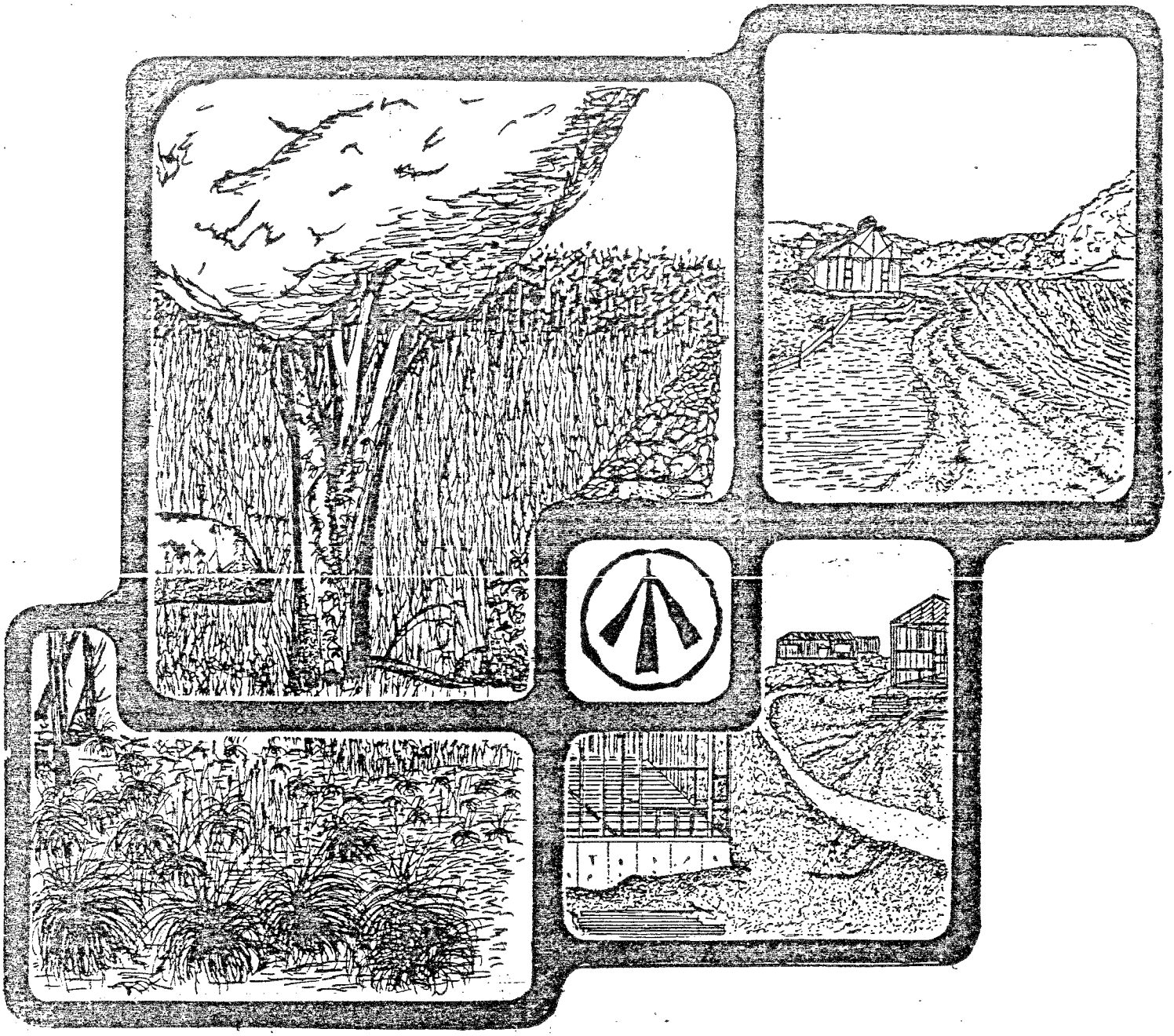
ENVIRONMENTAL REVIEW TEAM REPORT

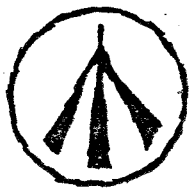


HOPP BROOK TRACT
BETHANY, CT

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

HOPP BROOK TRACT
BETHANY, CT
JUNE 1985



King's Mark Resource Conservation and Development Area
Environmental Review Team
Sackett Hill Road
Warren,Connecticut 06754

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies
U.S.D.A. Soil Conservation Service

State Agencies
Department of Environmental Protection
Department of Health
University of Connecticut Cooperative Extension Service
Department of Transportation

Local Groups and Agencies
Litchfield County Soil and Water Conservation District
New Haven County Soil and Water Conservation District
Hartford County Soil and Water Conservation District
Fairfield County Soil and Water Conservation District
Northwestern Connecticut Regional Planning Agency
Valley Regional Planning Agency
Central Naugatuck Valley Regional Planning Agency
Housatonic Valley Council of Elected Officials
Southwestern Regional Planning Agency
Greater Bridgeport Regional Planning Agency
Regional Planning Agency of South Central Connecticut
Central Connecticut Regional Planning Agency
American Indian Archaeological Institute
Housatonic Valley Association

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FUNDING PROVIDED BY
State of Connecticut

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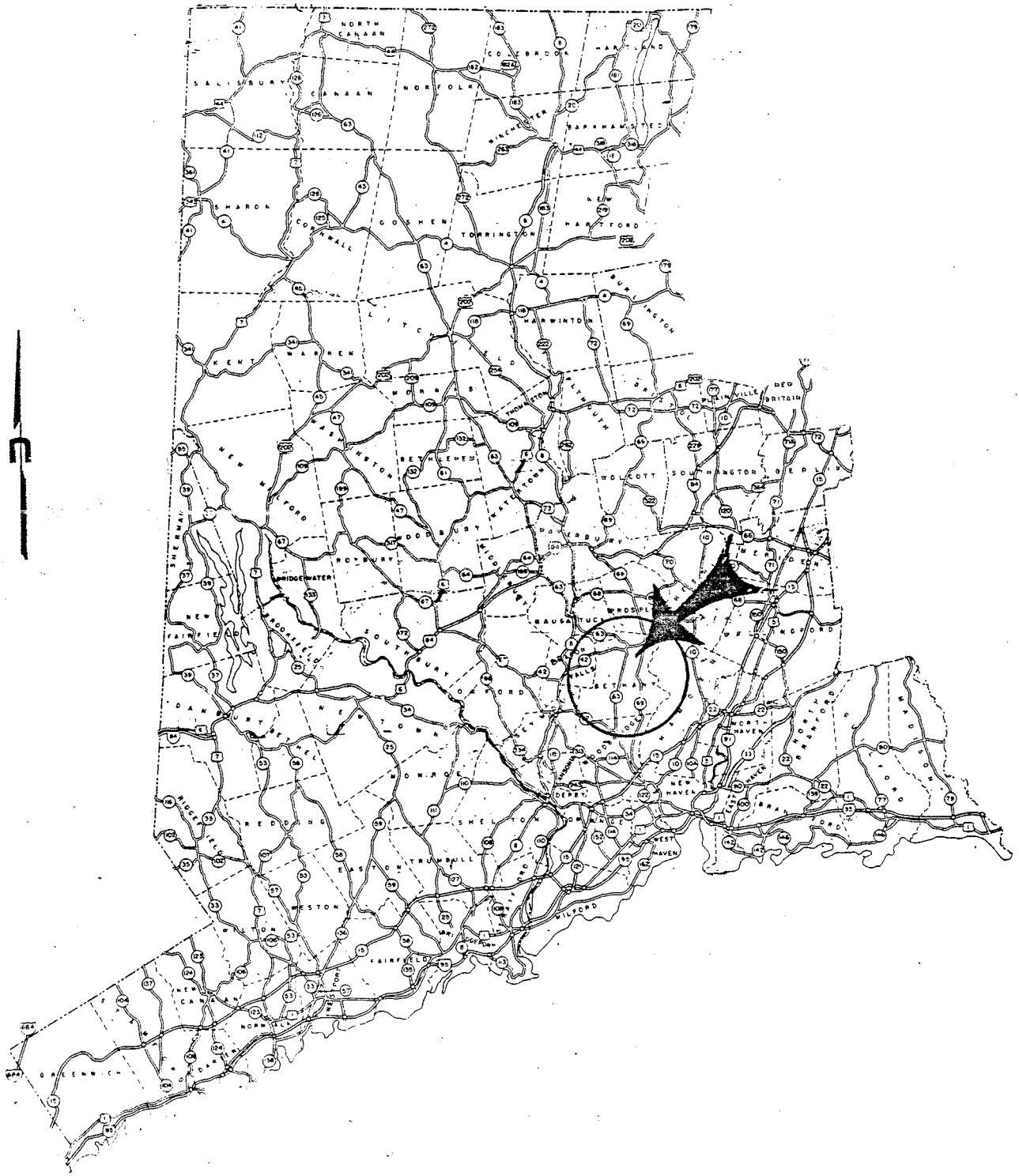


