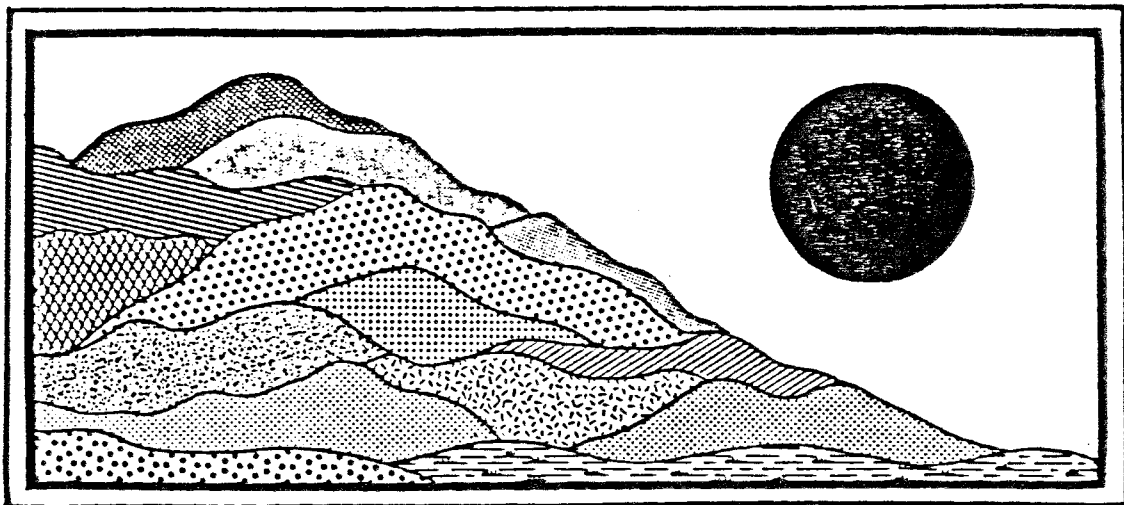


Mt. Hygeia Reservoir

Killingly, Connecticut

June 1988



ENVIRONMENTAL

REVIEW TEAM

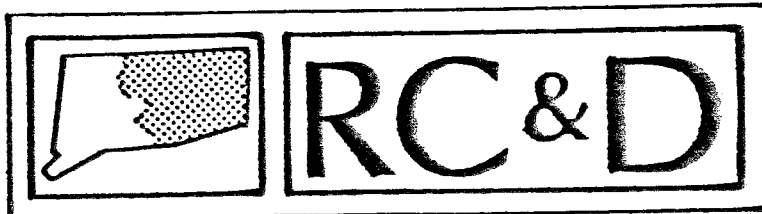
REPORT

Mt. Hygeia Reservoir

Killingly, Connecticut

Review Date: APRIL 14, 1988

Report Date: JUNE 1, 1988



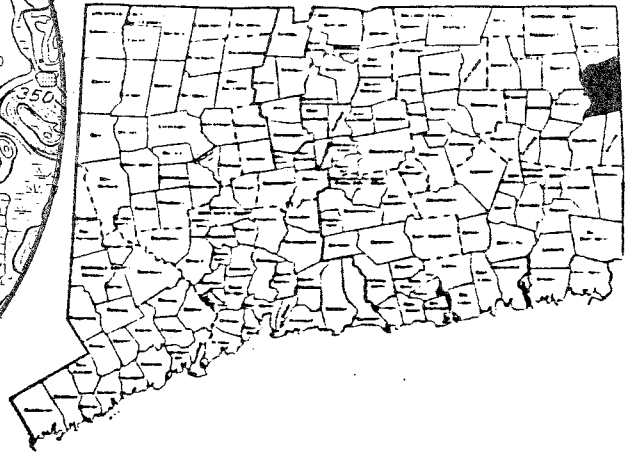
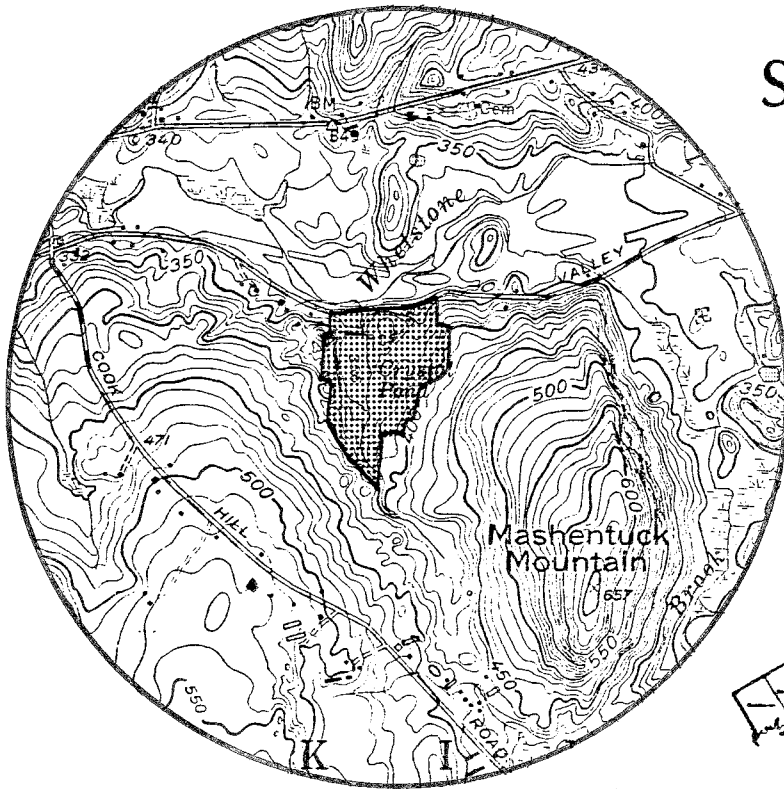
ENVIRONMENTAL REVIEW TEAM

PO BOX 198

BROOKLYN, CONNECTICUT 06234

Site Location

MT. HYGIEIA RESERVOIR
KILLINGLY, CONNECTICUT



EASTERN CONNECTICUT
RESOURCE CONSERVATION
& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

MT. HYGELA RESERVOIR

Killingly, Connecticut

This report is an outgrowth of a request from the Killingly Parks and Recreation Director to the Windham Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Deveopment (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 Thursday, April 14, 1988. Team members participating on this review included:

- Howard Denslow --District Conservationist - U.S.D.A.,
Soil Conservation Service
- Joseph Hickey --Planner - DEP, Parks and Recreation
- Steve Hill --Wildlife Biologist - DEP, Eastern District
- Wes Marsh --Dam Safety Program Coordinator - DEP,
Water Resources
- Brian Murphy --Fisheries Biologist - DEP, Eastern District
- Dick Raymond --Forester - DEP, Goodwin Conservation
Center
- Elaine Sych --ERT Coordinator - Eastern CT RC&D Area
- Bill Warzecha --Geologist - DEP, Natural Resources Center

Prior to the review day, each Team member received a summary of the proposed project, a list of the Town's concerns, a location map, a topographic map, and a property boundary map. During the field review the Team members were given soils maps and plans. The Team met with, and were accompanied by the Director of Parks and Recreation and the Town Planner. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project--all final decisions and conclusions 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 Committee hopes you will find this report of value and assistance in making your decisions on the recreation area.

If you require any additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 198
Brooklyn, CT 06234
(203) 774-1253

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Hygeia

1. INTRODUCTION

The Eastern Connecticut Environmental Review Team has been asked to conduct a natural resource inventory and evaluation of the Mt. Hygeia Reservoir Property by the Killingly Parks and Recreation Department. The Town is currently leasing the property from the Crystal Water Company and they are contemplating the feasibility of purchasing the land for a town-owned recreation area. Current plans which are underway include creating a parking area and a beach/bathing area for swimming lessons.

