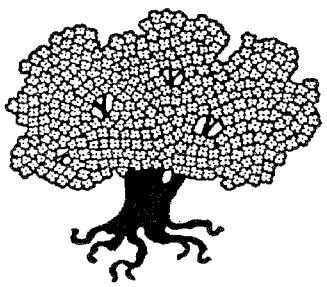
ASHFORD ESTATES SUBDIVISION

ASHFORD, CONNECTICUT

FEBRUARY 1989

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

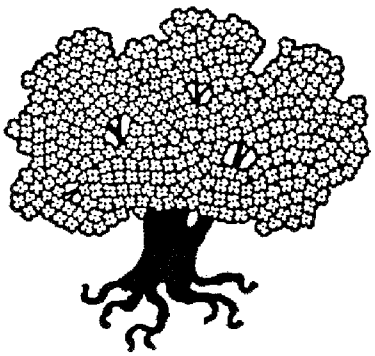


EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

ASHFORD ESTATES SUBDIVISION
ASHFORD, CONNECTICUT

REVIEW DATE: JANUARY 17, 1989

REPORT DATE: FEBRUARY 1989



EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM
P.O. BOX 70, ROUTE 154
HADDAM, CONNECTICUT 06438
(203) 345-3977

ENVIRONMENTAL REVIEW TEAM REPORT
ON

ASHFORD ESTATES
ASHFORD, CONNECTICUT

This report is an outgrowth of a request from the Ashford Conservation Commission to the Windham 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, January 17, 1989. Team members participating on this review included:

Nick Bellantoni	State Archaeologist	CT Museum of Natural History
Howard Denslow	District Conservationist	USDA-Soil Conservation Service
Kevin DesRoberts	Wildlife Assistant	DEP-Eastern District
Steve Hill	Wildlife Biologist	DEP-Eastern District
Brian Murphy	Fisheries Biologist	DEP-Eastern District
Dick Raymond	Forester	DEP-Goodwin Conservation Center
Elaine Sych	ERT Coordinator	Eastern Connecticut RC&D Area
Bill Warzecha	Geologist/Sanitarian	DEP-Natural Resources Center

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, a soils map and a consultant's report. During the field review the Team members were given full sets of plans and more consultant reports. The Team met with, and were accompanied by the Conservation Commission Chairman, other members of the Commission, the property owner, his engineers and consultants and an individual from the University of Connecticut. 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 recommmend what final action should be taken on a proposed project -- all final decisions rest with the Town and landowner. This report identifies the existing resource base and

evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in making your decisions on this proposed subdivision.

If you require additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P.O. Box 70
Haddam, Connecticut 06438
(203)345-3977

Table of Contents

1. Setting, Land-Use and Topography

The proposed 60-lot Ashford Estates subdivision consists of ± 267 acres of wooded land in the northwest corner of Ashford near the Willington town line. The land is bordered by Turnpike Road on the south, Armitage Road on the east, Bissonnette Pond on the west, and private, undeveloped land and Tinkerville Brook on the north. Kidder Brook flows in a southerly direction through the southwest corner of the site enroute to an unnamed surface water body off the site. It is understood that this pond, which is located on the south side of Turnpike Road, is used for the commercial breeding of fish. An access road for the proposed subdivision, about 3,700 feet in length, will follow along the high points of the site from Turnpike Road to Armitage Road.

The site is located entirely in a Residential Agricultural zone. The proposed residential subdivision would be a permitted use in the zone. According to Town regulations "a building lot shall contain at least two (2) continuous acres exclusive of wetland soils, bedrock or ledge at least 48 inches from the surface and slopes greater than 15 percent" for single family dwellings and accessory buildings. Each lot will be served by individual on-site wells and septic systems. Additionally, any activity within 100 feet of wetlands/watercourses is regulated and will require a permit from Ashford's Inland Wetland Commission.

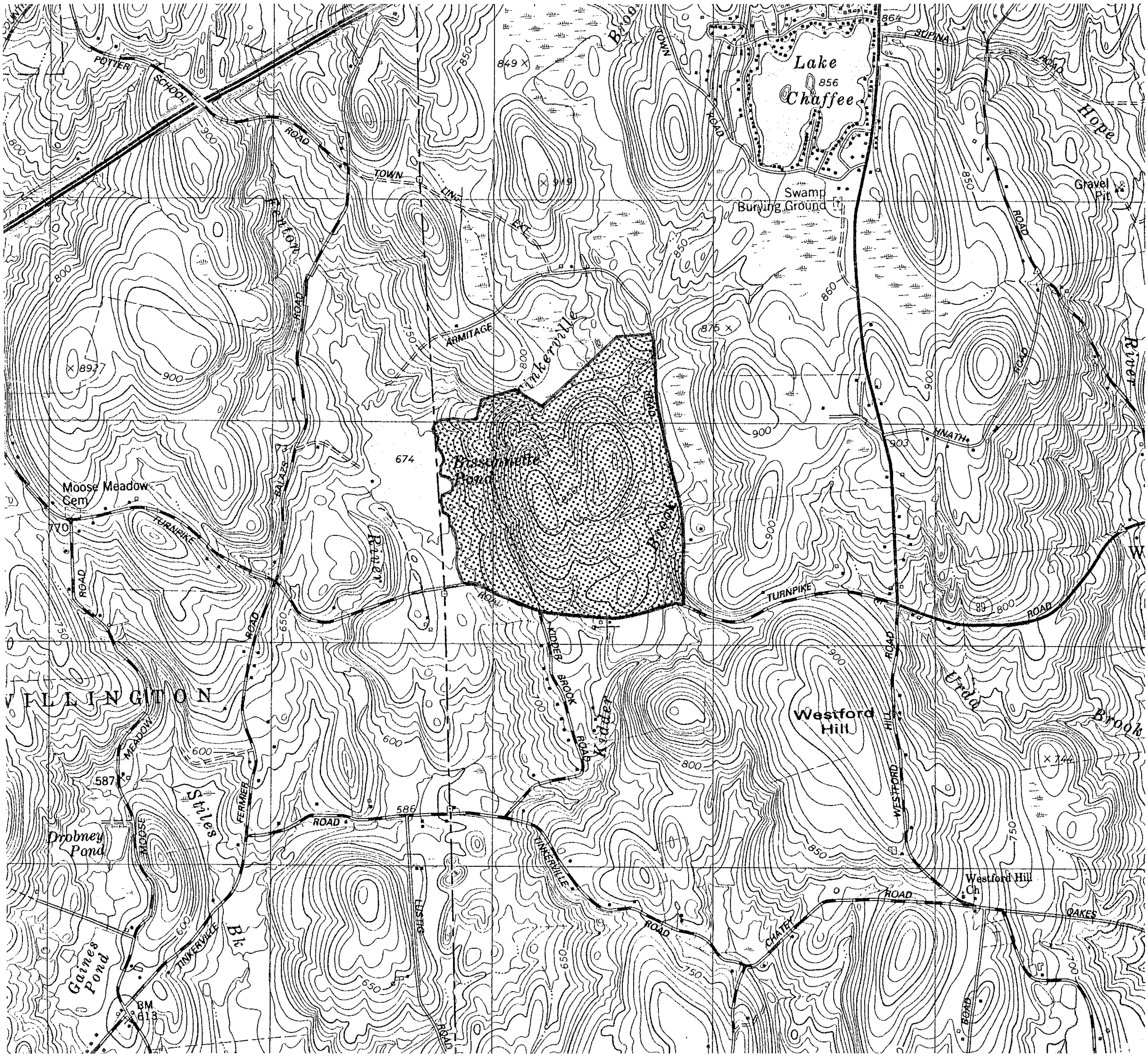
Land-use in the area is presently characterized by low density residential and scattered agriculture. It should be pointed out that the Environmental Review Team recently conducted a review for a proposed residential subdivision on 150 acres northwest of Ashford Estates in Willington (Fenton Bluffs, December 1988). Town officials also noted that another major subdivision is being considered for the area.

In general, the site is characterized by slopes that range from gentle to steep. The steepest slopes occur at the western third of the site near Bissonnette Pond. The remainder of the site contains gentle to moderate slopes. Site elevations range from about 885 above mean sea level near Lots #24 and #25 to about 680 feet above mean sea level at the western property line.

