environmental review team report

SHORELINE & VENUTI

EXCAVATION SITES

KILLINGWORTH
CONNECTICUT

RC&D

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES

ENVIRONMENTAL REVIEW TEAM REPORT
ON THE
SHORELINE AND VENUTI EXCAVATION SITES
KILLINGWORTH, CONNECTICUT
APRIL, 1975

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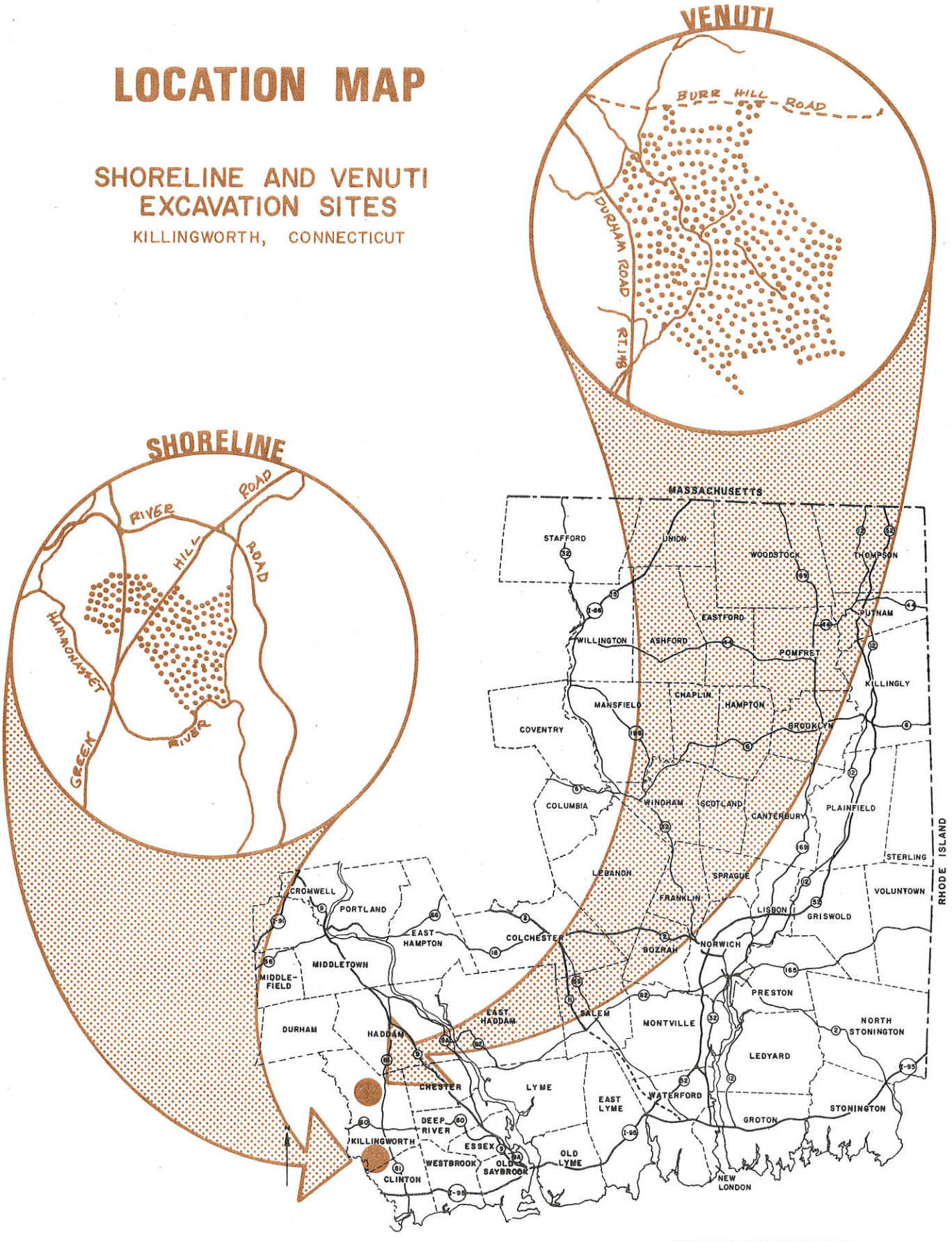
EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION MAP

SHORELINE AND VENUTI EXCAVATION SITES

KILLINGWORTH, CONNECTICUT



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This report is an outgrowth of a request from the Killingworth Planning and Zoning Commission, with the approval of the landowners, to the Middlesex County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Project Executive Council for their consideration and approval as a project measure. The request has been approved and the measure reviewed by the Environmental Review Team.

The Team that reviewed the excavation areas consisted of the following personnel: Barry Cavanna, District Conservationist, Soil Conservation Service (SCS); Howard Denslow, Soil Conservationist, SCS; Dennis Hutchison, Soil Scientist, SCS; William Zimmerman, Resource Conservationist, SCS; Timothy Dodge, Biologist, SCS; Robert Miller, Geologist, Natural Resource Center (NRC), Connecticut Department of Environmental Protection (DEP); Joseph Dowhan, Biologist, NRC, DEP; Stanley House, Forester, DEP; Manuel Cardoza, Jr., Sanitarian, Connecticut Department of Health; David Miller, Climatologist, Connecticut Cooperative Extension Service; Stanley Greimann, Planner, Connecticut River Estuary Regional Planning Agency; Barbara Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the sites on January 31, 1975. Reports from each Team member were sent to the Team Coordinator for review and summarization.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed excavation and future development and also suggests considerations that should be of concern to the Town of Killingworth and the owners. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The eastern Connecticut RC&D Council hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Miss Barbara A. Hermann (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Project, 139 Boswell Avenue, Norwich, Connecticut 06360.

INTRODUCTION

The Killingworth Planning and Zoning Commission requested the Environmental Review Team to review the two largest earth product removal areas in Killingworth with respect to drainage, erosion, landscaping, and ultimate treatment of the land. The two properties are at different stages of development and in different surroundings, so they will be discussed separately in this report.

The Shoreline Washed Sand and Stone Company owns a 60 acre site on Green Hill Road which abuts the Hammonasset River on its southernmost boundary. This area has been used for the extraction of sand and gravel for many years and currently consists of three mining areas separated by Paper Mill and Green Hill Roads. At the present time excavation is nearing completion. Several long range plans have been prepared by the Shoreline Company for consideration by the town. In this report the various aspects of recreational and residential development and the various plans will be discussed.

