material was placed over the naturally occurring poorly or very poorly drained soils mapped as Aquents (Aq) on the subdivision plan, consideration should be given to subsurface probes to determine the texture and nature of the fill material/substrate and underlying soils. The concern here is that if the road is placed over unstable fill material, displacement or subsidence may occur.

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 metamorphic bedrock. In general, the steel casing should extend at least 5 feet into the bedrock.

A typical well depth for a bedrock well ranges from 150-300 feet. Although bedrock is not known to be a prolific aquifer, Water Resources Bulletin No. 31 (Lower Connecticut River Basin) indicates that of 314 wells surveyed which tap metamorphic bedrock, 90% yielded about 1.8 gallons per minute or more. A yield of 1.8 gallons per minute would be equivalent to 2,592 gallons of water for a 24-hour period.

Because lot sizes are relatively large (will exceed 2 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, 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 subdivision. Every effort should be made to maintain a separating distance of 200 feet between neighboring wells. If this is accomplished, each well would then 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.

Based on present plans, the separating distance between wells on Lots 3 and 4 is about 115 feet and about 90 feet on Lots 7 and

8. Consideration should be given to increasing the separating distance of wells so that the chance for mutual interference during pumping periods will be minimized.

In order to provide the adequate protection of the bedrock aquifer, all wells will need to be properly installed in accordance with applicable State Public Health Code and Connecticut Well Drilling Board regulations. Additionally, the town sanitarian will need to inspect and approve all well locations.

The natural quality of groundwater should be satisfactory, however, Water Resource Bulletin No. 31 indicates that the bedrock in the area has potential for mineralizing well water with elevated iron and manganese. At elevated levels, these minerals tend to lower the overall water quality of drinking water. If elevated iron and/or manganese levels are present in the water, it may be necessary to provide suitable treatment filters.

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

A water related concern raised by nearby residents is the possibility that blasting on the site may have an impact on local wells. This will obviously depend on the blasting requirements and geology of the site. It is reasonable to assume bedrock tapping wells would be most likely to experience changes in yield from blasting, but the probability that the yield would increase seems at least as good as the possibility of a decrease. The applicant has hired a hydrogeologic consulting firm to conduct pump tests and water quality tests for several residences in the area. This background information can be used to note if there

are any noticeable changes in well water quality and quantity following any blasting that may occur on the site.

8. Sewage Disposal

Subsurface exploration for subsurface sewage disposal has been conducted on the proposed subdivision site by Carruthers Engineering of Wallingford, Connecticut. This work involved the excavation of deep test holes on each lot. The time of year that testing was conducted on the site is unknown.

In consideration of the deep test hole information, soil mapping data and visual observations made during the field walk, it appears that shallow to bedrock soils and till ("hardpan") soils which are characterized by shallow mottling, seasonally high water tables, and slow percolation rates will be the major design constraints with respect to subsurface sewage disposal. Also steep slopes, particularly where they exceed 25%, will be an obstacle with respect to on-site sewage disposal. It should be noted that the logs of some deep test holes excavated on the site for subsurface sewage disposal exploration were not included in the information package supplied to Team members. For example, the test holes located in the proposed primary leaching area for Lot 2 were missing. In order for the town sanitarian to properly assess each lot for on-site sewage disposal feasibility, the logs of all deep test holes including their location should be included with the plans.

Based on the Team sanitarian's review of the deep test hole information supplied, soil mapping data and a walking tour of the site, it appears that conditions on each lot will be suitable for subsurface sewage disposal, but that engineered systems would be required. The constraints (shallow to bedrock soils, seasonally high water tables) mentioned earlier will require septic systems that are filled and raised and relatively large in size. On Lots 2 and 3 pumping chambers which will raise the domestic waste to elevations higher than the discharge level at the houses will be required. Where possible, it is the Team sanitarian's opinion

that gravity systems should be used over the pump system. Perhaps more testing could be conducted on the lots mentioned above to determine whether or not gravity fed systems can be accomplished. This work could result in some re-arrangement of lot lines.