LOCATION

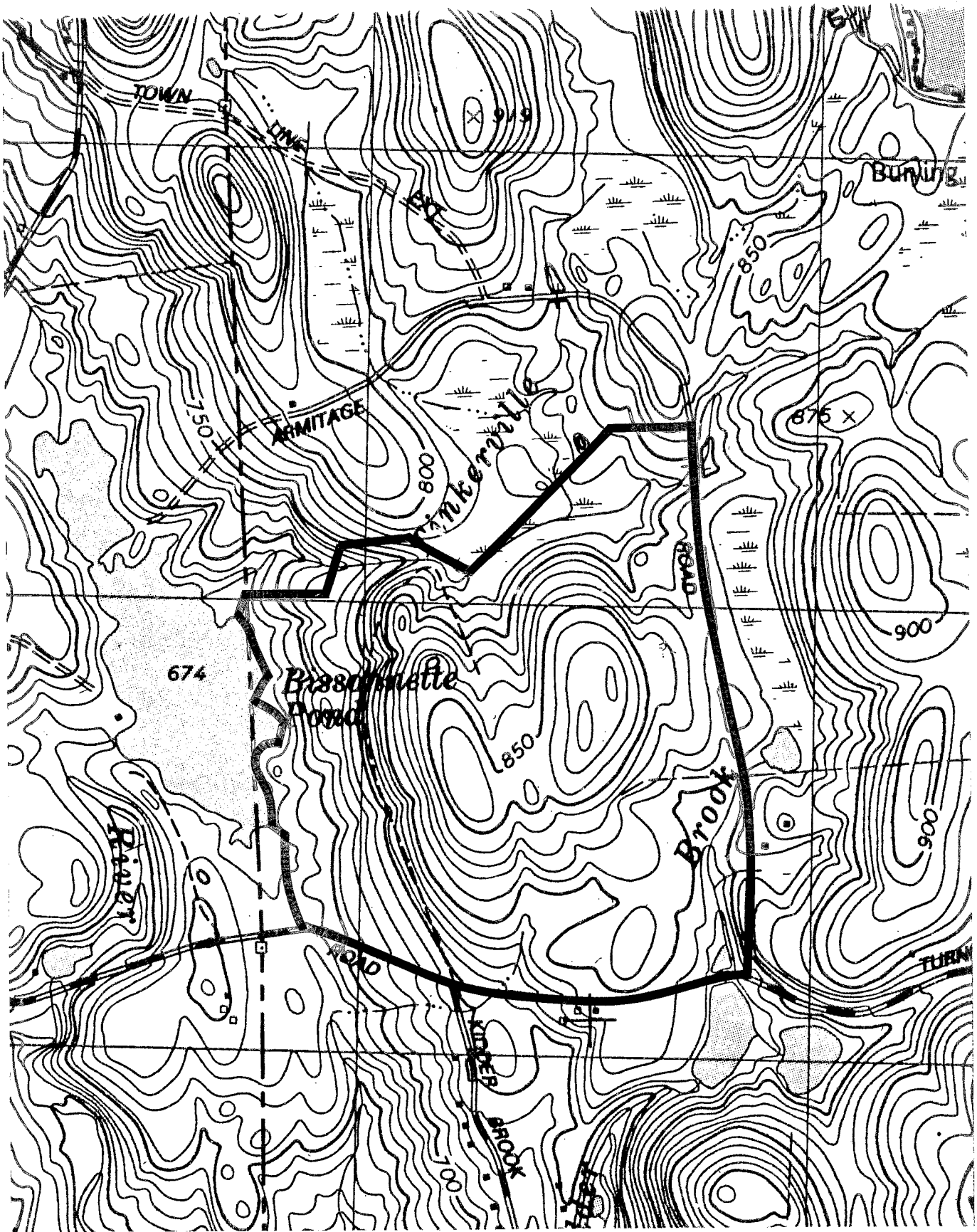
Scale 1" = 2000'

Approximate Site Location



TOPOGRAPHY

Scale 1" = 1000' — Approximate Site Boundary



2. Geology - Bedrock and Surficial

Although bedrock was not encountered in deep test holes for subsurface sewage disposal exploration on the site, it has been exposed by stream bank erosion and downcutting by Tinkerville Brook at the northern property line. This segment of the brook and adjacent land is very scenic. Additionally, it has historic, recreational, fish and wildlife value. According to map GQ1214 (Geologic Map of the Westford Quadrangle, CT, by J. D. Peper and Maurice H. Pease, Jr., 1975), which encompasses the site, bedrock underlying the site has been classified as the lower member of the Hamilton Reservoir Formation. It is described as a yellowish-orange weathering, medium to coarse-grained gneiss and schist composed mainly of the minerals quartz, feldspar, biotite and garnet. The rock unit also includes minor dark-gray, fine grained feldspathic (feldspar-rich) quartzite and a granular plagioclase-quartz-biotite gneiss.

"Schists" and "gneisses" are crystalline rocks that have been geologically altered by great heat and pressure within the earth's crust. The terms "schist" and "gneiss" refer to the textural and structural aspects of the rocks. The rocks underlying the parcel have undergone deformation (metamorphism) one or more times during the period following their deposition as deep ocean sediments. The stresses of deformation caused the alignment of platy, flaky and elongate minerals into thin sheets or bands. Where the alignment has resulted in a slabby rock (i.e., one that parts relatively easily along the surface of mineral alignment or foliation planes), the rock is termed a "schist". Where the alignment has resulted in a banded but more massive rock, the rock is termed "gneiss". Both rock types may grade into another in a single outcrop.

Deep test hole information compiled for the exploration of subsurface sewage disposal indicates that depths of 84" or 7 feet were obtained in most holes. Depth to the bedrock surface is probably shallowest at the northern limits of the site.

The underlying bedrock will serve as the principal aquifer for domestic water supplies on each lot. Since public water is not available in town, all of the proposed lots will undoubtedly need to rely on drilled wells, cased with steel pipe and completed as open-bore holes into the underlying bedrock. (See **Water Supply** Section)

Except for some minor occurrences of sandy, gravelly material along Armitage Road at the eastern limits, the site is covered by a glacial sediment called till. Till is a poorly sorted mixture of rock fragments and particles deposited directly by glacier ice. Rock fragments and particles found in the soil were derived from gneisses and schists in the area.

Based on soil mapping data, it appears that the texture of the majority of the till on the site is silty, stony to very stony and is characterized by a relatively shallow compact soil zone. The presence of the compact soil zone usually results in seasonally high water tables, soil mottling (an indicator of high ground water tables) and moderately slow to slow percolation rates. Deep test hole data verifies that the till covering the site includes one or more of these characteristics. Without proper planning and engineering the seasonally high water table condition can be a major hindrance in terms of on-site sewage disposal, road and driveway construction, and especially in cut areas there is the potential for wet basements.

The exact thickness of the till on the site is probably 10 feet or greater in most places.

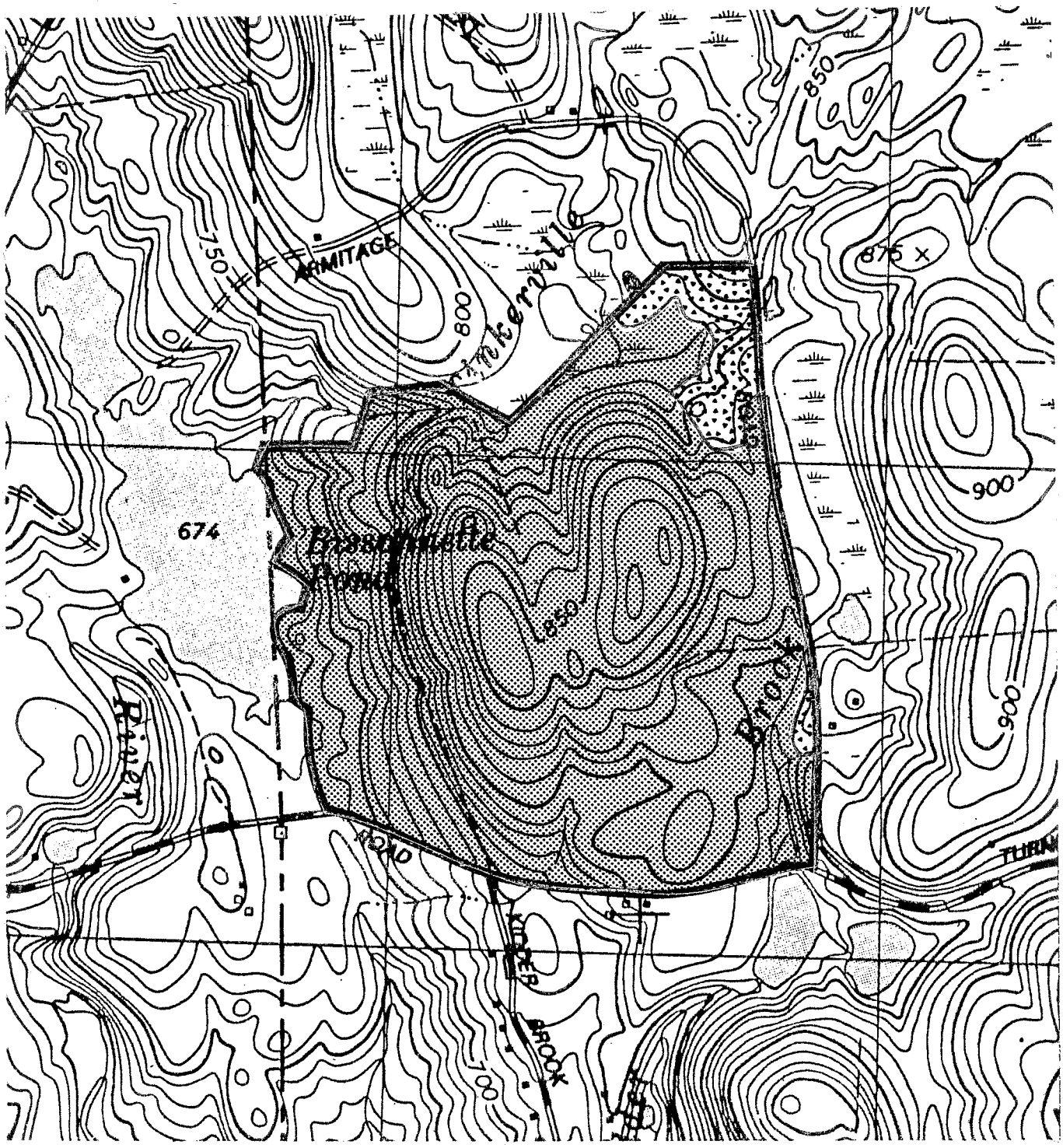
The sand and gravel deposits that occur in the eastern parts are minor and appear to have been mined in a few places. The sand and gravel was deposited by glacial meltwater streams. The exact thickness of the stratified drift is unknown.