The property of Joseph R. Venuti encompasses about 150 acres on Route 148. This site has been used for many years, but is still far from completion. On the majority of the excavation area, peat overlies the sands and gravels up to depths of twenty feet in places. The owner intends to remove all the peat and as much sand and gravel as needed to create a lake. In the long run, the owner intends to subdivide the upland portions of the site for residential use. In this report, the immediate problems of excavation as well as the proposed long term use of the site will be discussed.

Comments and recommendations made in this report are offered for consideration by the town and developers in the preparation and review of excavation and reclamation plans, but should not be construed as mandatory or regulatory in nature.

SHORELINE WASHED SAND AND STONE COMPANY

BACKGROUND AND EXISTING CONDITIONS

The Shoreline Washed Sand and Stone Company's site is located in the southwestern portion of Killingworth, near the Madison town line. The map shows the location of the site and the topography of the surrounding area. Neighboring land uses consist primarily of single family homes, several cemeteries, and properties of the Connecticut Water Company. The three excavation areas have a "hole-in-the-ground" appearance due to the steep slopes on the boundaries of the pits. Excavation is still underway in the area west of Paper Mill Road and east of Green Hill Road, though it is nearing completion. A decision will have to be made soon on the ultimate treatment of the site.

Local complaints about the site primarily concern the appearance of the steep slopes. The completed portions of the site have extremely steep unvegetated slopes that present both a safety and an erosion hazard. Due to the porous quality of the ground materials, little, if any, erosion has taken place as yet. Portions of the processing area and adjoining pit have been revegetated. Plant material trials have been done in cooperation with the Soil and Water Conservation District, the results of which have been quite successful. Former problems with sedimentation of the Hammonasset River are presently under control.

Several plans for final reclamation of the site have been presented to the town. Two basic alternatives were shown to the Environmental Reveiw Team. The first would leave both Green Hill and Paper Mill Roads in use, though Green

TOPOGRAPHY

Hill Road might be relocated a bit to the east and at a lower elevation. Two ponds are proposed with this plan, to the east and west of Paper Mill Road. The second plan would eliminate Paper Mill Road, relocate Green Hill Road as described above, and create a single, larger pond west of Green Hill Road. Both plans show the area east of Green Hill Road being graded on a gentle slope (except along the boundaries which have already been cut at slopes up to 50% or more).

Ultimate use of the site would most likely be recreational and/or residential due to the location of the site and surrounding land uses. Aspects of development, such as water supply, waste disposal, and roads, will be discussed relative to these uses and the alternative reclamation plans. The most favorable aspects of the various alternatives and a possible development concept will be presented in the summary.

WATER SUPPLY AND WASTE DISPOSAL

With the porous quality of the ground materials, development of an adequate water supply for recreational or residential uses should not present any particular problems. However, careful placement of on-site sewage disposal systems will be necessary to avoid possible contamination of the water supply.

Due to excavation, the ground water is presently about 4 to 6 feet below most of the land surface. Also, the sands and gravels have a very high percolation rate. Because of these factors there is a high potential for ground water pollution in the area. If residential development is permitted on all or a portion of the site, a low density (over 2 acres per lot) is recommended. Capped wells would also be desirable in preventing possible contamination.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

No problems are anticipated in this area with foundations or drainage due to the sand and gravel materials. The one area of concern on the site are the steeply cut banks which present a potential erosion problem. There are several possibilities for reducing this potential.

First, by eliminating Paper Mill Road, the steep cuts on either side would be eliminated as well. This would also allow for the creation of a single lake with greater recreational potential than two smaller ones. Lowering Green Hill Road would also lessen the height of the banks on either side. Both of these proposals have encountered opposition. Some residents do not want Paper Mill Road removed and concern has been expressed over the proposed alignment and grade of Green Hill Road. These questions will be discussed further in the following section.

Secondly, it was noted that a ridge is being created on the western boundary of the site, adjacent to the Connecticut Water Company land and at least one other property owner. This is due to the fact that excavation to the property line is not permitted. If an agreement can be reached between Shoreline and the adjacent property owners (particularly the Connecticut Water Company), it appears desirable to lower the level of the ridge to the level of the adjoining land.

On the remaining banks, attempts should be made to regrade slopes to the extent feasible. Vegetation should be established along these banks to stabilize them. Continuing cooperation with the Soil Conservation Service to experiment with vegetation suited to the soils and steep slopes is encouraged. Safety precautions, whether using vegetation, fences, or other measures, should be incorporated into the final plans.

ROADS AND UTILITIES

Both Green Hill and Paper Mill Roads bisect the site. Green Hill Road is a major route for Killingworth and Madison residents and provides access to the Connecticut Turnpike. Paper Mill Road is an unimproved road and provides no needed access to any abutting property other than that of the Shoreline Company. At best it serves as a short cut for a few local residents who find it convenient.

The major concerns of local residents regarding the road system is with the proposed elimination of Paper Mill Road and relocation of Green Hill Road. It appears that the removal of Paper Mill Road would not create any particular hardships for Killingworth residents and would allow greater flexibility and potential in developing the western portion of the site.

The proposed relocation of Green Hill Road poses problems with alignment and grade. It would add two curves to the road which presently do not exist. It should be determined whether this will create safety hazards on the road before giving any approvals. From the plans it appears that the proposed grade on Green Hill Road would be as high as 10% with an average of about 8%. This does not seem desirable. However, some lowering of the road, to a grade of 2 to 4%, would be feasible.

Two alternatives regarding Green Hill Road have been suggested. First, Green Hill Road could be left as is and a pedestrian underpass constructed underneath to connect the two portions of the site. Second, Green Hill Road could be lowered to a lesser degree than proposed, using its present alignment. This could be accomplished by using Paper Mill Road as a detour and closing the road during construction.

HAZARDS

The prime hazard on the site is one of safety along the steep banks. When final plans for the site are prepared, necessary precautions should be incorporated.

Another potential hazard is erosion. This could affect the stability of the banks and result in sedimentation of the Connecticut River. Efforts should be continued to regrade banks where possible and find vegetation which will thrive. It was noted on the day of the review that problems with sedimentation are now under control. Once the site is revegetated that should not be a problem.

If extensive residential development were permitted, there could be a potential for pollution of the Hammonasset River. Since this is an important source of water supply and also a prime recreational stream, only a low density residential development should be allowed.

