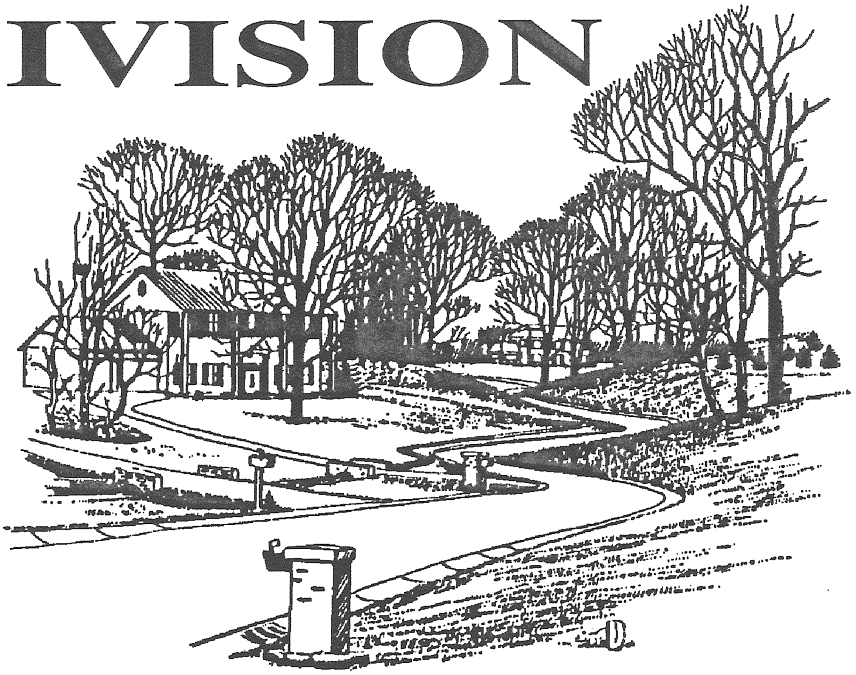
WEST HOLLOW SUBDIVISION



Marlborough, Connecticut

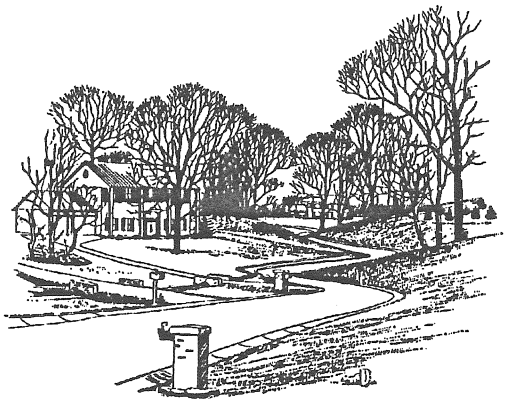
September 1992

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT
RESOURCE CONSERVATION & DEVELOPMENT AREA, INC.

WEST HOLLOW SUBDIVISION

Marlborough, Connecticut



Review Date: August 11, 1992

Report Date: September 1992

Eastern Connecticut Environmental Review Team
Eastern Connecticut Resource Conservation & Development Area, Inc.
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ENVIRONMENTAL REVIEW TEAM REPORT
ON
West Hollow Subdivision
Marlborough, Connecticut

This report is an outgrowth of a request from Marlborough Conservation Commission to the Hartford 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, August 11, 1992. Team members participating on this review included:

Nicholas Bellantoni	State Archaeologist CT Museum of Natural History
Denise Conkling	District Manager Hartford County Soil & Water Conservation District
Timothy Dodge	Resource Conservationist USDA - Soil Conservation Service
Douglas Hoskins III	Natural Resource Planner Hartford County Soil & Water Conservation District
Dawn McKay	Biologist/Environmental Analyst III DEP - Natural Resources Center
Brian Murphy	Fisheries Biologist DEP - Eastern District Headquarters
James Parda	Forester DEP - Eastern District Headquarters
Peter Picone	Wildlife Biologist DEP - Eastern District Headquarters
Eric Scherer	District Conservationist USDA - Soil Conservation Service

Dwight Southwick	District Engineer Hartford County Soil & Water Conservation District
Elaine Sych	ERT Coordinator Eastern CT RC&D Area, Inc.
Carol Szymanski	Regional Planner Capitol Region Council of Governments

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, a soils map, a copy of the 1987 ERT report. During the field review the Team members were given plans and additional environmental reports. The Team met with, and were accompanied by the Marlborough Planning Coordinator and the applicant's engineer. 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 and wetland restoration.

If you require additional information, please contact:

Elaine A. Sych
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(203)345-3977

1. Introduction

The Eastern Connecticut Environmental Review Team (ERT) has been asked by the Marlborough Conservation Commission to assist them in the review of the proposed West Hollow Subdivision.

The project site is ±235 acres in northern Marlborough located off of Jones Hollow Road, West Road and North Parker Road. A 49 lot single family residential subdivision is planned with a loop road and several cul-de-sacs. The Blackledge River bisects the property, and there is a large area of disturbed wetlands from previous mining activities.

The site was reviewed by the Eastern Connecticut ERT in 1987. The report is titled "Blackledge River", and it reviewed a 60 lot subdivision, rechannelization of the Blackledge River, creation of a 24 acre pond and regrading of the mined areas. Over the past five years the plans have changed substantially. The current plans incorporate many of the recommendations made in the 1987 report.

At this time the Town would like the ERT to review the current plans with regard to restoring the degraded wetland areas, pond creation, stormwater management, erosion and sediment control, fish and wildlife resources, forestry mangement, open space planning and archaeological significance. The following sections contain the review of the current project in relation to the above concerns.