GEOLOGY

Stratified Drift Till

*Entire site is underlain by the lower schist member of the Hamilton Reservoir Formations; generally consists of rusty-weathering ampelitic gneiss and pelitic schist.

Scale 1" = 1000'



3. Hydrology

Surface drainage as well as subsurface drainage, which tends to reflect the surface flow on the site, can be divided into four subwatershed areas; (1) the northern parts of the site drain northward to Tinkerville Brook; (2) the western third of the site drains westward to Bissonnette Pond; (3) approximately 39 acres in the southern parts drain to an unnamed tributary to Kidder Brook, a Fenton River tributary; and (4) the southeast corner drains to Kidder Brook, a Fenton River tributary.

All of the surface water bodies on the site are classified as AA by DEP. This means these waters are tributary to a public water supply watershed, presently uncontaminated, presumed suitable for direct human consumption and treated wastewater discharges are not allowed.

The subdivision of the property as planned, followed by the construction of new homes and driveways will undoubtedly lead to increases in runoff from the site. The present road layout, which trends along the high points of the site should help to minimize the potential impacts of stormwater drainage.

In order to properly assess post-development runoff in the study area , the developer should be required to prepare a stormwater management plan. The plan would include all pre- and post -development runoff calculations. It is recommended that Connecticut's Guidelines for Erosion and Sediment Control be closely followed with regard to stormwater management on the site. The management plan and calculations should be carefully reviewed by the Town's engineer and other appropriate town officials. The impacts of post-development runoff in the study area should be clearly understood in terms of flooding and streambank erosion. It is recommended that a written report accompany the plan which states the initial conditions and storm frequencies to be analyzed. A summary table showing the pre-development , post- development and designed system peak discharges for all design frequencies should also be included. An examination of all downstream culverts is warranted.

Every effort should be made to protect the streamcourses and surface water bodies on and off the site. This will help to minimize the chances for siltation problems. It seems likely that in order to protect the surface water bodies on the site, temporary and/or permanent sediment basin(s) will be required during the construction phases, especially in the areas of moderate to steep slopes and the presence of silty soils. These basins, as well as catch basins and roads, will

also need to be maintained on a regular basis in order to protect surface water bodies from sediment accumulation.

As mentioned earlier, the till soils covering the site are characterized by a "hardpan" layer. Deep cuts, (i.e., roads, driveways, etc.) into soils with "hardpan" layers are extremely difficult to stabilize due to seepage of groundwater over the compact zone (hardpan layer). The water creates an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to move downslope. After this begins, the slope is extremely difficult to stabilize. The establishment of a good vegetative cover is practically impossible on these eroding slopes.

WATERSHED BOUNDARY

Portion of site that drains to Bissonnette Pond

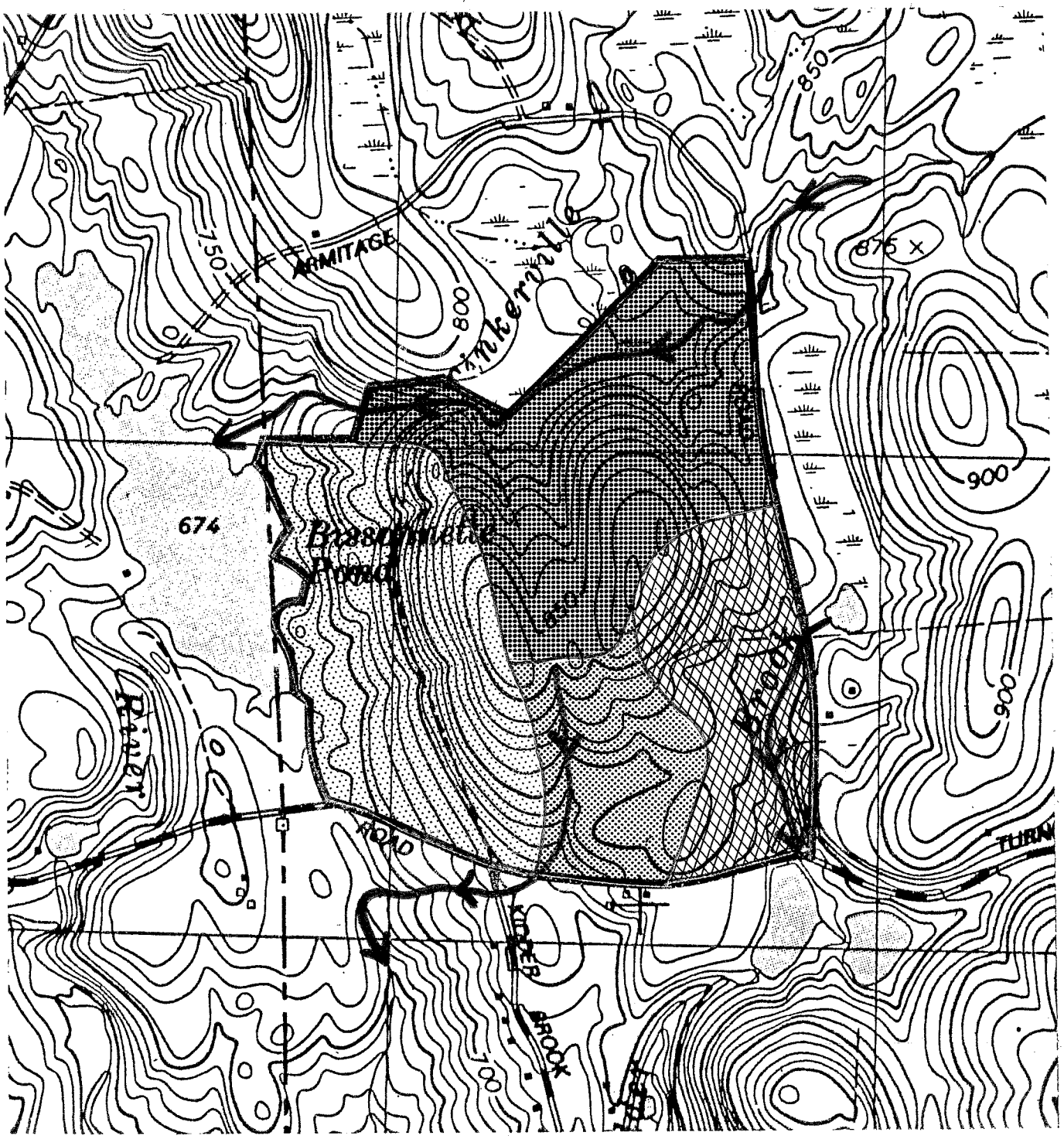
Portion of site that drains to Tinkerville Brook

Portion of site that drains to an unnamed tributary to Fenton River

Portion of site that drains to Kidder Brook

Watercourses showing direction of flow

Scale 1" = 1000'



Sec. 19-18-B32. Sanitation of watersheds. Unless specifically limited, the following regulations apply to land and watercourses tributary to a public water supply including both surface and ground water sources .

(a) As used in this section, "sewage" shall have the meaning found in section 19-13-B20(a) of the public health code: "Toxic metals" shall be arsenic, barium, cadmium, chromium, lead, mercury and silver and the salts thereof; "high water mark"' shall be the upper limit. of any land area which water may cover, either standing. or flowing, at any time during. the year "watershed" shall mean land which drains by natural or man-made causes to a public drinking water supply intake.

(b) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located within one hundred feet of the high water mark of any reservoir or within fifty feet of the high water mark of any stream, brook, or watercourse, flowing. into any reservoir used for drinking purposes.