FISH, WILDLIFE, AND RECREATION

At the present time, the site has been stripped of most existing vegetation. Therefore, it has little or no existing forestry or wildlife value. Efforts are underway to establish vegetation along the northerly and easterly banks of the largest pit. These plant materials are aiding in the prevention of bank erosion and sedimentation. Some plant materials presently in use, such as bristly locust and crownvetch, may provide values to wildlife as they become better established. Eventually, bristly locust will develop pods containing seeds with food value to bobwhite quail and other birdlife. Crownvetch provides limited food and cover to small animals.

Regardless of the particular use to which this property is finally put, the following suggestion would benefit the site. First, the area should be graded and a ground cover established. Once established, white pine and larch should be planted on an 8 foot spacing, alternating the species. Within 7 to 8 years, these trees would become established.

Excavation is currently at or near ground water level. If excavation is continued, a single large pond or a number of smaller ponds would be feasible. To make one large pond, the banks separating the adjacent pits and Paper Mill Road would be removed. This would generate additional material for excavation and would eliminate the problem of steep banks and establishing vegetation. This appears feasible and would probably result in a more esthetically pleasing area.

Any number of recreational possibilities would exist on the site. In conjunction with the lake, swimming, boating (non-power), and fishing would all be possibilities. On the eastern portion uses could include tennis courts, ball fields, skeet and trap ranges, day camp, campground, archery range, and golf driving range.

Establishment of vegetation suitable to these soils may be difficult, particularly if heavy pedestrian traffic is anticipated. Irrigation may be necessary in areas such as ball fields. A plan of development should be coordinated with the local Soil and Water Conservation District to take advantage of suitable plants as they become available.

ALTERNATIVE LAND USES FOR AREA

The two basic alternative land uses for this site are recreational and residential. As described above, many opportunities exist for recreational use. The Town of Killingworth has had one of the fastest growth rates of the area in recent years and will probably find itself increasingly short of local recreational facilities in the years ahead. This section of the town has been one of the most active development areas. There is presently no town-maintained swimming facility. Residents now use Chatfield Hollow State Park, Cedar Lake (Town of Chester), and State Forest lakes. In light of these observations, there seem to be some good arguments in favor of the development of this site for public recreation.

Residential use seems to be the only other alternative that would be compatible with the area. However, with the porous nature of the ground materials on the site, such a prospect poses leaching problems of some concern for the

future quality of the Hammonasset River.

SUMMARY AND RECOMMENDATIONS

Of the two plans considered, the one with the most merit appears to be the elimination of Paper Mill Road and the development of a single lake west of Green Hill Road which could facilitate public swimming, fishing, and/or boating. In determining the depth of the lake, the State Health Department should be consulted to insure an adequate volume and turnover for the anticipated number of swimmers. Whether Green Hill Road is to be rebuilt, and if so, in what fashion, are questions which will have to be decided locally.

As mentioned previously, public recreation appears to be the most desirable use of this site. A sketch on the following page shows some basic concepts for development which the Team has suggested. On the western portion of the site removal of Paper Mill Road, creation of a single lake with a beach area, removal of the ridge to the west and south, and some regrading of the northern slopes are proposed.

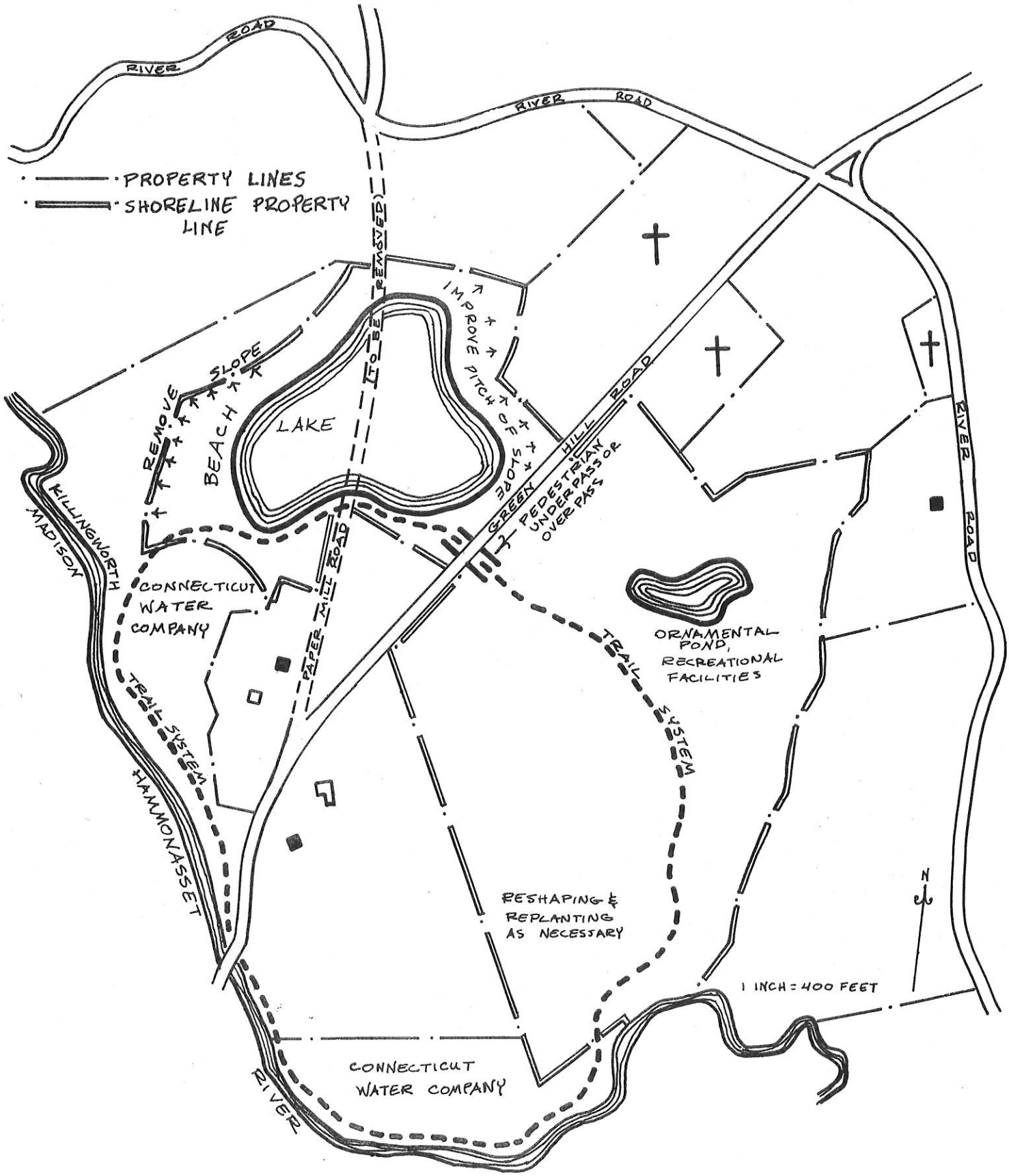
East of Green Hill Road there would be ample space for parking lots and other recreational facilities. A pedestrian underpass of overpass (depending on final elevation of Green Hill Road) to the lake area might be desirable for safety reasons. Possibilities for other recreational facilities are numerous as discussed previously. A local committee might be formed to work together with Shoreline in developing plans which will meet the needs and desires of the residents.