2. Wetland Impact Stormwater Management Sedimentation Basin Design Erosion and Sediment Control

In general, the plans for West Hollow Subdivision offer a marked improvement to those plans reviewed as part of a previous ERT report involving this site, dated March 1987. Several alterations have been made to the original design which present a substantial reduction in possible impacts to the wetlands environments on this site. However, there are several items which need to be addressed in the areas of wetland impact, erosion control and storm water management.

Wetland Impact

This report confers with the 1987 ERT report (page 30), in that the inland wetland boundaries appear to be adequately represented on the above cited plans according to aerial photo interpretation (actually confirming the boundaries in the field was not possible due to the current degraded condition of most wetland flags). The 1987 ERT report (page 30) commented that the 339 foot elevation could be used as the 100 year flood boundary which would effectively increase the regulated area. In addition, it was observed that several "small watercourses" on the western section of this parcel were not indicated as a regulated area. Both of these issues seem to have been adequately addressed on this current proposal.

On page ten of Supplemental Report to.... by Lee Alexander it is recommended that western portions of the floodplain area be regraded and reclaimed. The reasons given for this proposed activity is the unsightly nature of the areas in question, the alteration of surface drainage patterns and erosion/sedimentation concerns. To augment the wetland renovation efforts in the proposed pond area, it is agreed that regrading should take place in the area designated directly to the west of the proposed pond area.

The area adjacent to the "South Pond" was inspected on 8/19/92 after several periods of prolonged rainfall. There was significant channel erosion taking place in the areas where watercourses travel through these mounds. These streams were followed to their confluence with the "South Pond" were it was observed that sediment is effectively trapped by vegetated "deltas" on pond's shore. No discoloration or recently deposited sediments were observed in the water body.

It seems that "nature" is simply trying to restore this site to an equilibrium state that existed before gravel extraction activities took place. It is our opinion that the situation in this area is relatively stable from

an erosion and sedimentation point of view and should not threaten the water quality of the Blackledge River itself. From this point of view, regrading the area in question is not recommended.

However, if the intent is to maintain a certain amount of open water habitat on the site, it may not be desirable to allow this pond to continue accepting sediment. In this case, perhaps there are other methods that could be used to control the sedimentation which would require lesser amounts of disturbance in this proposed conservation area. Perhaps reinforcing the eroding channels and constructing several small sediment basins prior to the streams, confluence with the pond would suffice.

■ Mr. Alexander also proposes regrading the apparent spoil piles on the eastern bank on the main channel of the Blackledge River for aesthetic reasons and to allow a more "natural form of river bank vegetative community to develop. In general, this office does not recommend streambank grading activities unless there is an immediate threat of accelerated streambank erosion.

■ Since a considerable portion of the inland wetlands on this site are far removed from any development activities, it would not be practical to re-flag the wetland soil boundaries in their entirety. However, it would be beneficial to re-flag those inland wetland boundaries which are located relatively close to development areas including those wetland areas near house, roads, sediment basins, clearing limits, etc. These would serve as a visible reminder to construction personnel as to the location of wetland boundaries.

■ Due to the "discharge" of fill proposed for this site, it may be necessary to apply for a wetlands permit from the U.S. Army Corps of Engineers, if not done so already. It is recommended that the applicant contact the A.C.O.E. New England Division/Regulatory Branch at 1-800-343-4789 for a determination on this matter.

■ Mr. Alexander outlined a three year monitoring program to track the progress of the wetland restoration activities. It is also recommended here that monitoring take place by a professional wetlands scientist during the construction phase of the restoration. The name of this person or organization should be included in the wetlands restoration plan. This monitoring effort should be funded by the developer and performed by a wetland professional sanctioned by the Town.

■ Mr. Alexander also recommends selective cutting to encourage desirable growth in the wetland crossing areas. It is further recommended here that this be done with the supervision of a professional forester or wetland scientist.

■ Provisions for the de-watering of the excavated pond sediments should be included on the plan.

■ In wetland areas that are due to be regraded, an effort should be made to salvage mature,

healthy hydric vegetation which could be used to revegetate these areas.

■ Specifications recommended by the Soil Conservation Service regarding the salvaging and planting of wetland shrubs are included with this report (see enclosure #1 in the Appendix). Using this methodology could increase the success of revegetated wetland areas.

■ To help reduce plant mortality, any wetland restoration activity should take place in the vegetatively dormant season when ground is not frozen.

■ The number of wetland crossings and their locations have been greatly reduced from those proposed in the original plan. After inspecting the wetland crossing locations in the field, the construction plan for these activities appears to be sound.

Storm Water Management: Pre-Development Conditions

The storm water management plan seems to have been designed using imprecise soils information. As a result of the 1987 ERT, a more detailed soils map was generated by Kip Kolesinskas, CT SCS State Soil Scientist. The upland soils were more accurately defined and delineated on this map (see enclosure #2 in the Appendix). The information contained on this map differs significantly from the information found in the Soil Survey of Hartford County, 1962. It is recommended that this updated soils information be incorporated into the any storm water runoff calculations on this project.

According to Dwight Southwick, District Engineer, there still seems to be some inaccuracies in the stormwater runoff calculations when the engineer used the more general soil unit delineations found in the Soil Survey of Hartford County, 1962 which was used by the engineer. According to hydrologic soil groupings specific to this state, the Gloucester soils found on this site are part of hydrologic soil group "B", not "A" as indicated in the engineer's storm water runoff calculations (See enclosure #3 in the Appendix). A soil in the hydrologic group "B" is considered to have a lower infiltration rate with more runoff generated, than a soil in group "A". This would effect the weighted Runoff Curve Number (RCN), which in turn would increase peak flow discharge.

To calculate the "Time of Concentration" (Tc) in several of the sub-areas, three hundred feet of sheet flow (the maximum allowed) was assumed in areas of dense woods. According to Mr. Southwick, it is unlikely that this condition would exist in areas with this type of groundcover where the micro-topography would probably begin to channel flow. By reducing the sheet flow component, the Tc would tend to increase, thus increasing peak flow volumes.