This report provides information on the natural resources of the site and offers concerns and recommendations regarding the dam and the recreation potential for town use. The general concensus of the Team is that the site offers good potential for a Town park, and consideration should be given to the possibility of acquiring additional adjacent land.

2. SETTING AND LAND USE

The Hygeia Reservoir site, a potential town acquisition, consists of about 38 acres of wooded land in eastcentral Killingly. Hygeia Reservoir (a.k.a., Crystal Pond) has a surface area of about 4.86 acres and a volume of about 15,000,000 gallons. The site is bounded to the north by Valley Road and private, undeveloped land to east, south and west. Cook Hill Road traverses the southern limits of the Hygeia Reservoir watershed area. The term "watershed" in the preceding sentence refers to all land areas from which water may drain into the reservoir.

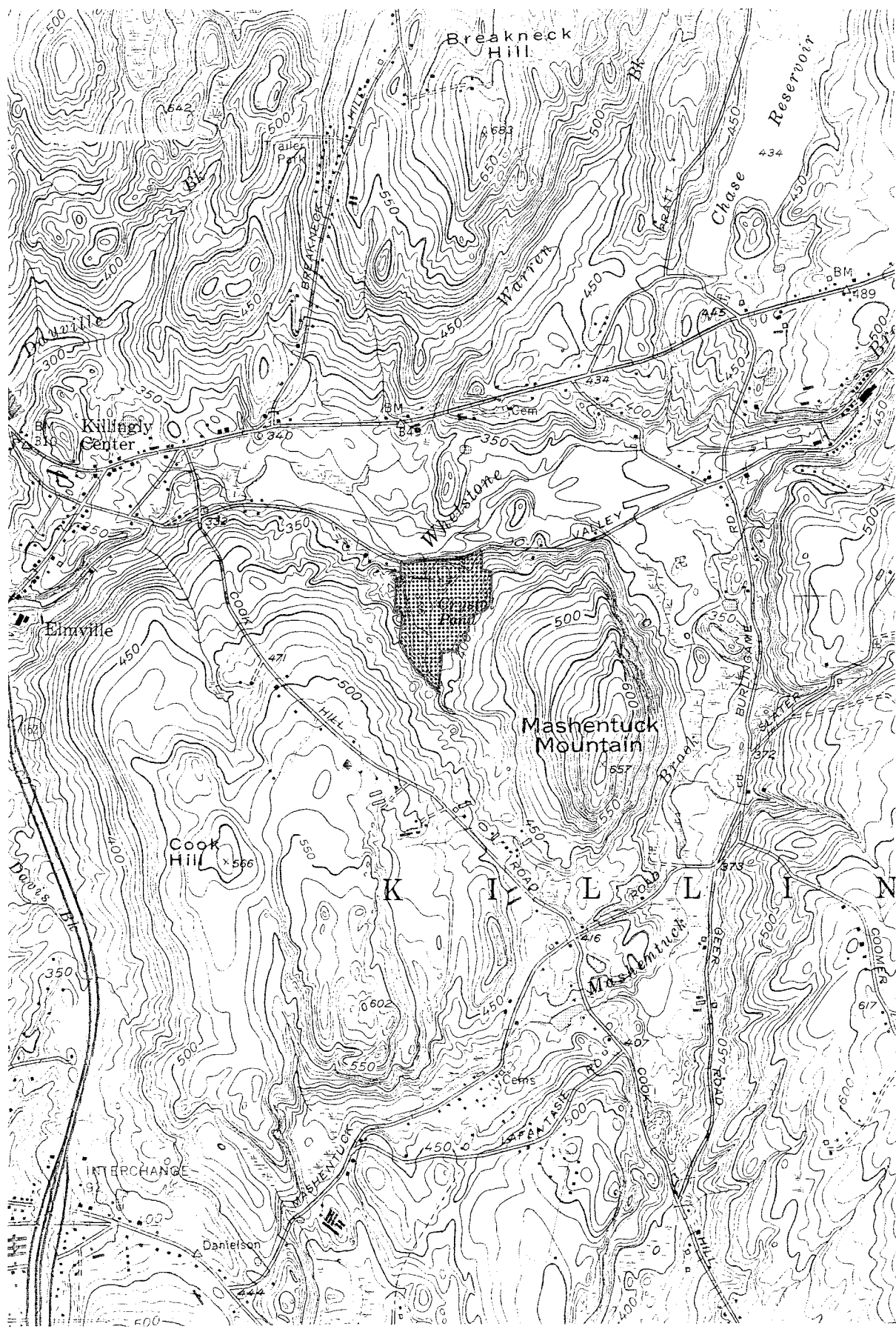
Except for low-density residential and agricultural land-uses along Cook Hill Road, the watershed is largely wooded and undeveloped. Cook Hill Road is about 1/2 mile south of the Reservoir.

Hygeia Reservoir is a non-active distribution reservoir currently owned by the Crystal Water Company and was last used in 1982. The Reservoir was created in 1886. An active water storage tank is located in the northeast corner but is not connected to the reservoir's distribution system.

Access to the property is provided by a gravel road around the water tower from Valley Road. The road will terminate at a parking area on the east side of the reservoir. It is understood that the Town is considering a bathing area (primarily for swimming lessons) on the east side of the reservoir and passive recreational land-uses such as hiking trails and picnic areas.

3. TOPOGRAPHY

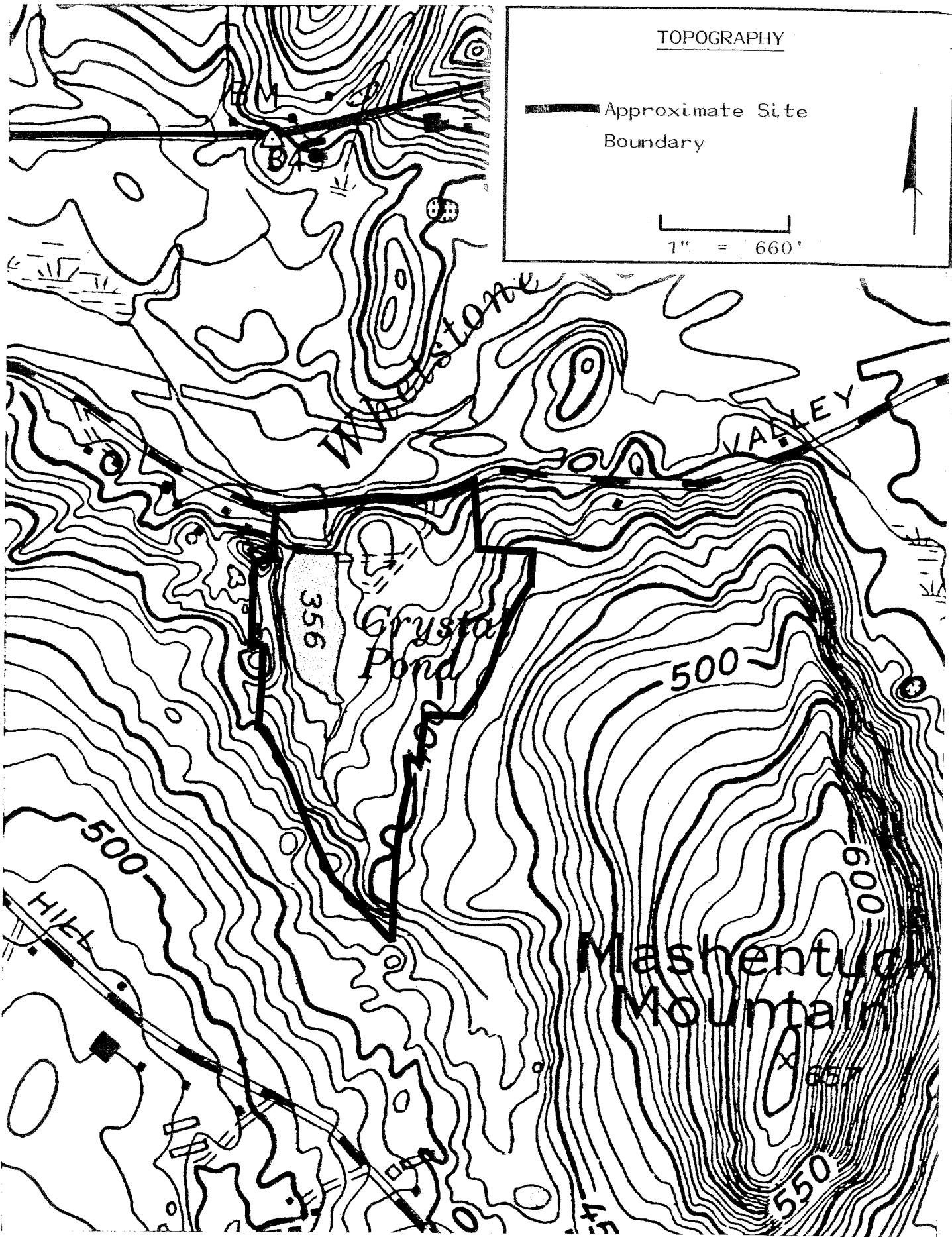
Slopes within the site generally range from gentle to moderate. Areas of steep slopes are concentrated along the western side of the reservoir. Elevations on the parcel range from a low of 356 feet above mean level