If sewage disposal systems utilize pump lift stations, special care must be taken not to locate the pump chamber where groundwater can infiltrate it. This could lead to pre-mature failure (flooding) of the leaching system. This is an important design measure since a seasonally high water table condition was noted in the deep test holes in this area. Also, the force main should be installed below the frost line so that effluent does not freeze during winter months.

The presence of seasonally high water tables on the site suggests a potential for utilizing curtain drains. Curtain drains, which intercept groundwater before it rises up into the leaching system and impairs its hydraulic capacity, may be useful on some lots if topography permits. Curtain drains may be connected to building foot drains but this will depend upon house and septic system locations and topography. Building foot drains should be installed around all homes. This will hopefully protect basements from becoming wet.

The installation of septic systems in areas where there are shallow to bedrock soils should also proceed with great caution and warrants careful examination. It is important to excavate a sufficient number of deep test holes in the area of the leaching system so that a good profile of the bedrock surface can be accomplished. In areas where shallow depths to bedrock occur, it would be wise to do soil testing downslope from the leaching system to ensure that there is an adequate amount of soil above the bedrock. In general, a more or less continuous layer of at least 2 feet of soil would be necessary on top of the ledge rock to assure adequate dispersal of sewage effluents. There should be no ledge outcropping within 50 feet downslope of the leaching

system. Therefore, it would be helpful to superimpose ledge rock boundaries on the subdivision plan if they exist near proposed leaching systems.

Several percolation tests conducted on the site revealed percolation rates that were faster than 5 minutes per inch which suggests the soils are highly permeable. The concern here is that septic tank effluent discharged into the ground may have little opportunity to be renovated by the soil components. Consideration should be given to greater separating distances between on-site wells and septic systems on these lots because of the undulating nature of the bedrock surface on the site and high water table condition.

Before subdivision approval, the applicant's engineering firm must show that each of the proposed lots in the subdivision meets the minimum soil standards set forth in Section 19-13B103e(a)(3) of the State Public Health Code.

The approval of septic systems should be a coordinated effort between the design engineer and the town's sanitarian. Since most lots will be deemed of "special concern" by the State Public Health Code, plans for the design of the subsurface sewage disposal facilities (along with the placement of each on-site water supply well) must be prepared by a professional engineer and submitted to the town sanitarian for review and approval by his/her certified staff. The final configuration of lots should not be approved until the health department is assured that each lot meets all of the State Public Health Code requirements.

9. Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the River Edge Subdivision site have been reviewed. According to the information, there are no known extant populations of Connecticut "Species of Special Concern" or Federal Endangered and Threatened species that occur at the site in question. But, this site is adjacent to a significant wetland: George Dudley Seymour State Park.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

10. Vegetation

The River Edge Subdivision tract which totals approximately ±46 acres may be divided into three broad vegetation types (Please refer to the vegetation type map). These vegetation types include mixed hardwoods which total approximately 29 acres; several hardwood and shrub swamps which total approximately 13 acres and two mixed hardwood/hemlock stands which total about 4 acres.

Type A

Mixed Hardwoods. This area totals approximately 29 acres and is made up of pole-size black oak, scarlet oak, white oak, chestnut oak, red maple, sugar maple, black birch, yellow birch, hickory, American beech and white ash. Some of these trees were damaged during the recent harvest operation. The understory is dominated by hardwood tree seedlings, witch hazel, scattered mountain laurel, maple-leaved viburnum, sweet pepper bush, high bush blueberry and barberry. Ground cover vegetation includes poison ivy, green briar, bracken fern, hayscented fern, Canada May flower and club moss.