The engineer used a ponding factor to adjust the peak discharge. The SCS method indicates that this factor should not be applied to the Tabular Discharge Method.

Storm Water Management: Post Development Conditions

Because of the proposed land-use changes indicated on the construction plans, the Tc's should be adjusted in sub-areas 7, 8 and 9. The computations do not indicate any such change.

The RCN number for the "after development" was calculated in this office for sub-area 8. An RCN of 63 was arrived at instead of the RCN 41 which the engineer calculated (here, the Gloucester soil was rated in the "B" hydrologic group as advised above). At any rate, the RCN should increase more than "1" after development in this area.

Stormwater Management: Sediment Basins

■ This office calculated the drainage basin area for sediment basin "A" to be 5.0 acres. The total detention volume for this area should be about 10,000 cubic feet. The amount provided by their engineer is only about 4,000 cubic feet. This proposed storage appears to be insufficient according to our calculations.

■ The calculations show the drainage area for Sediment Basin "B" to be 1.9 acres. By incorporating some of the off-road areas which would be draining onto the road, this office arrived at an area of 2.5 acres. This would increase the calculated sediment storage volume from .007 acre-feet to about .01 acre-feet (an increase of 130 cubic feet).

■ According to calculations made by this office, total storage required for Basin "B" is 4,356 cubic feet. The basin provided as shown on the plans, sheet 5 of 31, has a volume of about 2,200 cubic feet. This appears to be insufficient.

■ Basins "C" and "D" were not checked. A typical concern for all sediment basins is that the outlet protection appears to be insufficient. The rip-rap for these areas should continue beyond the outlet point for the proper distance according to expected velocities.

■ It is possible that the proposed activity on this site will require a Stormwater Discharge Permit from the U.S. Environmental Protection Agency (EPA). These regulations cover "Construction activity including clearing, grading and excavation, except operations that result in the disturbance of less than 5 acres of total land area which are not part of a larger common plan of development or sale". For more information on this matter, contact the Bureau of Water Management at the Connecticut Department of Environmental Protection (566-3245).

Erosion and Sedimentation Control

■ The chart on page 33 of the 1987 ERT report, entitled "Major Limitations for the Development of: Blackledge River Subdivision" is still valid (see enclosure #4 in the Appendix). If and when the detailed soil map is incorporated onto this plan, a review of how engineered practices may or may not have overcome the limitations presented on this chart will be reviewed.

■ It is recommended that filter fabric envelopes be used to cover all catchbasin grates during construction phases (see enclosure #5 in the Appendix for a detail).

■ Additional silt fencing is needed in several locations throughout the site. Refer to the enclosed diagrams for details.

■ It is recommended that a erosion control mat/blanket be used on any slopes greater then a 3:1 ratio, especially the 2:1 slopes called for at the end of Paquanage Place (North American Green SC150 or its equivalent).

■ A special seed mixture is recommended for revegetating those upland sites that will contain infertile, droughty soils after clearing (such as the proposed regraded areas to the west of the flood plain). Refer to enclosure #6 in the Appendix for details.

Miscellaneous

■ Meets and bounds should be placed on all conservation easement boundaries found on this plan and included on the deeds of the individual lots, along with a list of the restricted activities. A copy of the conservation restriction document should be inspected for adequacy.

■ On lot 12, the limit of clearing extends into the conservation easement area.

■ Pipe guards are recommended for all footing drain outlets to avoid clogging as a result of small animal activity (see enclosure #7 in the Appendix for examples).

3. Resource Conservationist Comments

Habitat/Wildlife Species: Re-Assessment

The Resource Conservationist makes one comment with respect to Lee Alexander's interpretation of the federal definition of wetlands. Mr. Alexander states that the lack of wetland vegetation is reason for not considering this area wetland. The USDA-Soil Conservation Service always look at what hydrophytes might grow in a particular location under "natural conditions" even though there may be no vegetative element present now. In other words simply removing vegetation by cutting, etc. is not reason to consider an area "non wetland." If the hydrology is present and the soils are in fact non-drained hydric, then it would still fit the federal definition of wetland.

Impact of proposed Project.

There is no specific disagreement with Mr. Alexander's conclusions. What bothers the Resource Conservationist is that the development proposal intrudes on natural wetlands seven (7) times. The incremental loss of wetlands where small isolated wetlands occur can be more damaging than a single larger acreage loss in one wetland. It is true that less than one half acre is involved and that may be the least damaging to the wetland system. However, the effect is to infringe on the wetlands seven times and present opportunities for road sand, salt, catch basin maintenance problems, surface water runoff which may have questionable quality, and the disturbance or reduction of wildlife travel corridors. If wetlands are important to a town, a design which minimizes crossings would be desirable.

Wetland Enhancement Management Recommendations

The following are comments directed primarily at the construction process for the wetland/pond. If the opportunity exists, the developer and town might consider constructing an irregular shaped pond and shorelines. Cove areas tend to make better wetlands than utilizing a linear approach along a shoreline. This design approach increases the edge effect and creates a pleasing visual experience. If there is any opportunity to salvage existing wetland soils which may have been buried in the "debris mounds", as referred to in the supplement, that soil could not only provide a growth medium, but a seed bank of wetland plants as well. In general, if specific wetland plants are to be established, then a growth medium of upland soils works as

well as wetland soils, however if a wide variety of natural wetland plants is desired and no specific plantings are intended, then the natural wetland soils may work best. Similar to the soils, if any wetland plants can be salvaged for reestablishment after grading they should be moved and healed in during the dormant season. Planting mortality increases after bud break. No upland spoil should be placed in a wetlands.