Scale 1" = 10 miles

10 0 5 10 miles

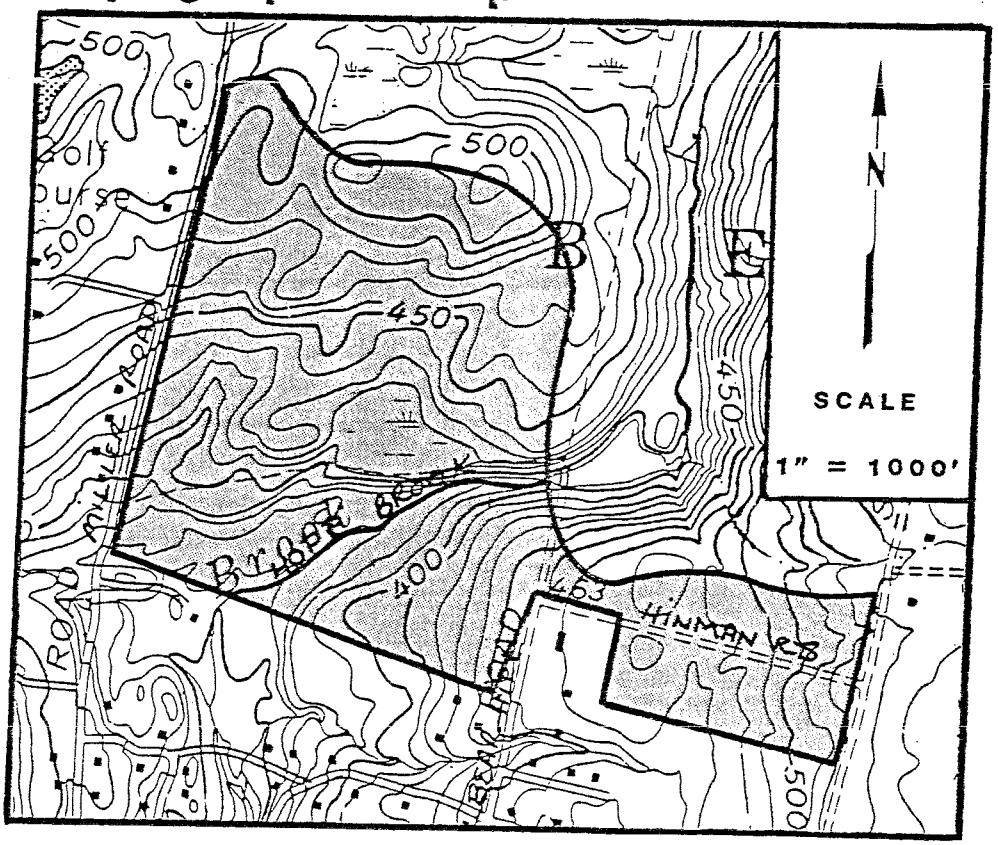
HOPP BROOK TRACT

I. Introduction

The Ansonia-Derby Water Company is proposing to sell 167 of the 640 acres it owns in Bethany as soon as it obtains DPUC approval for the disposal. The 167 acre tract is known locally as the "Hopp Brook Tract" and is classified as Class III land (outside of a public water supply watershed). The land will be offered to the town, which will have 90 days to consider its acquisition.

The Hopp Brook tract is located in the western portion of town off Bear Hill and Miller Roads (see Figure 1). Hopp Brook traverses the central portion of the property. The land is mostly wooded, undeveloped, and characterized by moderate to steep slopes.

Figure 1 **Topographic Map**



The First Selectman from Bethany requested this ERT study to assist the town in understanding the characteristics of the site and the potential of the site for alternate uses. Specifically the ERT was asked to identify the natural resource base of the subject site and to comment on the suitability of the property for recreational use, forest management, wildlife management, and r e s i d e n t i a l development. This information will assist the town in making environmentally sound decisions regarding the site in the best interests of Bethany.

The King's Mark Executive Committee considered the Town of Bethany's request and approved the project for study by the ERT.

The ERT met and field reviewed the site on April 17, 1985. Team members participating on this project included Marc Beroz, Soil Scientist, U.S.D.A. Soil Conservation Service; Dave Lord, District Conservationist, U.S.D.A. Soil Conservation Service; Paul Rothbart, Wildlife Biologist, Connecticut Department of Environmental Protection; Don Smith, Forester, Connecticut Department of Environmental Protection; David Thompson, Archaeologist, Greater New Haven Archaeological Society; Bill Warzecha, Geohydrologist, Connecticut Department of Environmental Protection; Carolyn Westerfield, Planner, Southcentral Connecticut Council of Governments.

Prior to the field review day, each team member was provided with a summary of the proposed study, a checklist of concerns to address, a topographic map, a soils map, and a soils limitation chart. During the ERT's field review, team members met with representatives from the town and walked the property. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the team's findings. The report identifies the natural resource base of the property and discusses opportunities and limitations for alternate land uses. It is hoped the information contained in this report will assist the town in making environmentally sound decisions.

If any additional information is required, please contact Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC & D Area, Sackett Hill Road, Warren, CT, 06754.

* * *

II. Highlights

1. *The major geologic constraints in terms of developing the tract include: (1) areas comprised of steep slopes, (2) shallow to bedrock areas, (3) areas containing inland wetland soils, (4) areas having a seasonal high water table due to the firmness of the underlying soil layer (hardpan) and (5) the presence of numerous surface boulders particularly in the northcentral parts. These limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems for developed areas. The limitations may also pose problems in terms of road construction and placement of foundations. As a result, careful planning will be required if the property is developed.* (p. 7 & 8)

2. *If lot size requirements were significantly reduced (e.g., a zone change to one acre), the geologic limitations mentioned above would likely present greater problems in terms of developing a particular lot.* (p. 8)

3. *Unless public water facilities become available, bedrock would be the only practical source of potable water for the site. A yield of 3 gallons per minute is generally considered adequate for the household needs of an average family, and most locations on the site would probably yield this amount. Natural groundwater quality should be good.* (p. 8 & 9)

4. *Based on a Flood Insurance Rate Map for the town of Bethany, an area which parallels the entire length of Hopp Brook on the site lies within the 100 year flood boundary. The 100 year flood boundary is narrowest (± 30 feet wide) near the dam but widens considerably (± 180 feet) at the southern boundary of the site. Development of the site for residential use may increase the amount of run-off to Hopp Brook during periods of rainfall.* (p. 11)

5. *The major soils mapped for this site are described in the text of this report together with their suitability for alternate land uses.* (p. 11)

6. *This site is bisected by Hopp Brook which has a well defined streambelt corridor. Any development proposals for this site should consider providing for a buffer area or set back boundary of 50 to 100 feet from this streambelt corridor. This will help to protect against potential soil erosion and sedimentation damage. This*

potential damage is significant due to the steep slopes and highly erodible soils found along the corridor. (p.14)

7. *Access to the northern part of this site should be from Miller Road and not from the intersection of Bear Hill and Hinman Road. Access from this intersection would require crossing Hopp Brook in the area of the existing dam and would significantly alter the streambelt corridor in this area.* (p. 15)

8. *The entire site has high potential for passive recreation. The bouldery and irregular topography makes for interesting hiking and walking trails. There would be minimal soil erosion from a well maintained trail system.* (p. 14)

9. *There are 8 differing vegetative types found within the study area. Each of these types and their potential for forest management is described in the text.* (p. 15)

10. *The "Hopp Brook Tract" property may be divided into four major wildlife habitat types. These are mixed hardwoods, conifers, open land, and wetlands. If the site is developed for residential housing there will be an immediate negative impact on wildlife. While mitigating measures cannot offset these negative impacts, there are a number of measures which can be implemented to minimize the adverse impacts of the project on wildlife. These are identified in the text.* (p. 20 & 21)

11. *All available data indicates that this Hopp Brook valley has been occupied by prehistoric peoples for thousands of years. Any plan to develop the area should recognize the fragile nature of these non-renewable resources and should seek to preserve their cultural and historic data from destruction in the opinion of the Team's archaeologist.* (p. 23)

12. *Land in the vicinity of the subject site in Bethany is zoned for one-family residences on lots of a minimum of 65,000 sq. ft. (1½ acres). The land of the site itself is zoned for a minimum of 130,000 sq. ft. (3 acres) per dwelling unit. The Regional Plan of Development Land Use Map indicates that this area of Bethany should be encouraged to remain as open space or be developed for less than 1 family/acre residential.* (p. 27 & 28)

13. *Land within the site directly along both sides of Hinman Road is relatively flat and open, and would lend itself to residential development. Land directly opposite the fire house on Bear Hill Road would also be adaptable for residential development. Land in the*

northern portion of the site is relatively flat although undulating, and while rocky boulders and seasonal wetlands were seen, it could also lend itself to very low density residential development. (p. 28)

14. *The land along the stream bed and the slopes to each side should be considered for part of the town's reserved passive recreation areas. This is a very attractive natural feature of the tract and is suitable for a variety of passive recreational activities.* (p. 28)

III. Topography and Setting

Slopes on the site range from relatively flat to moderate to steep. Steepest slopes within the site are found mainly astride Hopp Brook in the central portions. The relatively flat areas comprise the northern parts of the property, the open field areas on the north and south side of Hinman Road, and the wetland areas paralleling Hopp Brook in the southern parts. The remaining portions of the site are mostly moderately sloping.

Maximum and minimum elevations of the site are ± 510 feet and ± 360 feet above mean sea level.

The major topographic feature on the property is Hopp Brook, which flows in a southwesterly direction through the central parts.

