

River Junction Estates



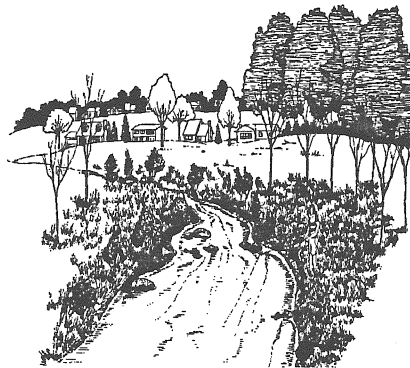
Putnam, Connecticut

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut
Resource Conservation and Development Area, Inc.

River Junction Estates

Putnam, Connecticut



Environmental Review Team Report

Prepared by the
Eastern Connecticut Environmental Review Team
of the Eastern Connecticut
Resource Conservation and Development Area, Inc.

for the
Inland Wetlands Commission
Putnam, Connecticut

July 2000

CT Environmental Review Teams
1066 Saybrook Road, P.O. Box 70
Haddam, CT 06442
(860) 345-3977

Acknowledgments

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

The Eastern Connecticut Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field review took place on Tuesday, May 2, 2000.

Nicholas Bellantoni	State Archaeologist Office of State Archaeology - UCONN (860) 486-5248
Douglas Hoskins	Wetland Specialist/Environmental Analyst III DEP - Bureau of Water Management Inland Water Resources Division (860) 424-3903
Chet Kasper*	Resource Assistant DEP - Eastern District Headquarters (860) 295-9523
Ann Kilpatrick	Wildlife Biologist DEP - Eastern District Headquarters (860) 295-9523
Julie Shane Kiritsis	Stormwater Permit Engineer DEP - Bureau of Water Management Stormwater Management (860) 424-3914

D. Glenn Miller	District Manager Windham County Soil & Water Conservation District (860) 774-8397
Brian Murphy	Fisheries Biologist DEP - Eastern District Headquarters (860) 295-9523
Nancy Murray	Biologist/Environmental Analyst III DEP - Environmental and Geographic Information Center Natural Diversity Data Base (860) 424-3589
Robert W. Scully	Sanitary Engineer 3 Environmental Engineering Section DOPH - Division of Environmental Health (860) 509-7296

*Individual primarily responsible for the Wildlife Resources section.

I would also like to thank Dan Remian, chairman, inland wetlands commission, Shirley Serafin, Rene Desaulniers, inland wetland commission members, Brenda Roy, secretary, inland wetlands commission, Gerry Cotnoir, chairman, planning commission, John Woodfall, planning commission, Daniel Rovero, mayor, Allan and Kathleen Rawson, property owners and applicants, Robert Messier and Raymond Nelson, engineers for the applicant, Stanley Dynia, environmental consultant for the applicant, and Steve Smith, broker, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were given additional information and plans. Some Team members made individual or additional visits to the project site. 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 plans 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 potential development, and also suggests considerations that should be of concern to 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 reviewing the proposed subdivision.

If you require additional information please contact:

Elaine Sych, ERT Coordinator
CT ERT Program
P. O. Box 70
Haddam, CT 06438
(860) 345-3977

Introduction

Introduction

The Putnam Inland Wetlands Commission has requested assistance from the Eastern Connecticut Environmental Review Team in conducting a review of the proposed River Junction Subdivision.

The ±120 acre site is located south of Route 44, bounded on the east by Putnam Road, the south by Chase Road, west by the Five Mile River and north by Cady Brook. The project will consist of 20 single family house lots with on-site sewage disposal systems and on-site water supply wells. Lots #1-5 have already been approved, and Lot #5 is currently being built on. The area is zoned agricultural and over the past +30 years it has been the site of a gravel excation operation (100 acres previously mined and 23 acres in the process of/or soon to be mined. The proposed lots range in size from +2 acres to +11 acres. A pond has been constructed on the site in the southern portion. A new through road is proposed (approximately 3900' in length) and one cul-de-sac (485' in length) is planned. The site has extensive wetlands, as well as frontage along two watercourses.

Objectives of the ERT Study

The commission is requesting the review due to the amount of wetlands and watercourses on and abutting the site. They are concerned about the deforestation and fragmentation of the forest and wetland habitats. The commission would like to determine what effects the progressive mining and proposed subdivision will have on wetlands, wildlife, and fisheries in the area, and whether the scope of this project should be reduced and additional wetland protection be considered.

The ERT Process

Through the efforts of the inland wetlands commission this environmental review and report was prepared for the Town of Putnam.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the commission. Team members were able to review maps, plans and supporting documentation provided by the applicant.

The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted on Tuesday, May 2, 2000. Some Team members made individual and/or additional site visits. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

Figure 1.

Location Map

Scale 1" = 1000'