4. The Natural Diversity Data Base

The Natural Diversity Data Base maps and files have been reviewed for the project area. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur within your project boundaries. However, our information indicates that Jones Hollow Swamp is a significant area for juvenile Salmo salar (Atlantic Salmon). Please refer to the Fish Resources section for further information.

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.

5. Forestry Management

Environmental Considerations

The techniques in this review can reduce erosion problems, help control storm water, save valuable vegetation and utilize certain timber resources. Woodlands provide a protective influence on soil stability and water quality. The forest also provides habitat for a variety of wildlife from amphibians and reptiles to small mammals, a variety of birds, predators and larger mammals. They depend on woodland for food, water, shelter and breeding habitat. Trees also have a positive influence on air quality as they convert carbon dioxide to oxygen and act as terrestrial sinks (collectors) to reduce airborne particulate and gaseous pollutants. Forests also provide a cool ecosystem from shade that is absent in open areas.

When highly absorptive forest soils are disturbed (grades on hills and filled to create roads, driveways, lawns and houselots) the overland flow of water increases because the sponge-like effect if the litter and humus layer is lost. The resulting soil compaction prevents rain from soaking into the soil surface as it falls. This causes water to collect and run over the lawn and roads. The run-off has the potential to build erosive power in short distances, tear soil loose and result in sedimentation and siltation. The greatest impact on water quality from loss of absorptive forest soils is during, or just after, construction. The increased erosion can cause sediment accumulation in streams, ponds, destruction of aquatic habitat by siltation and reduction of water quality from turbidity. Forested areas contribute little sediment to streamflow. Converting a forest environment to an urban one could affect water relations drastically. Peak flows may increase as well as sedimentation. One set of estimates has shown run-off increasing by 15, 29, and 41 percent by paving 25, 50, and 75 percent of a forested watershed. This is because urbanization reduces interception of rain, infiltration, soil moisture storage, and evapotranspiration, and increases overland flow and run off. Forestland is also beneficial in protecting water quality by minimizing eutrophying nutrients, such as phosphorus, and soilborne contaminants. Phosphorus is generally the limiting nutrient for aquatic ecosystems and usually tightly held by forest ecosystems. However, on-site sewage disposal generates large quantities of phosphorous, which can enter aquatic systems and accelerate eutrophication. Phosphorous export from forested land is estimated to be one-seventeenth that of urban land. In the West Hollow Subdivision storm flow water runoff measures will protect ponds and streams from siltation and erosion and/ or nutrient inputs.

Trees are very sensitive to the condition of the soil within the entire area of their root systems. Construction practices involving excavation, filling and grading for road building and structures, and soil compaction from heavy equipment disturbs the balance between soil aeration, soil moisture level and soil composition. Disturbances to soil near trees can cause a decline in tree health and vigor resulting in mortality in three to five years. Cutting or bruising roots with machinery creates breeding areas for root fungi which can also kill a tree in a short time. Trees with cut root systems do not have proper soil holding capacity, windfirmness or water-nutrient absorption ability. This also results in reduced health and vigor and opens the tree for insect and/or disease infestation. Mechanical injury which physically damages bark and scars the surface of the tree can lead to hollow trees which are structurally unsafe around people and homes. The older and/or larger a tree is the more readily it is affected by the negative impact of construction related activities. Once houses are built and trees begin to die from past carelessness from construction the aesthetic quality of an area is reduced. The dead trees become a hazard and expensive to remove when near roads, homes or utility lines.

Research has shown that trees on a houselot will enhance the value of that houselot. In general, only favor healthy, high vigor trees to be left on a houselot. Individual trees should be straight, well-formed and firmly rooted. Avoid extremely tall or larger diameter trees as they may be more subject to windthrow or mortality, unless advised to by a forester. The best trees to save on houselots would be sugar maple, red oak, white pine and hickory. Trees may be left in groups or "islands" to reduce the impact of soil disturbance and mechanical injury. Both individual trees or "islands" can be designated for retention with flagging prior to construction by a professional forester so they will be avoided. No excavation, equipment or filling should occur within 20-50 feet (depending on tree diameter - the larger the tree the further away disturbance should occur) of single trees or groups of trees. A general rule to follow is no equipment or excavation within two times the radial spread distance of the crown. Finally, trees left on site around houses should be away from the house at least for a distance equal to the height of the tree. The negative effects of construction on trees is not usually visible at the time the work is done. However, soil compaction, root injury, and scraped bark contribute to insects and disease infesting the tree after machinery has left the site. This creates hazards and problems for home owners as trees die several years after construction. These problems can be minimized or eliminated with proper care taken with vegetation during development.

Trees grown in a crowded forest environment rely on each other for stability and side support. Openings from roads and houselots which allow wind to pass through them will result in broken off or uprooted trees. This can occur with single trees in houselots and along newly cut roads. Trees growing on northwest and southeast slopes and those in hardpan soils with seasonally high water tables are the greatest liability. Type E (refer to vegetation map) is the most susceptible if construction equipment cuts roots systems and thereby reduces the tree's own capacity to support itself. Machinery should not get closer than 25 feet from the base of the trees along road or houselot edges. Due to the size of the houses proposed in this subdivision and the overall fragile structure of the trees due to slow growth and overcrowding they should be no closer than the height of the tree from the edge of the house or the edge of the roads.