In reshaping the land, an opportunity exists along the northern boundaries of the proposed lake and eastern section of the site to create a natural amphitheater for spectator sports and/or entertainment. Also, if an agreement can be reached with the Connecticut Water Company and other abutting property owners to remove the ridge on the western boundary, a hiking trail could be constructed from the site to the Hammonasset River and along the river. With the exception of a short stretch, this could be accomplished on Connecticut Water Company lands through an easement. This would also provide access to the river for fishing.

In short, the whole area could be made into a very attractive community park complex which would provide another link in the sought after greenbelt envisioned in both local and regional plans for the area as well as meet the local recreational needs. The Town of Killingworth is urged to give this opportunity careful consideration as it searches for the ultimate acceptable use of the property.

CONCEPT SKETCH
FOR RECREATIONAL DEVELOPMENT

SHORELINE WASHED SAND AND STONE COMPANY



VENUTI PROPERTY

BACKGROUND

The property of Joseph Venuti is a large tract of land (about 200 acres) located along the east side of Route 148. A wetland area occupies about 50 acres. Both the sand and gravel and the peat are located in this wetland area and have been mined for many years. The owner is now proposing to continue excavation in a more orderly and rational manner than in the past, with a lake to be created as a result of the excavation. The lake would provide a focus for an eventual residential subdivision on the upland portions of the site.

Present concerns of local residents appear to center around the site's appearance and downstream siltation. Questions regarding the proposed future use of the site have centered around the quantity and quality of water and the feasibility of creating a lake and the suitability of the remaining area for residential development. There was also considerable interest expressed in the history of this site and the creation of the bog.

In this report, the geologic and biologic history of the wetlands on the site will be presented along with a description of the existing conditions. This will be followed by a discussion of the various aspects of excavation and the proposed uses of the site. A brief summary of recommendations will be presented at the end.

GEOLOGIC AND BIOLOGIC HISTORY OF THE WETLAND

The site visited is not an uncommon example of a glacially created lake whose presence was first initiated during the times of glacial retreat, approximately 12-13,000 years ago.

The small valley in which the wetland is located was probably caused by the southerly advancing glaciers who found this area easily erodable and thus gouged out this small depression. As the climate warmed and the glaciers retreated, the stream's flow increased, which in turn increased the competency or size of material and/or the amount of material carried by the stream. As the stream entered this glacially dug lake, its flow rate decreased, thus causing the material to settle out and form what is known as stratified drift. (See surficial geology map on page 20.) The size and amount of stratified drift found in the bog is directly related to the rate at which glacial melting took place. In this bog the sediments are characterized by sand, gravel, silt, and clay. In many places they are poorly sorted with abrupt changes in grain size.

The wetland on this site developed in a similar fashion to other present-day swamps and bogs in Connecticut. Kettle-holes, river valleys, and other lowland sites with imperfectly or poorly drained soils, seasonally high water tables, and cooler microclimatic conditions relative to adjacent upland sites were favorable to the establishment of inland swamps, bogs, and marshes. In southeastern Connecticut, such as near Killingworth, these inland wetlands initially supported a more northern, or boreal, vegetation composed of sedges, peat (Sphagnum) mosses, and trees such as black spruce soon after glacial retreat from the area. As temperatures began to warm with the waning of the glacier, more southerly species began to invade these sites and northern species become isolated and restricted to the cooler upland bogs of northwestern Connecticut.

Approximately 7-8,000 years ago, a major warming trend occured in New England which probably favored the extension of distinctly southern species into the Northeast, especially along the coastal areas with their more moderate climatic conditions. It is probable that at this time, Atlantic White Cedar, Chamaecyparis thyoides, a swamp tree species common in southeastern United States, first established itself in Connecticut. This tree is presently restricted to wetlands in the southeastern corner of the state; Killingworth represents the southwestern-most fringe of its general distribution in Connecticut.

Throughout their history, as both climate and water levels fluctuated, swamps and bogs in this general area undoubtedly underwent many changes in their vegetation and wildlife composition and sedimentary deposits. These events are clearly reflected in the different strata of peat and muck deposits in the Killingworth wetland. Pollen analyses from similar deposits have revealed even more detailed changes in the vegetation of these sites since their formation. Organic matter, largely in the form of partly decomposed plant fragments and Sphagnum (peat) mosses, began to accumulate in these depressions in the form of peat, favored by the cool, wet, anaerobic conditions which slowed decomposition of these materials. The present depth of the peat deposits at the Venuti site ranges from 15 to 22 feet, which, although deep for Connecticut, is entirely consistent with its origin. (Peat deposits up to 40 feet or more in depth have been encountered elsewhere in the state.)

EXISTING VEGETATION AND WILDLIFE ON THE SITE

Wetlands. Although the Venuti wetland is presently devoid of trees, the owner states that the area was originally a wooded red maple swamp before he began development of the site. He also recalls no white cedar having been present on this property. The presence of cedar wood fragments in at least the upper layers of excavated peat and muck from the site indicates the wetland did at one time contain Atlantic White Cedar. Due to the extreme sensitivity of white cedar to windthrow, logging, and other disturbances, it is quite likely that red maple replaced cedar in the aftermath of a relatively recent (within the past 100 years) major storm or other activity, such as logging.

The recent clearing of trees from the site has caused a rather rapid retrograde succession in the vegetation as a whole of this site, if adjacent uncleared wooded swamps may be taken as representative of the pre-cleared condition of the site. This former swamp (i.e., wooded wetland) is presently dominated by hummocky sedges (Carex stricta), tall cat-tails (Typha latifolia), reeds (Phragmites communis), and low bushy growths of Spiraea which would warrent the present classification of the site as a shallow marsh. Hummocks of several species of Sphagnum moss (e.g., Sphagnum magellanicum, S. palustre, S. flavicomens, etc.) dominate the ground or moss layer. If left alone, the area in time would soon convert into a wooded swamp again.