↑
N

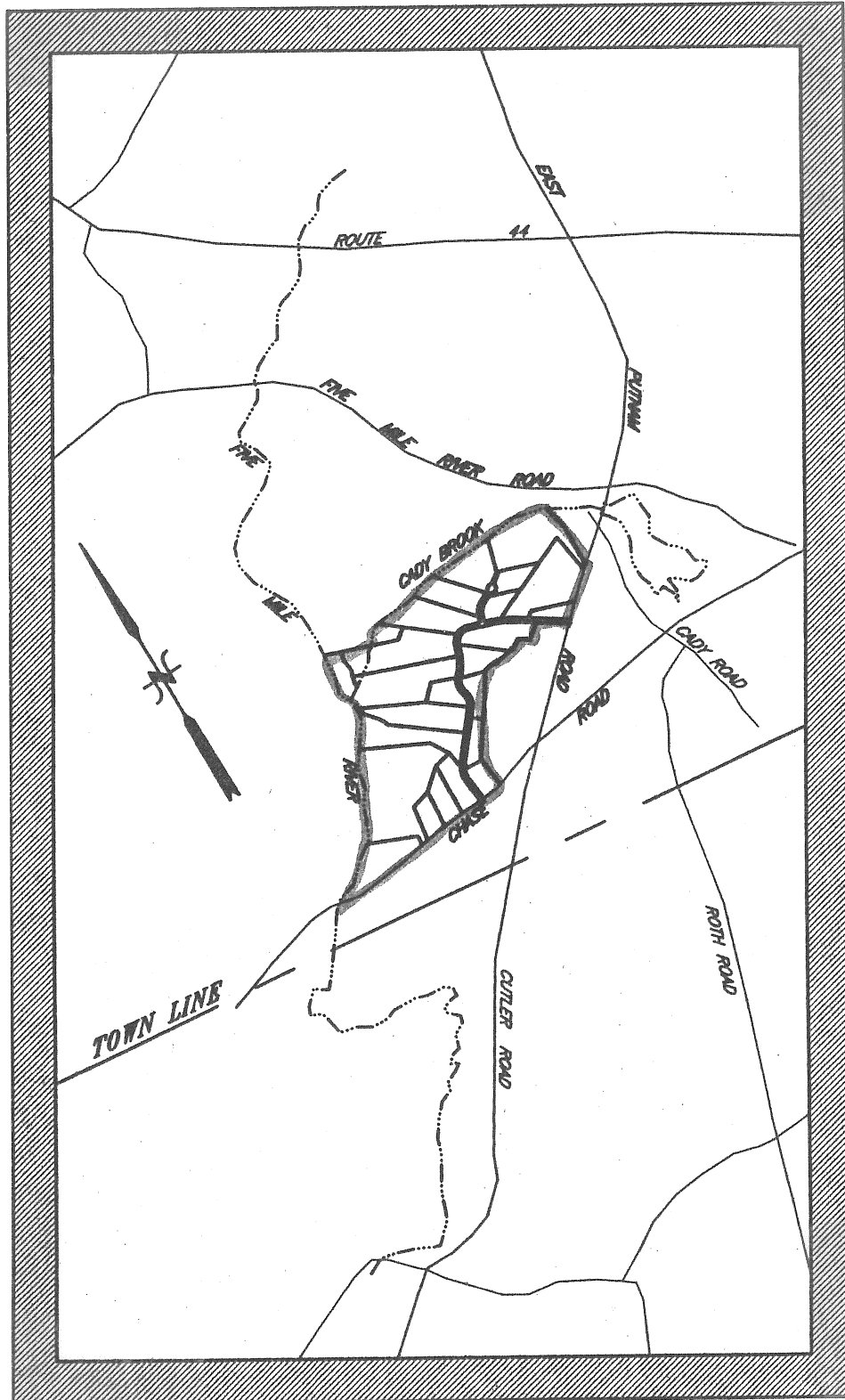
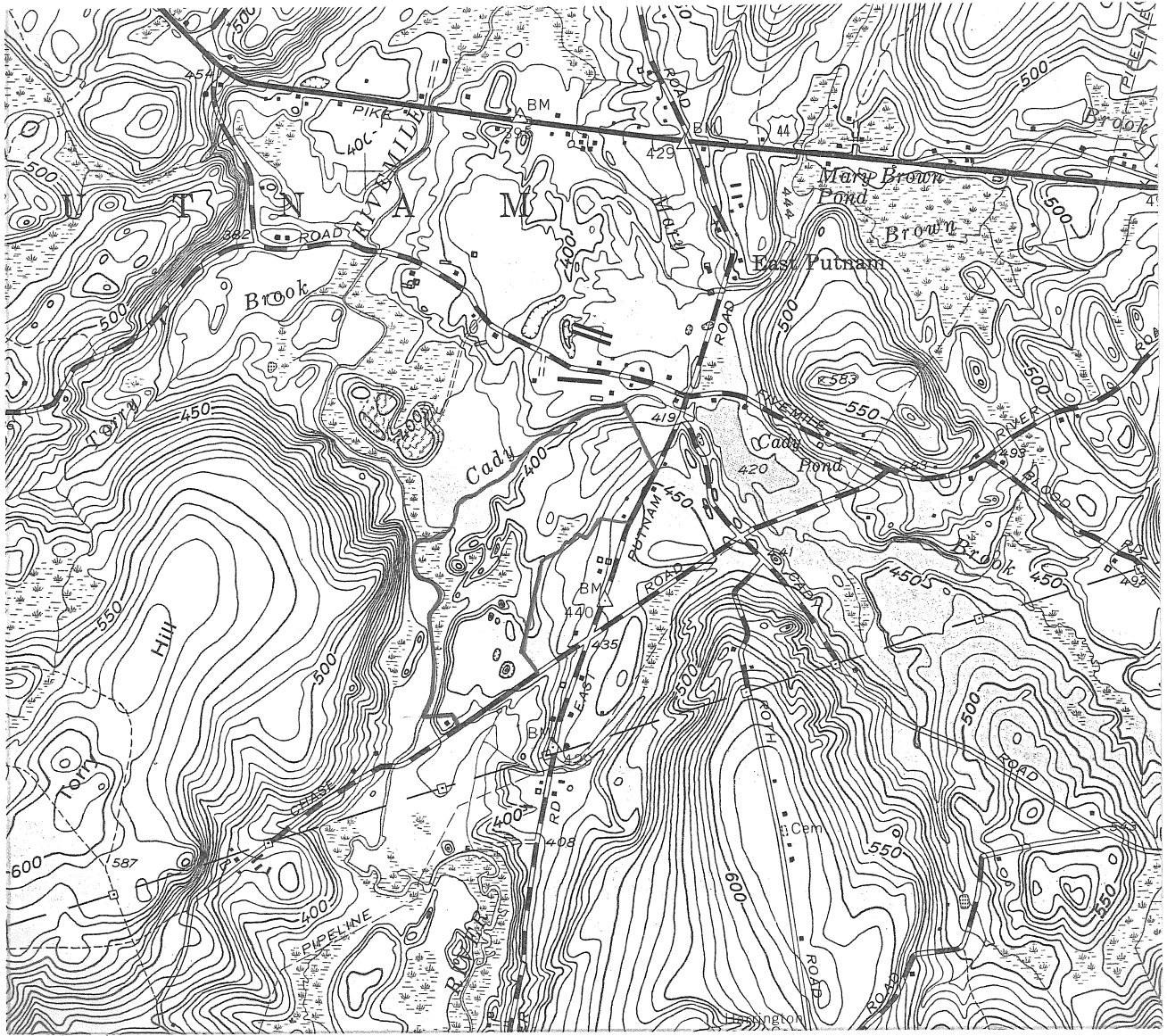


Figure 2.

↑
N

Topographic Map

Scale 1" = 2000'



Wetland Review

Specific concerns listed on the ERT request pertaining to wetland review included "How can the project be modified to minimize impacts on the wetlands, river and streams? and How can the effects of the mining be mitigated?"

The existing effects of historical gravel mining on certain wetlands of this property are substantial, namely that wetland bounded by wetland flags 3 -15 through 3 - 45 spanning lots 10, 11 and 12. This area appears to be a large, very productive vernal pool. Vernal pools are depressions in the landscape that fill with water during the wetter periods of the year (spring and late fall), and become drier during the warmer summer months. True vernal pools also support unusually diverse and dynamic assemblages of wildlife. Much of this wildlife is solely dependent on these areas for one or more periods of their life cycle. Because of the absence of permanent water, fish do not live in these ephemeral pools, making these areas very attractive to certain animals which would normally fall prey to these carnivorous fish. Rare and endangered amphibian species are commonly found in these pools.

The amphibian life that use these pools as breeding grounds soon migrate into the surrounding uplands to live out their adult phase and return to the pools only to breed. Migration distances vary significantly between species. One literature search turned up figures ranging from a minimum of 200 feet and a maximum of 750' with an average migration of about 525'. The wood frog has a significantly larger dispersal range, known to be as far as one half mile from their host pool.

Even though the historical gravel mining was generally kept 50 feet from the wetlands, the gravel excavation that occurred outside of this buffer has severely

impacted the aforementioned upland habitat required by the amphibians that breed and develop in this vernal pool. Impacting their upland habitat as such has most likely had severe consequences to the vernal pool ecosystem and will continue to degrade the pool in years to come, particularly if houses are constructed in the vicinity.

The applicant is encouraged to obtain the services of a wetland biologist to more accurately determine the value of this vernal pool and its requisite upland habitat. If this vernal pool is as productive, or potentially productive as the Team wetland specialist suspects, it is recommended that lots 10, 11, 12 and 20 be removed from the plan to allow for some regeneration of the valuable, complex mix of uplands and wetlands that exists in this area. It is also recommended that an aggressive restoration plan for the upland areas in the vicinity of the vernal pool be undertaken in order to quickly establish a complete and robust cover of grass species. Establishing this corridor of open space that connects the area of the Cady Brook, Five Mile River wetland complex will benefit the functions of the wetlands included therein significantly.