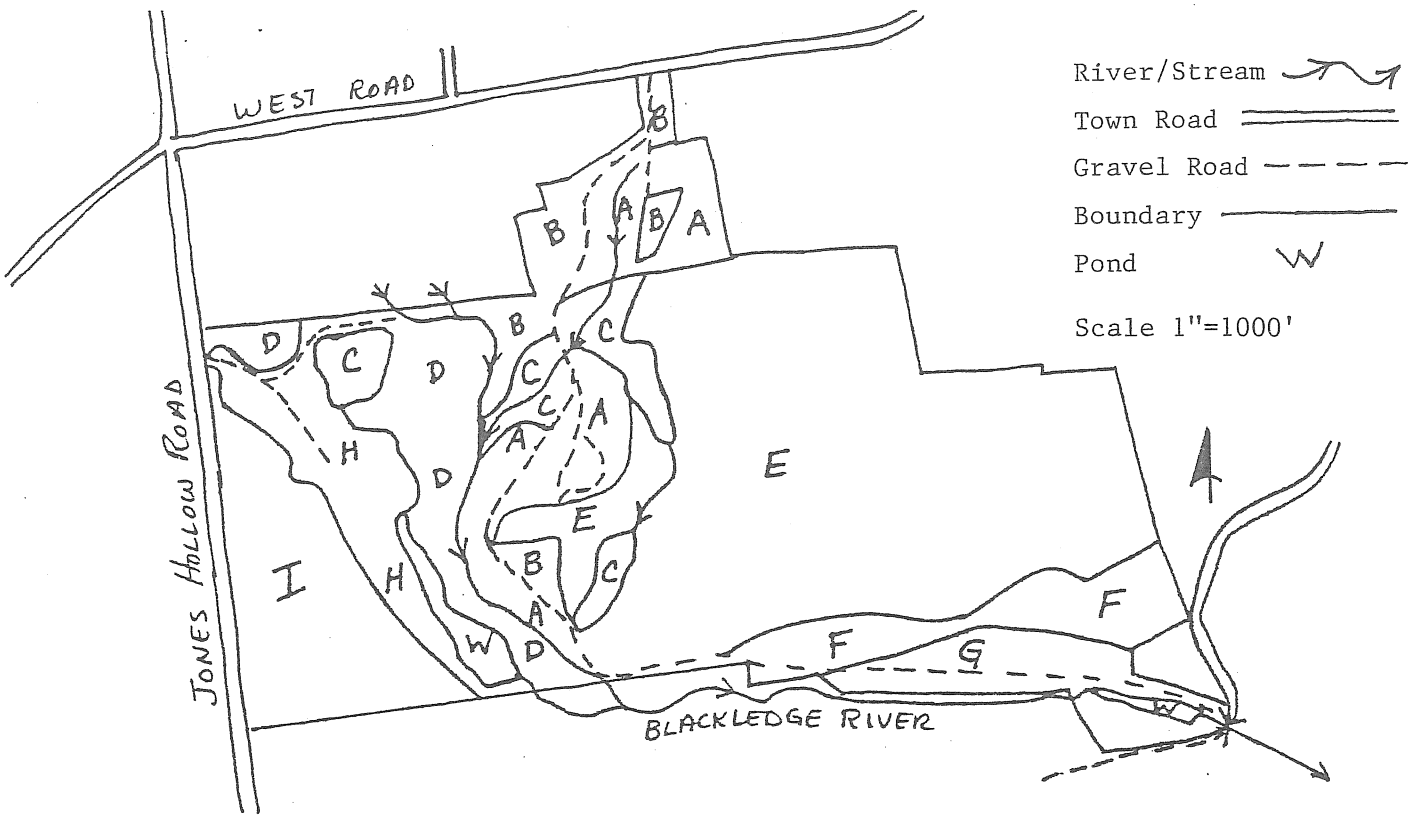
Due to the high value of trees today proper forest management is essential before, during and after construction. A forester views a proposed subdivision as a group of plant communities. Each of these communities (commonly called a "stand") have developed to accommodate the existing environmental restrictions of light, soil, moisture and nutrients. Each plant community will react differently to changes caused by construction. A professional forester is essential in evaluating tree health and vigor, insect and disease problems, species longevity, potential mortality, management of open space for recreational opportunities and wildlife habitat. Management recommendations are not only based on present tree condition, but also on expected future conditions trees in 10, 20 or 30 years. A pre-development thinning in Type E (refer to Vegetation Map) could serve to strengthen trees in these areas against breakage and wind throw while raising revenue for future plantings along roads, on houselots and other woodland improvements, i.e., hiking trails. A forester should be involved in the overall development plan to advise on individual tree retention, tree island retention, erosion and sedimentation control and site limitations which can create future hazards.

Lee Alexander's Wetlands/Wildlife Restoration plan of July 7,1992 addresses planting, landscaping and erosion and sedimentation regarding the pond and regrading existing soil banks and mounds. These recommendations will protect soil, water and vegetation. The Town of Marlborough is encouraged to adopt and follow Alexander's recommendations.

Conclusion

Trees have value in reducing climate extremes, controlling runoff, filtering out polluting particles from air and water, reducing noise, providing aesthetic enjoyment, creating wildlife habitat, recharging aquifers, supplying wood fiber and functioning as a carbon sink. Healthy vegetation provides the long term amenities. Therefore a good relationship between urban growth and forest lands must exist. Trees around houses can be healthy, long lived and valuable if treated properly in the conversion from forested habitat to subdivision. What is lost due to development is the wildlife carrying capacity of the forest and its ability to produce wood fiber for generations in the next century and beyond.

Vegetation Map



TYPE A: Mixed Hardwood - 20 acres - Sapling, Pole, Sawtimber, Understocked

TYPE B: Old Field - 12 acres

TYPE C: Hardwood Swamp - 14 acres

TYPE D: Open Swamp - 18 acres

TYPE E: Oak-Hickory - 95 acres - Pole, Sawtimber, Fully Stocked

TYPE F: Mixed Hardwood - 12 acres - Pole Timber - Fully Stocked

TYPE G: Softwood-Hardwood - 12 acres - Sawtimber - Fully Stocked

TYPE H: Excavated Area - 33 acres

TYPE I: Mixed Hardwood - 25 acres - Sapling, Pole - Overstocked

Seedling size - less than 2" D.B.H. (4½' above the ground diameter breast heigl
Sapling size - trees 2"-5" D.B.H.
Pole size - trees 5"-11" D.B.H.
Sawtimber size - trees 11" D.B.H. and greater

6. Wildlife Resources

This report is to supplement the 1987 report by Steve Hill, Wildlife Biologist in the Blackledge River ERT Report. Please refer to that report for additional information.