Type B

Hardwood Swamp/Shrub Swamp/Stream belts. Approximately 13 acres of this tract is inland wetland. The hardwood swamp and stream belt areas are made up predominantly of red maple, yellow birch, white ash and black gum. Most of the trees are sapling to pole size and of variable health and quality. Understory vegetation consists of spice bush, highbush blueberry, sweet pepperbush, arrow wood, swamp rose, witch hazel, deciduous holly, swamp azalea, steeple bush, meadowsweet, barberry and mountain laurel. Herbaceous ground cover and vines include skunk cabbage, tussock sedge, sphagnum moss, cinnamon fern, sensitive fern,

poison ivy, greenbriar, Virginia creeper, grape vine and club moss.

Type C

Mixed Hardwood/Hemlock. Two areas, totaling about 4 acres, consist of pole size white oak, chestnut oak, black oak, scarlet oak, shagbark hickory, red maple, black birch and hemlock. Understory vegetation is made up of maple-leaved viburnum, mountain laurel, sheep laurel, lowbush blueberry, huckleberry and greenbriar. Club moss, Pennsylvania sedge and bracken fern dominate the ground cover throughout this area.

Recently the majority of this property was harvested of all of it's merchantable timber. Only a few trees larger than 14 inches in diameter at breast height (4 1/2 feet above the ground) remain. Even though these trees are not exceptionally healthy (many have small crowns and crooked stems) they do have aesthetic value and should be protected. Some of the residual trees were damaged during the harvest operation, many of these are located along the trails which were created during this harvest. Trees that were severely damaged could be removed and utilized for fuelwood.

Where healthy, high quality trees are present, they should be selected for retention and worked into the final site plans for individual houselots.

It should be noted that trees are very sensitive to the condition of the soil within the entire area under their crowns. Development practices near trees such as excavation, filling and grading for construction of roadways and buildings may disturb the balance between soil aeration, soil moisture level and soil composition. These disturbances may cause a decline in tree health and vigor, potentially resulting in tree mortality within

three to five years. Mechanical injury to trees may cause the same results. Dead trees reduce the aesthetic quality of an area and may become hazardous and expensive to remove if near roadways, buildings or utility lines.

Care should be taken during the construction period not to disturb the trees that are to be retained. In general, healthy and high vigor trees should be favored for protection over unhealthy trees because they are usually more resistant to the environmental stresses brought about by construction.

Where feasible, trees should be retained in small groups or "islands". This practice lowers the possibility of soil disturbance and mechanical injury. Individual trees and "islands" of trees should be temporarily, but clearly marked so they may be avoided during construction.

The clumps of mountain laurel and hemlock which are present have high aesthetic value and should also be protected. Unfortunately the hemlock is susceptible to infestation by the Hemlock Woolly Adelgid which is present in the local area. When infestations are heavy this scale-like insect may cause mortality in hemlock in as little as two years. Once infestations, however light, are detected, the insect may be effectively controlled by a thorough application of insecticidal soap. This insecticide will suffocate the adelgid and have minimal adverse impact on the environment.

Buffer zones of at least 50 feet wide along the wetlands, stream belts and Connecticut River Conservation easement should be established to help protect these areas from aesthetic degradation, erosion and windthrow problems. Disturbance of the natural vegetation, including cutting or clearing trees in these buffer zones should be kept to a minimum. Where disturbances are unavoidable, suitable natural vegetation should be re-established as soon as possible.

Windthrow is a potential hazard throughout the hardwood swamp areas and also along the streams which pass through this property. Tree root depth is restricted by saturated soils in these areas. Under these conditions trees are unable to become securely anchored and are susceptible to windthrow. Trees which are crowded and rely on each other for stability have an even greater potential for windthrow problems and top breakage. These conditions may be intensified if linear openings, which allow wind to pass through rather than over these areas, are made. Openings and clearings in and along side these wetland areas should be avoided if at all possible. Undisturbed buffer zones of at least 50 feet deep around the wetlands will help to reduce the windthrow potential.