Other concerns include:

- 1) It is recommended that the signatures of the soil scientists that delineated the wetlands on this parcel be included on the plan.
- 2) To assist in maintaining good water quality, provide better wildlife habitat and deter the proliferation of Canada geese, it is recommended that a "no mow" area around the perimeter of the pond be established in order to create a naturally vegetated buffer.
- 3) Since Lot 5 is positioned in close proximity to the Five Mile River, a buffer area wider than the existing 50 foot buffer area would have been appropriate. Given that the lot has already been approved and a foundation is in place, it is

recommended that this 50 foot buffer line be increased where prudent and feasible to approach the 100 foot buffer recommended by the DEP Fisheries Department. This expanded buffer boundary should then be demarcated in the field and recorded on the deed so that current and any future landowners would be aware of this limitation.

4) The applicant is commended for generally observing a 50 foot setback from wetlands and/or watercourses, however it appears that the buffer was respected only for houses, septic systems and drives. In these instances, when the domicile is situated so close to a buffer, it is likely that landscaping, maintenance of yards and other intrusions will occur in these buffer areas. To preserve this valuable wetland buffer area, it is recommended that as above, the buffer be demarcated in the field and recorded on the deeds of the individual lots so that the current and any future landowners would be aware that these areas are to remain natural.

5) It is recommended that the man-made swale on Lot 9 that artificially drains the vernal pool be filled in and restored, including that portion excavated through the wetland area. It was stated during the site walk that it was constructed in order to divert water into the pond. It was also stated that this channel rarely contains any flow into the pond. This is not surprising since a majority of the water in the pond most likely enters as groundwater through the highly porous sands and gravel. As an aside, the swale does not stop short of the wetlands as indicated on sheet 7 of 16 of the plan.

6) The footing drain proposed on Lot 15 should be pulled back, off the slope, to avoid erosion of the slope and sedimentation of down-slope wetlands.

7) Omitting curbs as well as point stormwater discharges as the applicant has planned for the proposed subdivision is to be commended. If done correctly, these procedures tend to assist in the reduction of stormwater pollution and maintain groundwater flows into nearby wetlands. However, it appears that

further planning is needed to assure the proper management of stormwater collected off the roads. For instance, will swales be needed along the road or is the stormwater expected to instantaneously infiltrate into the ground? What will happen if roadside stormwater collects and flows parallel along the road over driveways? Will small culverts or swales be needed on the drives to manage this flow?

8) The mapped FEMA 100-year floodplains on Cady Brook and the Five-mile River should be placed on the plan.

9) The existing culvert on River Junction Road (station 14+00) is labeled on the plan as "proposed."

Soil and Water

Conservation District Review

Because at least two isolated wetland pools have in some way been the centerpiece - in terms of notable resources - of this tract of land, this section will focus on them with an attempt to give historic, current, and future contexts.

Historic Perspective of Select Aquatic Features

The point of the historical context is that pools like those addressed in this report exist in isolation in the sense that that condition is perhaps their hallmark; they *don't* exist in isolation in the ecological and landscape sense in that they commonly occur in what this reviewer terms *constellations*. A constellation comprises a group of pools that are in relatively close proximity and that can be presumed to be functionally interrelated (please see map and aerial photo included in this report - Figures 4 and 5).

The parcel of land considered in this assessment has been host to such a constellation of isolated woodland pools, some of them more or less classic, well defined kettles in glacial outwash, and others with more irregular physiography (please refer Figure 4). Labels on the map include a subscript indicating the pools' status; an "e" indicates that at least the pool itself is extant even if its upland is dismembered and an "h" signifies that the pool or depression no longer exists, having been altered by earthwork.

One or more of the historic kettle depressions may not have featured water, although kettles C and D almost certainly did. An additional subscript of "d" for *dry* denotes those depressions whose bottoms were probably not below

groundwater level and so probably did *not* feature water (kettles E and F). "G" indicates a pool that does not appear as a depression on the topographic map but shows up on earlier aerial photographs as a likely kettle pool.

As is characteristic of isolated pools in our region in general, those here occurred (past tense) in an array or constellation, with each in the assemblage likely hosting a unique combination of vegetation and associated fauna. (This is true of the two reviewed extant pools with respect to vegetation and can be presumed for the others.) Pools occurring in such an array are functionally interrelated and are integrated ecologically. Breeding amphibians like the spotted salamander (*Ambystoma maculatum*), for example, show considerable fidelity to their "home pool" from year to year, but a percentage of their progeny can be expected to select other nearby pools for breeding.

Due to these interrelationships between and among pools established over long periods of time in their development, the loss of one or more from the group can be expected to affect the population dynamics of pool inhabitants in residuals. The "original" condition of the array of pools at this site has been radically altered in recent decades. Kettles in the southern section of the parcel have evidently been gone for some time (a decade or more) while those in the more northern section (pools A and B) appear to have undergone relatively less direct impact until recently.

Although general and sketchy, this historic picture is borne out by several disparate sources of information: aerial photos taken in 1952 show pools C and D as intact and containing water; the 1974 National Wetlands Inventory map indicates kettles C and D as water features; and the USDA SCS Soil Survey for Windham County, completed in 1981, indicates the area these pools are in as gravel pits adjacent to Hinckley and Merrimack soils, not identifying the wet depressions as it likely would have if still intact. Later photos show a succession

of earthwork and the gradual alteration and eventual disappearance of depressions C, D, E, F, and G.

Current Conditions and Implications

Functions of the remaining pools (A and B) are radically altered since a significant portion of their uplands are now stripped nearly to the pools' edges. Within a narrow band of scant residual vegetation, the pools are ringed with silt fencing. Among the few consolations in this is that apparently nowhere are the fences keyed in. Since buried silt fencing is an impediment to salamander migration, at least partial passage under the fences would seem to be an asset. At times of the year (amounting to *most* of the time) other than the critical but relative brief breeding periods in which they frequent isolated pools, amphibians like the spotted salamander and the wood frog (*Rana sylvatica*) live in the surrounding forest, often far (up to a quarter mile or more) from their breeding sites. In this case, however, resident adults and emigrating matamorphs (maturing amphibians leaving their breeding pools) are left with degraded and fragmented surrounding upland habitat to which to migrate.

The large, newly excavated pond in the south section of the property may well be an ecological aggravation to what little remains to the viability of remaining pools. Such large, open areas of created surface water attract and contribute to the propagation of a suite of aquatic and semi-aquatic predators (including snapping turtles, otters, and herons, to mention a few) in significant numbers. These animals in and of themselves are not objectionable and are an integral part of our native fauna. But with the introduction of a sizable new, artificial body of surface water in the proximity of what had otherwise been relatively isolated woodland pools, these predators can more easily discover the nearby inhabitants,

contributing further to expected morbidity and mortality from the eventual streets and driveways that will be part of the planned subdivision.

Pool A (please see Figures 4 and 5)

This pool is very roughly 1/2 acre in extent and is in a depression associated with an ephemeral surface watercourse along Ridgebury, Leicester, and Whitman soils. The pool is isolated from other surface water features, has no perennial surface inlet, and a narrow, channeled surface outlet at the south end that becomes subterranean distal to the pool. The pool is vegetated with a shrub zone of buttonbush (*Cephalanthus occidentalis*) more or less on the south end.

An invertebrate that has come to be considered a quintessential vernal pool indicator organism, the fairy shrimp (*Eubranchipus*—probably *E. vernalis*) inhabits this pool as does the wood frog.