Despite the past history of the property having been mined so close to the wetland areas, it still has good wildlife habitats. A good portion of the area that is proposed as open space has been degraded. The removal of the topsoil and gravel has caused a change in the types of vegetation growing back in. Given the diminished value of a sizeable portion of the open space, it is recommended that additional higher value habitat in the upland be protected.

Currently, beaver are not as active on the site as in 1987. Given the nature of beavers, it is not uncommon for them to move around to other sites. The return of greater beaver activity to this site is inevitable so proper planning considerations should be undertaken. For example, the 100 year flood line could be greatly influenced if the beaver dam is reconstructed. It is recommended that lots #2, 4, 6, 8, 10, 12, 14, 15 and 17 be reconfigured to protect more habitat along the wetland boundaries of the Black Ledge River.

On page 7 of Lee Alexander's report dated 12 May 1992, he recommends that no specific residential plan be devised to the property until a more detailed suitability analysis is conducted.

Habitat size is the best indicator of the number of species present (Vizyova 1986). A conservative approach to development that is sensitive to minimizing habitat degradation and maximizing habitat conservation is key to maintaining the ecological integrity of a property. The footprint of the development should be as small as practically feasible.

Vernal pools are temporary water bodies that provide habitat for a variety of species of amphibians that are totally dependent on them for survival. Careful delineation of the vernal pools should be done. This includes late winter, spring, summer, and fall surveys to properly assess their presence. Many valuable vernal pools are lost or seriously impacted because surveys were done at the wrong times of the year.

The alder habitat found in the wetland area provides good potential woodcock cover. Woodcock

numbers have been on a historical downtrend which has been attributed to the loss of wetlands and other habitats. Protection of the alder habitat on the property is advised.

In addition to Lee Alexander's report, dated 12 May 1992, which advises the use of native plants for restoration purposes, the following native shrubs are recommended:

Black Chokeberry Aronia melanocarpa
Shadbush Serviceberry Amelanchier canadensis
Elderberry Sambucus canadensis
American Cranberrybush Viburnum trilobum
Nannyberry Viburnum lentago

A copy of a publication addressing the availability of native shrubs from Connecticut nurseries is included in the Appendix.

Literature Cited

Picone, P.M 1992. Connecticut Native Shrubs: Availability List Wildlife Division Publication, No. NHW-24, 11 pp.

Vizyova, A. 1986. Urban woodlots as islands for land vertebrates: a preliminary attempt on estimating the barrier effects of urban structural units. Ecology(CSSR) 5:407-419.

7. Fish Resources

This report will address anticipated impacts to local aquatic resources and delineate appropriate measures to mitigate impacts.

Fish Population

The Blackledge River, a vital tributary of the Salmon River, supports a coldwater fishery of significant recreational value. Adjacent to the proposed 49 lot subdivision, the river is low gradient as it meanders through a broad band of wetlands. It is annually stocked by the Fisheries Division with more than 8,360 adult brook, brown, and rainbow trout in the towns of Bolton, Hebron, and Marlborough. The river was last sampled in the Town of Marlborough on 7/26/89 upstream of West Road. The following diverse group of resident, anadromous (fish that migrate up rivers from the sea to breed in fresh water), and catadromous (Fish that migrate down river to breed in marine waters) species were found: native brook trout, brown bullhead, bluegill, largemouth bass, pumpkinseed, chain pickerel, fallfish, golden shiner, creek chubsucker, tessellated darter, sea lamprey and American eel.

The Blackledge River also contains important nursery and adult habitat for Atlantic salmon. Adults can potentially ascend upstream as far as West Road in a wet year and Hartford Road in a dry year. Spawning may occur throughout the entire stretch of stream within the Town of Marlborough. Similarly, juvenile salmon can be found throughout the entire stretch, initially from fry stocking and eventually from natural reproduction.

The northern unnamed watercourse, tributary to the Blackledge River also supports a fishery. Adult blacknose dace and juvenile native brook trout were observed in areas downstream of the proposed Passenchaug Road crossing, adjacent to proposed Lot Number 4.

Impacts

The following impacts can be expected if proper mitigation measures are not implemented:

1. Site soil erosion and sedimentation of watercourses through increased runoff from unvegetated

areas. During housing/road construction and proposed regrading of soils along the Blackledge River, topsoil will be exposed and susceptible to runoff events, especially if suitable erosion and sediment controls are not properly installed and maintained. Low gradient sections of streams (such as along the proposed development) that receive excessive sediment can not naturally cleanse and scour sediment during periods of large river discharges, i.e. spring freshets. This places the Blackledge River adjacent to the proposed West Hollow Subdivision at risk since sediment deposits will remain within the main channel for many years. Specifically, the following impacts to fisheries could be expected if erosion and sedimentation occurs:

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

(2) Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

(3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to disperse to other areas not impacted by siltation.

(4) 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 effectively limit fish population levels.

(5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.

(6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes. Eroded soils contain plant nutrients such as phosphorous and nitrogen. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.

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

2. Road construction. Placement of arch culverts in concert with placement of fill for road construction may result in stream sedimentation problems if proper erosion and sedimentation controls are not followed. Impacts due to stream sedimentation were previously discussed.

3. Aquatic habitat degradation due to the influx of stormwater drainage. Two sedimentation/detention basins will collect and outlet stormwaters before finally draining into the Blackledge River. Basins are designed to contain a 10 year storm event. Stormwaters from roadway systems can contain a variety of pollutants that are detrimental to aquatic ecosystems. 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. In extreme situations, spilled petroleum based chemicals or other toxicants can result in partial or complete fishkills.