LOCATION

Scale 1" = 2000'





represented by the surface elevation of the reservoir, to a high of 420 feet above mean sea level along the eastern boundary. From the eastern boundary, the land surface continues to rise moderately then steeply to Mashentuck Mountain. The peak of Mashentuck Mountain represents the eastern watershed boundary for the reservoir. The difference in elevation from the summit of Mashentuck Mountain to surface elevation of Hygeia Reservoir is about 301 feet.

All runoff from the site flows either directly into Hygeia Reservoir or its major inflowing stream. The outlet stream for the reservoir is a tributary to Whetstone Brook.

4. GEOLOGY

The Hygeia Reservoir site is located in the East Killingly topographic quadrangle. A bedrock geologic map (GQ-1571, by George E. Moore, Jr.) for the quadrangle has been published by the U.S. Geologic Survey. No surficial geologic map exists for the quadrangle at the present time. The Team's Geologist referenced the Soil Survey for Windham County for the surficial geologic materials section of this report.

A. Bedrock Geology

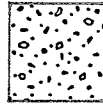
The bedrock underlying the site as well as the watershed area has been classified as Plainfield Formation (upper quartzite member). It is described as a white, light gray, light blue-gray and yellowish-gray, medium to fine grained, resistant quartzite. Although it does not outcrop visibly on the site or watershed, it is probably within 10 feet of the ground surface in most places. The variety of rock underlying the site has been used as material for the construction of stone walls transecting the site. The term "quartzite" indicates that the rock is metamorphic (has been altered by tremendous heat and pressure within the earth's crust). It is composed mainly of the mineral quartz and has a granular texture.

The underlying bedrock is a source of domestic water to many homes in the area. A northwest/southeast trending fault zone that runs parallel to Cook Hill Road is reported south of the site. Because of its close proximity to the site, it is expected that the upper few hundred feet of the bedrock is fractured and weathered. The fault mentioned above is a structural feature that formed during the geologic past but is no longer experiencing active movement.

B. Surficial Geology

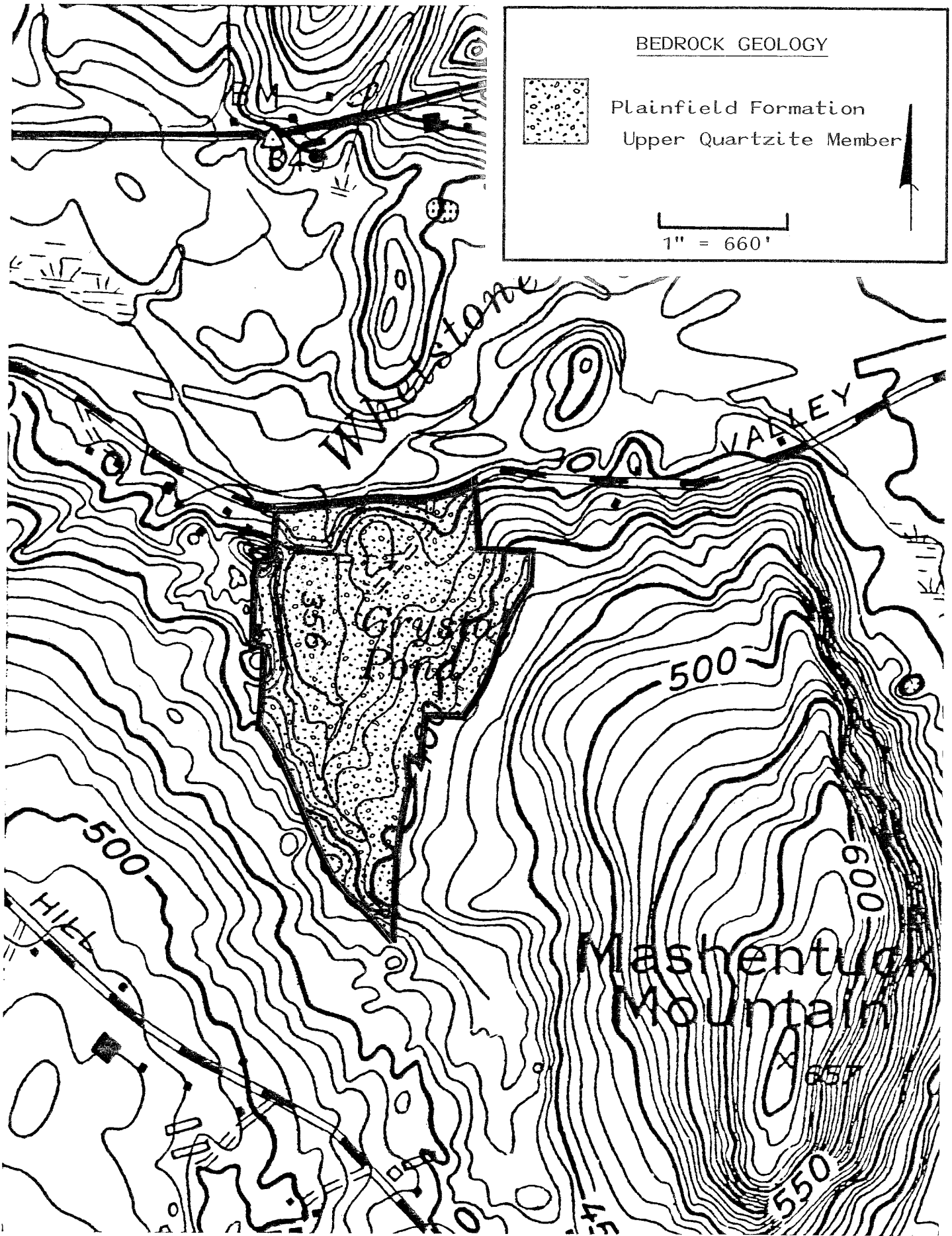
Overlying bedrock on most of the site is a blanket of unconsolidated sediments of glacial origin. As ice advanced over Connecticut one or more times during the last million years or more, it scraped and chipped bedrock