The wetland presently is utilized by muskrats. In addition waterfowl, primarily black ducks and mallards, may use the area for limited feeding and resting.

The stream which flows through the site appears to have a perennial flow. The drainage area above the site is in excess of 3.5 square miles (see map on

page 19). The site reviewed is one of a number of wetlands this stream system drains from and/or flows through. Portions of the stream have been previously rerouted to facilitate excavation of material from the pit. However, the majority of the stream course remains in its natural state. This stream flows into the Hammonasset River approximately 4,500 feet downstream of the site.

The Connecticut Department of Environmental Protection does not stock this stream with trout; however, the Hammonasset Fish and Game Club has a fish stocking program for waters they control through purchased fishing rights. Certain portions of this stream may fall in this category and be stocked with trout. In any event, this stream is similar to many in Connecticut which produce populations of native brook trout as well as various species of minnows. The property owner indicated trout are present in this stream.

Upland. The upland portion of the site consists primarily of a mixed hardwood forest with a heavy concentration of oak and hickory. The forest is in fair condition and has very little, if any, softwood trees in the area.

With the exception of the wetland area, wildlife habitat exists primarily for woodland game and nongame species such as whitetail deer, ruffed grouse, gray squirrels, songbirds, woodpeckers, racooon, and other small mammals. Existing habitat quality is fair. The overstory canopy is quite dense and shades out many useful understory plants (shrubs and vines) that might otherwise be present and provide food and cover to wildlife.

Presently, the best wildlife habitat is found along the easterly border of the wetland. Located here are greenbriar, willow, alder, birches, weedy plants, blackberries, wild grasses, scattered mountain laurel, and other plants with high values to wildlife.

EXCAVATION

Both the peat and the sand and gravel on this site are marketable resources. The peat is now being used in the preparation of potting soil for nearby nurseries. Sand and gravel are always in demand for various phases of construction. Present plans call for excavation of the peat and some of the gravel to create a lake of about 30 acres in size.

At the time of the review, portions of the property near the entrance were being used to dry the peat and mix it with other materials to form a compost product. There was evidence of former excavation along the western perimeter of the wetland. An application had also been made for excavation of a 3 acre area at the northern end of the swamp. The two major concerns relating to the excavation process are aesthetics and the effect on the downstream water quality. Increased traffic on Route 148 has also presented questions of safety.

Aesthetics. The site is most visible from Route 148 near the entrance road. There is not a way to make the excavation area aesthetically pleasing while excavation is underway. A more feasible solution would be to screen the area from view using vegetation and/or fences along the road or around the excavation area.

Impact on Water Quality. Since the site falls within the watershed of the Hammonasset River, which supplies the surface and subsurface water resources feeding two major public water supply systems (New Haven and Connecticut Water Companies), it is important that the quality of the water be maintained. The potential effects of the present and proposed excavations of the peat and gravel materials are primarily:

(1) Increased siltation into the drainage system with consequent effects on water quality and stream biota.
(2) As a result of the excavation of the highly anaerobic peats and mucks, there will be a reduction in the oxygen level of the stream. The materials will also give a sulfuric taste to the water (H_2S) and increase the acidity of the water (lower pH). Brownish discoloration of the water is also likely from the humic acids.
(3) Destruction of existing wildlife habitat. No survey has been done on the site, but the area is potentially an important habitat for waterfowl, songbirds, and muskrat. No doubt it is also utilized by other wildlife species.
(4) Removal of organic materials and creation of a lake will affect shoreline erosion. A lake this large will have a considerable fetch. Eastern shores will be particularly susceptible to erosion due to prevailing SW and NW winds in the area.

Though there did not appear to be a downstream sedimentation problem on the day of the review, it does not preclude the possibility, particularly as excavation is undertaken near the outlet of the wetland and during major storms. In order to prevent such problems from developing there are several steps which can be taken: conducting excavation by sections (i.e. graduated removal steps); diverting the brook; controlling erosion on disturbed sloping areas by temporary and permanent seedings and/or by use of mulch, hay bale checks, etc.; and construction of settling basins.

The construction of a settling basin through which the outflow from any one section being excavated would pass would be desirable. Also, if necessary, the possibility exists of developing a larger settling pond south of the entrance road, to settle out any remaining sediment before the stream leaves the property. However, care must be taken so as not to instigate erosion and sediment problems if such a pond were developed in this latter area.

A plan of excavation operation with an appropriate timetable should be presented by the owner. Planting plans for both temporary and permanent seedings and for reclamation of the slopes with seedlings, mulch, etc., would be in order.

The loss of oxygen in the stream water resulting from the excavation of peat can be remedied by oxygenating the water before its release into the stream. A pump would probably prove satisfactory in spraying water into the air to oxygenate it. There would be some additional loss of water by evaporation with spraying.

Creation of a lake will result in the loss of wetland values to songbirds, waterfowl, and muskrat, as well as loss of stream habitat for fish. It will, however, create a pond habitat which, if excavated to a depth of 25 feet, will probably support a trout fishery. The water area would also provide a resting area for waterfowl. Water which flows through sand and gravel is typically

clear and aesthetically pleasing. However, food plants beneficial to waterfowl may have difficulty becoming established. In addition, it may be difficult to establish natural food sources for trout, thereby requiring semiannual stocking of fish. In general, a lake is not as productive as a combination of marsh and open water habitat, since a diversity of habitats creates a greater diversity of wildlife and vegetation.

Leaving a fringe of marsh and peat around the periphery of the proposed lake/excavation site would have several benefits, one of which would be maintaining some of the wildlife value of the area. Marsh peats are also excellent erosion controls. They would reduce the potential for shoreline erosion, particularly on the eastern bank. A vegetative windbreak on the western shores would be helpful in reducing wave action. A third benefit of a marsh and peat fringe around the lake would be its use as a sediment trap for runoff from the upland areas.

Traffic. Though Route 148 is a state road, it is narrow and poorly aligned. Any major growth in traffic use will necessitate upgrading at some future date. Extensive residential development in the area, including this site, will contribute to the problem. Truck traffic would also have an impact, but only during the excavation period. Also, the trucks generally travel at slower speeds and during daylight hours. However, due to their size, they do present a potential hazard.