There were numerous green frogs (*Rana clamitans melanota*) in evidence at the date of this field review. The green frog is primarily an amphibian of larger, permanent water bodies but makes its way to isolated pools under natural conditions, to some degree, from nearby rivers and or other waters. Their prevalence here now, however, may partly indicate an influx of migrants already drawn to the pools via the large constructed pond. Green frogs are among the list of predatory opportunists that can exploit isolated pool inhabitants like fairy shrimp, mole salamander larvae, such as those of the spotted and marbled salamanders (*A. maculatum* and *A. opacum*), and wood frog tadpoles.

Pool B (please see Figures 4 and 5)

This pool is confined to the depression in a horseshoe-shaped glacial outwash feature. It is approximately 1/2 acre in extent and is vegetated with a shrub layer of chokeberry (*Pyrus Spp.*) and a benthic layer of sphagnum moss. Given the limited time and coverage at the field visit and especially that small portion afforded to this pool, this Team member noted no amphibians or aquatic invertebrates here. This has meaning only in the context of the previous qualifying statement; had time permitted, a more careful survey would likely have revealed the presence of one or more ephemeral pool indicators such as spotted salamanders.

Gross alterations to wildlife habitat are obvious here, including loss of surrounding upland forest that, among other functions, provided pool-breeding amphibians with the upland habitat they rely on for the majority of their life cycles. Without question, functional values that were extant prior to the disturbance are severely altered and the ecological course of this parcel's development has been shifted.

The Future

In an attempt to put these comments in perspective, it may be helpful to keep in mind that despite our notion of what constitutes a pristine resource, we live on a landscape that's been changed many times over by geologic and biotic forces, including human activities. This is, of course, in many ways a philosophical debate and as such may seem to have little place in a report like this. But in fact it is central to the challenges of increasing development pressures on a finite landscape.

Isolated-pool breeding organisms show varying degrees of resiliency and, since they have evolved in and are adapted to a region in which a gravel operation, in some ways, approximates conditions we presume to have been prevalent in a revegetating post-glacial landscape (exposed sand and gravel, spotty tree cover, scattered low vegetation, and, generally, early succession), it is reasonable to expect less than total devastation and perhaps adequate recovery, given the maintenance of existing adjacent forest cover. However, associated with subdivision development, beyond gravel extraction, are nonpoint source pollution and habitat fragmentation that will have further significant impacts on what remains of these former woodland pools.

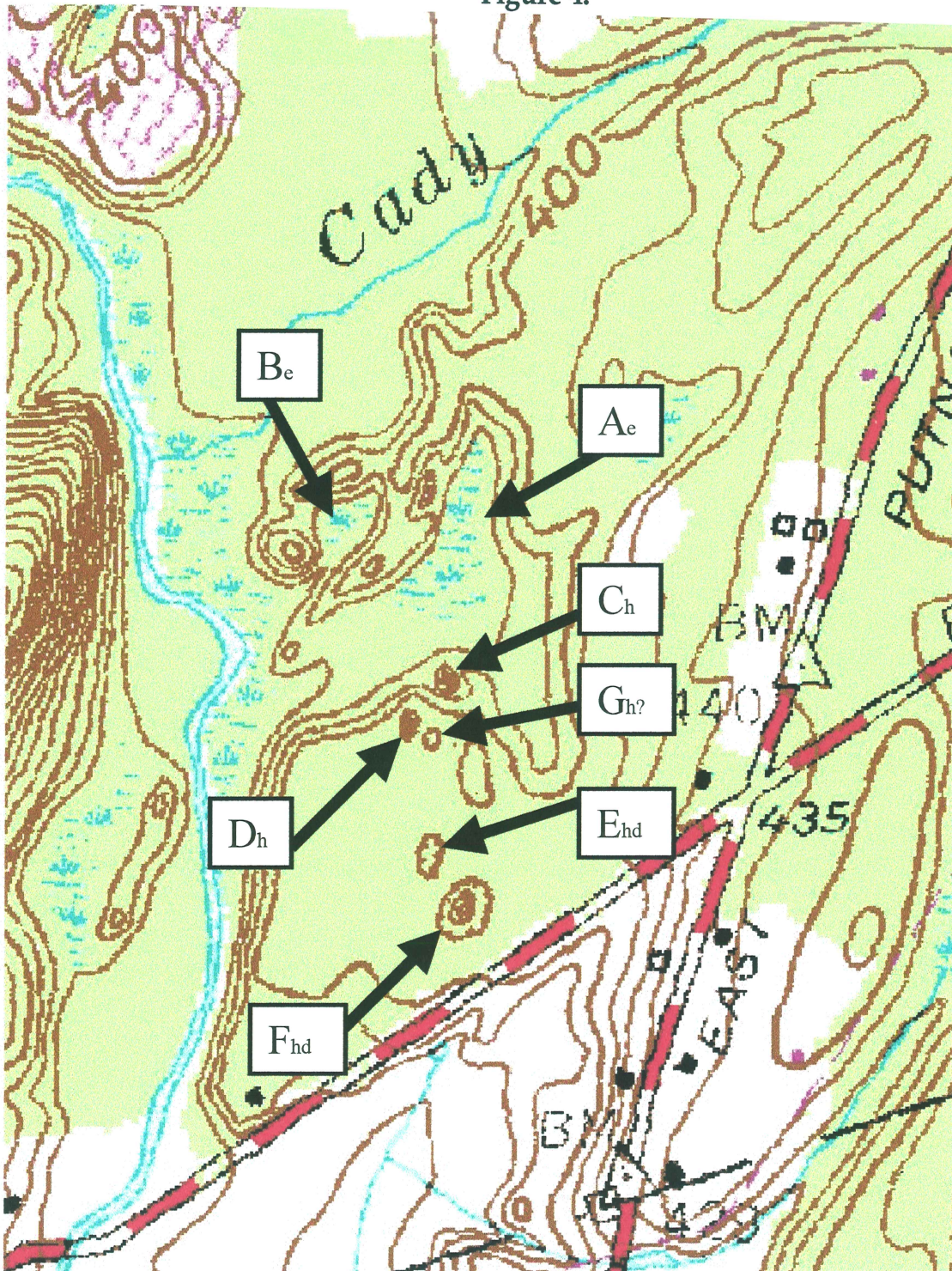
In a landscape context, considering the constellation of pools on this parcel, and even from the point of view of individual pools, the coup de grâce for major portions of this resource has already been dealt. Cessation of any activities creating further disturbance to the pools and a regimen to reestablish native vegetation in areas already disrupted will encourage healing for remaining pools and their environs. The specific course, or courses, of remedial action would ideally require a more detailed reassessment; however, given the prevailing site characteristics - in terms of soil types, existing vegetation, and other factors - there are some general guidelines that apply.

Site conditions here are generally conducive to the establishment and growth of a suite of native, woody pioneer species. These may include but are not limited to: quaking aspen (*Populus tremuloides*); largetooth aspen (*Populus grandidentata*); gray birch (*Betula populifolia*); pitch pine (*Pinus rigida*); white pine (*Pinus strobus*); bear or scrub oak, (*Quercus ilicifolia*); sweetfern (*Comptonia peregrina*); and bayberry (*Myrica pensylvanica*). Cultural methods can be employed that involve recruiting and encouraging the establishment of these native plants from local sources, preferably from nearby on the site. Doing so would favor restoration of woody cover, eventually providing shade, hiding

places, and other structures and functions that isolated pool species need to complete their life cycles and remain viable.