BEDROCK GEOLOGY

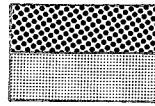


Plainfield Formation
Upper Quartzite Member

1" = 660'

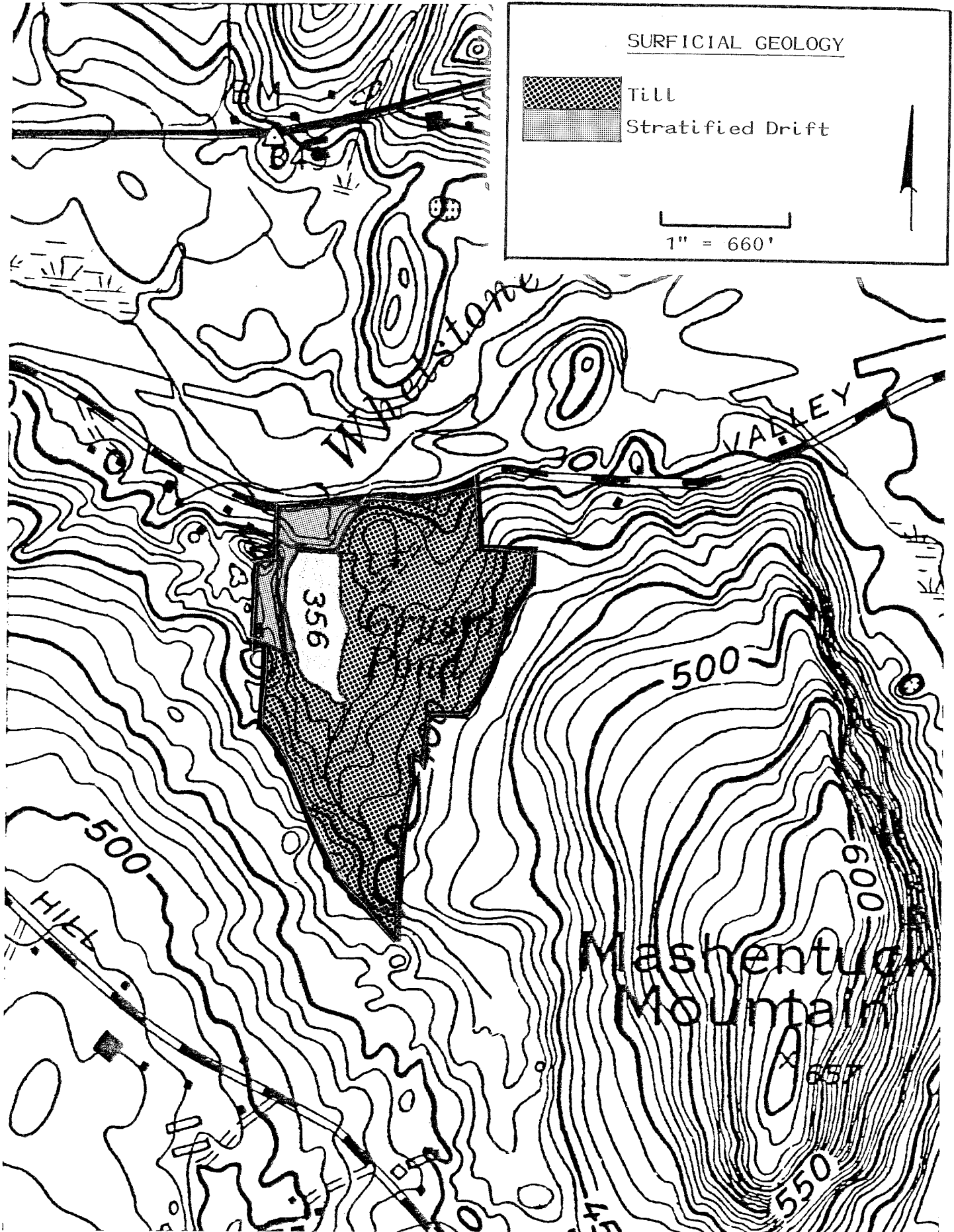


SURFICIAL GEOLOGY



Till
Stratified Drift

1" = 660'



outcrops and bulldozed pre-existing soils, incorporating the rock particles into the ice mass. These particles were then plastered against bedrock ridge and knobs by the ice as it continued its advance, or were let down gently from the ice as it began to waste away. The nonsorted accumulation of rock fragments that resulted contains a wide range of sizes and shapes and is known as till.

Based on soil data mapping the texture of the till on the parcel is mostly sandy, stony and loose. Flanking the westside of the site and north of the spillway for the reservoir, are deposits of sand and gravel. These materials, known as stratified drift, were washed out of and away from the receding ice stream by meltwater streams. Sand and gravel has been mined from this area in the past.

C. Limitations to Development

The geology of the site should pose no major problems in terms of developing the site for bathing and passive recreational purpose. To the extent that the east side of the site can be used for hiking and picnicking, the site provides an opportunity for peaceful walks through a forested area characterized by varied slopes. As mentioned earlier, there are areas of steep slopes. These areas may be rigorous for some hikers and also will require maintenance due to the potential for erosion. In order to maintain the high quality of water in the reservoir, it is suggested that if hiking trails are created, a regular maintenance program be implemented to ensure that trails do not erode and pose a siltation problem to the reservoir or its inflowing stream. Of most concern would be those areas closest to the reservoir and streamcourses feeding it.

The flatter areas along the eastern limits of the site would be favorable for picnic areas. The area that parallels the inflowing stream is limited for hiking due to seasonally high water tables. This area should not be disturbed, but left alone.

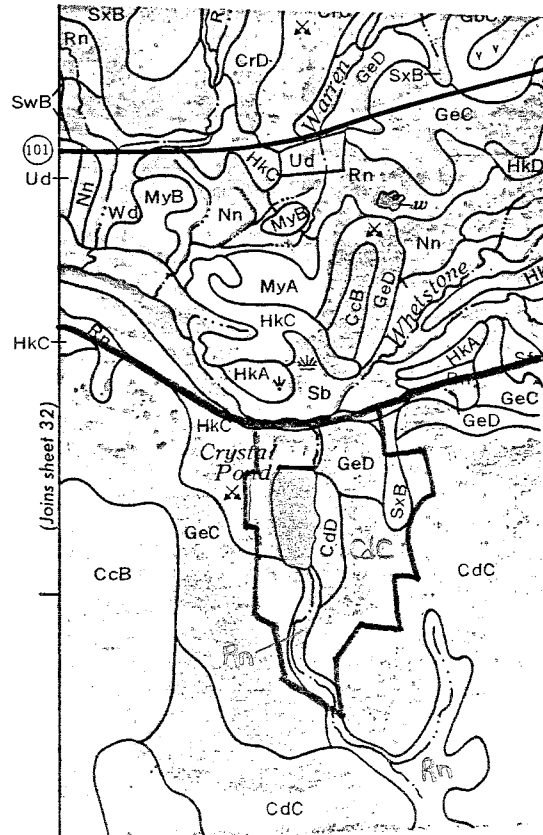
5. SOIL RESOURCES

A. Soils

On-site evaluation has confirmed the soils present and located as shown on the soils map from the Windham County Soil Survey. A minor exception is that the Canton and Charton extremely stony fine sandy loam (CdC) extends down to the edge of the water (east side of the reservoir) at less than a "D" slope. The slope on this side is a "C" grade of not greater than 15%. (Please refer to the soils map) This means that this area (east shore) would be easier to utilize for active or passive recreation or future limited building without as much erosion potential, adverse drainage problems, etc. This same soil, CdC, is found to be sloping at a gentle 2-3% grade on the