PROPOSED LAKE

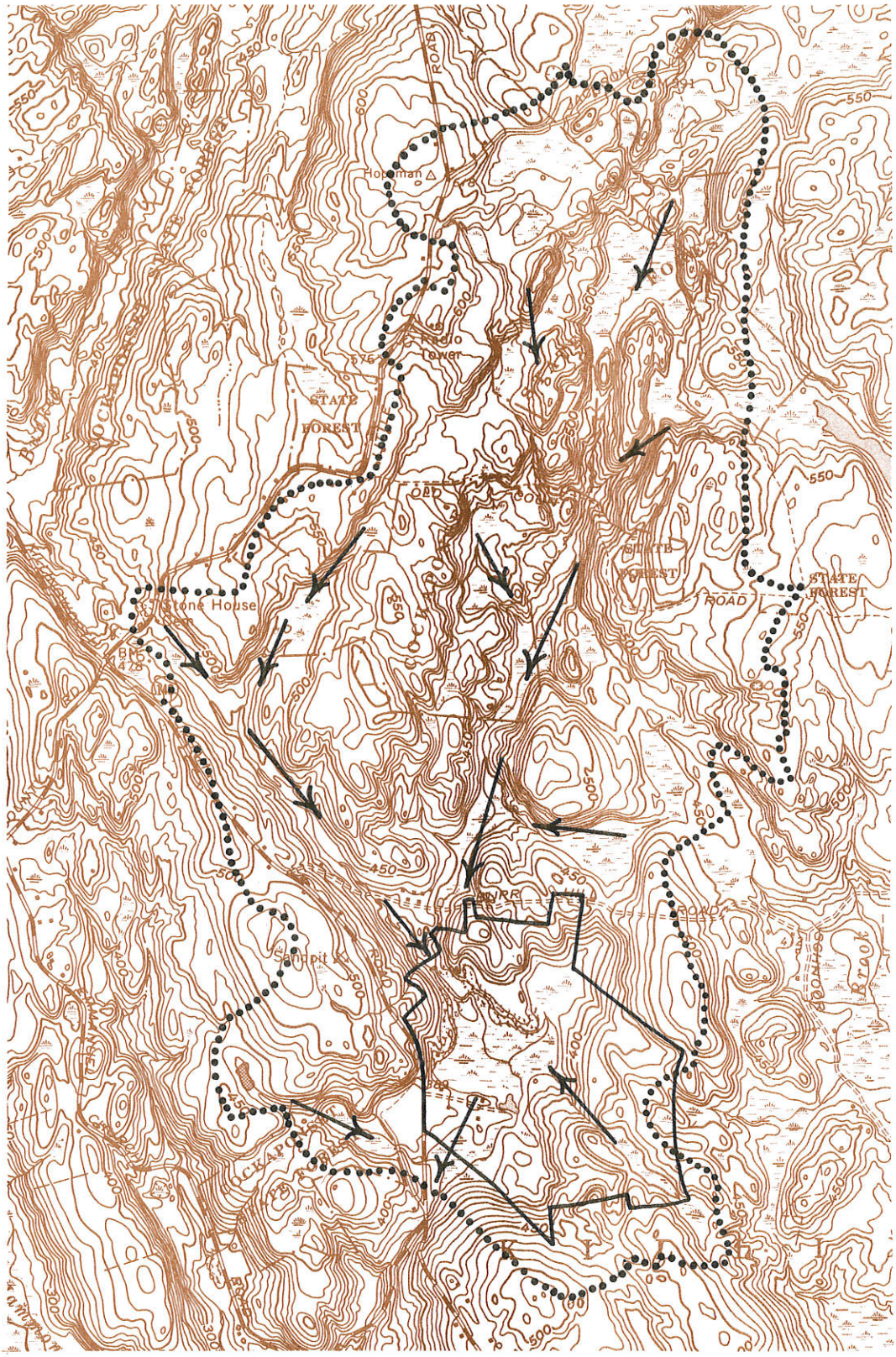
Since this site is located within the Hammonasset River watershed, the maintenance of the water quality in the proposed lake will be of importance. Recreational use of the lake is also a possibility. Both the quantity and quality of the water entering the lake will be of importance.

The total area of the drainage basin flowing through the wetland is about 3.67 square miles. This area is shown on the map on the following page. The main source of this water is from runoff from precipitation which collects in small swampy areas north of the wetland. The swamps feed small streams, most of which enter the site from two larger streams located to the northwest and east. The map on page 20 shows the local drainage patterns at the site. The main flow coming in from the northwest is perennial while that from the east may dry up during summer months.

The only stratified drift sediments (sand and gravel) found within the drainage area of the site are those within the site. They comprise approximately .18 square miles of 5% of the total drainage area. (See the surficial geology map on page 20.) This is a good indication that most of the water flowing within the drainage basin will pass through the site as surface water and not be taken up in ground water storage or pass out of the drainage area below the surface.

The low flow for the stream coming into the site is estimated at .05 million gallons per day (mgd). This means that during the summer months the stream can be expected to drop to this flow but very rarely go below it.