To reiterate, the first and single most important thing is cessation of further disturbance to any remaining pools and their uplands. As noted, implementing the best *detailed* course of action for a plan to assist in restoration would require more focused assessments and prescriptions based on them.

Figure 4.



Map is for purposes of general illustration only and scale is undefined.

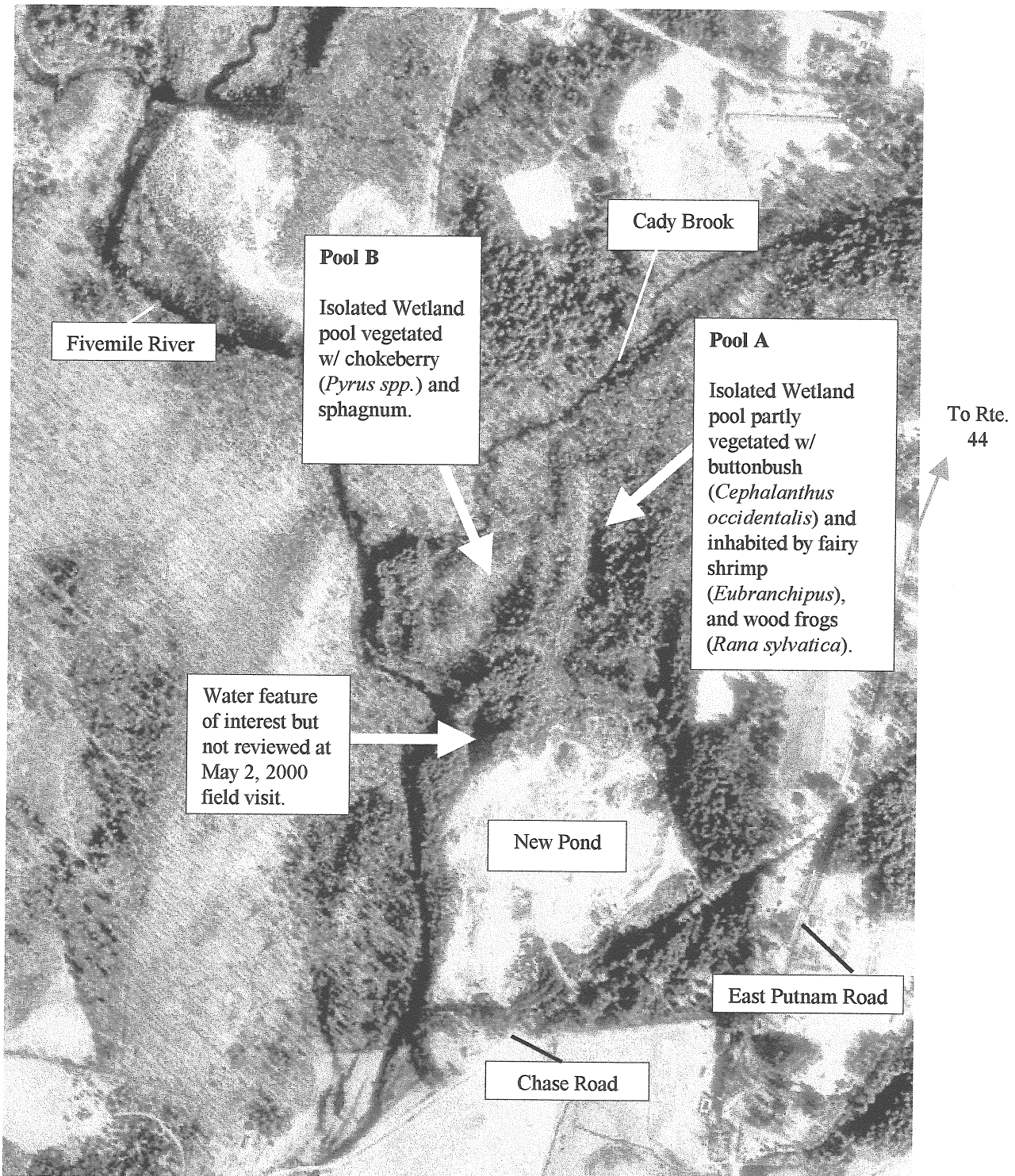
Subscripts:

e = extant

h = historic

d = a depression that probably did not feature water

Figure 5.



From 1991 Digital Ortho Photo Quarter Quad -- Source: Univ. of Conn. MAGIC Scale altered from native 1:24,000 for this report.

Wildlife Resources Review

This assessment is based on a site visit conducted on May 28, 2000, a review of the site plans prepared by Messier & Associates, Inc., and other background information provided by the town and applicant.

Wildlife Habitat

Mature mixed hardwoods including oaks, hickory and maple, with a small component of white pines, dominate the undisturbed portions of the property. Acorns produced by oaks are a valuable food for a wide variety of birds and mammals including eastern wild turkeys, wood ducks, blue jays, white-tailed deer, gray squirrels, southern flying squirrels, Eastern chipmunks and white-footed mice. Other mammals that are likely occupying the property include coyote, red fox, eastern cottontail rabbit, raccoon, short tailed weasel and star-nosed mole. The patches of softwoods contribute to forest diversity and provide additional cover for wildlife throughout the year. Wildlife species described as "area sensitive" are likely using the remaining forest on the property given that adjacent properties contain forest habitat that is largely unfragmented. Included on this list would be a number of forest birds that require relatively large tracts of continuous forest for successful breeding (e.g., veery, yellow-throated vireo, scarlet tanager, sharp shinned hawk and barred owl), and mammals that have large home ranges. e.g., fishers and bobcats.

The most significant habitat feature on the property is the wetland complex consisting of Cady Brook, Five Mile River, the wetland encompassed by lots 9-12, and the associated riparian zone (zone of vegetation immediately adjacent to the bank of a stream or other water body). A diversity of wildlife are attracted to wetlands due to the complex vegetative structure and abundance of food present in the form of insects, berries and seeds. This wetland system likely provides

food and den sites for aquatic mammals such as mink and river otter and breeding and feeding habitat for amphibians and reptiles. Many species of birds commonly use forested wetlands, riparian habitats and adjacent uplands for breeding, feeding and shelter. Some of these birds include hermit thrush, tufted titmouse, gray catbird, rufous-sided towhee, white-throated sparrow, woodpeckers, common yellowthroat, veery, eastern phoebe, American woodcock, eastern wild turkey, red shouldered hawk and barred owl. Forested riparian zones aid in the survival of aquatic invertebrates and plants by removing excess nutrients and sediment; provide shade for optimum light and temperature conditions necessary for the survival of fish; and provide a source of leaf matter and woody debris which provide both food and cover for aquatic insects, fish and amphibians. In addition, forested riparian areas serve as travel corridors for wildlife.