SOIL MAP

Owner Mt. Hygeia Reservoir, Killingly Operator _____
County Windham State Connecticut
Soil survey sheet (s) or code nos. Atlas Sheet #33 Approximate scale 1"=1320'
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating
with Windham County Soil and Water Conservation District



SOILS

- CdC - Canton & Charlton extremely stony fine sandy loams, 3 to 15 percent slopes.
- CdD - Canton & Charlton extremely stony fine sandy loams, 15 to 35 percent slopes.
- GeC - Gloucester extremely stony sandy loam, 3 to 15 percent slopes.
- GeD - Gloucester extremely stony sandy loam, 15 to 35 percent slopes.
- HkC - Hinckley gravelly sandy loam, 3 to 15 percent slopes.
- *Rn - Ridgebury, Leicester & Whitman extremely stony fine sandy loams.
- SxB - Sutton extremely stony fine sandy loam, 3 to 8 percent slopes.

* Designated wetland soil by P.A. 155

higher, flatter east side of the property.

A band of wetlands indicated by Rn soils contains a stream which flows into the reservoir from the south. The stream originates in the 240 acre drainage area feeding the reservoir.

B. Soils and Recreation Development

The Town's Recreation Department has had the trees removed from the east side of the reservoir just south of the water tower. Parking, picnicing, and swimming areas are being planned. It is suggested that a diversion be graded into the slope immediately above the beach when it is developed. This will prevent uphill runoff from washing out the beach. The Soil Conservation Service is available, if requested, to stake-out construction for the diversion. Plans that have been prepared for the parking area and entrance road show stormwater to be directed away from the gradual slope to the beach area and reservoir.

The suitability of the area for water-based recreation, principally swimming lessons, is excellent. The topography is gentle and lends itself to situating parking, the beach and picnic areas in a unique way. Elevated observation of the water is unrestricted. Good supervisory control and safety is possible. There should be minimal distraction and disturbance compared to some other town areas, where motor-boating and vehicular traffic is allowed or is nearby.

The wetlands with the stream and adjacent slopes at the south and west side of the parcel should not be developed in any way which could cause erosion and allow sediment to enter the reservoir. Retaining the woods around the reservoir in their natural condition will assure the best water quality. Some building along the east shore south of the swimming area may be possible providing that it is well back from the water. Building on easy slopes, not in wetlands or drainage draws, and leaving largely undisturbed natural wooded buffers down to the water's edge is important to assure continued excellent water quality.

The Team did walk the higher, flatter land on the east side of the property. This section is well back and above the reservoir. The area has future suitability for recreation fields, tennis complex, large building, etc. As land for public acquisition becomes more scarce, and as this area of Killingly develops, this area of the parcel may become important to the Town.

6. HYDROLOGY

A. The Watershed

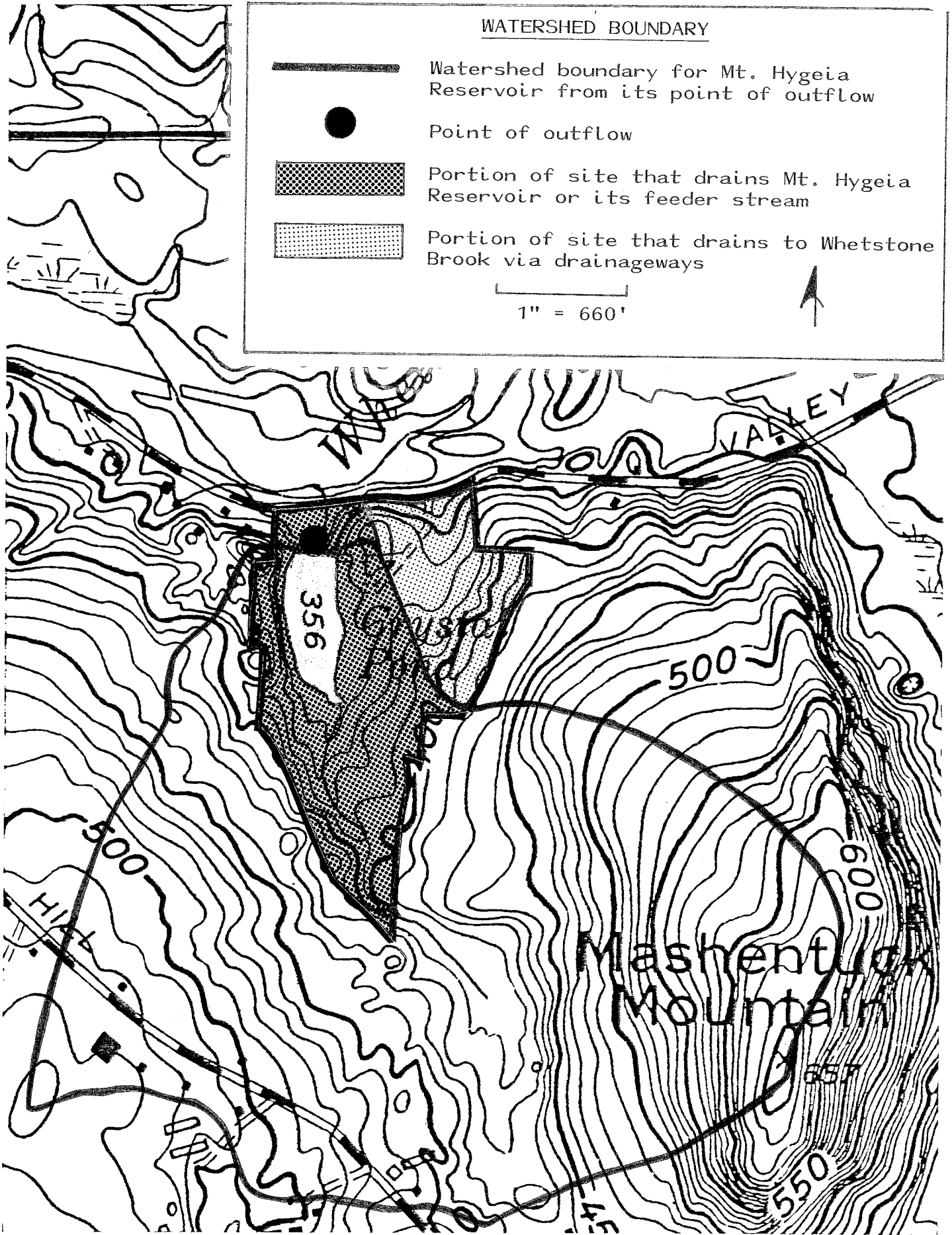
By definition, the watershed of Hygeia Reservoir comprises all land areas from which water may drain into the reservoir. A raindrop falling on the watershed boundary would have a 50 percent chance of passing into or out of the watershed. As shown by the accompanying map, the watershed boundary, or drainage divide tends to follow the crests of local hills, i.e., Mashentuck Mountain. It is to be expected that the spatial layout of the boundary as shown differs somewhat from the actual location of the divide. These differences may be attributed to slight inaccuracies in the topographic contour lines on the base map and due to re-routing of road drainage by man-made structures, i.e., pipes, culverts, etc. Nevertheless, the boundary as shown would be substantially correct for planning purposes. The watershed as depicted comprises approximately 244 acres or about .38 square miles. Except for about 11 acres in the northeast corner of the site, all drainage from the 38 acre site flows directly into Hygeia Reservoir or into one of its tributaries. The major streamcourse, which is unnamed, flows into the reservoir at the southern end. Surface runoff in the northeast corner flows downslope to a drainageway that routes the water under Valley Road and ultimately into Whetstone Brook.