Alterations in wetland areas which permanently raise the water table such as restricting natural drainage and stream flows, may eventually have negative impact on the vegetation in these areas. Raising the water table may drown roots causing widespread mortality in the trees, shrubs and herbaceous vegetation which are now present. The impact on vegetation created by construction of the proposed road crossings of the wetland area will be minimal providing that the culverts that are utilized are adequately sized and properly placed.

Development of roadways, driveways, houses and septic systems will necessitate clearing a portion of this tract. The trees that must be removed for this development should be utilized as fuelwood or chopped.

VEGETATION TYPE MAP

Scale 1" = 1000'

A - Mixed Hardwoods, ±29 acres

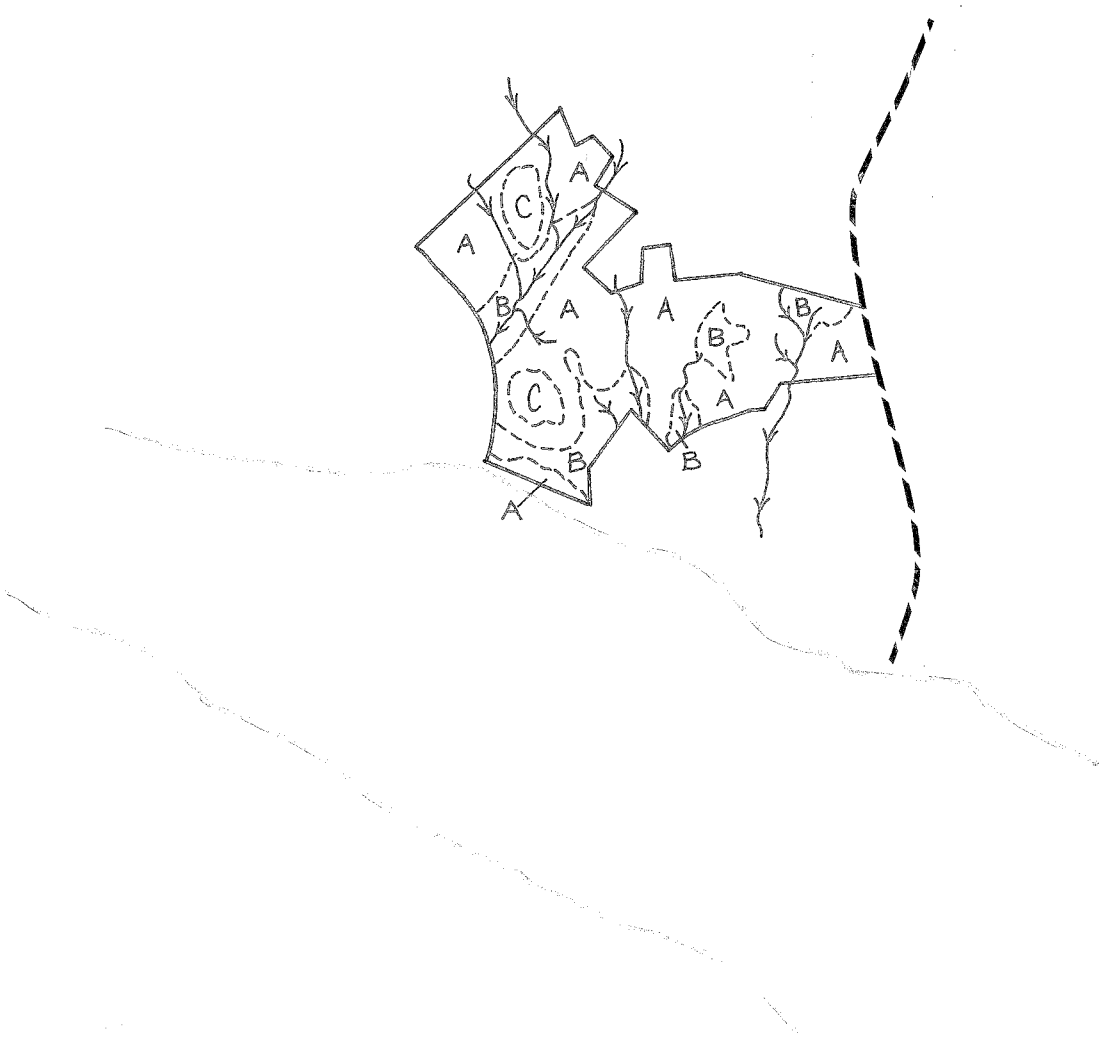
B - Inland Wetlands, ±13 acres

C - Mixed Hardwoods/Hemlock, ±4 acres

Vegetation Type Boundary ------

Stream ~~~>

Rock Landing Road ▬▬▬



11. Wildlife Resources

Habitat Type Descriptions

The habitat types on this property include mixed hardwood forest, wooded swamp, and associated riparian areas. The variety of habitat types provides for a diversified wildlife population.

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 (dependent upon age mix of stand) 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, swamps and small marshy areas. Associated vegetation includes red maple, birch, alder, cattails, dogwood, jewel-weed, spicebush, sweet pepper bush, skunk cabbage, false helebore, 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, 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 presently 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.

The diversified habitats at this site provide for the needs of a wide variety of wildlife species that inhabit the general area. Development of this site will result in fragmentation of habitat types which will in turn reduce species diversity and richness.

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. Development of this area will decrease the amount of habitat simply because the land will be occupied by physical buildings and roads. Human activity in the area will greatly increase, even after construction is completed. Some species of wildlife will not tolerate increased human activity and will emigrate from the area. Other species, tolerable of human activity, might be attracted to the area, and may become a nuisance to area residents (i.e. raccoons, skunks, moles).