(c) No sewage disposal system, cesspool, privy or other place for the deposit or storage of sewage shall be located on any watershed, unless such facility is so constructed that no portion of the contents can escape or be washed into the stream or reservoir.

(d) No sewage shall be discharged on the surface of the ground on any watershed.

(e) No stable, pig.pen, chicken house or other structure where the excrement of animals or fowls is allowed to accumulate shall be located within one hundred feet of the high water mark of a reservoir or within fifty feet of the high water mark of any watercourse as above mentioned, and no such structure shall be located on any watershed unless provision is made in a manner acceptable to the commissioner of health services for preventing manure or other polluting materials from flowing or being washed into such waters.

(f) No toxic metals, gasoline, oil or any pesticide shall be disposed of as a waste into any watercourse tributary to a public drinking water supply or to any ground water identified as supplying a public water supply well.

(g) Where fertilizer is identified as a significant contributing factor to nitrate nitrogen occurring in excess of 8 mg/l in a public water supply, fertilizer application shall be made only under current guidelines established by the commissioner of health in cooperation with the state commissioner of agriculture, the college of agriculture of the University of Connecticut and the Connecticut agricultural experiment station in order to prevent exceeding the maximum allowable limit in public drinking water of 10.0 mg/l for nitrate plus nitrate nitrogen.

(h) Where sodium occurs in excess of 15 mg/l in a public drinking water supply, no sodium chloride shall be used for maintenance of roads, driveways, or parking areas draining to that water supply except under application rates approved by the commissioner of health, designed to prevent the sodium content of the public drinking.water from exceeding 20 mg/l.

(i) The design of storm water drainage facilities shall be such as to minimize soil erosion and maximize absorption of pollutants by the soil. Storm water drain pipes, except for crossing culverts, shall terminate at least one hundred feet from the edge of an established watercourse unless such termination is impractical, the discharge arrangement is so constructed as to dissipate the flow energy in a way that will minimize the possibility of soil erosion, and the commissioner of health finds that a discharge.e at a lesser distance is advantageous to stream quality. Special precautions shall be taken to protect stream quality during construction.

4. Soil Resources

Natural Resources

The existing resources of the 267 acre site are accurately documented and discussed within the Analysis of Regulated Activities report prepared for the Conservation and Inland Wetlands Commission by Baystate Environmental Consultants, Inc. The heavily forested site does rest largely on two drumloidal ridges and their side slopes. The west side slopes down to Bissonnette Pond. The soils are of glacial-till origin, i.e. most having a firmly compacted hardpan within 24 inches of the surface. Upland areas slope to drainage draws, then to wetlands, intermittent streams, and eventually to Tinkerville Brook (north-west), Kidder Brook (east) and Bissonnette Pond (west).

Soil types have been delineated on the development plans to provide a rough indication of location. The environmental consultant and project engineers recognize the delineations as only rough guides since exact location would have to be based on soils mapping done at the same large scale as when the wetlands were defined and flagged. A soil map of the site from the Windham County Soil Survey is contained in this section of the report. The wetland soils have been blue-flagged in the field by Richard Snarski, a certified soil scientist.

Development Concerns

Numerous questions and concerns relative to impact on water resources have been raised by the Ashford Inland Wetlands and Conservation Commission. These have been answered in technical reports prepared by Baystate Environmental Consultants, Inc. The SCS District Conservationist has reviewed these reports and largely agrees with their analysis and findings. There are a few specific concerns, some related to implementing the development as planned, which are noted below.

The field inspection by the Review Team raised a question on the flagged limits of the wetland in Lot #46. It was questioned as to whether or not the wetlands extended further up the drainage draw, and then if the new road (Timber Trail) would adversely impact this wetland. SCS Soil Scientist Al Roberts later inspected the site and concluded that the flagging did properly delineate a wide watercourse through which upslope runoff travels over and under the surface. He would not map it as a wetland soil. The road, with installed storm drainage which will cross the draw above, will intercept some of the runoff to this area. Since this very intermittent watercourse only functions to convey runoff no adverse affect is likely with development as

planned. The runoff overflow from this watercourse does flow over the proposed septic field locations on Lot #44. This needs to be prevented by diverting this overflow through a culvert beneath an access drive to Lot #45, and into the wetland on Lot #44. Project engineers are aware of the concern and should show design details on a future plan.

Storm runoff from approximately 1500 feet of new road (Timber Trail) is directed to Turnpike Road, and than down the edge of the road to the wetlands north of a road curve - all through newly installed RCP and catch basins. Installation of RCP storm drainage within Turnpike Road ROW will necessarily disturb stable road-side and cause potential soil erosion and then sedimentation of the existing town road culverts. It is suggested this new RCP storm drainage either pick-up runoff presently draining through the existing culverts with new catch basins, or the storm drainage be installed further back in the woods with easements across Lots #57, #58, #59, and #60. The latter would allow the roadside to remain in a stable vegetated condition.

Regarding overall storm drainage the applicant has done a good job directing and dispersing runoff into the subwatersheds where it presently flows. The flared pipe outlets and riprap aprons should slow runoff and disperse it. The receiving wetlands should be capable of slowing, filtering, and assimilating the runoff. This is discussed in the consultant technical reports.

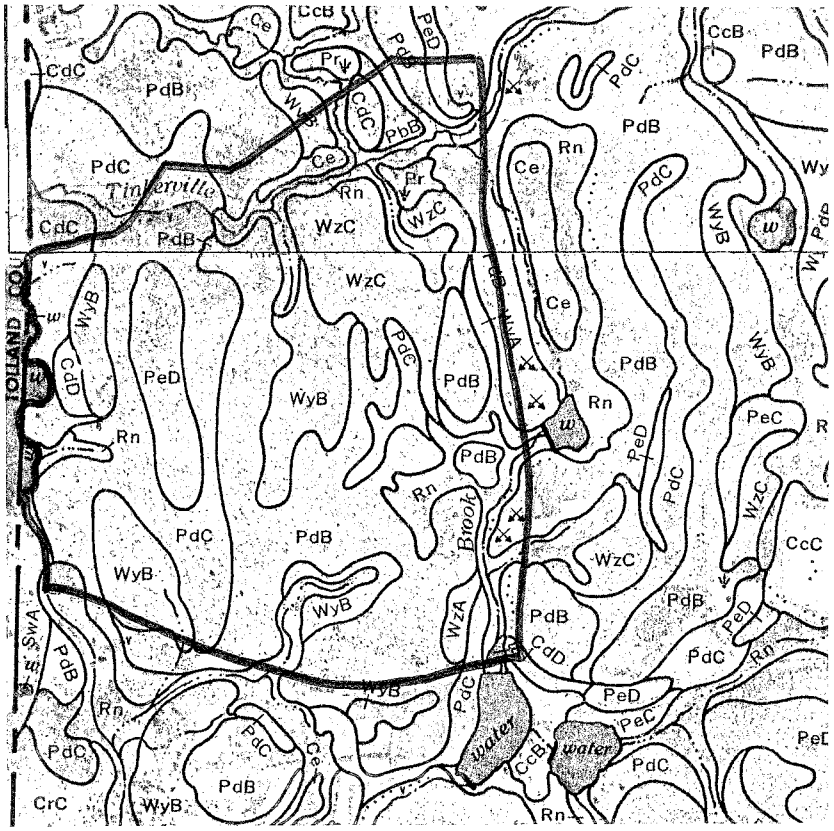
An Erosion and Sediment Control (ESC) plan has been prepared for the subdivision. It shows and tells (in narrative sheet 43 of 43) what will be done to control disturbance. However a sequence of development could be stated more clearly. Will the new road, or a portion of it, be totally installed and town approved before any lots are built upon? Will building permits be held up until a town inspector OK's the ESC plan compliance for a certain portion of the project? Also final grading is not shown around each proposed house, septic, etc. It may be logical that the ZEO review and certify a detailed ESC plan for each lot before issuing a permit. This detailed ESC plan could simply be part of the engineered septic layout design. In this case, a statement to the effect that such ESC plan for each lot will be prepared, should go on the final subdivision plan approved by P & Z.

Regarding the Conservation Easement, the existence and preservation of this buffer should be to prevent water quality degradation from erosion, septic effluent, any other contaminated runoff, and to maintain wetland wildlife habitat. To this end, it is suggested the forest ground surface not be disturbed with any mechanical equipment with the possible exception

of that necessary to make a walking trail to and/or near the water. Trees and branches of poor quality might be allowed to be removed to stimulate growth of desirable native trees and shrubs, or even new seedling underplanting. Restrictions of the easement area should be written in the owners' deeds.