The general groundwater flow pattern on the site and in the watershed parallels the surface flow pattern to a great extent. The shape of the water table (that level below which all spaces in the soil and bedrock are filled with water) is largely conformable with the surface topography, although minor surface features may not be reflected in the water table. Rainfall reaching the ground may pass overland as surface runoff or it may be absorbed into the ground. If absorbed, the water may either be returned to the atmosphere through evaporation or transpiration, or it may trickle down to the water table and become groundwater.

B. Water Quality

Ultimately, groundwater may be discharged at the surface in the form of a spring, seep, wetland, or stream. The quality of surface water therefore depends in part upon the route by which precipitation has been "transformed". More particularly, water quality is determined by the nature of the materials with which the water comes in contact and by the length of time the contact occurs.

Because the watershed is only lightly developed and because the land area in the immediate area of the Reservoir is undeveloped, surface and groundwater quality in the watershed is excellent. DEP classifies the groundwater and surface water in the area as GAA and AA, respectively. This means that the groundwater is within public water supply watershed or



within the area of influence of public water supply wells. It is presumed to be suitable for direct human consumption. The State's goal is to maintain that condition by regulating almost all discharges to groundwater. In terms of risk to groundwater or surface water quality, designating the site as passive recreation open space would be the next best land use to maintaining the land as public water supply watershed.

The potential sources of pollution in the watershed includes a failing septic system(s) or runoff from agricultural fields/operations. Based on current land uses in the watershed, the area of potential threat would be primarily along Cook Hill Road. It should be pointed out that the Team has no reason to believe that there are failing septic systems or agricultural pollutants in this area.

Because of their distance from the reservoir, it does not seem likely that they would present an immediate threat to water quality of the reservoir at the present time. Bacteriologic sampling data supplied to the Town by Crystal Water Company revealed excellent water quality in the Reservoir. In order to insure that the present water quality conditions are maintained, Town officials should closely monitor the development activity that occurs in the watershed in the future, especially given its current lightly developed status.

Runoff from developed areas and discharges of wastewater from houses or other buildings may receive considerable cleansing in the soil. The problem is determining how much stress (in the form of polluted water) can be placed on the soils before their renovative abilities are overtaxed. The answer to this problem varies from soil to soil and from contaminant to contaminant. For example, bacteria is more effectively removed from soils with a deep water table while nitrates tend to be less of a problem in soils with a shallow water table. As mentioned earlier, potential sources of pollution in the upper part of the watershed (i.e., closer to the headwater region) are less likely to pose a threat to the reservoir to a noticeable degree than those sources that are near the reservoir. It should be noted that timber harvesting has taken place in close proximity to the reservoir. If conducted improperly, this type of activity can threaten the environmental health and water quality of the reservoir in terms of erosion and siltation problems from skidders and clearcutting.

7. WATER SUPPLY

It is understood that public water from the Crystal Water Company is available to the site. If an on-site well had to be developed to serve the facility, the primary aquifer that is capable of use on the site is the metamorphic (quartzite) rock underlying the site. Neither the thickness nor areal extent of the stratified drift in the western parts makes the drift seem favorable for groundwater development.

The metamorphic rock underlying the site has potential for low (3 gallons per minute) or possibly even moderate yields (8 gallons per minute), depending to some extent on the depth of any wells drilled into the rock and the number of fractures it intersects. A well producing 3 gallons per minute (4320 gallons per day) would probably be adequate enough to meet the needs of the proposed recreational facility provided there is adequate storage facilities.

8. SEPTIC SYSTEMS

It seems likely that if the site is developed for bathing purposes and for passive recreational uses, on-site sanitary facilities including bathhouses will be required. As a result, septic system(s) will need to be developed to service the potential recreational facility. A cursory review of soils mapping data indicates that the soils southeast of the water tower would be favorable for the installation of on-site septic systems. The soils in this area are somewhat excessively to well drained and have a relatively deep water table. The bedrock surface is probably 8 feet or greater. Detailed soil testing, which includes deep test holes would be required in order to determine subsurface conditions and make an accurate assessment of the soil's ability to handle the projected flows from sanitary facilities and not to overload the area with too great a volume of sewage. This testing should be done in conjunction with the Northeast District Department of Health. This area also appears to be favorable in terms of protecting the reservoir from possible septic system pollutants. Groundwater in the area described above (southeast of the water tank) would appear to flow northeastward toward a seasonal drainageway. It is expected groundwater flow in this area would be in the direction opposite that of the reservoir.

9. DAM REVIEW

A. Physical Structure

The Mount Hygeia Reservoir Dam is an earth embankment type dam having a masonry overflow spillway. It is approximately 325 feet long and has a maximum height of 30± feet. The watershed contributing runoff to the pond/dam is .38 square miles. Construction of the dam reportedly occurred in 1886 to creat a water supply impoundment, which is now owned by the Crystal Water Company of Danielson.

B. Administrative History/Status Pursuant to DEP

This dam falls under the jurisdiction of the DEP pursuant to Sections 22a-401 through 22a-410 of the Connecticut General Statutes. An administrative order was issued on October 20, 1978, which directed the owner to perform an engineering evaluation of the dam's spillway adequacy, stability and seepage.

After initiating legal action through the DEP Attorney General's Office, the owner engaged the firm of A. R. Lombardi Associates, Inc. to prepare the necessary engineering studies. The Lombardi report was received by DEP on April 16, 1981, and subsequently reviewed. The report did not adequately address Departmental concerns with the dam's stability and seepage, and it will not be approved until those issues are resolved.

A request for maintenance work at the dam was forwarded to the dam owner on February 11, 1986, subsequent to a reinspection of the dam. The Crystal Water Company was then reminded of the outstanding unresolved engineering issues and their failure to respond to the maintenance request in correspondence dated May 23, 1986. To date, the water company has not responded to this reminder.

When the outstanding order is adequately addressed, the improvements recommended by the Lombardi engineering report (and approved by the DEP Dam Safety Section) must be implemented. Since the extent of the repairs necessary cannot be determined without resolving the outstanding engineering issues identified in the Lombardi report, no reasonable repair cost estimate can be given at this time. Suffice to say a substantial sum of money will be required to repair the dam to satisfy the outstanding order.

10. VEGETATION

A. Type Description

Refer to Vegetation Map.

Stand 1: This white pine stand covering 4.1 acres is fully stocked with fair to good quality trees. The overall site quality is high. The overstory consists of pole to sawtimber-sized white pine with scattered pole-sized Norway spruce which appears to have been underplanted among the pines. Seedling and sapling-size black birch comprise the understory. The ground cover consists of 1 and 2 year old white pine seedlings.

Portions of the stand were harvested during the recent harvesting operations.