Impacts of Excavation and Development

After the site visit and evaluation of plans for development, several concerns arose relative to the amount of land clearing and proximity of the proposed developed sites to the wetlands and watercourses. A portion of the property has already been excavated and graded for house lots 1-9 and lot 12. The house lots that include the Brookside Landing cul-de-sac area (lots 13 - 19) will need to be logged, excavated, and graded. As forests become replaced or fragmented by roads and development, wildlife habitat is lost and the potential for water quality degradation increases. Direct loss of habitat due to the excavation and subsequent development of the property will lead to a decline in wildlife species abundance on the property. Forest interior breeding birds will be dispersed from the property due to lack of adequate territory. It has been documented that isolated patches of forest smaller than 100 acres are characterized by a low density and diversity of birds that breed within the interior of forest habitat. High rates of cowbird parasitism (cowbirds laying their eggs in the nests of other birds) and nest

predation by raccoons, skunks and domestic cats have been reported where small patches of forest are surrounded by open habitat and residential development. Similarly, mammalian predators that have relatively large home ranges, tend to avoid areas where large permanent openings exist. These fragmented habitats attract more common species such as raccoon, Virginia opossum, white-tailed deer, striped skunk, European starling, American robin and house finch. Increased human disturbance will discourage some wildlife species from using the property, especially nesting songbirds from May through July.

Aside from Cady Brook and Five Mile River, there are two major wetland areas of concern. These lie in the middle section of the property between lots 11 and 12, and surrounded by lots 9, 10, and 11. While a standard 50 foot buffer might be sufficient in protecting water quality and hydrology in some areas, it will not adequately protect the biological functions of the wetland/upland complex for wildlife, particularly amphibians. These animals are especially sensitive to wetland alterations, water quality degradation and habitat fragmentation because they have small home ranges, relatively limited dispersal capability and high site fidelity (annually return to same wetland sites to breed.) Some salamanders and frogs depend on vernal pools (shallow wetlands that form in topographic depressions that are filled by spring rains and snowmelt and dry out in most years) and other temporary wetlands for breeding. The uplands surrounding these wetlands are an integral part of the wetland systems amphibian populations require for survival. For example, studies have shown that salamanders will move an average distance of 500 feet (200-800 feet) from their wetland breeding habitats into adjoining upland forests to feed and live out their adult life. Upland forests provide important habitat features such as patches of canopy shade, a deep layer of leaf litter, downed logs and other woody debris that are not only important to amphibians, but other wildlife as well. In addition, forest canopy removal can have a detrimental effect on vernal pool ecology by altering soil and water temperature, evaporation rates and the import of organic

material, e.g., leaves and branches, into the pools. Further, road systems can significantly impact reptile and amphibian populations through direct mortality, i.e., road kills, where roads intersect migration and dispersal routes. The presence of curbing, berms and drainage ditches also can cause them to divert from their normal migration routes.

Recommendations for Minimizing Impacts

Efforts should be directed toward protecting the wetlands and watercourses with properly maintained pollution and sedimentation control devices and maximizing the width of the wetland buffers. Although the established 50 foot buffers will limit the extent of permanent impacts, i.e., buildings and driveways, their ability to provide sufficient habitat for wildlife or to filter excess nutrients from landscape applications is questionable. At a minimum, the buffers along the two streams should be extended to 100 feet, where feasible. All buffer areas (50 and 100 foot) should be encumbered by conservation restrictions/easements. The easements should prohibit further development, the creation of manicured lawns and the use of chemical applications in order to reduce the amount of "lost habitat", promote the retention of primarily wooded habitat, and reduce the potential for wetland contamination. The easements should allow accepted conservation practices, such as timber stand improvement and wildlife habitat enhancement, to be conducted. The restrictions should be incorporated into the deed of record and the boundaries marked in the field.

An effort should be made to provide a travel corridor through the property for wildlife by maintaining a connection between the large wetland that lies within lots 9-12, Cady Brook and the Five Mile River. It is therefore recommended that lots 11 and 10 be removed from the plans. Lot 11 is located between two valuable wetlands and the plot plan for lot 10 is surrounded by wetlands and shows the septic system at the proposed 50 foot wetland buffer line. Amphibians and other

wildlife likely migrate through this area when moving to and from the wetlands. Consideration should be given to designating these lots as open space or adding them to adjacent properties with conservation easements in place.

The upland area adjacent to lots 11 and 10 should be restored to accelerate the protection of the wetlands and to mitigate for some of the wildlife habitat lost as a result of the land clearing and excavation. Some suggested plantings that are good for erosion control and wildlife habitat include orchardgrass, switchgrass, white clover and white pine. It appears that an effort is being made to accomplish this. In addition, a margin of vegetation (minimum 25 feet in width) should be allowed to re-vegetate between all excavated areas (that will become lawn or "yard space") and the forest edge following tree removal to increase habitat diversity. These "soft edges" will provide habitat for species that would otherwise not be found in either heavily-forested habitat or open grasslands.

The construction of the man-made pond encompassed by lots 1-8 creates ideal feeding and breeding habitat for Canada geese. Careful consideration should be given as to how the area around the pond is managed. Goose/human conflicts often arise in parks, and on ballfields, golf courses and in this case residential lawns when large open areas of manicured grass exist in close proximity to open water. Geese require fresh water for nesting and resting, as well as tender grasses and other succulent vegetation for feeding. Although Canada geese are generally considered aesthetically pleasing, problems occasionally arise when large accumulations of droppings litter public use area and overfertilize waterbodies, resulting in algae blooms.

To help reduce goose/human conflicts, minimize the amount of lawn area near the pond and create a natural physical barrier to discourage easy movement of geese on and off the water. Allowing the upland vegetation around the pond to

grow tall and/or landscaping the area with a variety of native, berry-producing shrubs will not only discourage the geese, but will provide additional food and cover for songbirds, small mammals and other wildlife. In addition, the property owners should be discouraged from feeding geese by informing them of the problems associated with attracting too many birds to one area, e. g., water contamination and disease.

Fish Resources Review

Fisheries Resources

The Five Mile River supports a very diverse and healthy fish community. It is annually stocked by the DEP Inland Fisheries Division with over 4,800 adult (9 - 12") brook, brown and rainbow trout in the Towns of Putnam, Thompson, and Killingly. It is also known to support naturally reproducing brown trout populations often referred to as "wild brown trout." In addition to salmonids, other stream dwelling fish, which can be found in abundant numbers include: blacknose dace, longnose dace, fallfish, white sucker, tessellated darter, golden shiner and common shiner. Due to the small impoundments on the Five Mile River, obligate lake or pond species including largemouth bass, chain pickerel, yellow perch, bluegill, pumpkinseed, redbreast sunfish, and brown bullhead can also be found in this watercourse.

The stretch of the Five Mile River is best characterized as low gradient and meandering with a moderate degree of sinuosity. Stream mesohabitat adjacent to the property is in the form of long stretches of pool/run habitats.

Cady Brook was sampled by the DEP Fisheries Stream survey team on 7/12/94 within a 100 meter stretch above Chase Road in the Town of Putnam. A mixed coldwater/warmwater fish community was documented which included adult brown and rainbow trout, white sucker, tessellated darter, largemouth bass, chain pickerel, pumpkinseed sunfish, and brown bullhead.

Adjacent to the property, Cady Brook is a moderate gradient stream containing more shallow riffle than pool mesohabitat. Similar to the Five Mile River, the stream contains generous amounts of large woody debris; however, streambed

substrate contains more amounts of coarse materials such as large gravels and cobbles than the Five Mile River.