MAJOR DRAINAGE BASIN

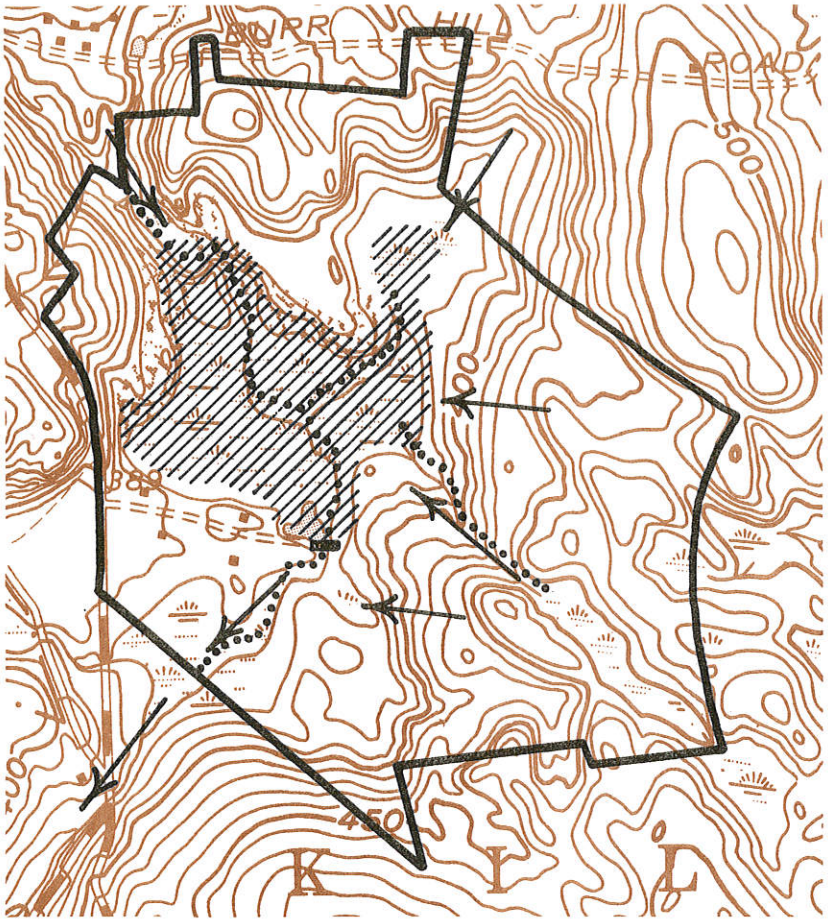


●●●●●●●●● BOUNDARY OF DRAINAGE BASIN

△ 1 INCH=2000 FEET

DIRECTION OF DRAINAGE

BOUNDARY OF PROPERTY



LOCAL DRAINAGE AREA OF BOG

APPROXIMATE AREA OF PROPOSED LAKE

MAJOR SURFACE DRAINAGE ROUTE

DIRECTION OF DRAINAGE

1 INCH = 1000 FEET N

SURFICIAL GEOLOGY

STRATIFIED DRIFT

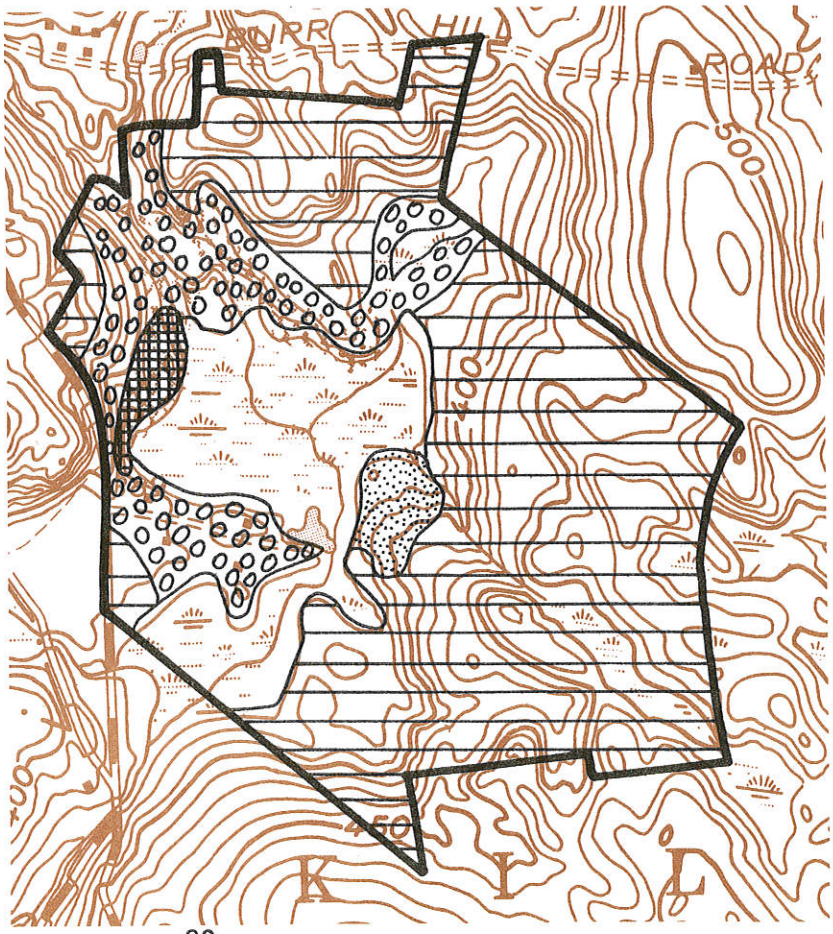
ARTIFICIAL FILL

BOULDER ERRATICS

BOG DEPOSITS

TILL

1 INCH = 1000 FEET N



The approximate size the proposed lake would assume, based on a dam raising the present water level 4 feet, is 33.8 acres. The probable boundary of the lake is shown on the map with the local drainage patterns. Using an average depth of 8 feet, this body would hold 37 million gallons of water. With greater depth there would be greater volume.

The quality of the water entering the site is excellent as a large portion of its drainage area is State-owned forest lands and very few residential areas are found here. The use of the proposed lake for recreation raises the question of maintaining water quality and safe health standards. A problem may arise here as to the construction of the dam and its proposed spillway elevation. A 4 foot rise in the water above the swamp's existing level will increase the surface area of the proposed lake and the hydraulic head on gravel below the proposed lake. This may increase the loss of water due to evaporation above the surface and ground water flow below the surface. During hot summer months this total loss may equal or exceed the incoming flow rates. This would severely limit the use of the proposed lake for recreation. An in depth study as to the ability of the proposed lake to maintain its proposed height and still establish safe water quality should be conducted.

One problem that may arise, which is very common in Connecticut in man-made lakes, is that of siltation. Possibly monitoring and observation should be done before construction of the lake in order to determine the amount of sediment that may build up on the lake bottom. If the lake is to be used for recreation facilities this may become important as any sediment build-up will decrease the total gallons of water present and thus limit the swimming capacity.

A buffer strip of 150 to 200 feet should be required beginning at the lake or wetland boundary and extending inland. All roads and residential development should be prohibited in this area. This would help protect water quality, reduce potential erosion and sedimentation along the banks of the lake, allow for access around the lake's perimeter, and provide for recreation and/or nature study areas. This would also help to maintain the existing wildlife values.

Regarding recreational use, it is doubtful whether swimming would be permitted in the lake. State Health Department regulations do not permit swimming in a water body located within two miles of a storage reservoir and feeding into that reservoir. The site appears to be just short of 2 miles from the northern end of the Hammonasset reservoir. However, it might be desirable to have the State Helath Department inspect the site and make an official decision.

Other recreational use, such as fishing and boating, would be possible. Care should be taken during excavation to avoid steep side slopes along the lake which could be dangerous for persons near the water's edge.

RESIDENTIAL DEVELOPMENT

The site is situated within a residential zone for single family homes on lots of two acres or more. The preliminary plan shows 65 lots on the upland portions of the site.