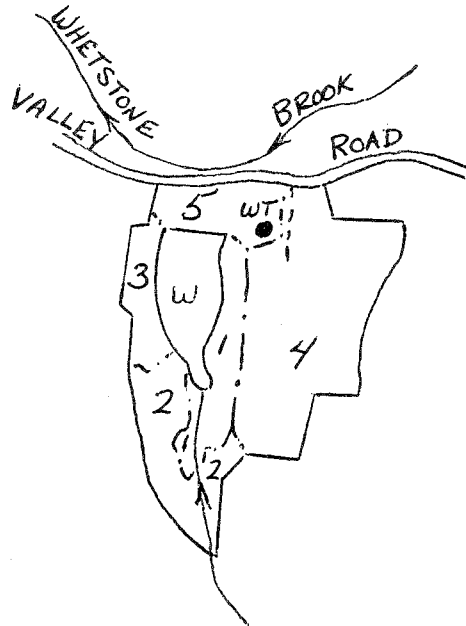
Stand 2: Occupying 5.9 acres, this mixed hardwood stand is variably stocked due to the recent harvest. Fair to good quality trees occupy this high site. The overstory contains pole to sawtimber-sized red maple, sugar maple, black birch, yellow birch, beech, white ash and white pine. Sapling-sized red maple, sugar maple and white pine together with viburnums and witch hazel form the understory. The ground cover is comprised of various grasses and ferns.

VEGETATION

MOUNT HYGIEIA RESERVOIR
KILLINGLY, CONNECTICUT
APRIL 1988



SCALE: 1" = 1000'



<u>LEGEND</u>	
	STREAM
	PUBLIC ROAD
	ACCESS ROAD
	WATER TOWER
	PROPERTY BOUNDARY
	VEGETATION TYPE BOUNDARY

VEGETATION TYPE DESCRIPTIONS*

- Stand 1. White Pine, 4.1 acres, fully stocked (portions cleared), pole to sawtimber.
- Stand 2. Mixed Hardwoods, 5.9 acres, variably stocked, pole to sawtimber.
- Stand 3. Softwood-Hardwood, 2.4 acres, fully stocked, pole to sawtimber.
- Stand 4. Mixed Hardwoods, 16.8 acres, variably stocked (portions cleared) pole to sawtimber.
- Stand 5. Field, 3.9 acres, open to lightly stocked, sawtimber.
- W Open Water, 4.8 acres.

* Seedling-size: Trees less than 1 inch in diameter at 4½' above the ground (D.B.H.).
 Sapling-size: Trees 1 to 5 inches D.B.H.
 Pole-size: Trees 5 to 11 inches D.B.H.
 Sawtimber-size: Trees 11 inches and greater D.B.H.

Stand 3: This 2.4 acre softwood-hardwood stand occupies the gravel slope west of the reservoir. It is fully stocked with fair to good quality trees. Site quality is low for hardwood, but high for softwood. Pole to large sawtimber-sized white pine and white oak form the overstory. The understory consists of seedling and sapling-sized white pine and white oak. The ground cover consists of blueberry and various grasses.

Harvesting of sawtimber was not accomplished due to the severity of the slope. A number of trees along the edge of the reservoir were windthrown during recent storms.

Stand 4: Covering 16.8 acres; this mixed hardwood stand of fair to good quality trees is variably stocked due to the recent harvesting activities. Overall site quality is medium to high for hardwood and high for softwoods. The overstory contains pole to sawtimber-sized black oak, scarlet oak, white oak, red maple, beech and white pine. Sapling to pole-sized red maple, black birch, white pine and beech comprise the understory. Sapling to pole-sized hemlock occurs as widely scattered individuals in the overstory and understory. Ground cover consists of club moss, ground pine and various ferns with white pine and hardwood tree seedlings.

Stand 5: This 3.9 acre stand occupies the area around the dam and the water tank. Stocking ranges from open to lightly stocked with sawtimber-sized white pine. These overstory trees of poor to fair quality have a form commonly known as "cabbage pine". The open understory and existing ground cover of grasses gives the stand a park-like appearance.

The recent harvesting activities did not include this stand.

B. Effects on Vegetation

The proposed utilization of the forested areas of the parcel for recreation development will impact the vegetation negatively dependent upon the extent of clearing, which depends upon the magnitude of development. Removal of some vegetation to open up areas proposed for passive recreation to increase sunlight and airflow must be considered. Clearing operations, where possible, should remove only the lowest quality trees and those which are a direct hazard to area users. The healthier, more vigorous trees should be retained where possible for their high shade and aesthetic value.

Later, some loss of vegetation may occur due to soil compaction, mechanical root injury, direct trampling and vandalism along the trails. Such vegetation losses will reduce the aesthetic quality of the area and may potentially cause accelerated erosion in some areas. These disturbances will also accelerate mortality of unhealthy low-vigor trees. Dead and dying trees in areas of use are hazardous and should be removed to reduce the risk of injury.

C. Management Practices

Due to the recent harvesting activities, the silvicultural operations necessary are salvage of the trees which have been windthrown or heavily damaged by logging machinery. This operation should be completed as trails are constructed.

Any harvesting in Stand 2 should be limited to the driest seasons of the year to avoid soil erosion which could cause sedimentation of the reservoir. Also the size and type of harvesting equipment to be used could be specified in an effort to limit potential environmental damage on a moist soil.

Stand 5: is considered to be inoperable due to access and severity of the slope. Possibly the stand could be operated from the top by cable, however, access would have to be from the adjoining property.

The remaining stands are accessible and operable.

D. Mitigating Measures

The trees which are removed during future clearing operations for development of the proposed trails, recreational and building sites should be utilized for sawtimber, fuelwood and woodchips. Trees that are to be removed should be marked to lessen the likelihood of removing desirable trees.

Dead and dying trees, which have the potential to become hazardous to users of the facilities, should also be removed and, where possible, utilized for the highest value use.

The trails should be well defined and clearly marked. This should limit extensive soil compaction, mechanical root injury and trampling of herbaceous vegetation outside these areas. Detrimental soil compaction may be reduced by spreading woodchips, crushed stone or cinders over the trails. The construction of wood corduroy over wet areas will protect these environmentally sensitive areas.

Eventual loss of some trees caused by soil compaction, even with the addition of woodchips, crushed stone, cinders or corduroy, is unavoidable. As these trees die, they should be removed, where necessary, to prevent a potential hazard.

11. WILDLIFE HABITAT

The area contains two distinct wildlife habitats. The upland forest site consists mainly of mixed hardwoods. The wetland habitat consists of the reservoir and associated shoreline/swamp type habitat.

A. Upland Forest

The upland forested area provides habitat for the following wildlife species; white-tailed deer, raccoon, fox, and various other small mammals. The birds inhabiting this area include redtailed hawk, American kestrel, common screech owl, ruffed grouse, and various species of woodpeckers (Picoides spp.), flycatchers (Tyrannus spp.), titmice (Parus spp.), nuthatches (Sitta spp.), vireos (Vireo spp.), wood warblers (Parula spp.), and American crow (Corvus brachyrhynchos).

B. Reservoir/Wetland

The reservoir and associated wetland provides habitat for a variety of wildlife species including raccoon, muskrat, otter, mink, and various small mammals. Bird species utilizing this area include dabbling ducks (Anas spp.), Canada goose (Branta Canadensis), kingfisher (Ceryle alcyon), flycatchers (Tyrannus spp.), and numerous reptiles and amphibians.

C. Nature Trail

The wildlife habitat present on this site provides the town with an area for the development of recreational facilities. A nature trail complete with informational signs providing insight into the ecology of wetlands would be beneficial in that it helps the general public appreciate a site's ecological value.

12. FISH RESOURCES

A. Introduction

The Mt. Hygeia Reservoir (owned by the Crystal Water Company), is an man-made impoundment of a tributary to Whetstone Brook approximately 4.8 acres in size. It is no longer used as an active water withdrawal supply. The town of Killingly which currently holds a 5 year lease with the water company plans to use the reservoir for recreational purposes only, and sought assistance in helping to determine the recreational potential for the area and whether or not the reservoir should be purchased.