SOILS

Windham County USDA-SCS
Wolfden Road
Brooklyn, CT 06234
774-0224



SCALE 1 " = 1320'

CdC - Canton & Charlton extremely stony fine sandy loams, 3 tp 15 percent slopes
CdC - Canton & Charlton extremely stony fine sandy loams, 15 to 35 percent slopes

*Ce - Carlisle muck

#PbB - Paxton fine sandy loam, 3 to 8 percent slopes
PdB - Paxton very stony fine sandy loam, 3 to 8 percent slopes
PeD - Paxton extremely stony fine sandy loam, 15 to 35 percent slopes

Pr - Pits, gravel

*Rn - Ridgebury, Leicester & Whitman extremely stony fine sandy loams

WyA - Woodbridge very stony fine sandy loams, 0 to 3 percent slopes
WyB - Woodbridge very stony fine sandy loam, 3 to 8 percent slopes
WzA - Woodbridge extremely stony fine sandy loam, 0 to 3 percent slopes
WzC - Woodbridge extremely stony fine sandy loam, 3 to 15 percent slopes

#Prime farmland soil
*Designated wetland soil by P.A. 155

5. Sewage Disposal Systems

Detailed soil testing for on-site sewage disposal has been performed on the site by Gardner and Peterson Associates. A representative of the Northeast District Department of Health, of which the town is affiliated, witnessed the deep test holes and percolation tests. This work involved numerous deep test holes that generally attained depths of 84" or 7 feet. In general, soil profiles consisted of a topsoil layer, a weathered and rooted sub-soil layer from 0.5 foot to 1.5 feet and then "hardpan". The bedrock surface was not encountered in any of the deep test holes on the site. For the most part percolation tests conducted on the site revealed acceptable rates. Most ranged in the 10-20 minutes/inch range, but a few were slower (40 minutes/inch). None revealed percolation rates that were faster than one minute per inch. The groundwater table and/or shallow mottling, an indicator of a seasonally high water table, was found in most test holes.

From a subsurface sewage disposal standpoint, it appears that the most important design constraint will be the presence of a seasonally high water table due to the restrictive "hardpan" layer present throughout the site.

The subsurface sewage disposal report prepared by Gardner and Peterson Associates and the Northeast District Department of Health, indicates that subsurface conditions are suitable for the installation of on-site septic systems, but that engineered systems would be required. Each system will need to be large, filled and raised. The presence of seasonally high water tables indicate that each system should probably be protected by curtain/building/footing drains, which will hopefully intercept ground water in the area and convey it away from the leaching field. The purpose of a curtain drain is to assure that the seasonal high water table does not rise up into the leaching system and impair its hydraulic capacity.

Before subdivision approval, the applicant's engineer must demonstrate that each of the proposed lots in the subdivision meets the minimum soil standards set forth in Section 19-13B103e(a) (3) of the Public Health Code. Each system should be able to hydraulically disperse the expected discharge into the site's natural soil layers per Section 19-13-B103e(a) (4) of the Code. The State Public Code (Technical Standards) requires a 50 foot distance between any part of a septic system and any watercourse on a public water supply watershed.

Also accompanying this part of the report is Section 19-13 B32. Sanitation of Watersheds. (a-i). which addresses the protection of water quality from subsurface sewage disposal systems and storm drainage systems in public water supply watersheds.

It should be noted that the proposed leaching area on Lot #44 is located in a subdued topographic swale, which appears to be the outlet for the mapped wetland area on Lot #46. Although soil testing revealed satisfactory soil conditions for subsurface sewage disposal in the area, every effort should be made to relocate the septic system on Lot #44 to an area which would not be affected by potential surface flow. Surface flow, especially during periods of heavy precipitation, could impair the functioning of the septic system by flooding or eroding parts of it.

6. Water Supply

Based on review of hydrogeologic data, the principal aquifer on the site is the underlying crystalline, metamorphic rock. Wells drilled in bedrock generally supply small but reliable yields of ground water that fill the fractures (cracks and seams) in the rock. Since the yield of a given well depends upon the number and size of water bearing fractures that it intersects, and since the distribution of the fractures is irregular, there is no practical way of predicting the yield of a well in a specific location, outside of drilling the well. However, experience has shown that most fractures generally occur within the first few hundred feet of the bedrock surface. The probability of increasing the yield of a well usually decreases with depths below 300 feet.

The applicant's environmental consultant estimated a water budget for the proposed project. It was demonstrated that annual ground water usage for the site would not exceed annual ground water recharge. As a result, it was determined that the underlying aquifer should adequately meet the water demands of the project. However, it must be kept in mind that the water budget assumes the underlying bedrock is fractured and is capable of transmitting water to the wells. As mentioned earlier, this cannot be predicted without first drilling the well.

Present lot layout should allow for a spacing of about 200 feet between domestic wells in the proposed subdivision. This should help to minimize the chances for mutual interference, since at least one acre of direct recharge would be available to the well(s).

Each well should ideally be located on a relatively high portion of the lot, properly separated from the sewage disposal system or any other potential pollutant (e.g., fuel oil storage tank, storm drains, etc.) and in a direction opposite the expected direction of ground water movement. Since the site is located within the watershed of a public water supply watershed and since leakage from underground fuel storage tanks is a frequent cause of ground water contamination in the State, it is recommended that residential tanks of this nature be prohibited from the watershed area. The wells should all be cased with steel pipe into the underlying bedrock. In order to provide adequate protection of the quality of bedrock water, all wells will need to be properly installed in accordance with all applicable State Public Health Code and Connecticut Well Drilling Board regulations. In addition, the town sanitarian for the Health District will need to inspect and approve well locations.

In the Shetucket River basin, 134 domestic wells tapping crystalline bedrock (i.e., gneisses, schists, etc.) were surveyed from Connecticut Water Resources Bulletin No. 11. Of these, approximately 90 percent yielded 3 gallons per minute or more. A well yield of 3 gallons per minute is generally satisfactory for most domestic uses.

The natural quality of ground water should be satisfactory. However, the bedrock beneath the site may have elevated amounts of iron, iron sulfides, and/or manganese minerals, which could lower the overall quality. In either case, there are suitable treatment filters available to ameliorate these potential water quality concerns.

Groundwater in the area is classified by the Department of Environmental Protection as GAA, which means that it is presumed suitable for direct human consumption without treatment.

7. Vegetation

The parcel proposed for subdivision may be divided into five (5) major vegetation types. Included are ± 230 acres of mixed hardwoods, ± 4 acres of hemlock, ± 19 acres of hardwood swamp/streambelt, ±8 acres of marsh and ±3 acres of old field. Additionally, there is ± 1 acre of water and areas used for past gravel extraction totalling ± 2 acres.

Vegetation Type Descriptions

TYPE A- (Mixed Hardwoods) Covering ± 199 acres, this overstocked pole to sawtimber-sized stand contains fair to good quality red oak, black oak, scarlet oak, white oak, red maple, sugar maple, white ash, black birch and beech. White pine and hemlock occurs in the overstory as scattered individuals or in small groups in some areas. A heavy understory of mountain laurel occurs throughout much of this type. Other areas are occupied by witch hazel, ironwood (both Caspinus caroliniana and Ostrya virginiana) and desirable hardwood tree seedlings. White pine is the predominate seedling/sapling in some areas, especially near the intersection of the old town road and Turnpike Road. Due to the high density of the overstory and understory, the ground cover of ferns and grasses is light.

TYPE B- (Mixed Hardwoods) This ± 31 acre stand is variably stocked with fair to good quality pole to sawtimber-sized trees. Species present are the same as in **Vegetation Type A**. Recent harvesting of poles and sawtimber has reduced the overall stocking of the stand and allowed regeneration of desirable hardwoods to become established. These seedlings now form the understory. A ground cover of raspberries and blackberries exists where the tree seedlings have not fully occupied the site.

TYPE C- (Hemlock) Pole to large sawtimber-sized hemlock associated with a minor component of mixed hardwoods such as black birch, white oak and red maple occur in this fully stocked ± 4 acre stand. The trees are of fair to good quality. A variable understory of mountain laurel is present. Ground cover is comprised of various grasses, mosses and ferns.

TYPE D- (Hardwood Swamp/Streambelt) Occupying ± 19 acres, this fully stocked type contains pole to sawtimber-sized red maple, sugar maple, black birch, white ash and various oaks. The understory is composed of ironwood, witch hazel, speckled alder, mountain laurel, spicebush, sweet pepperbush and red maple seedlings. Skunk cabbage, ferns and grasses from the ground cover. Some of the tree species noted during the field inspection not normally found in hardwood wetlands were present due to the narrow width of the wetlands.

TYPE E- (Marsh) Totalling ± 8 acres in two separate marshes, this type is comprised mainly of a shrub overstory which includes highbush blueberry, sweet pepperbush, speckled alder and spicebush. Hardwood tree seedlings and saplings, notably red maple and dogwood, are beginning to encroach upon the sites. A ground cover of sedges and cattails exists. The large marsh along the parcel's north boundary contains large pole to sawtimber-sized dead standing trees, different from the small marsh at the southeast corner which surrounds a small body of water.