IV. Geology

The study site is located entirely within the Naugatuck topographic quadrangle. A bedrock geologic map (QR-9, by Michael Carr) and a surficial geologic map (QR-35, by Richard Foster Flint) have been published by the Connecticut Geological and Natural History Survey.

BEDROCK GEOLOGY

According to map QR-9, bedrock underlying the tract is classified as undifferentiated Hartland Formation. Rocks making up this formation includes biotite muscovite schists, mica quartzites, diopside-tremolite schists, marbles, and amphibolites with garnetiferous (garnet-bearing) biotite-muscovite gneiss in places. All of these rocks (i.e., gneisses, schists, marbles, quartzites, etc.) are metamorphic rocks. Before the rocks were subjected to metamorphic processes (great heat and pressures within the earth's crust) they consisted of either sedimentary, igneous and/or pre-existing metamorphic rocks. They were deposited during the Ordivician geologic period approximately 430-500 million years ago. Based on visual observations made on the field review day and available bedrock, surficial and soil mapping, bedrock does not appear to break ground surface on the site.

No economic value can be ascribed to the rock types or minerals composing the Hartland Formation. Depending upon their mineralogic make up, the metamorphic rocks underlying the site may be a source for local building stone. Their usefulness as such would depend upon whether or not the rocks would be firm and erosion resistant.

SURFICIAL GEOLOGY

Overlying the bedrock on most of the site is a glacial sediment known as till. Till consists of a mixture of non-sorted clay, silt, sand, gravel, and boulders. These materials were primarily deposited beneath the former glacial ice sheet, although some may have been released from within or from the surface of the ice as it was wasting during the period of glacial retreat. As a result of this mode of deposition, the upper few feet of till is commonly

sandy, stony and loose while the lower portion is siltier, blocky and more tightly compact. Compact till soils will be encountered mainly in the eastern parts of the site. Thickness of the till is probably not much more than ten feet throughout the property.

Another type of glacial sediment deposited in the central parts of the site along Hopp Brook is ice-contact stratified drift. These deposits consist of poorly to well sorted sands and gravels deposited by streams of meltwater in close relation to melting glacier ice and/or locally in ponds dammed by melting glacier ice. Generally speaking, the area delineated as " H K B " on Figure 3 , which is on the north side of Hopp Brook, is the area covered by ice contact stratified drift. The stratified drift deposits on the site may be a source of commercial sand and gravel. However, it appears that the deposit may be too small in aerial extent to be considered for commercial extraction. Depending upon the quality of the sand and gravel, it is possible that the material could be used locally as a road base for driveways or roads if the site is developed.

Overlying till and/or stratified drift along Hopp Brook in the central parts are post-glacial sediments called alluvium. "Alluvial deposits", which are delineated by the symbol Ps (Podunk soils) on the soils map in this report (see Figure 3) consist of sand, silt, and gravel mixed with organic matter. The deposits occur as a thin cover on the Hopp Brook Valley floor. These soils are regulated inland wetland soils and hold very low potential for development.

Seasonally wet areas exist in and near surface drainage channels in the northern and eastern parts of the site. These soils are delineated by the symbol RN (Ridgebury, Leicester, and Whitman soils) on the soils map and are also classified as regulated inland-wetland soils. They also hold low potential for development.

GEOLOGIC DEVELOPMENT CONCERNS

Because the tract of land is rural, development of the site for residential use would require the installation of properly located and constructed subsurface sewage disposal systems. In addition, unless a public water supply main was extended to serve the site, individual on-site water supply wells would probably be required on each lot. (See Water Supply section of this report).

Based on visual observations and consideration of soil survey, bedrock, and surficial geologic maps, the major geologic constraints in terms of developing the tract include: (1) areas comprised of steep slopes, (2) shallow to bedrock areas, (3) areas containing inland wetland soils, (4) areas having a seasonal high water table due to the firmness of the underlying soil layer (hardpan) and (5) the presence of numerous surface boulders particularly in the

northcentral parts.

These limitations will weigh heaviest on the ability to provide adequate subsurface sewage disposal systems for developed areas. Generally, engineered septic systems will be required in areas where the above mentioned limitations prevail.

Town officials indicated on the review day that present zoning in the Hopp Brook tract area is three acres. This should allow a potential developer flexibility for locating a subsurface sewage disposal system on a particular lot. However, it should be pointed out that there could be a particular lot whereby the presence of the restrictive conditions (topography, shallow bedrock areas, watercourses/ wetlands) mentioned above could make it unsuitable for development despite special engineering practices. Also, if lot size requirements were reduced (e.g., a zone change to one acre), the geologic limitations may present greater problems in terms of developing a particular lot (e.g., placement of septic systems and wells).

The land areas most suitable for development appear to be in the northern parts of the site off Miller Road, the open fields on either side of Hinman Road, and the open fields on the west side of Bear Hill Road. It seems likely that with proper location, engineered design, and careful installation, septic systems would be capable of functioning satisfactorily in the above areas under current zoning without having a significant adverse impact on water quality.

Detailed soil testing for subsurface sewage disposal systems will be required for areas proposed for development. For some of the more restrictive lots, additional testing would be warranted.

The geologic limitations (i.e., slopes, shallow depths to bedrock, wetland areas) mentioned earlier may also pose problems in terms of road construction and placement of foundations. As a result, careful planning will be required if the property is developed.

Hopp Brook, which traverses the central parts of the site, is a very attractive feature on the tract. If possible, consideration should be given to keeping this streambelt area in open space. Passive recreational uses such as hiking and jogging would be very compatible with this part of the site.

V. Water Supply

Unless public water facilities become available, bedrock would be the only practical source of water for the site. The till and stratified drift deposits on the site would probably not be a very reliable water source. This is mainly because the permeability of the till is too low and the stratified drift deposits on the site covers too small

an area and is probably not thick enough.

Yields from bedrock wells depend upon the number and size of water-bearing fractures that are intersected by the wells. Density and size of fractures in different bedrock zones will vary widely, but in general, both are commonly greater in granular rock (e.g., gneisses) than in highly foliated rock (e.g., schist). Since the bedrock underlying the site comprises various types of bedrock (i.e., gneisses, schists, quartzites) the ultimate yields may depend upon the particular rock type tapped. In either case, however, there would be at least an 80 percent chance that a well at any site could yield at least 2.5 gallons per minute (gpm) and at least a 50 percent chance that it could yield at least 6 gpm (Source: Connecticut Water Resources Bulletin No. 19). A yield of 3 gallons per minute is generally considered adequate for the household needs of an average family.

Natural groundwater quality should be good, although some possibility of undesirably high mineral (usually iron and manganese) content exists. Should well water prove to be high in mineral content, several filtration methods are available to over-come these problems.

VI. Hydrology

The subject site is located entirely within the Hopp Brook watershed. Hopp Brook originates in a small wetland area about 2.5 miles northeast of the site, near the intersection of Lebanon Road and Fairwood Road. It traverses the central portions of the site in a southwesterly direction enroute to Bladens River. The watershed boundary for Hopp Brook is shown in Figure 2. As shown by the map, the watershed boundary tends to follow the crests of local hills and ridges. The watershed of Hopp Brook as depicted, comprises approximately 2,100 acres or about 3.28 square miles.

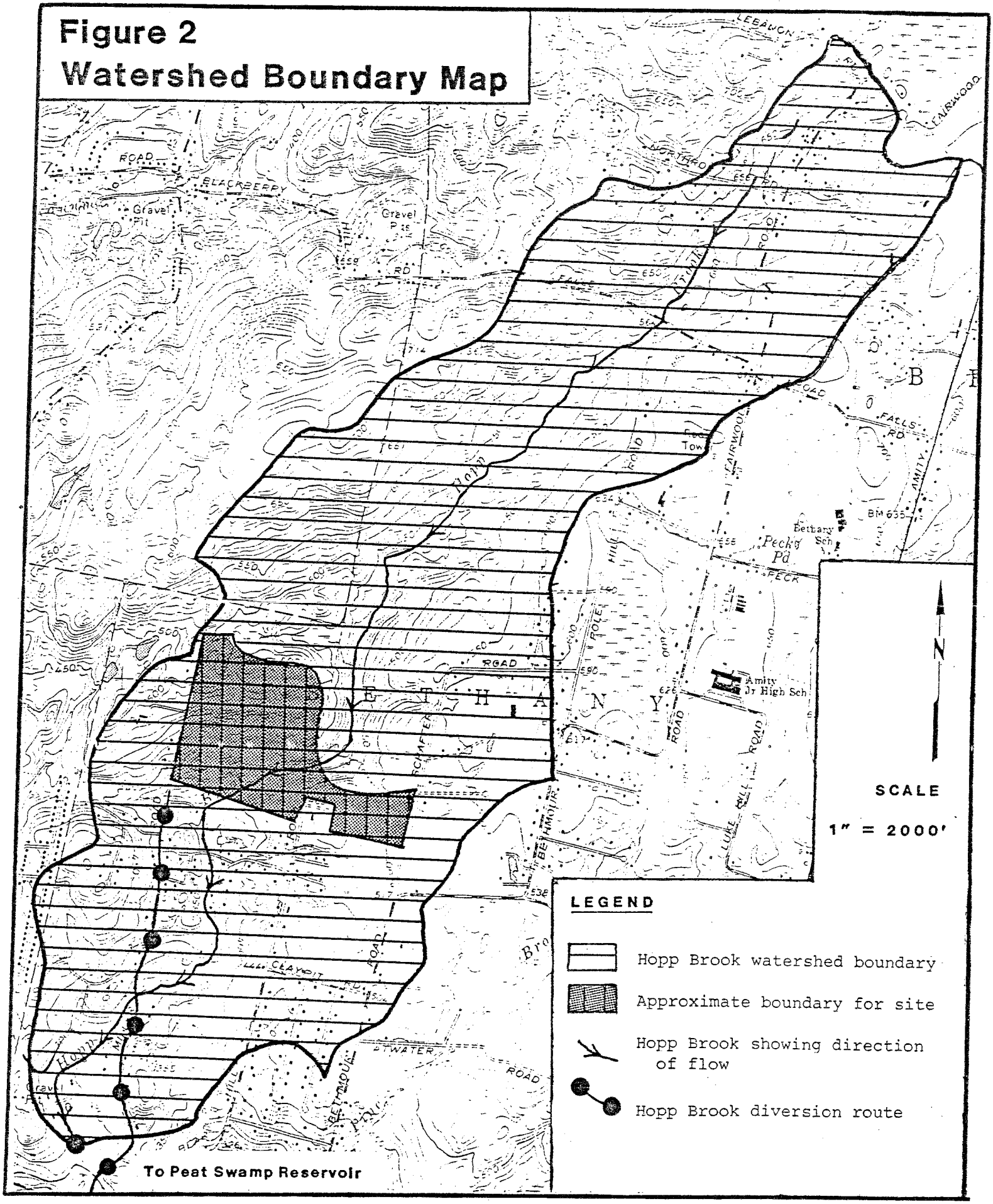
It should be pointed out that water from Hopp Brook is diverted into Peat Swamp Reservoir, which is just over two miles south of the site. Peat Swamp Reservoir, also known as Beaver Pond, is an active reservoir operated by the Ansonia-Derby Water Company.