Upland Wooded Areas: Fragmentation of habitat may lead to a decline in species diversity and richness. Sensitive, interior species that require large tracts of undisturbed forest, such as veeries, ovenbirds and scarlet tanangers may decrease and 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).

6. In most cases, natural marshes are of more value than constructed ponds and ditches because of vegetative composition, gentle sloping edges and shallow water depths (6"-3'). If any pond work is planned they should be small (1/4) acre, shallow ponds.

7. All culverts installed should have screens to lessen potential damage from beaver.

8. Although Canada geese are usually aesthetically pleasing they can become a serious nuisance problem. If problems exist or develop consider these suggestions:

a. Create undesirable edge habitat around ponds (i.e. abrupt drop off, not grass zone such as gravel or chips).

b. Fencing of ponds.

c. Educate local residents on nuisance problems to discourage feeding.

d. Do not crate and/or maintain islands within ponds, Often these serve as nesting sites.

e. Plant vegetation other than grass which will be aesthetically and environmentally acceptable (i.e. shrubs, pachysandra, honeysuckle, ground juniper, Virginia creeper).

References

Adams, Lowell W., and Louise E. Dove. 1989. Wildlife Reserves and Corridors in the Urban Environment: A Guide to Ecological Landscape Planning and Resource Conservation. National Institute for Urban Wildlife. 91pp.

Best, L.B., D.F. Stauffer, and A.R. Geier. 1978. Evaluating the effects of habitat alteration on birds and small mammals occupying riparian communities. Pages 117-124. in (Strategies For Protection and Management of Floodplain and Other Riparian Communities). Proc. symp. Dec. 11-13, 1978, Gallaway, GA. Gen. Tech. Rep. W0-12, Forest Serv., U.S. Dep. Agric., Wash. D.C. 410pp.

Brown, S., M.M. Brinson and A.E. Lugo. 1978. Structure and functions of riparian wetlands. Pages 17-31. in (Strategies For Protection and Management of Floodplain and Other Riparian Communities). Proc. symp. Dec. 11-13, 1978, Gallaway, GA. Gen. Tech. Rep. W0-12, Forest Serv., U.S. Dep. Agric., Wash. D.C. 410pp.