TYPE F- (Old Field) Covering ± 3 acres, this old field type developed as a former agricultural field is reverting to woodland. The ground cover of grasses, ferns and goldenrod is being invaded by seedling-sized red maple, various oaks and white pine. At present, the stocking of hardwood and softwood seedlings is very light and variable.

TYPE G- (Gravel Pits) The old gravel extraction sites totalling ± 2 acres are covered with a shrub overstory of speckled alder and witch hazel in areas where the gravel surface has not been exposed. A light stocking of red maple and gray birch seedlings and saplings is found in some areas of this Type.

TYPE W- (Water) Small bodies of water on the parcel cover ± 1 acre. The major portion of this type is found near the old gravel pits and the marsh at the southeast corner of the property.

Mitigating Measures

Trees are very sensitive to the condition of the soil within the entire area under their crowns. Development practices near trees, such as excavating, filling and grading for construction of roadways and buildings may disturb the balance between soil aeration, soil moisture and soil composition. These disturbances may cause a decline in tree health and vigor, potentially resulting in tree mortality within 3-5 years. Mechanical injury to trees may cause the same results. Dead trees reduce the aesthetic quality of an area and may become hazardous and expensive to remove if near roadways, buildings or utility lines.

Care should be taken during the construction period not to disturb the trees that are to be retained. In general, healthy and vigorous trees should be retained as they are more resistant to the environmental stresses brought about by construction. Where feasible, trees should be saved in small groups or "islands". This practice lowers the possibility of soil disturbance and mechanical injury to these residual trees. "Islands" and individual trees should be temporarily, but clearly, marked so that they may be avoided during construction.

The poorly drained soils present within the **Hardwood Swamp/Streambelt Type D** limit the vegetative growth to species that are able to tolerate high moisture conditions. The trees present are able to tolerate the present site conditions, however, any adverse change in drainage conditions could change the species composition of the area. Harvesting and/or construction equipment should **not** be permitted to cross the **Hardwood Swamp/Streambelt Type D** except at the old road crossing already present. This will prevent soil disturbance which could cause soil compaction or stream siltation.

Management Considerations

Vegetation Type A would benefit from a light thinning to reduce the overstocked condition and improve the overall health and vigor of the stand. The undesirable growing stock of the pole and sawtimber classes should be removed. An effort should be made to retain the desirable large diameter black birch as well as scattered softwoods, not only for their high aesthetic value but also to maintain the diversity of the species.

Due to the light volume per acre to be removed (3 cords and 500 board feet) in **Type A**, it would be best to combine the thinning operation with the road and houselot clearing operations. Removal of the culls, which because of their location may be hazardous, may contribute some fuelwood volume.

Eventually **Vegetation Types F** and **G** will become fully stocked with trees as forest succession proceeds. Reinforcement planting could be undertaken if desired after development is complete. Suitable species for this site would be white pine, hemlock or Norway spruce.

The remaining Vegetation Types should not receive any silvicultural activities at this time.

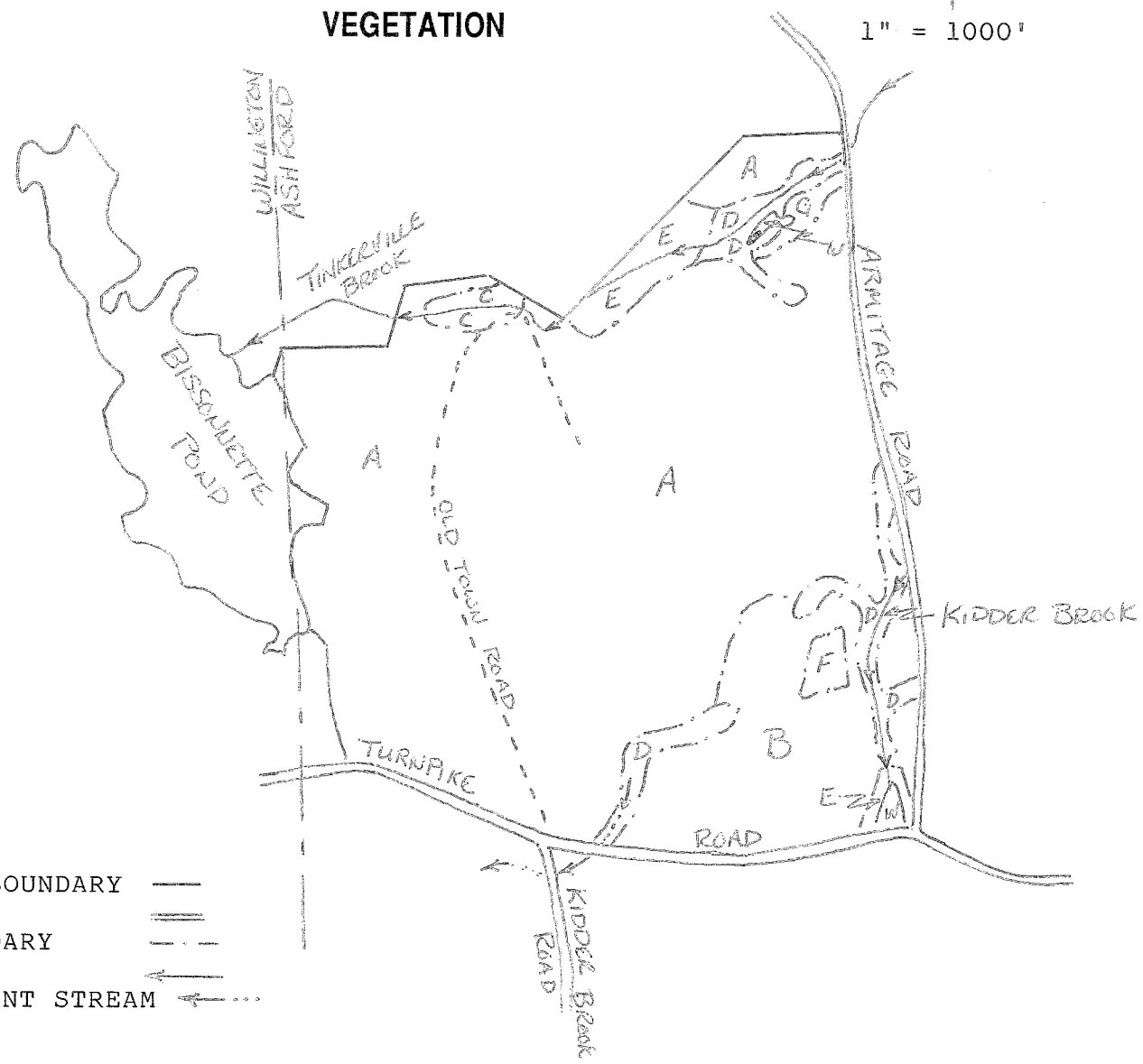
Revenue from the harvesting in **Type A** may cover the cost of hiring a private consulting forester to mark trees to be removed in the thinning operation.

22

VEGETATION

N

1" = 1000'



LEGEND

PROPERTY BOUNDARY
ROAD
TYPE BOUNDARY
STREAM
INTERMITTENT STREAM

VEGETATION TYPE DESCRIPTIONS:

Type A: Mixed hardwood, 199+/- acres, overstocked, pole to sawtimber size
Type B: Mixed hardwood, 31+/- acres, variably stocked, pole to sawtimber size
Type C: Hemlock, 4+/- acres, fully stocked, pole to sawtimber size
Type D: Hardwood swamp/streambelt, 19+/- acres,fully stocked, pole to sawtimber size
Type E: Marsh, 8+/- acres, variably stocked, seedling to sapling size
Type F: Old field, 3+/- acres, variably stocked, seedling size
Type G: Gravel pit, 2+/- acres, lightly stocked,seedling to sapling size
Type W: Water, 1+/- acres

Seedling size: Trees less than 1 inch diameter at 4½' above ground (DBH)
Sapling size: Trees 1 inch to 5 inches DBH
Pole size: Trees 5 to 11 inches DBH
Sawtimber size: Trees 11 inches DBH and greater

8. Wildlife Resources

Wildlife Habitat Description

The area of the proposed Ashford Estates subdivision is composed of two major habitat types; mixed hardwoods and wetland/riparian areas. A detailed description of wetland/riparian habitat has been provided by Baystate Environmental Consultants.

Upland areas are comprised of mixed hardwoods. The overstory is dominated by red oak, white oak, hickory, white pine, red maple, and black birch. The understory cover is thick in some areas and consists primarily of witch hazel, ironwood, red maple seedlings, flowering dogwood, oak seedlings, spicebush, mountain laurel, and lowbush blueberry. A relative abundance of dead wood (snags and fallen trees), which is important for a number of birds, small mammals and reptiles, occurs in this area.

The large wetland associated with Tinkerville Brook provides important habitat for a number of waterfowl, amphibian, mammalian, and reptilian species. There was also evidence of previous beaver activity.