4. Percolation of septic effluent into stream and wetland ecosystems. On-site septic systems from the 49 lot subdivision can be potentially dangerous to stream and wetland environments. Nutrients and assorted chemicals that may be placed in septic systems could enter aquatic environments in the event of a failure or infiltrate the groundwater during the spring when water tables are close to the surface. The introduction of septic effluent could result in a major threat to fish habitat, public health, and overall water quality conditions. Effluent will also stimulate the growth of nuisance aquatic vegetation and algae.

5. Transport of lawn fertilizers to watercourses. Runoff and leaching of nutrients from fertilizers and lime applied to subdivision lawns could possibly stimulate filamentous algae and nuisance aquatic weed growth in nearby watercourses, especially in slow moving low gradient stretches.

6. 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. Development which brings about polluted stormwaters, excessive stream sedimentation, lawn fertilizers, and lawn herbicides can negatively impact wetlands by hindering their ability to properly function.

7. Impacts to downstream environments. Any water quality problems and habitat degradation that occurs within Blackledge River will eventually be observed in downstream areas. The protection of the Blackledge River salmonid fisheries is contingent upon the maintenance of existing water quality standards and instream habitat conditions. If realized, the aforementioned impacts would have a severe, adverse effect upon the Blackledge River Watershed.

Recommendations

The following recommendations should be considered by Marlborough land use commissions to mitigate impacts to local aquatic resources.

1. Discourage residential development on lots that immediately abut the Blackledge River. Proposed housing development on the eastern (Lot #'s: 2,4,6,8,10,12) and northern edge (Lot's #'s 14,15,17,48,49,5) are extremely close to the Blackledge River and its wetlands. Long term impacts such as soil erosion, septic effluent, stormwater runoff, and wetland degradation can be more effectively minimized if these areas are left in their natural condition and designated as "open space." This strategy will provide a suitable "no development" buffer zone such as what has been designed along the western edge of the river at Jones Hollow Road. Left as open space, a critical fisheries resource such as the Blackledge River will be afforded

maximum protection from development impacts. The present design of riverside housing lots and conservation easement falls short of environmental resource protection.

2. Do not regrade soil mounds along the Blackledge River. Proposed regrading of soil banks and removal of vegetation less than 18 inches in diameter will result in stream sedimentation since many soil mounds that abut the river have been incorporated into the streambank. Streambanks and soils in this areas have become stabilized by vegetation and streambank are presently in a stable condition. Regrading will only cause streambank instability and erosion.

3. Develop an aggressive and effective erosion and sediment control plan. Proper installation and maintenance of erosion/sediment controls is critical to environmental well being. 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. The applicant and the Marlborough wetland enforcement officer should be responsible for checking this development very frequently to ensure that all soil erosion and sediment controls are being maintained. In addition, the applicant should post a performance bond with the town to protect against future soil erosion violations. Past stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

4. Eliminate Seaukum Road Wetland Crossing. This roadway crossing, albeit it will be disturbed at the narrowest point, will result in the greatest loss of wetlands as compared to other proposed crossings. The crossing is functionally unnecessary since access to other sections of the subdivision can be readily acquired from Mawnantuck Trail.

5. All bridge crossings and land grading/filling near seasonal streams and wetlands should take place during low flow periods. This will help minimize the impact to the 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. Watercourse setbacks for septic systems. 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. If development is allowed on riverside housing lots, the town sanitarian or IWWCA should require analyses of phosphorus and nitrate transport to ensure that leachate does not interfere with aquatic resources. Doing this may go beyond the standards of local and State health code but is warranted to protect the Blackledge River from avoidable sources of eutrophication. If riverside lots are not developed, then extensive analysis of phosphorus and nitrates will not be required. All septic systems should be maintained on a regular basis. Residents should be encouraged to utilize non-phosphate laundry detergents.

7. The effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch basins. To provide added protection, the town should consider detention basin design that will contain stormwaters in excess of a 10 Year storm event. Softwater drainage design is encouraged. Stormwaters should be only be 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. Catch basins and plunge-pools will only trap heavy, coarse sediments reducing the likelihood of excessive stream sedimentation; however, waters that contain pollutants such as salts and even small amounts of fine enriched sediments will eventually cause water quality and aquatic habitat degradation. This impact can not be prevented since catch basins will not remove these materials.

8. 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.

8. Planning Considerations

The following recommendations are made to enhance the site plan and development of this parcel:

Proposed phasing is an excellent idea for this site. Minimizing exposed areas will reduce soil erosion and wetlands and watercourses pollution. The site need not be stripped of trees. "Limits of disturbance" within working areas can be delineated so that as much as is feasible natural areas are retained;

The proposed 2.8 acre pond could be used as a skating pond in winter. This recreational feature will enhance the development and provide a much needed active recreation area;

This site is recognized as being a crucial link in providing a continuous greenbelt along the Blackledge River. Any revisions to the proposed plan should continue to encourage a buffer and public access;

Ownership of the open space proposed on the site especially along the Blackledge River should be deeded to a local land trust which will permit public access to the river trail;

Areas immediately surrounding homes could be left natural, i.e., wooded rather than encouraging lawns which may be treated with harmful pesticides in the future;

Individual lot owners should be advised of the existence of wetlands on their property by way of their deed. They should also be advised of the restricted uses within wetland areas - such as no earth filling, no grass clipping dumping, etc.;

Maintenance of silt fences and hay bales will be crucial to the success of this project. The developer should designate one individual on staff who will be responsible for installing and maintaining erosion and sediment control measures. The town may contact this person and receive maximum attention. Perhaps this individual could also provide bimonthly reports to town supervisory staff on the progress and problems of erosion and sediment controls which could then be verified in the field by the town's designated agent. This approach would lessen the time spent by the town watching over this project.