The diversion, which is piped the entire distance, begins at the dam of the surface water body near the central parts of the site. It parallels Hopp Brook to Miller Road then turns southward along Miller, Acorn Hill, and Swamp Roads, and ultimately discharges into Peat Swamp Reservoir. The amount of water diverted is unknown.

No other major watercourses are visible on the site. There are a few intermittent streamcourses, which are tributary to Hopp Brook, present on the site.

Surface runoff and groundwater on the site flows generally downslope toward local discharge areas such as inter-

Figure 2
Watershed Boundary Map



mittent drainage channels, wetland areas, springs, and/or overland by sheetflow into Hopp Brook. Water from discharge areas (i.e., intermittent drainage channels, seeps, wetlands, etc.) on the site is then routed via the channels toward Hopp Brook.

Development of the site for residential use may increase the amount of runoff during periods of rainfall. These increases would depend largely on the density, amount of impervious surfaces (roofs, driveways, etc.) created over the soil, the removal of vegetation, and the compaction of soils in disturbed areas.

FLOODPRONE AREAS

A Flood Insurance Rate Map for the town of Bethany has been published by the Federal Emergency Management Agency/Federal Insurance Administration. Based on the map, an area which parallels the entire length of Hopp Brook on the site lies within the 100 year flood boundary. The 100 year flood boundary is narrowest (± 30 feet wide) near the dam but widens considerably (± 180 feet) at the southern boundary of the site. A "100" year flood is a flood with a one chance in 100 or 1% chance of occurring in any year. It should be pointed out that this does not mean a flood of this magnitude will occur only once in a 100 year period. The probability of occurrence reamins the same each year regardless of what happended the year before.

The remaining parts of the site comprise areas of minimal flooding. Areas within the site which may be subject to wetness and perhaps some flooding during period, of particularly heavy rains include swampy areas and topographic swales.

A decision to keep development out of the 100 year flood zone would be a wise one.

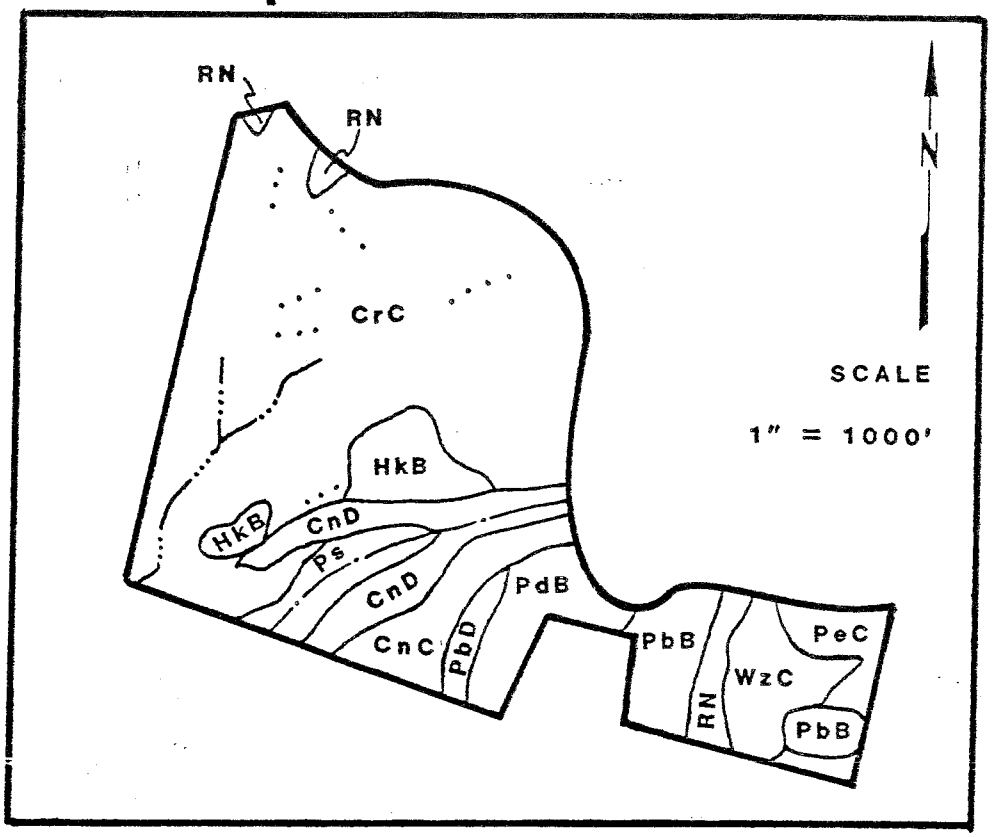
VII. Soils

The attached soil survey map (see Figure 3) and following narrative is a revision of the data contained in the Soil Survey of New Haven County, Connecticut. The letter symbols on the map identify map units. Each map unit symbol has a unique composition of soils. Areas with the same symbol have the same composition.

Map Units CnC and CnD - These map units are composed principally of Charlton soils. Charlton soils are very deep and well drained. Typically they have fine sandy loam textures to a depth of 60 inches or more. These Charlton soils have many stones and boulders both on the surface and throughout their depth.

The CnC map unit has slopes of 3 to 15 percent. The CnD map unit has slopes of 15 to 35 percent except on the

Figure 3 Soils Map



north side of Hopp Brook where the slopes range up to 65 percent.

Roads, buildings and septic tank absorption fields are extremely difficult to construct on these soils. Moving the many large boulders in these soils will require special construction equipment or blasting. Construction costs will be very high on slopes of 15 to 25 percent and astronomical on slopes above 25 percent.

Map Unit CrC - This map unit is composed primarily of two soils so intermingled on the ground that they could not be separated on the amp. One soil is named Charlton. Charlton soils are very deep and well drained. Typically they have fine sandy loam textures to a depth of 60 inches or more.

The other soil is named Hollis. Hollis soils are shallow and well drained. Typically they have fine sandy loam textures overlying hard bedrock at a depth of 10 to 20 inches. The Hollis soils comprise about 20 percent of this map unit.

Both soils have many stones and boulders both on their surface and throughout their depth. Slopes are dominantly 3 to 15 percent except in some small localized areas where the slopes may range up to 35 percent. These steeper slopes are identified on the soils map with the symbol (.....).

Moving the many large boulders in these soils will require special construction equipment or blasting. The shallow depth to bedrock of the Hollis soils pose additional construction problems. The cost of construction will increase on the steeper slopes. Septic tank absorption fields will function properly, if they can be built. Larger separating distances between wells and leach fields are advised in order to compensate for the decreased renovation capacity of the soils. The renovation capacity of these bouldery soils is decreased because a large volume of the soil material is occupied by rock fragments.

Map Unit HKB - This map unit is composed primarily of Hinckley soils on 3 to 8 percent slopes. Hinckley soils are very deep and excessively drained. Typically they have loamy sand overlying sand and gravel to a depth of 60 inches or more.

Construction of buildings and roads on these soils is relatively inexpensive. Septic tank absorption fields can be easily constructed though the State Health Code requires double the separating distance between wells and leach fields to compensate for the soils' fast perc rate.

Map Units PbB, PbD, PdB and PeC - These map units are composed dominantly of Paxton soils. Paxton soils are very deep and well drained. Typically they have fine sandy loam textures throughout their depth. These soils have a very firm compact layer called hardpan with its upper boundary between the depths of 22 and 30 inches. These soils also have a brief high water table located just above the hardpan layer during the wettest periods of the year.