Effects of Development on Wildlife

The majority of development will occur in upland areas. This will result in fragmentation of the mixed hardwood habitat which will in turn reduce species diversity and richness. Species that are intolerable to human disturbance will be forced to emigrate into adjacent habitat. Species dispersion into adjacent habitats may result in competition with species already occupying the area. Many species will also be forced to inhabit less desirable habitat; decreasing their ability to survive. Species more tolerable of man such as starlings, robins, house sparrows, and raccoons may increase in number and become a nuisance.

The wetland associated with Tinkerville Brook is an area of special concern. Wetlands support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply, and a high carrying capacity (Brown et al. 1978). There are many small species that are endemic to wetland/riparian habitat and many larger animals require access to streams or water body margins for survival even though they may spend much

of their time in other habitats (Milligan and Raedeke 1986). Part of the food supply for many vertebrates is the high abundance and diversity of insect populations that are typical of wetland ecosystems (Brown et al. 1978). The planned discharge of stormwater into this wetland may have negative impacts on invertebrates, amphibians, and reptiles due to increased pollution, sedimentation, and water levels (Campbell 1973).

Since nineteen (19) of the proposed building lots contain wetlands there will be a negative impact on these areas if there is any clearing or removal of vegetation within wetlands. Vegetation removal in wetlands would have severe impacts on wildlife, especially reptiles and amphibians. Soil and water types, cover, food, breeding grounds, and hibernation areas may be altered so that species dependent on specialized habitats are eliminated and more adaptable species reduced (Campbell 1973). Barriers to seasonal movement and population dispersal, such as roads are also serious threats (Campbell 1973). Access to two (2) building lots will require wetland crossings.

Mitigation of Developmental Impacts on Wildlife

Several measures can be taken to minimize the impacts of development on wildlife. There should be at least a **100 foot buffer** surrounding all wetland areas in which no vegetation removal should take place. Owners of lots with conservation easements to wetlands should be discouraged from any removal of vegetation within this buffer. These buffer strips will help limit disturbance to wetlands and provide important corridors for a number of wildlife species.

Since the average lot size is four (4) acres, as much of each lot as possible should be left wooded. This would reduce vegetation removal, habitat destruction, and be more aesthetically pleasing for the residents of the development. Owners of lots should also be discouraged from removal of dead wood. The existence of many wildlife species depends on the presence of dead trees. Removal of snags will reduce potential nest sites for both primary (cavity excavating) and secondary cavity nesting birds (i.e. black-capped chickadees, downy woodpeckers, white-breasted nuthatches) (Best et al. 1978). Fallen trees are also a necessity for many species (i.e. salamanders, snakes, mice, shrews, insects) (Hassinger 1986) and should not be removed.

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9. Fish Resources

Site Description

A. Proposed Development Location - The proposed Ashford Estates development will be comprised of 60 housing lots on a 267 acre parcel in the town of Ashford. The area is surrounded by diverse aquatic and wetland complex ecosystems: Kidder Brook flows through the southeastern portion of the property while Tinkerville Brook abuts the entire northern portion before flowing into Bissonnette Pond which forms the western boundary. Residents will not have access or water rights to the pond. All residential lots will be served by on-site water and sewage disposal. A Housing development at this location will have to be carefully planned to avert man-induced water pollution inputs to the lake and surrounding streams. This section of the report will address anticipated impacts to these aquatic resources and delineate recommended mitigation measures.

B. Bissonnette Pond - This pond is an impoundment of the Fenton River, a valuable fisheries resource in Eastern Connecticut. Residential development presently exists on the western edge of the pond. Specific data concerning the lake's limnological characteristics are not available. It appears to be a shallow and nutrient enriched "eutrophic" pond. During the process of eutrophication or lake aging, a lake or pond typically passes through three major states of succession; oligotrophy, mesotrophy, and eutrophy. The transition from one state to the next may take thousands of years; however, eutrophication can be rapidly accelerated by man-made inputs of nutrients such as excessive soil erosion, stormwater runoff, and septic tank leachate. Surface waters of the Fenton River are classified by the Department of Environmental Protection (DEP) as "Class A". Designated uses for a "Class A" watercourse are: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses.

C. Tinkerville Brook - The stream which flows into Bissonnette Pond contains "extremely diverse" instream aquatic habitat and highly variable riparian (streamside) habitat. Its waters are classified as "A". Tinkerville Brook initially flows through a swamp in the northeastern section. This low gradient stretch contains valuable "pool" habitat. Pools are hiding and resting areas for fish as opposed to riffles which are areas where fish actively feed. Next, the stream enters a high gradient stretch through a bedrock gorge containing: cascading falls, predominant eastern hemlock riparian zone, bedrock and large boulder substrate, and mixed pool and riffle

instream habitat at approximately a 1:1 pool-riffle ratio. A 1:1 ratio is considered optimal for resident fish production. Finally, the brook empties into Bissonnette Pond through a low gradient stretch characterized by pool/riffle habitat and mixed hardwood shrub riparian zone.

D. Kidder Brook - This small stream flows through the southeastern portion of the parcel and outlets into private ponds utilized for the commercial production of warmwater fish. A tributary of the Fenton River, this brook is also classified as "Class A" surface waters. Less than 4 feet in width, this stream flows through red maple wetland habitat. Stream substrate is predominantly fine sands and gravels with mixed cobbles.

Fish Population

Bissonnette Pond primarily supports a warmwater fishery. Fish species which are expected to inhabit this lake are: largemouth bass, chain pickerel, white sucker, yellow perch, brown bullhead, bluegill sunfish, pumpkinseed sunfish, and golden shiner.

Tinkerville Brook is expected to support a native brook trout population. Other types of stream fish such as tessellated darter, blacknose dace, longnose dace, fallfish, and white sucker may also inhabit this stream. Warmwater fish from the pond may periodically move into the brook during spawning periods.

It is unknown whether or not Kidder Brook supports a fish population. It appears that streamflow conditions may be minimal in the summer due to several ponds located in the upper portion of the watershed.

The Fenton River supports a valuable recreational coldwater fishery. The Bureau of Fisheries (DEP) stocks the river throughout its length with more than 7,000 adult brook, brown, and rainbow trout in the towns of Willington and Mansfield. This river is the major fisheries resource in the area.

Impacts

The following impacts on local aquatic environments can be expected if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of aquatic ecosystems through increased runoff from unvegetated areas : During construction topsoil within the proposed building lots will be exposed and susceptible to runoff events. Erosion and sedimentation due to construction has long been regarded as a major cause of stream degradation. Nationally, silt is considered a major stream pollutant. Excessive sediment deposition could damage local aquatic habitats in the following ways:

(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 insects. 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 gills.

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

(7) Sediment encourages the growth of rooted aquatic plants and promotes filamentous algae growth. Eroded soils contain plant nutrients such as nitrates and phosphates. Although algae and aquatic plants require these nutrients for growth, most aquatic ecosystems contain very limited amounts. Consequently, excess nutrients act as powerful fertilizers resulting in accelerated plant growth or extensive algae blooms which drastically reduce water clarity. Fish kills due to oxygen depletion in the summer called "summerkill" may occur when these algae populations die. Dead algae are rapidly decomposed by bacteria in the summer sometimes causing low oxygen levels. Unfortunately, summer lake dissolved oxygen levels are naturally at their lowest and the introduction of nutrients can only serve to make a bad situation critical.

2. Aquatic and wetland habitat degradation due to the influx of stormwater drainage : Roadway runoff from residential housing lots will be outletted to plunge-pool basins at three locations before being discharged to wetland complexes. Stormwaters can contain a variety of pollutants that are detrimental to aquatic environments. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts,

and coarse sediment. Once introduced into stream environments, stormwater runoff will fertilize stream waters causing water quality degradation. More harmful still are spilled petroleum based chemicals or other toxicants that can precipitate partial or complete fishkills. Additionally, fine silts in stormwaters that remain in suspension for prolonged periods of time often cannot be effectively removed from plungepool basins.

Moreover, stormwaters can negatively impact wetlands. Wetlands are beneficial in several ways. Wetlands serve to: **(1)** control flood waters by acting as a water storage basin, **(2)** trap sediments from natural and man-made sources of erosion, and **(3)** help filter out pollutants from runoff. If serious wetland degradation due to stormwater effluent occurs over time, their ability to function as a "wetland" and properly filter out and trap sediments may be drastically reduced.

3. Percolation of septic effluent into aquatic habitats : A failure of individual septic systems to operate properly could be dangerous to aquatic environments. Nutrients and assorted chemicals that may be placed in septic systems could possible enter streamwaters or Bissonnette Pond 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 rapidly degrade water quality. Additionally, septic effluent will stimulate the growth of nuisance aquatic vegetation and algae blooms.