9. Archaeological Review

The project area is located along the Blackledge River which was an important natural resource for both Native American adaptation and later Euroamerican farming in the area. On the steep slopes in the western portions of the project area, three foundations of dry stone have been located. These are the remnants of late 19th to early 20th-century homesteads. Artifacts collected on the surface associated with these stone features date to this time period. These features can provide important information concerning the early farming history of the town. The Office of State Archaeology recommends that historic documentation, including land deed searches be conducted on these properties and an extensive mapping and photographic record be compiled on the stone features. Limited archaeological testing may also prove helpful. However, no major excavation work appears necessary.

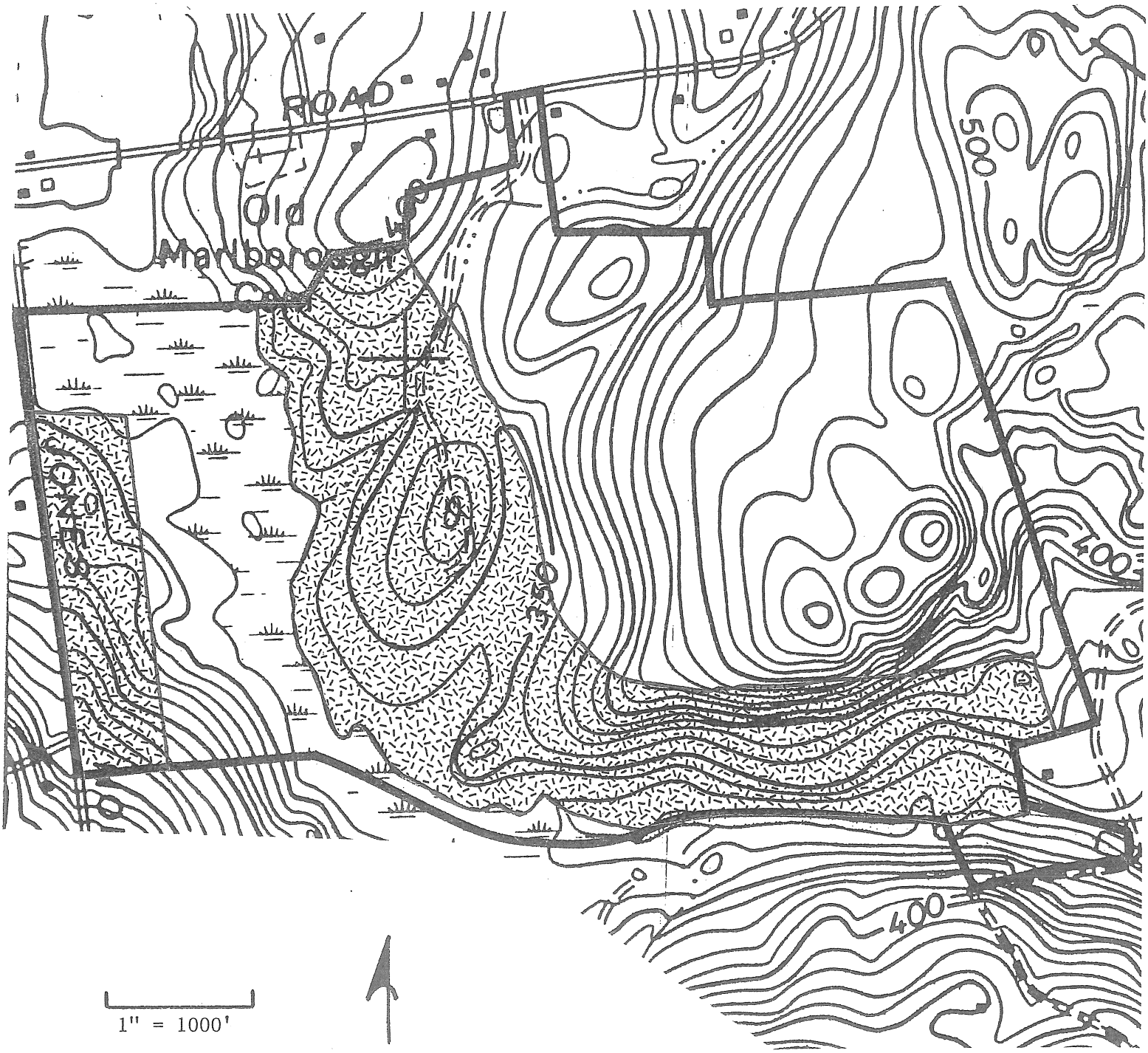
A review of the Connecticut Archaeological Site Files and Maps shows no known prehistoric sites listed for the project area. However, similar topographic and environmental settings along the Blackledge River in Marlborough and adjacent communities have yielded prehistoric Indian settlements dating to 10,000 years ago. The Office of State Archaeology anticipates the most sensitive areas for Indian campsites to be along the river on elevated well-drained soils. Within the project area, the area of concern is adjacent to the river along its east and north boundaries.

The Office of State Archaeology recommends an archaeological survey for these areas: 1) along Jones Hollow Road to map and photograph the stone foundations, and 2) the knolls of well drained soils along the east and north boundaries of the Blackledge River for the location of Native American encampments. All archaeology should be conducted prior to any construction activity and in compliance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources.**

The Office of State Archaeology is prepared to offer West Hollow Associates and the Town of Marlborough any technical assistance in conducting the archaeological survey. Please contact the Office of State Archaeology at 486-5248.

Archaeological Sensitivity Map

Areas of Archaeolgical Sensitivity



10. Appendix

A. List of Team Members
B. Materials referred to in Section 2.
C. Connecticut Native Shrubs Availability List

Appendix

For Appendix Information please contact
the ERT Office at 860-345-3977

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.