The soils in map units PbB and PdB are on 3 to 8 percent slopes. Up to 3 percent of the soil surface is covered by stones and boulders in PdB.

The soils in map unit PeC are on 3 to 15 percent slopes. The surface of these soils is covered by up to 25 percent stones and boulders. The diameter of the rocks on the Paxton soils is generally 3 feet or less.

Map unit PbD has slopes of 15 to 25 percent.

The compact hardpan layer in the Paxton soils have slow percolation rates. Septic tank absorption fields must be specially designed in order to work properly. The stones and boulders on the soils of the PeC map unit are small enough to be moved by customary construction equipment. Construction on the steeper slopes of the PbD will require careful design. Care must be taken to prevent the breakout of septic effluent downslope of the leach fields especially on these steeper slopes.

Map Unit Ps - This map unit is composed primarily of Pootatuck soils on 0 to 3 percent slopes. These soils are very deep and moderately well drained. Typically they have fine sandy loam surface layers overlying stratified sand and gravel to a depth of 60 inches or more. Pootatuck soils have a seasonally high water table between the depths of 18 and 30 inches. These soils are flooded by Hopp Brook. Pootatuck soils are inland wetlands. Any development on these soils would be subject to flood damage.

Map Unit RN - This map unit is composed of very deep and poorly drained soils on 0 to 5 percent slopes. These soils have fine sandy loam textures to a depth of 60 inches or more and a seasonal high water table within 12 inches of the soil surface. The area of RN soils adjacent to Hinman Road flood. All the areas of RN are inland wetlands.

Any community development on these soils would be extremely costly in order to overcome the limitation of a high water table and prevent flood damage.

Map Unit WzC - This map unit is composed of Woodbridge soils on 3 to 15 percent slopes. Woodbridge soils are very deep and moderately well drained. Typically they have fine sandy loam textures to a depth of 60 inches or more. Woodbridge soils have a hardpan with its upper boundary between the depths of 20 and 30 inches. These soils have a seasonal high water table between the depths of 18 and 30 inches from late autumn through the spring.

Community development on these soils is limited by the seasonal high water table and the slow percolation rate of the hardpan. Septic leach fields will require fill. Precautions are needed to prevent water damage to roads and buildings from frost heaving.

RECREATION

The entire site has high potential for passive recreation. The bouldery and irregular topography makes for interesting hiking and walking trails. There would be minimal soil erosion from a well maintained trail system.

FARMLANDS

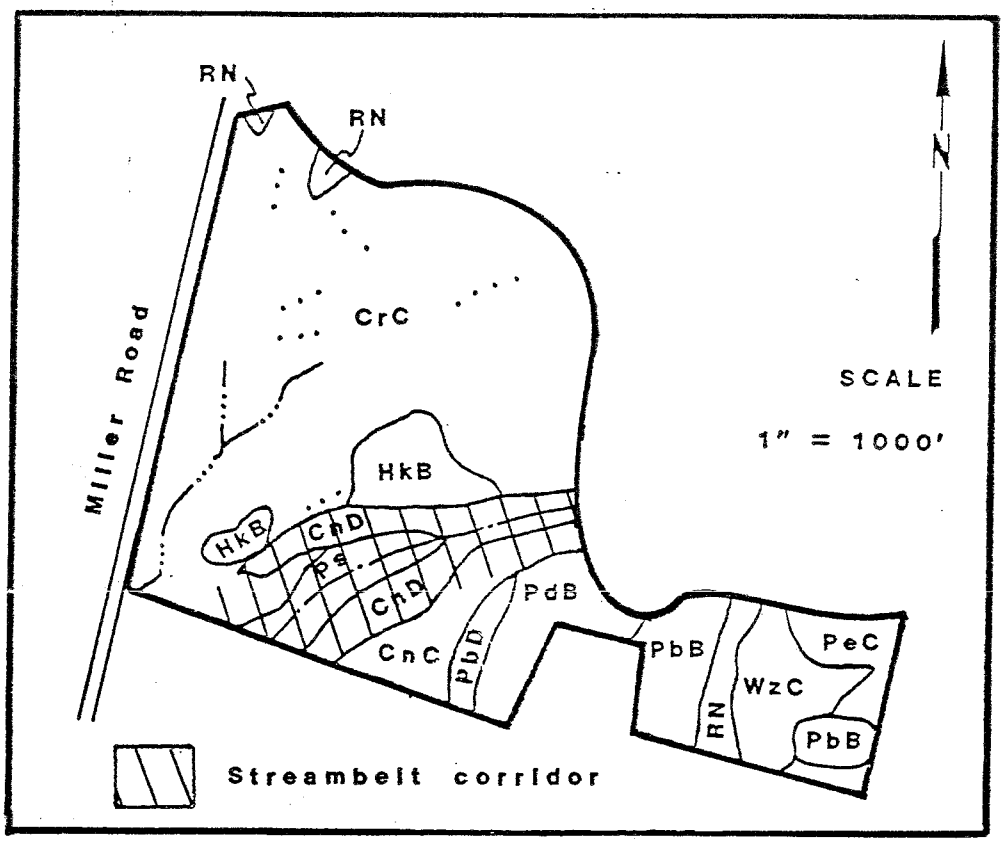
The soils in map unit PbB are prime farmlands. Prime farmland is land that has the best combination of physical and chemical properties for producing crops.

STREAMBELT CORRIDOR PROTECTION

This site is bisected by Hopp Brook which has a well defined streambelt corridor (see Figure 4). Any development proposals for this site should consider providing for a buffer area or set back boundary of 50 to 100 feet from this streambelt corridor. This will help to protect against potential soil erosion and sedimentation damage. This potential damage is significant due to the steep slopes (15 to 35%) and highly erodible soils found along the corridor.

Access to the northern part of this site should be from Miller Road and not from the intersection of Bear Hill and Hinman Road. Access from this intersection would require crossing Hopp Brook in the area of the existing dam and would significantly alter the streambelt corridor in this area.

Figure 4 **Streambelt Corridor**



VIII. Vegetation

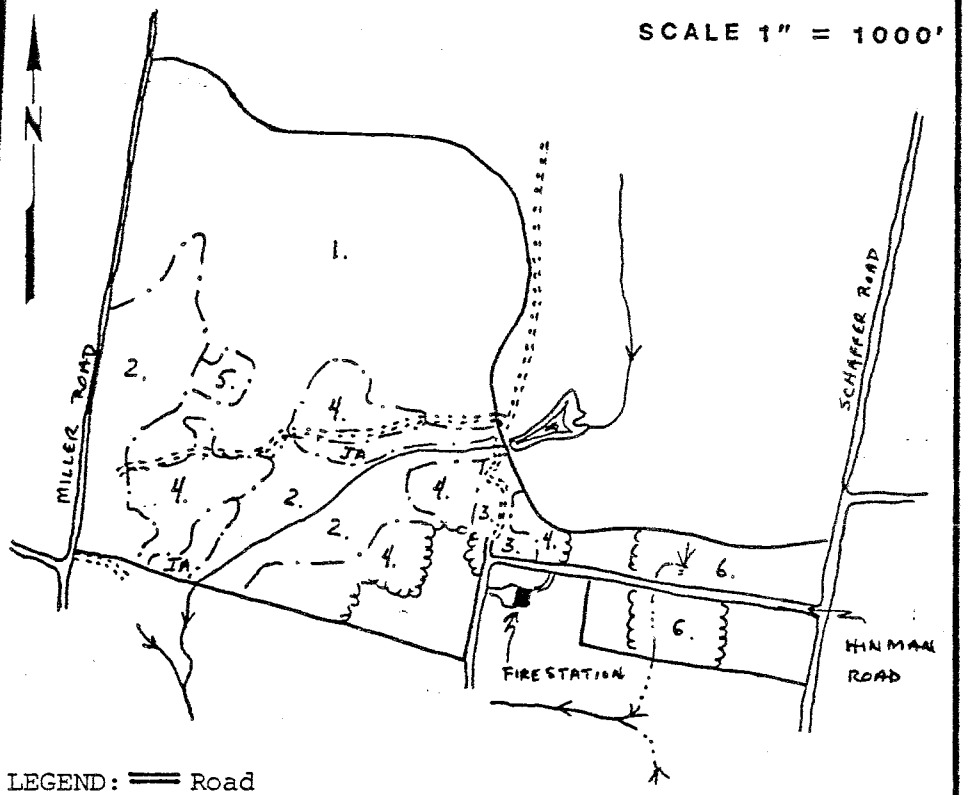
The geographic area of Connecticut in which the study area is located is a vegetative zone broadly described as "Upland Central Hardwoods". The principal tree species found here are white oak, red oak. black oak, sugar maple, red maple, hickory, white ash, and yellow poplars. Softwoods also occur here, especially on drier, poorer quality sites or where introduced by man. These generally consist of hemlock and white pine.

There are 8 differing vegetative types found within the study area. For the most part, the boundaries of these vegetation types gradually grade into one another, causing wide transition zones where tree species dominant in one

type are present in another. These conditions cuase difficulty in mapping. In other areas, transition zones are almost non-existent and mapping is greatly simplified.

The eight vegetative types are identified in Figure 5 and discussed below. Figure 6 identifies those areas of the site with high, medium, and low productivity potential for forest management.