Impacts

1. Removal/Alteration of Riparian Vegetation

Albeit that Lot #5 has already been approved by town commissions, a significant amount of clearing and disturbance has occurred within the riparian zone of the Five Mile River and adjacent upland areas negatively impacting riparian function. Clearing of vegetation will also occur as close to 50 feet from the edge of Cady Brook on proposed lots 13, 14, and 16. It is the opinion of the Team's fisheries biologist that the 50 foot wide buffer is inadequate to sufficiently protect the Five Mile River and Cady Brook. Riparian vegetation serves to sufficiently protect the Five Mile River and Cady Brook. Riparian vegetation serves several vital functions in the maintenance of biologically diverse stream and riparian ecosystems. Vegetated riparian ecosystems:

- naturally filter sediments, nutrients, fertilizers, and other non-point source pollutants from overland runoff,
- maintain stream water temperatures suitable for spawning, egg and fry incubation, and rearing of resident finfish,
- stabilize streambanks and stream channels thereby reducing instream erosion and aquatic habitat degradation,
- supply large woody debris to streams providing critical instream habitat features for aquatic organisms,
- provide a substantial food source for aquatic insects which represent a significant proportion of food for resident finfish, and
- serve as a reservoir, storing surplus runoff for gradual release into streams during summer and early fall base flow periods.

2. Construction site soil erosion and sedimentation through increased runoff from unvegetated areas.

This parcel will be significantly disturbed prior to subdivision development as vegetation will be cleared and sand and gravel mined. Significant cuts and fills will occur to prepare the proposed final grades for the subdivision. Until the area is finally stabilized and revegetated, significant disturbance will occur on proposed lots 13, 14, 15 and 16 which could threaten the aquatic resources of Cady Brook. A temporary sediment/detention basin is proposed on lot 13 which outlets approximately 90 feet from the edge to Cady Brook. Final grading shows that surface drainage will ultimately flow in the direction of Brookside Landing. During the site visit, the lack of erosion and sediment controls on Lot #5 were resulting in sediment runoff to the Five Mile River. Excessive sediment deposition could damage Cady Brook and the Five Mile River, both high quality aquatic resources in the following ways:

- Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry.
- Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect population levels in turn will adversely affect fish growth and survival.
- Sediment reduces the amount of usable habitat required for spawning purposes. Resident fish may be forced to disperse to other areas not impacted by siltation.
- 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.
- 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.

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

3. Percolation of septic effluent into riverine resources.

A failure of septic systems to operate properly would be potentially dangerous to the environmental health of nearby riverine resources. Septic systems on Lots 15 and 16 are within 100 feet of Cady Brook. Nutrients, especially phosphorous and assorted chemicals that may be placed in septic systems could possibly enter wetlands and streams in the event of a system failure or infiltrate the groundwater during the spring when the water tables are close to the surface. Failure of the systems to operate properly could threaten fish habitat, public health, and overall water quality conditions.

4. Transport of lawn fertilizers and chemicals to pond environments.

Runoff and leaching of nutrients from lawn fertilizers can stimulate aquatic weed and algal growth in riverine habitats and degrade water quality.

Introduction of lawn herbicides has been known to directly result in "fish kills."

Recommendations

The following recommendations are provided to ensure protection of fisheries resources.

- 1. It is recommended that at a minimum, a 100 foot open space buffer zone be maintained along the wetland boundary of all streams.**

Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life. These

buffers will absorb surface runoff and other pollutants before they can enter wetlands, ponds, and stream ecosystems. Additionally, buffer zones can improve the quality of instream habitat for fishes. For example, research has shown that trout habitat units can increase 2,400% when well-vegetated buffer zones are used for stream corridor protection.

2. It is recommended to revegetate disturbed areas along Lot #5 to increase vegetative buffer width to approximately 100 feet.

This buffer area should remain as an undisturbed strip to allow native vegetation to become re-established. The area should not be transformed into grass lawn. To help accelerate the development of the riparian zone, a replanting plan should be developed which would include a mixture of native mixed hardwood and shrub vegetation.

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 basins. Land disturbance and clearing should be kept to a minimum. Construction phasing is recommended and all disturbed areas should be restabilized as soon as possible. Exposed, unvegetated areas should be protected from storm events. The temporary sediment basin should be maintained especially due to its location to Cady Brook. The applicant and local wetland enforcement officer should be responsible for checking this development on a periodic basis 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 possible soil erosion violations. Past siltation disturbances in Connecticut have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

4. Properly design and locate the septic systems.

It is crucial that septic systems effectively renovate septic effluent, in particular phosphorous. Septic effluent can be one of the greatest threats to the ecology of streams. When septic leach fields are proposed to be located within 100 feet of wetlands and watercourses, the town sanitarian or IWWC should require analyses of phosphate and nitrate transport to ensure that leachate does not interfere with aquatic resources. Doing this may go beyond the standards of the State Health Code, but it is warranted to protect surface waters from avoidable sources of eutrophication. All septic systems should be maintained on a regular basis. Residents should be encouraged to utilize non-phosphate detergents.

5. Limit liming, fertilization, and the introduction of chemical to housing development lawns.

This will help abate the amount of additional nutrients to stream environments. Non-phosphorous lawn fertilizers are currently available from various lawn care distribution centers.

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur at the site in question.

The 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 Environmental & Geographic Information 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. Consultations 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.

Archaeological Review

A review of the State of Connecticut archaeological files and maps shows no known archaeological site on the project area; however, our files do indicate seven prehistoric Native American archaeological sites in very close proximity. These sites range from hunting and gathering camps to possible Native American villages. These sites appear to date from 4000 years ago to approximately 1000 to 500 years ago. In addition, field review of the property suggests that environmental and topographic features have a high sensitivity for the discovery of unknown archaeological resources. The Office of State Archaeology strongly recommends an archaeological survey for the project area. The survey should be conducted in accordance with the Connecticut Historical Commission's *Environmental Review Primer for Connecticut's Archaeological Resources*.

The Office of State Archaeology (OAS) is prepared to offer an technical assistance to the property owner in conducting the recommended archaeological survey. The OAS looks forward to working with the landowner and the town of Putnam in the preservation and conservation of any archaeological resources that might exist on the property.

Stormwater Review

Since the site construction involves the disturbance of over five acres, Connecticut's General Permit for the Discharge of Stormwater and Dewatering Wastewaters (the "Permit") will cover the project. The permit requires that the site register with the Department of Environmental Protection (CT DEP) at least 30 days before the start of construction. The registrant must also prepare, submit and keep on site during the construction project a Stormwater Pollution Control Plan (the "Plan"). The Plan must be followed and updated as needed during the course of construction, for example, if the single row of silt fence along the ponds and wetlands is inadequate.

Please note that while this review is based primarily on the state Permit, many of the erosion and sedimentation issues are included in the Connecticut Guidelines for Soil Erosion and Sediment Control (the "guidelines"), and are issues that must be dealt with on a local level before being included in the Plan. Silt fence installation must comply with the guidelines, and may be used only in drainage areas of one acre or less.

The Plan must include a site map as described in Section 6(b)(6)(A) of the General Permit and a copy of the erosion and sedimentation (E & S) control plan for the site. The E & S plan that has been approved by the Town in conjunction with the CT DEP Inland Water Resources Division (IWRD) and the local Soil and Water Conservation District may be included in the Plan. This plan and site map must include specifics on controls that will be used during each phase of construction. Specific site maps and controls must be described in the Plan, as well as construction details for each control used. The permit requires that "the plan shall ensure and demonstrate compliance with" the guidelines.

The permit (Section 6(b)(6)(D)) requires inspections of all areas at least once every seven calendar days and after every storm of 0.1 inches or greater (this is in contrast to some statements in the submitted reports.) The plan must also allow for the inspector to require additional control measures if the inspection finds them necessary, and should note the qualifications of personnel doing the inspections. In addition, the plan must include monthly inspections of stabilized areas for at least three months *following* stabilizations. There must be someone available to design and adjust E&S controls for changing site conditions, who has the authority and resources to ensure that such necessary changes are implemented.