Campbell, C.A. 1973. Survival of reptiles and amphibians in urban environments. Pages 61-66. in (Wildlife In An Urbanizing Environment). Proc. symp. Nov. 27-29, 1973, Springfield, Mass. Coop. Extn. Serv., Univ. of Mass., U.S. Dep. Agric., Cnty. Extn. Serv. 182pp.

Conover, Michael R. and Gary S. Kania 1988. Browsing preference of White-tailed deer for different ornamental species. Wildlife Society Bulletin vol. 16, pp. 175-179.

Devlin, D. 1985. Woodland wildlife management. Pennsylvania Woodlands. Penn. State Univ., Col. of Agric., Coop. Exten. Serv. 6:1-6.

Geis, A.D. 1986. Wildlife habitat considerations in Columbia, Maryland and vicinity. Pages 97-99. in (Wildlife Conservation and New Residential Development). Proc. symp. Jan. 20-22, 1986. Tucson, Ariz., Estes Co., Cottonwood Prop., Nat. Wildl Fed. 203pp.

Hassinger, J. 1986. Dead wood for wildlife. Pennsylvania Woodlands. Penn. State Univ., Col. of Agric., Coop. Exten. Serv. 7:1-6.

Milligan, D.A. and K.J. Raedeke. 1986. Incorporation of a wetland into an urban residential development. Pages 162171. in (Wildlife Conservation and New Residential Developments). Proc. symp. Jan. 20-22, 1986. Tucson, Ariz. 203 pp.

12. Fish Resources

Site Description

A total of 8 single family homes are proposed on this development site adjacent to the Connecticut River. Minimum lot size is 2 acres. Houses will be served by on-site septic systems and water supply wells. Preliminary plans show that the proposed roadway network will involve several wetland crossings. Additionally, a detention basin will be constructed within wetlands. This report will address all major impacts to aquatic resources and delineate mitigation measures required to effectively minimize impacts.

Small intermittent brooks that empty into the Connecticut River are found on the ±46 acre site proposed for development. Each watercourse's riparian (streamside) zone is primarily comprised of wetland habitat. One of the primary functions of these watercourses and associated wetlands is to provide clean and unpolluted waters to the Connecticut River.

Fish Population

No fish populations can be found on the proposed development site since stream flows are low and intermittent. However, fishes endemic to the Connecticut River may seasonally utilize the lower sections of watercourses in areas where they enter the mainstem.

Impacts

The following impacts of the proposed subdivision on the local watercourses and the Connecticut River can be expected if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of brooks through increased runoff from unvegetated areas: During construction topsoil within the proposed building lots will be exposed and susceptible to runoff events. Small watercourses on the site provide a direct avenue for sediment transport downslope to the Connecticut River. Erosion and sedimentation due to construction has been long regarded as a major cause of stream degradation. Excessive sediment deposition could damage aquatic ecosystems that support fish populations in the following ways:

(1) Sediment reduces the survival of resident fish eggs, aquatic insects, and the amount of usable habitat required for spawning purposes.

(2) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes, (CTDEP 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.

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

2. Degradation of wetland habitat: Proposed building lots will be constructed within or adjacent to wetlands. Furthermore, wetlands will be impacted by wetland crossings and the proposed detention basin. Stormwaters from the road system will be discharged into various locations that outlet into wetlands. Stormwaters can contain a variety of pollutants such as: hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts, and coarse sediment that are detrimental to aquatic organisms and their habitat.

Wetlands are beneficial in several ways. They serve to: **(1)** control flood waters by acting as a water storage basin, **(2)** trap sediment from natural and man-made sources of erosion, and **(3)** help filter-out pollutants from runoff before they enter watercourses.

3. Percolation of septic effluent into watercourses: A failure of individual septic systems to operate properly (refer to Sewage Disposal Section) would be potentially dangerous to brooks and associated wetlands. Nutrients and assorted chemicals that may be placed in septic systems could possibly enter wetlands or stream waters in the event of a septic system failure or infiltrate the groundwater during the spring when water tables are close to the surface. Failure of septic systems could inflict long-term damage to local aquatic environments since the introduction of septic effluent could result in a major threat to fish habitat, public health, and overall water quality conditions.