Figure 5 Forest Stand Map

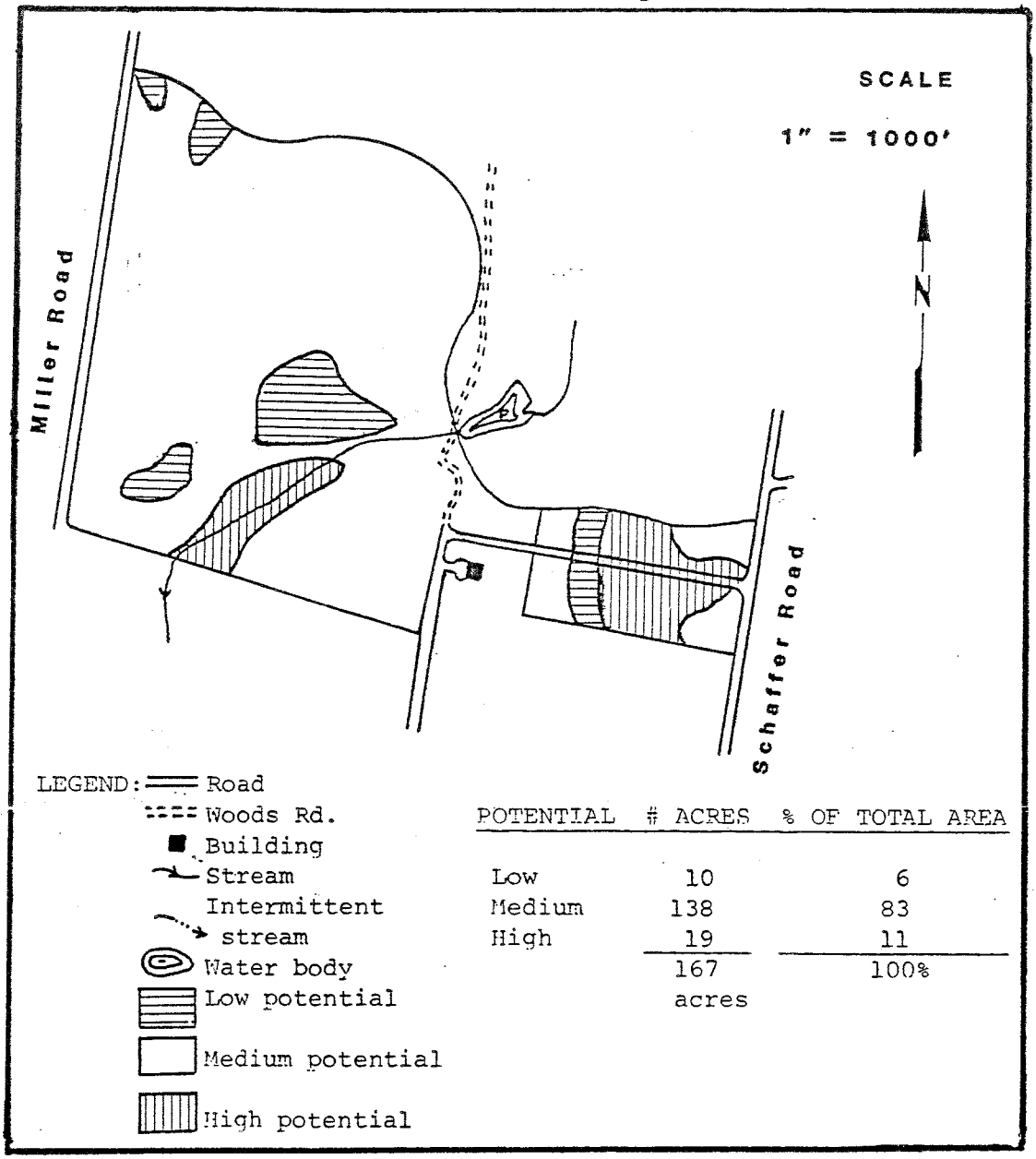


LEGEND:
- Road
- Woods Rd.
- Wooded area
- Building
- Stand boundary
- Water body
- Intermittent stream
- Perennial stream
- Wetland

ACREAGE BREAKDOWN

STAND #	ACRES	DESCRIPTION
1.	77	Oak/Hickory
2.	30	Mixed Hardwoods
3.	3	Mixed Hardwood (poles)
4.	22	Softwood Plantation
5.	2	Cleared area
6.	13	Red Maple
IA	5	Inaccessible/ Inoperable
Total Forested	152 acres	
Nonforest	15	
	167 acres	

Figure 6 Forest Soils Productivity Potential



POTENTIAL	# ACRES	% OF TOTAL AREA
Low	10	6
Medium	138	83
High	19	11
	167 acres	100%

Stand #1. Oak/Hickory, 77 acres - This well-stocked stand is composed of medium to poor quality, small sawlog-sized* red oak, white oak, and hickory. These trees are growing at a fair rate on a medium quality growing site and are approximately 60 years old.

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*seedling size-less than 1" in diameter at breast height (dbh)
sapling size-1-5" in dbh
pole size-5-11" in dbh
sawlog size-11" and larger in dbh

The understory species encountered include poles and saplings of the above species plus red maple, black birch, hemlock, maple leaved viburnum and high bush blueberry.

The ground cover here includes ground pine, spotted pipsissewa, Christmas fern, mullein, wood nettle, poison ivy, and scattered grasses.

This area was harvested around 1982. Subsequently, a mixture of white pine, larch, and hemlock were planted in the more open areas.

Many of the tree species present in this type and the mixed hardwood vegetation type have high commercial value for sawtimber and fuelwood. The condition of the trees is variable, as dictated by site conditions, past land use, and past vegetation management. Over the past few years, most of the accessible area of this type has been harvested for both commercial sawtimber and fuelwood as part of an intensive watershed management program. These areas have a good potential for the production of forest products. This potential can be utilized more fully through the continuation of proper forest management. Trees in these areas will respond well to periodic thinnings aimed at removing the poorer quality trees. These thinnings will reduce competition between species and result in a healthier, higher quality stand.

Stand #2. Mixed Hardwoods, 30 acres - This well-stocked stand is composed of good quality, pole to small sawlog-sized red maple, yellow poplar, black birch, yellow birch, red oak, and ash. These trees are growing at a medium rate on a good quality growing site and are approximately 50 years old.

The understory species encountered include spicebush, barberry, and saplings of the above hardwood species.

The ground cover here includes partridge berry, wild sassparilla, wood nettle, violet, white trillium, marsh mellon, dolls eyes, and poison ivy. Skunk cabbage, various ferns, lily of the valley, trout lily, and various mosses can be found here as well.

The potential for the production of forest products is good here and can be maintained through continuation of sound forest management practices as in Stand #1.

Stand #3. Mixed Hardwood (poles), 3 acres - This type is composed of primarily red oak, ash, white oak, black birch, red maple, sugar maple, and hickory poles which have developed on what was once (± 40 years ago) open field or pasture. Scattered throughout can be found occasional larger hardwoods, red cedar and softwood reproduction.

The understory contains ironwood, witchhazel, honey suckel, barberry, multiflora rose, and hardwood seedlings and saplings.

Ground cover here still contains remnants of the area's field origins. Species such as mosses, grasses, poison ivy, and some scattered ground pine can be found here.

The potential for production of forest products here is limited due to the small acreage involved.

Stand #4. Softwood Plantation, 22 acres - This fully-stocked plantation is composed of good quality, small saw-log-sized white pine. These trees are growing at a good rate on a good quality growing site and are approximately 45 years old.

The understory species encountered include saplings of cherry, black birch, red maple, and sugar maple. Additionally, witchhazel, spicebush, and occasional multiflora rose can be found.

The ground cover here is scarce due to the dense crown closure.

Due to the windthrow hazard inherent in thinning plantation-growth pines, care should be exercised in planning thinning operations. Should residential development be planned for these areas, it is important to thin these areas 5 or so years in advance of development. This will give the residual stand enough time to develop additional wind firmness, something which is critical for a residential landscape.

Stand #5. Cleared Area, 2 acres - This area was basically similar to Stand #1 prior to the harvesting described in Stand #1. The harvest here was more intense, leaving a residual stand of clumps of sapling to pole-sized hemlocks.

Stump sprouting, as well as natural regeneration, has produced many sapling-sized oaks, maples, and black birch. As in Stand #1, a mixture of white pine, larch, and hemlock have been planted here.

Ground cover here consists primarily of grasses, with frequent small clumps of blackberry and raspberry.

This area should be allowed to develop for another 10 years, at which time thinning and release work may be in order.

Stand #6. Red Maple, 13 acres - Red maple is the dominant tree species along with scattered white ash, American elm, black willow and yellow birch. The understory contains spice bush, sweet pepper bush, elderberry, and several species of viburnum. Skunk cabbage, tussock sedge, cinnamon fern, sensitive fern and sphagnum moss are widespread as ground cover. Generally, tree growth potential is limited by the high water table and saturated soils which are present. Under these conditions, trees are shallow rooted and unable to become securely anchored, causing high potential for windthrow. These soil conditions also limit

access and operability. Due to these limitations, the feasibility of implementing timber management practices may be severely reduced.

Stand IA. Inaccessible, 5 acres - This area is similar in species composition to the adjacent mixed hardwood type (#2). However, steep slopes in this area preclude the use of harvesting machinery except where material may be reached from the margins. Due to these steep slopes, erosion of exposed mineral soils may endanger water quality in the adjacent stream. Therefore, it is best to avoid management activities which may disturb the protective organic layer, opening the way to erosion problems.