The majority of the upland area is underlain by till deposits (see surficial geology map). Till is a predominantly non-sorted, non-stratified material de-

posited directly when the local glacial ice melted. It consists of varying mixtures of boulders, gravel, sand, silt, and clay. The area is overlain by numerous boulder erratics whose diameters range from two to five feet.

Along the entrance road and the west and north sides of the wetland, the upland area is underlain by coarse gravel, shown on the surficial geology map as ice contact stratified drift deposits. The term ice contact comes from the fact that these deposits were closely related to the melting glacier ice.

Water Supply and Waste Disposal. Due to the physical characteristics of the site, any development would be faced with severe limitations for providing on-site sewage and water supply wells. Each home would be served by a bedrock well. In Connecticut, bedrock wells drilled to a depth between 100 and 200 feet have an average yield of 3 gallons per minute which is generally adequate for a single family home. The major difficulty on this site will be locating the wells so that they will not be contaminated by nearby septic systems.

The areas of till and the areas of stratified drift will both face problems in terms of subsurface sewage disposal, though of different natures. They are problems which are not beyond engineering capabilities, but will require special consideration in design.

The most common problem of till is a hardpan layer located relatively close to the ground surface. The problem with this till or hardpan layer is that ground water, or possibly subsurface sewage effluent, cannot infiltrate into the till very easily and therefore tends to flow on top of this layer. This is particularly true during wet seasons. In this area, with the land moderately sloping towards the swamp, the route of the ground water is into the swamp. In terms of subsurface sewage disposal the combination of hardpan soils and slope may cause decreased water quality in the swamp or proposed lake due to inadequate treatment and direct flow to the swamp or lake. Other factors affecting placement of a septic system in the till area are boulders, depth to bedrock, and topography.

The areas of stratified drift are underlain by coarse gravel. The gravel allows for rapid movement of ground water, or subsurface sewage effluent. The slope of the land here is gentler than in the till areas, but again the ground water flow is toward the bog. The main concern here is that the subsurface sewage effluent may not have adequate treatment in the coarse gravel and cause a lowering of water quality in the proposed lake.

The general characteristics of the site suggest that a good deal of design care should be exercised if the site is eventually developed for housing. A very low density development would appear to be feasible, provided that placement and design of septic installations would be very carefully controlled and supervised. Leaving an undeveloped buffer of 150 to 200 feet around the lake will also aid in reducing the possibility of septic effluent reaching the water in an unrenovated or partially renovated condition.

Foundation Development and Graded Conditions. With the varying topography and depth to bedrock, careful design will be necessary to avoid differential settlement. Construction of basements may also encounter problems with ledge, boulders, and seasonal high water tables. The major concern during construction, however, will be the control of erosion and preventing sediment from reaching

the lake. This problem will be reduced considerably if lots are large and are developed independently. If the entire area is developed at once, the developer should be required to prepare an erosion and sediment control plan. Once again, the buffer strip around the lake will help prevent sediment from reaching the water.

Roads and Utilities. As mentioned previously, Route 148 is narrow and poorly aligned. A substantial increase in residential development and associated traffic will necessitate its upgrading. This proposal would contribute to the traffic problems.

Construction of roads on the site should take the topography into consideration. Boulders, ledge, and seasonal high water tables will present some difficulties. Roads should not be placed alongside the lake since this would permit sand and salt to wash directly into the water.

Hazards. The chief hazard on this site is the problem which land development poses for the maintenance of a pure public water supply. For this reason, a low density development (on lots greater than the 2 acre minimum) is recommended.

Flooding is a potential hazard for any development which might occur near the swamp. The swamp has been mapped in an area denoted as having occasional floods. This means that occasionally during heavy rains or extensive spring snow melting, the water level in the stream or swamp area may rise an average of 5 feet above its normal level. This may cause serious problems on the western and southern sides of the swamp/lake as the slope of the land is low and a small rise in the water level may cause much of the land to be inundated by flood waters.

The wetland area is a natural frost pocket. Removal of vegetation and development of an open surface of water will intensify this effect in the summer months. This should not however, present any particular problems.

Vegetation and Wildlife. At the present time there are very few softwoods on the site. Plantings would improve the watershed, wildlife conditions, and aesthetics of the site. It is suggested that white pine, hemlock, and larch be planted in the areas already worked and in the hardwood areas. A spacing of 15 feet by 15 feet is recommended. When softwoods come up to about 4 to 6 feet, some of the hardwoods should be removed. This planting could be started at any time.

Wildlife should be given considerations during planning for any type of development. Plant materials are available which are adapted to sandy gravelly areas, such as the mining area, for erosion control and which also have additional values to wildlife. In other areas, specific plantings should be considered to provide additional food and cover. Housing development will exclude larger animals such as whitetail deer. Other smaller animals would adjust their home range. There would also be a probable increase in songbirds.

Services to Support Development. In a small town, the impacts of development on community services and programs are significant. The fiscal, traffic, and political ramifications are issues which must be faced and dealt with whenever and wherever a change in land use occurs.

Compatibility with Surrounding Land Uses. A well-designed housing development around a body of water poses no problem in this regard, provided the concerns regarding water quality are satisfied.

Alternative Land Uses for the Area. The only alternative to housing, other than leaving the site undeveloped, would be recreation. The major drawback here is the probable lack of swimming facilities which seems to be the prime recreational need in Killingworth.

SUMMARY AND ADDITIONAL COMMENTS

At the present time, the Venuti property is in need of a carefully thought out long range plan of development. Much of the present problems, particularly with aesthetics, are a result of haphazard practices in the past. The potential problems presented by excavation are ones which can be dealt with. Erosion and sediment control should be an integral part of all future excavation plans. unsightly appearances can be most easily dealt with by screening the area from view.

The eventual use of the site will determine certain aspects of the excavation and reclamation process, such as the final configuration of the lake, leaving a border of peat and marsh, the depth of the lake, and plantings for erosion control, windbreaks, and wildlife. Recreational access, if desired, should also be provided for.

A basic concept of the future development of the upland area should be prepared. However, the excavation could take a considerable period of time to complete, so it would seem premature to prepare any detailed plans at this time. There is a distinct possibility that regulations governing aspects of development, such as on-site sewage disposal, may be revised in the near future. Also, additional data, such as a detailed soil survey, should be available within a few years and could be a valuable aid in drawing up the final site plans.

Being within the Hammonasset watershed, the prime concern in excavating materials from the wetland and developing the upland portions of the site is the maintenance of the water quality. This would appear to be feasible with careful planning and control of excavation and construction activities.