Details for the installation of all crossings and culvert installations, including appropriate and individualized erosion controls, must be included.

The permit (Section 6(b)(6)(C)(iii)) requires that the plan include a design for post-construction stormwater treatment of 80% of total suspended solids from the completed site. Sheet flow off of the road discharging to stable road banks or grassy swales may meet this requirement.

Subsurface Sewage Disposal Review

The Team sanitary engineer was unable to attend the site evaluation on 5/2/2000, and the following comments are based upon a review of the January 2000 Messier and Associates subdivision plans.

The plans depict 20 lots and a parcel designated Parcel A. If Parcel A is being created the Northeast District Department of Health should review the parcel for compliance with Public Health Code Section 19-13-B103e (a)(3). This will ensure the existing septic system serving the dwelling on Parcel A remains on the lot, and the lot has a code complying septic system area available.

The subdivision land has been the site of a gravel excavation operation. Gravel removal operations can render sites to be unsuitable for sewage disposal systems if too much naturally occurring material is removed. Public Health Code Section 19-13 B103e (a)(3) stipulates the minimum soil conditions required for new septic systems. There must be suitable naturally occurring soils available to adequately absorb or disperse the expected volume of sewage effluent without overflow, breakout or detrimental effect on ground or surface water. If there is not, then new septic systems could not be approved pursuant to PHC Section 19-13 B103e (a)(4). It is this reviewers understanding that the deep test pits conducted for the proposed subdivision identified naturally occurring soils.

Soil maps classify the majority of the non-wetland soils on-site as Hinckley and Merrimac soils. These soils are typically quite permeable, and do not have shallow ledge rock or maximum groundwater conditions in their undisturbed state. Such conditions can adversely effect the operation of sewage disposal systems. The soil survey rates Hinckley and Merrimac soil as severe for subsurface sewage disposal systems. The severe rating is due to the poor filtering characteristics of these permeable soils. Public Health Code Section 1 9-13-B103d

(e) stipulates a severely rated soil constitutes an area of special concern. New septic systems in areas of special concern require engineered designs. Only several of the lots in the proposed subdivision stipulate that engineered designs are required. These lots have percolation test rates faster than one minute per inch. These fast percolation rates also qualify the lots to be classified as areas of special concern. The engineer should review the soil ratings on the proposed lots. Lots classified as areas of special concern should be designated to require engineered designs.

One of the primary concerns with very permeable soils is the potential for contamination of wells if the leaching systems are located too close to ledge rock. Pollution of wells can occur if poorly treated sewage effluent moves quickly to fractures in the bedrock. If this happens pollution can move quite quickly to nearby drilled wells. Because of this concern the Public Health Code's Technical Standards require well separation distances to be doubled whenever sites have percolation test rates faster than 1 minute per inch and there is less than 8 feet separation provided between the bottom of the leaching system and ledge rock. Several of the lots in the proposed subdivision show 150-foot well separation distances due to fast percolation rates although shallow ledge rock conditions were not identified.

Elevating leaching systems as much as possible above the ground water will reduce the potential for pollution where the soil is highly permeable. Deep leaching pits or galleries should be avoided unless ground water is very deep. The leaching systems shown on the proposed lots in the subject subdivision are 4 foot wide by 1-foot deep stone leaching trenches. These trenches are one of the shallowest available leaching systems.

Biodegradable organic chemicals may pollute ground water where the soil is highly permeable, the ground water is relatively high, and the volume of sewage discharge is large. Experience has shown that unacceptable levels of pollution are

unlikely to occur at the densities proposed. The proposed lots range from 2+ - 11+ acres.

Septic systems add nitrates to ground water. Excessive nitrate levels in drinking water wells could be a hazard to the health of infant children who consume the water regularly. It is extremely unlikely that domestic subsurface sewage disposal systems could ever produce hazardous nitrate levels in wells as long as the minimum separating distances required by the Public Health Code are provided, and the wells are properly cased and sealed into bedrock. Nitrate enrichment of surface waters from septic systems can be a concern if density is high. No adverse affect would be anticipated on surface water quality from housing developments with one acre minimum lot sizes. This office has recommended local health departments require nitrogen analyses for all parcels where the density of development exceeds one bedroom per 0.167 acre. These criteria would require such an analyses for new 3 bedroom houses on less than 1/2 acre. The River Junction Estates subdivision has relatively large lots (2 plus acres) therefore nitrogen pollution from the septic systems would not be anticipated. It should be recognized that there are other non-point sources of nitrogen pollution such as fertilizer that can be a concern.

Phosphate is another nutrient contained in sewage; phosphate can stimulate considerable algae growth in surface water. Fortunately phosphates in sewage combine readily with certain minerals normally present in soils to form insoluble deposits which are readily removed by filtration through soils. It is therefore unlikely that properly designed subsurface sewage disposal systems would be a significant source of phosphate pollution.

Bacteria are always present in sewage. Bacteria are removed by filtration through the soil and are rarely found to pass through more than 3 - 5 feet of unsaturated soil, or 10 - 15 feet of saturated, naturally occurring soil. It has been shown that the survival of bacteria seldom exceeds 10 days if confined to unsaturated soils.

The principle factor determining the survival of bacteria in soil is moisture. The minimum separation distances to surface waters (50 ft.) and to wells (75 ft.) provide for bacteria elimination as long as the leaching systems are satisfactorily elevated above maximum ground water and ledgerrock conditions.

Viruses are smaller than bacteria and are not as readily removed by filtration. They also can have longer survival times. Presently a minimum 21 day minimum travel time is desired for proper viral renovation. A time of travel analysis is not typically required on small (less than 5,000 gallons per day) septic systems. It is the Team's sanitary engineer's understanding that it has not been done in the subject case.

The majority of the proposed lots do not have any hydraulic constraints due to the presence of well drained, permeable soils with no restrictive underlying layers to impede sewage effluent and groundwater flow. Lots 5, 8, 9, and 10 may have limited hydraulic conductivity due to relatively shallow ground water conditions. Soil test data for lot 5 was not shown on the plans. It is my understanding a separate engineered plan is available for lot 5. Soil test data for lot 5 should be on the plans.

Minimum leaching system spread (MLSS) criteria is a tool in the Technical Standards that ensures lots have sufficient hydraulic capacity to handle design sewage flows. Based upon review of the subdivision plans the Team sanitary engineer concurs with the project engineer that MLSS need not be considered on the majority of the lots due to the lack of restrictive layers, however, lots 5, 8, 9, and 10 should be re-evaluated to ensure MLSS compliance. The leaching system on lot 9 does not meet MLSS criteria. The reserve leaching area for lot 9 is also too close to the property line. The test holes on lot 10 identified wet soils at 40 inches and based on the proximity to nearby wetlands it is likely that shallow groundwater is present. The engineer noted lots 5, 8, and 10 did not have any restrictive layers within 60 inches of the ground surface. The leaching systems for

lots 8 and 9 are at approximately the same elevation and they are both in close proximity to wetlands. Based on these factors it is likely lot 8 has similar shallow ground water conditions as lot 9.

This office is available to discuss the above noted comments on the sewage disposal facilities for the proposed River Junction Estates subdivision.

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, 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: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.