Non-Forest Areas, 15 acres - Some of the more productive areas in the study area are occupied by open fields. These areas are at present being utilized as mowed fields (vegetated with grasses and assorted wildflower and weed species).

IX. Wildlife Habitat

The "Hopp Brook Tract" property may be divided into four major wildlife habitat types. These are mixed hardwoods, conifers, open land, and wetlands.

Mixed Hardwoods - This habitat type consists of a diverse species composition including red oak, white oak, chestnut oak, beech, hickory, maple, black and yellow birch, blue-beech and witchhazel. Hemlock and cedar are sparsely scattered throughout this type. Understory vegetation consists of hardwood saplings, viburnum, blackberry and raspberry, club moss, dewberry, mountain laurel, greenbriar, grass and various herbaceous species.

Wildlife utilizing such habitat include deer, turkey, squirrel, rabbits, fox, and numerous non-game species.

Conifers - This habitat type consists of five stands of white pine. Understory varies from open to densely covered, consisting of grasses, club moss, briar patches and various herbaceous species.

Wildlife frequenting such sites include rabbits, deer, woodpeckers, and various non-game species.

Open Land - This type consists of several grass/clover hay fields with stone wall/brushy borders.

Wildlife utilizing such habitat include deer, rabbits, turkey, woodchucks, chipmunks, fox, bluebirds, mourning doves, and numerous other non-game species.

Wetlands - The wetland habitat consists of seasonally flooded mixed hardwoods and approximately 2,000 feet of perennial stream.

The seasonally flooded mixed hardwoods are dominated by red maple. Understory vegetation consists of spicebush, skunk cabbage, and various herbaceous species.

Stream side vegetation consists of hemlock and yellow birch associated with spicebush, grasses, ferns, and numerous herbaceous species.

Wildlife frequenting such sites include deer, mink, raccoon, woodcock, woodpeckers, songbirds, and numerous amphibians and reptiles.

Discussion - If the site is developed for residential housing there will be an immediate negative impact on wildlife. The primary impact would be a direct loss of habitat due to roads, driveways, buildings, recreational facilities, and walkways. Another impact would be a change in habitat where forest and fields are cleared for lawns and landscaping. A third impact will be increased human presence, vehicular traffic, and a number of roaming cats and dogs. This will drive the less tolerant wildlife species from the site, even in areas where it has not been physically changed.

A number of measures can be implemented to minimize the adverse impacts of the project on wildlife. When developing the road and walkway systems, every effort should be taken to keep erosion (silt) out of the remaining wetlands. Culverts should have devices installed to discourage beaver. Retention ponds if needed, could possibly be designed to benefit waterfowl. Subdivision design along the concept of cluster development or larger lots (5 to 10 acres) would reduce negative impacts on wildlife, since more undisturbed land would remain. Landscaping should be coordinated by a professional with natural landscape concepts. Avoiding lawns and chemical applications will lessen acreages of lossed habitat. Fields on which buildings will be constructed should maintain their stone wall/brushy borders.

In a small but heavily developed and highly populated state like Connecticut, where available habitat continues to decline on a daily basis, it is critical to maintain and enhance existing wildlife habitat. The following practices will help to improve conditions within the various habitat types:

Forestland Guidelines

1) Create a diversity of habitat by making small irregularly shaped openings (¼ to an acre) in an east to west direction (to obtain maximum sunlight). This will encourage fruit producing shrubs valuable to many types of wildlife. Edges of openings should be feathered (gradually blended

into the forest type).

2) Pile brush along edges of openings for small mammals and birds.

3) If a timber harvest is planned these practices should be followed:

a. Encourage mast producing trees (oak, hickory, beech).

b. Leave 5 to 7 snags per acre.

c. Exceptionally tall trees are utilized by raptors for nesting and perching and should be encouraged.

d. Trees with vines (berry producers) should be encouraged.

e. Create small openings with feathered edges.

f. Construct small brush piles.

Open Land Guidelines

1) Hay fields should be maintained as they provide both an agricultural and wildlife need. Stonewall/brushy edges should remain.

2) A fifteen foot uncut border should be left where fields abut forest. This border should be mowed every three to five years (after August 1). These uncut borders are valuable to many wildlife species.

3) Bluebird boxes should be erected at field edges.

It should be recognized that for optimum wildlife habitat potential a variety of successional stage vegetation should be encouraged.

Wetland Guidelines

1) Leave buffer strips (100 feet) of natural vegetation along wetland areas to help filter and trap silt and sediments.

2) Development of potholes (3-5 feet deep) within seasonally flooded mixed hardwoods to insure year round wildlife waters.

Additionally, the development of a nature trail/wildlife preserve would be valuable as a recreational opportunity, for maintenance of valuable wildlife habitat, and with proper planning, as a natural resource education process.

To conclude, residential development would negatively impact existing wildlife populations. However, more urban adapted wildlife species (i.e., robbins, sparrows, starlings, skunks, raccoons, etc.) would be attracted. The site has excellent potential as a recreational resource and wildlife preserve.

If further wildlife related assistance is required, the town is encouraged to contact the Western District DEP Office.

X. Archaeological Resources

In the Hopp Brook Tract, since most of the ground surface is covered with duff and leaf littler, the presence of historical archaeological resources is far more obvious upon a cursory examination than that of prehistoric resources. Nevertheless, prehistoric sites are there and the potential for the discovery of others exists. Additional sites are located elsewhere in the Hopp Brook drainage outside of the study area. All available data indicates that this valley has been occupied by prehistoric peoples for thousands of years. Any plan to develop the area should recognize the fragile nature of these non-renewable resources and should seek to preserve their cultural and historic data from destruction.

In order to discover prehistoric sites, three days were spent by members of the Greater New Haven Archaeological Society excavating a total of 15 quarter-meter test pits. All soil was sifted with ¼" mesh hardware cloth. Below the leaf litter the A, B, and C soil horizons were considered as separate stratigraphic units in each pit. The A horizon was a dark brown to black loam. The B. horizon was a light brown sandy loam of variable thicknesses. In some places it was absent with A resting directly upon C. In others it may have been 50 to 70 cm thick. In these deeper areas testing was not adequate to examine the upper surface of C. This deepest horizon is composed of glacial gravels, and is presently believed to be the upper surface of a kame terrace (Flint 1930:103), or ice-contact stream terrace on the side of the Hopp Brook valley. These pits were not randomly distributed, but were placed in specific locations considered to have a high potential for pre-historic occupancy on the basis of the configuration of the ground surface. In one locale, two test pits produced both quartz and very obvious chert (flint) chipping debris in the B horizon which was 30 cm deep. This has been designated Hopp Brook site 1. In another locale, two more test pits produced similar chipping debris, as well as a split quartz cobble in the initial stages of being worked into a tool. In one pit the B horizon was 30 cm deep, in the other the B horizon

seemed to be absent. This has been designated Hopp Brook site 2.

It is now recognized that upon the termination of the glacial ice in the Northeast, bands of Paleo-Indian hunters and gatherers (10,000 - 7,000 B.C.) would have moved into the area from the south and west. As they did so, they would have encountered the north to south oriented glacial stream valleys in which they then would have been the first occupants (Moeller 1980). It is suggested here that the level and well drained surface of a kame terrace as situated in this valley would have provided an attractive site for these people. If an effort is to be made to explore the potential for the existence of one of these small sites, then this terrace must be more extensively tested in the areas where the B horizon is the thickest and would have protected occupational debris resting on the top of the C horizon from subsequent disturbance.

An attempt has also been made to contact and interview local collectors. In 1974 the writer did a limited survey of sites with the support of the Connecticut Archaeological Survey at Central Connecticut State College employing this approach. Then 7 different sites were located in the southwestern corner of Bethany, three of which are in the drainage of Hopp Brook. The others are immediately to the east of this valley. Recently, local collectors have provided the GNHAS with data leading to the location of two additional sites in the Hopp Brook drainage, but outside of the Water Company property. Another local collector, whose data we have not yet seen, claims to have a collection of approximately 2,000 projectile points from several sites in both Bethany and Woodbridge. Some 400 to 500 of these come from another specific locale in the Hopp Brook tract. We have not yet had an opportunity to test pit this area. This is the largest collection yet reported from any site in Bethany.

Historical cultural resources in the area are most obvious and therefore difficult to protect from vandalism. Near the corner of Bear Hill and Hinman Roads are the foundations of a 19th century house and barn. The house is located in the Beers Atlas of 1868. A cursory examination of the Bethany Town records indicates that the house was once the home of H. Oliver Chatfield who inherited the property in 1914 and sold it to the Ansonia Water Company in 1924. One of the collectors who has been interviewed has two bricks from inside the house foundation. Although not found in situ, they could have been part of the fireplace or chimney. Adhering to the bricks are fragments of lime mortar made from the burning of oyster shells. This type of mortar may be indicative of the 18th century. It is expected that careful excavation of foundations and associated sub-surface features such as privy pits (Hume 1969) would reveal well-stratified and in situ data.