4. Transport of lawn fertilizers and chemicals to aquatic habitats : Runoff and leaching of nutrients from fertilizers placed on subdivision lawns can stimulate nuisance aquatic weed growth and help precipitate algae blooms. The introduction of nutrients will accelerate the lake eutrophication process. Introduction of lawn chemicals may result in fish kills and degrade water quality.

5. Alteration of the Fenton River Watershed : The Fenton River watershed in this area is undergoing a rapid change from forested woodlands and wetlands to residential subdivision development. For example, Environmental Review Team members recently assessed a proposed 36 lot subdivision (directly upstream from Bissonnette Pond) on an 150 acre parcel abutting the Fenton River in the town of Willington. Additionally, newly constructed homes have been built along the shores of Bissonnette Pond.

Recommendations

The wide ranging impacts previously discussed may be reduced in part by implementing the following suggested recommendations:

1. It is recommended that subdivision lot Number 60 which abuts Bissonnette Pond be eliminated from subdivision plans: Current plans show that the proposed house and septic system will be located between wetlands. Furthermore, approximately 45% of the total lot acreage has been delineated as wetlands. Given that this lot abuts the pond, serious consideration should be given to declaring this area as "open space".

2. It is highly recommended that at the minimum, a 100 foot open space buffer zone be maintained along wetland boundaries that border Tinkerville Brook, Kidder Brook, and Bissonnette Pond : This buffer can be an effective mitigation measure at this development location. No construction and alteration of existing habitat should be allowed in this zone. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985). These buffers will absorb surface runoff and other pollutants before they can enter wetlands, ponds, and stream ecosystems. Additionally, buffer zones can improve the quantity of instream habitat for fishes. For example, research has shown that brook trout habitat units can increase 2,400% when well-vegetated buffer zones are used for stream corridor protection (HEP Notes, 1988).

3. Install and maintain proper erosion and sedimentation controls during site construction activities : These measures should include silt fences and staked hay bales placed along the perimeter of all wetland, stream, and pond habitats. Proper installation of haybales and silt fences require that they be placed within excavated trenches. Only small areas of soil should be exposed at one time and these areas should be reseeded and stabilized as soon as possible. The Town of Ashford should have an appointed official who would inspect this development on a daily basis to ensure that contractors have complied with all stipulated mitigation devices. Past lake and stream siltation disturbances in Connecticut associated with residential housing developments have occurred when contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

4. Stormwaters should not be directly outletted to wetland complexes : The proposed riprapped plunge pool design will be generally ineffective for the containment and entrapment of sediment and fine silts, especially during large storm events. It is suggested that the developer design an alternate stormwater management plan that would direct runoff away from wetlands and down existing or created road systems that contain a series of hooded catch basins.

5. Properly design and locate individual septic systems (refer to sewage disposal section) : Septic effluent can rapidly degrade wetland, stream, and pond ecosystems. Septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure. Residents should be encouraged to use phosphate-free laundry detergents.

6. Limit liming, fertilization, and the introduction of chemicals to subdivision building lot lawns : This practice will help abate the amount of additional nutrients to aquatic habitats. Nonphosphorus lawn fertilizers are currently available from various lawn care distribution centers.

Summary

The Fenton River watershed is presently undergoing a tremendous amount of residential housing development. With continued growth foreseen in the future, a concerted effort must be expended by the town to weigh the benefits of this and other housing developments against the cost of negative impacts to aquatic resources. As development continues, recommendations for minimizing impacts will be less effective and more costly. When applicable, the town of Ashford and other surrounding towns should review residential development plans on a watershed wide basis.

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10. Archaeological Review

On-site inspection of the proposed Ashford Estates subdivision site east of Bissonnette Pond along Armitage and Turnpike Roads located two large early-to-mid 19th century historic mill sites. The mill foundation structures and ruins are along Tinkerville Brook. The ruins may represent an industrial carding mill complex, which are indicative of the earliest phases of textile production in eastern Connecticut. These types of carding mills are relatively uncommon, and, review of the structures indicate a good amount of archaeological integrity. As a result, this mill complex offers a tremendous opportunity to research the early industrial history of Ashford and eastern Connecticut in general.

A review of the State of Connecticut's Archaeological Site Files and Maps show no prehistoric occupations within the boundaries of the proposed project area. However, similar waterway systems like Tinkerville Brook often have early hunting and gathering encampments along its course.

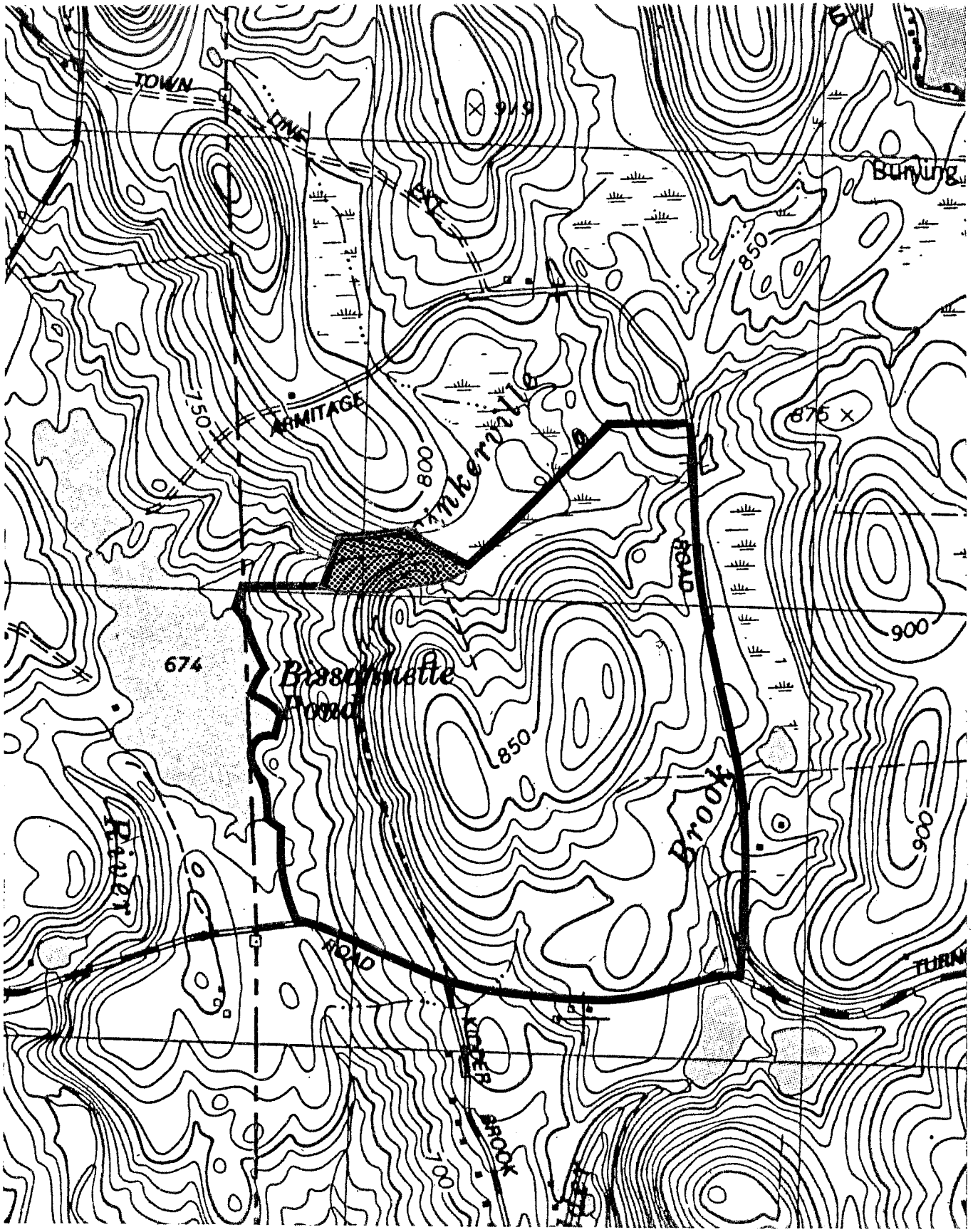
A professional archaeological reconnaissance survey is strongly recommended in order to locate and identify all prehistoric and historic resources which might exist in the project area. In addition, an historic preservation easement should be considered to protect the mill complex from being adversely effected by future land use decisions. These cultural resources are significant to the historic heritage of the people of Ashford and eastern Connecticut and deserve the enforcement of preservational guidelines.

In summary, the project area is located in a critical area of importance to the early industrial history of the Town of Ashford. Two large early-to-mid 19th century mill sites and adjacent structures were located along Tinkerville Brook. It is strongly recommended that all feasible efforts be undertaken to identify and ensure the preservation and conservation of the cultural resources in the area, including the establishment of historic preservation easements along Tinkerville Brook.

HISTORIC PRESERVATION

Recommended Historic Preservation Easement

Scale 1" = 1000'



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 specialsits, 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.**