4. Transport of lawn fertilizers and chemicals: Runoff and leaching of nutrients from fertilizers on lawns will stimulate filamentous algae growth in streams 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.

Recommendations

The following recommendations are provided to assist with the mitigation of the previously outlined impacts.

1. It is highly recommended that at the minimum, a 100 foot open space buffer zone be maintained along all wetlands and the wetland boundary of watercourses. No construction nor alteration of existing habitat should be allowed in this zone. This buffer can be an effective mitigation measure at this development location. 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).

2. Install and maintain proper erosion and sedimentation controls during site construction activities. Silt fences and haybales should be placed within excavated trenches to ensure that all runoff is properly contained. Proper installation and maintenance of controls is particularly important on the project site since all surface water drains immediately downslope to the Connecticut River. A town official should be responsible for inspecting this development on a daily basis to ensure that contractors have complied with all stipulated mitigation devices.

3. The need for on-site detention of stormwaters should be determined. At the environmental review team meeting, it was stated that increased surface runoff due to land development was estimated to be less than 5%. If this is an accurate assessment, then it is recommended the detention basin not be constructed within wetland habitat. The construction of a detention basin to detain such insignificant increases in surface drainage is unnecessary, especially when its construction will result in the loss of wetlands. The effective management of stormwaters and roadway runoff can be accomplished through proper design, location, and maintenance of roadways and catch basins. Stormwaters from catch basins should be initially outletted into non-wetland habitat; thus, avoiding direct contact with wetlands. Maintenance of catch basins is very critical. 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 prohibited.

4. Properly design and locate individual septic systems (refer to Sewage Disposal Section). Systems should not be placed adjacent to or within 100 feet of sensitive wetland and aquatic ecosystems. It is crucial that all septic systems be placed in areas that will effectively limit septic effluent. All septic

systems should be maintained on a regular basis. It is also important to prevent the disposal of harmful chemicals into septic systems which may negatively affect operation and possibly result in system failure.

5. All instream work and land grading/filling near watercourses and wetlands should take place during low flow periods. This 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 and wetlands.

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.

References

CTDEP (Connecticut Department of Environmental Protection) 1989. Non Point Source Pollution: An Assessment and Management Plan. CTDEP, Hartford.

ODFW (Oregon Department of Fish and Wildlife) 1985. The Effects of Stream Alterations on Salmon and Trout Habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon. 70 pp.

USFWS (United States Fish and Wildlife Service) 1984. Habitat Suitability Information: Rainbow Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82(10.124). 64pp.

USFWS (United States Fish and Wildlife Service) 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82/(10.60). 65pp.

13. Archaeological Review

A review of the State of Connecticut Archaeological Site Files and Maps indicate that ten prehistoric campsites are located in the immediate proximity of the project area, including one at the end of Rock Landing Road and nine in the George Dudley Seymour State Park. No sites have been recorded for the project area. However, this is most likely a reflection of archaeologists unable to test for site locations on private property rather than there being no archaeological sites in the area. Based on predictive models of site location in Connecticut, the "River Edge" project lies in an archaeologically sensitive area and should be tested before any construction activity occurs. The Town of Haddam's Archaeological Assessment Map shows this area as significant.

In an earlier assessment with the property owner, the Office of State Archaeology approved deed restriction language requesting an archaeological survey as lots are sold and developed. This is satisfactory as long as potential buyers understand that the Office of State Archaeology must be notified before any construction commences. In addition, our office should be notified prior to any road construction in the project area.

On-site inspection located a number of potential rockshelter sites as well as prominent knolls overlooking wetlands that would be advantageous site location areas.

In summary, the project area is located in a critical area of importance to prehistoric Indian lifeways. It is strongly recommended that all feasible efforts be undertaken to identify and ensure the preservation and conservation of the archaeological resources in the area.

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.