A short distance down the Bear Hill Extension is a dam across Hopp Brook and nearby foundations which, in the Beers Atlas, are designated as "s. mill", which is here assumed to be a sawmill. This alone has considerable implication for environmental change in the area. Today there is insufficient water in Hopp Brook to make such a mill operative. It may be hypothesized that the operation of the mill helped to spell out its own demise. The virgin forest cover would have provided a stable situation in which run-off and erosion would have been minimal. Precipitation would have been absorbed regularly by the vegetation and the soil and the water table would have provided a constant, year-round source of water for Hopp Brook, but with predictable spring-to-fall fluctuations in water level. With the mill, clear-cutting on the slopes on either side of the brook would have increased surface run-off. If ground cover was destroyed there would have been an increase in erosion. Today it is to be noted that the Bear Hill Extension, a dirt track, has been badly eroded recently. With the forest cut down and the litter gone, less water would have been absorbed by the soil to provide a constant supply to the stream. The net effect upon Hopp Brook would be an increase in the seasonal extremes in water level. It would be very low in the fall and exceptionally high in the spring. Just below the dam in the valley there is at least one presently dry secondary stream channel. It is not known if this represents normal meandering of the stream or if it was carved out at a period of exceptionally high water. Unpredictable extreme fluctuations would lead to greater degrees of inefficiency in the operation of the sawmill. The introduction of the more efficient portable steam powered mill would have been terminal. (See photo in Bethany Town Hall).

Once the virgin forest was removed, then the imported English field system would have been imposed upon the landscape. The many stone walls which run through the wood and still outline fields today are the artifactual remains of this system. Depending upon the quality of the soil and the number and size of the remaining rocks, some fields would have been used for agriculture and others for pasture. With the decline of agriculture some fields would have been permitted to return to forest and others planted with white pine. Of note are some exceptionally large dead hardwood trees adjacent to one or two of the stone walls. These were, perhaps, permitted to grow next to the walls when the fields were in active use, and consequently predate the present forest cover.

Perhaps the most current cultural influence upon the environment in the study area is the iron grate which has been installed in the pond above the dam and also the pipe which leads from there to the Peat Swamp Reservoir in Seymour. This is literally draining the upper valley of

Hopp Brook so that the downstream flow is minimal. A process which was initiated in the 19th century prior to 1868 continues unabated, and in a more efficient form today. Just as the 19th century industrialists attempted to find more efficient means with which to maximize their returns, so also are the 20th century occupants striving for greater degrees of cultural efficiency and return.

It is to be cautioned that the above is intended as a tentative working model with which to understand the interactions of culture and the environment. Its application here has been strongly influenced by William Cronon's (1983) Changes in the Land: Indians, Colonists, and the Ecology of New England. Obviously many necessary historical, cultural, and ecological facts are missing, with which the model could be expanded.

Most of the environs of the Hopp Brook drainage have presently escaped the expanding sprawl of suburbia and are still rural in character. Consequently, this area could provide the archaeologist with an opportunity to study in depth the development of prehistoric cultures within the context of the local environment over the several millennia since the Pleistocene. There is also a great deal to be learned concerning our own cultural heritage from an interdisciplinary approach including anthropological archaeology, history, and ecology.

As the ownership of the Hopp Brook Tract changes, it is hoped that those in decision-making positions will take a positive attitude toward these specialized concerns and will seek to preserve the integrity of the historical and cultural resources of the area.

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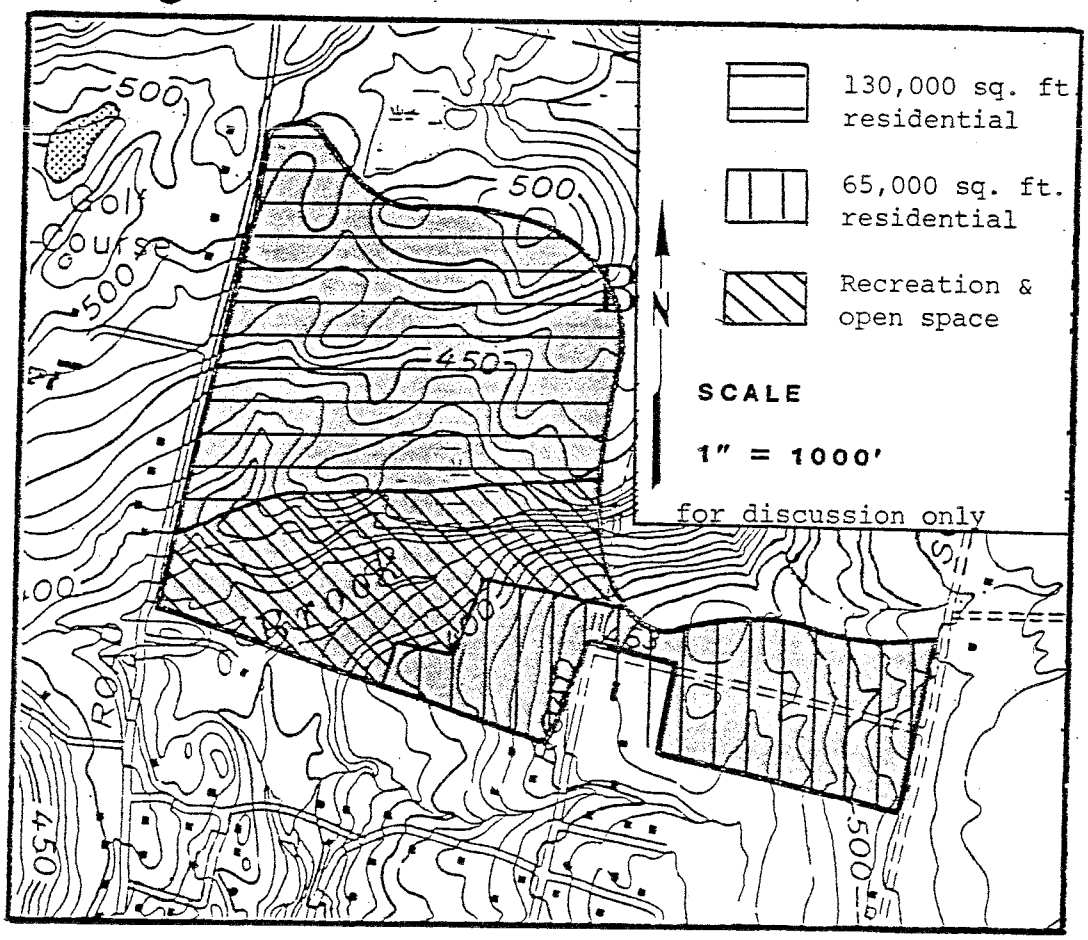
XI. Additional Planning Considerations

As previously discussed, this is a site of approximately 167 acres of Class III land, proposed for recreational use or residential development. It is presently owned by the Ansonia-Derby Water Company, and is proposed to be offered to the Town of Bethany for acquisition. The site is in the western portion of Bethany between Miller Road and Schaffer Road. To the north of the site is land which will be retained by the Ansonia-Derby Water Company. Development in this area of the town is primarily one-family residential. There are a few farms. There is a volunteer fire department station at the corner of Bear Hill Road and Hinman Road. The extension of Bear Hill Road, from this corner north, is a winding dirt lane descending into the site. Land in this portion of Bethany is zoned for one-family residences on lots of a minimum of 65,000 sq. ft. (1½ acres). The land of the site itself is zoned for a minimum of 130,000 sq. ft. (3 acres) per dwelling unit. There is a private golf club across the street from the site on Miller Road.

Figure 7 Design Zones



There are no public water supply or sewers in the site or nearby - nor are there plans for any in the future. The Regional Plan of Development Land Use Map indicates that this area of Bethany should be encouraged to remain as open space or be developed for less than 1 family/acre residential.

Land within the site directly along both sides of Hinman Road is relatively flat and open, and would lend itself to residential development. It would also be good land for recreational playing fields, if the town considered that there was a need for such intensive recreational use. However, it is the opinion of the Team's planner that there are sufficient recreational fields in Bethany at this time.

Land directly opposite the fire house on Bear Hill Road would also be adaptable for residential development. It appears that this land could be suitable for 1½ acre housing sites along the road with a right-of-way for more housing sites in the rear. To achieve this, the town would need to rezone this acreage to 65,000 sq. ft. or adopt cluster provisions for this area. Care should be taken that such sites do not utilize much of the acreage which is steeply inclined towards the stream bed. This land should be preserved and maintained (possibly by the town) for passive recreation.

The land along the stream bed and the slopes to each side should be considered for part of the town's reserved passive recreation areas. There is already in existence an adequate path from Miller Road to the extension of Bear Hill Road, a path which could be maintained for horseback riding as well as walking. Care should be taken to separate the hours of pedestrian and equestrian useage. No dirt bikes or similar vehicles should be permitted. The town should also investigate the need for adoption of regulations of use of the property to be retained by the Ansonia-Derby Water Company - including the pond.

Land in the northern portion of the site is relatively flat although undulating, and while rocky boulders and seasonal wetlands were seen, it could also lend itself to very low density residential development. A loop road could be constructed from Miller Road and (minimum) 3-acre lots of varying shapes could be laid out to maximize the unique siting potential and preservation of existing vegetation.

Figure 7 identifies three different design zones for the property which indicate the above observations.

* * *

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, recreation specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - a 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

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 the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

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 an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the team to enter the property for purposes of review, and a statement identifying the specific areas of concern the team should address. When this request is approved by the local Soil and Water Conservation District and the King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.