No extensive limnological information exists for this water body. The water in the reservoir is classified by the DEP as "AA" surface water. Designated uses for this water classification are as follows; existing or potential drinking water supply; fish and wildlife habitat; recreational use; agricultural, industrial supply and other purposes. The water level of the reservoir is currently drawdown so that a beach and other shoreline improvements can be accomplished.

B. Fish Population

The exact fish species assemblage of Mt. Hygeia reservoir is unknown. It appears to primarily support a warmwater fish population. During the field review, several exposed sand and gravel spawning nests, typically built by warmwater fish such as largemouth bass and sunfish were observed. This observation was further evidence that the reservoir supports a warmwater fish population. Thus, the type of fish expected to inhabit this reservoir are: largemouth bass, chain pickerel, yellow perch, pumpkinseed sunfish, bluegill sunfish, brown bullhead and golden shiner.

Warmwater fish spawn during the spring. Presently, suitable spawning habitat for warmwater fish is not available for use due to the water level being lowered. Therefore, successful fish spawning cannot be expected to occur in 1988. Only a muddy-type substrate appears to predominate the reservoir bottom under present water level conditions. This is not suitable spawning habitat for warmwater fish. Consequently, fish production will be reduced or severely limited in scope during 1988. Very few fish can be expected to be "recruited" into the existent fish population.

C. Recommendations

1. Open up the reservoir for recreational fishing purposes. The warmwater fish population will naturally reproduce in the springtime as long as normal water levels are maintained; thus, fish stockings of largemouth bass or sunfish will not be required. However, the quality of fishing will probably be somewhat poor two or three years from now (1990-1991) due to the lack of fish production in 1988.
2. Leave the two large white pine trees that have fallen into the reservoir. Once normal water levels are realized, these submerged trees will provide excellent "cover" or hiding places for the resident fish population. Fish "cover" or hiding places for the resident fish population. Fish "cover" is a basic prerequisite for a "well balanced" fish population. Well balanced means a favorable ratio between predatory fish (largemouth bass) and forage fish (sunfish).
3. Stock trout in the reservoir on a "put-and-take" basis. The purpose of this strategy is that most trout stocked in the reservoir should be caught or harvested before the summer when warm water temperatures and low dissolved oxygen levels will limit fish survival. It appears that the reservoir is deep enough near the dam that adequate summer refuges (cold water temperatures less than 72°F and dissolved oxygen levels greater than 5ppm) for trout may exist. A stocking recommendation for this reservoir would be 400 to 500 trout released in early spring. More fish may want to be stocked if heavy springtime fishing pressure is expected. A mixture of only "adult" (greater than 9") brook trout and rainbow trout is recommended. Brown trout should not be stocked since they are often difficult to catch; thus, they would not be readily available to

fishermen and may be subjected to adverse environmental conditions in the summer. The DEP Bureau of Fisheries will not stock trout in this reservoir since its use would only be available to local town residents and not the general public. In this case, trout would have to be purchased from a private source. The Team's fisheries biologist can be contacted at 295-9523 for a list of private hatcheries which will sell trout to the town.

4. Small boats less than 14 feet in size could be allowed in the reservoir for fishing purposes; however, only boats with electric trolling motors should be allowed. These restrictions will prevent possible water contamination which may arise if large horsepower outboard engines are allowed.

D. Summary

Mt. Hygeia Reservoir offers a significant opportunity for fisheries recreation. Pursuing a program to improve fishing is highly recommended.

13. RECREATION POTENTIAL

A. Bathing

The Team's geologist has assessed the potential of the reservoir for bathing. The Department of Health Services (DOHS) uses the following formula to estimate the maximum number of swimmers per day that should be allowed to utilize a waterbody $N = \frac{1000}{v + F}$ where N is the number of swimmers, v is the volume of the water body, and F is the inflow provided by streams and other sources. This formula is useful only if the initial natural quality of the water is acceptable and if other safety factors, such as beach space and lake bottom conditions are satisfactory. As indicated earlier, water quality in the reservoir is generally excellent. In addition, the water level of the reservoir was lowered considerably on the review day. The reservoir bottom near the proposed beach area sloped gently then more moderately. Efforts should be made to ensure that the lake bottom does not drop abruptly especially in the bathing area that separates non-swimmers from swimmers. Ideally, the slope for the beach bottom should not be steeper than a foot vertical drop over a 10 foot horizontal distance.

In order to use the DHS formula given above, it was necessary to determine the volume of the reservoir. Based on information supplied to Team members, the volume of the reservoir was estimated to be about 45 acre feet, or about 15 million gallons. This is based on a surface area of about 5 acres and on an average depth of 9 feet. The inflow rate (F) is variable, but the Team's geologist estimated the amount of dilution water available by determining the area of watershed tributary to the bathing area and using a standard estimated minimum stream flow figure for Connecticut of 50,000 gallons per day per square mile of watershed. The estimate is 19,062 gallons per day. Plugging the above numbers into the DHS formula, the number of swimmers that could use the reservoir each day during worst case conditions is estimated to be 102.

During more typical summer flow conditions (an in-flow rate equalled or exceeded 90 percent of the time or about 100,000 gallons per day per square mile), the permissible number of swimmers per day would be about 121. These figures suggest that the reservoir can be a useful swimming facility for the Town, provided all DOHS factors are, or can be made acceptable.

Another important factor that needs to be considered is the size of the bathing area. If bathers are concentrated in a small area, localized bacterial pollution can occur, even with sufficient dilution water flowing through the reservoir. The DOHS suggests that there be at least 1,000 gallons of water within the immediate bathing area for each bather using the bathing area during the course of the day. If it's assumed that 50 square feet contains approximately 1,000 gallons of water, then there should be 50 square feet allocated per bather. This will help to prevent the possibility of bacterial deterioration and to allow for swimming activity. Using the 121 bather figure for the proposed beach, then a bathing area of 6,050 square feet should be required. This would be an area of about 120 feet by 50 feet.

Another satisfactory method for determining the size of the bathing area is to develop at least 1 foot of beachfront for each of the average number of bathers. As can be seen, this method would compare quite closely for the figure mentioned above (120 lineal feet of beachfront could support 120 bathers, assuming 1 foot of beachfront/bathing). It is suggested that the Town contact the Northeast District Department of Health and DOHS (566-1259) for recommendations regarding the development of a bathing area at the reservoir.

A final water quality concern is to ensure that the reservoir is protected from parking lot runoff. This appears to be readily accomplishable by directing surface runoff away from the reservoir and to the northflowing drainageway on the northeast corner.

B. Town Park

A small, but attractive town park complete with beach and picnic area potentially could be developed on this 38 acre property. However, careful study is needed to determine whether or not the bottom contours at the proposed beach site would be acceptable from a public safety standpoint. Furthermore, the Town of Killingly must consider the extremely limited swimming capacity available.

Although swimming may not prove to be a feasible use at the Mt. Hygeia Reservoir, the property still has potential as a town park, especially if additional property can be acquired to become a good trout pond on at a least put-and-take basis, with the land east of the pond supporting a picnic area. A system of hiking trails also could be developed, leading to possible overlook points on Mashentuck Mountain. Perhaps a youth group camp area also could be developed.

About The Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area--an 86 town area.

The Team is 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, sanitary landfills, commercial and industrial developments, sand and gravel operations, 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 officials 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. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, a statement identifying the specific areas of concern the Team should address, and the time available for completion of the ERT study. 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 regarding the Environmental Review Team, please contact Elaine A. Sych (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.