environmental review team report

Ronnella Property

LEDYARD, 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
ROMANELLA PROPERTY
LEDYARD, CONNECTICUT

APRIL, 1975

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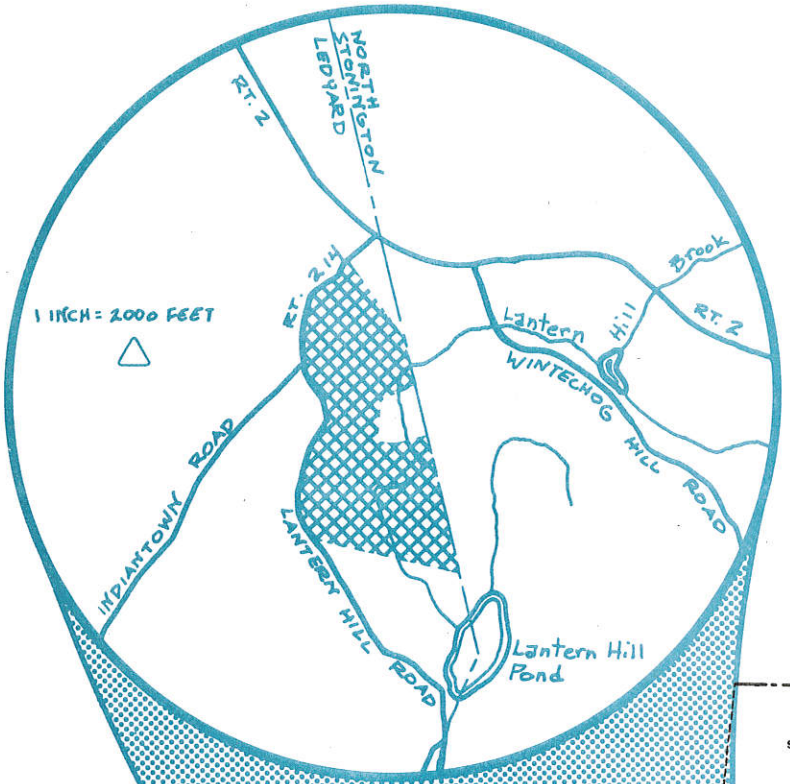
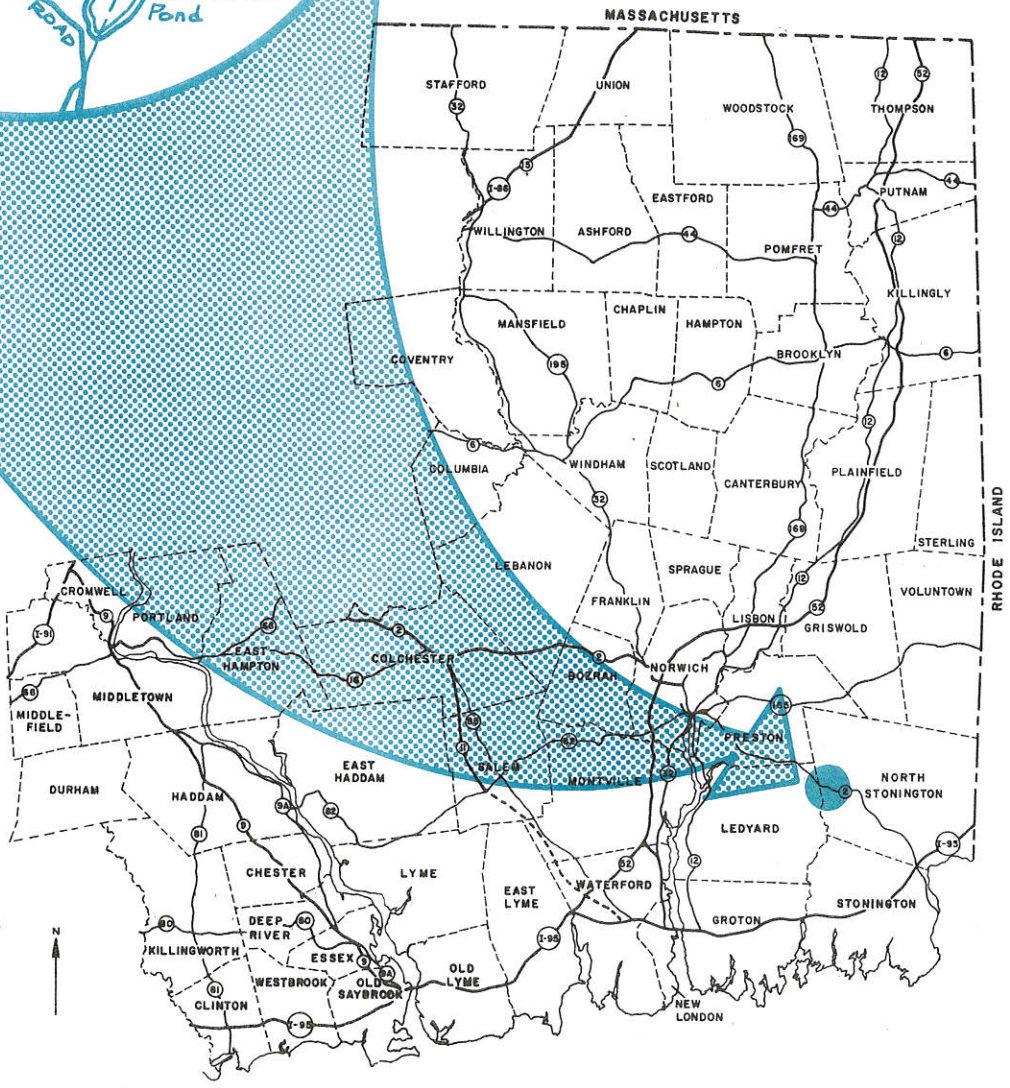
EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE

ROMANELLA PROPERTY
LEDYARD, CONNECTICUT





EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON THE
ROMANELLA PROPERTY
LEDYARD, CONNECTICUT

This report is an outgrowth of a request from the Town of Ledyard, with the approval of the landowners, to the New London County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) 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 soils of the site were mapped by a soil scientist of the USDA Soil Conservation Service. Reproductions of the soil survey and a table of limitations for urban development were forwarded to all members of the Team prior to their review of the site.

The Team that reviewed the proposed development consisted of the following personnel: Sherman Chase, District Conservationist, Soil Conservation Service (SCS); Sidney Quarrier, Geologist, Natural Resources Center, Connecticut Department of Environmental Protection (DEP); Andrew Petracco, Recreation Specialist, DEP; Joseph Piza, Fisheries Biologist, DEP; Donald Capellaro, Sanitarian, Connecticut Department of Health; Daniel Civco, Landscape Architecture, Connecticut Cooperative Extension Center; Thomas Seidel, Planner, Southeastern Connecticut Regional Planning Agency; Barbara Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on February 20, 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 development and also suggests considerations that should be of concern to the Town of Ledyard and the developers. 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

James Romanella and Sons, Inc., owns a 72 acre parcel in the northeast section of Ledyard. It is situated on the east side of Route 214 and Lantern Hill Road, just south of Route 2. The owners propose to excavate sand and gravel from the site, thereby creating a lake. The initial plan also shows 19 house lots proposed along the road frontage.

The owners have proposed to donate the lake upon completion to the Ledyard Parks and Recreation Commission. Both swimming and fishing are probable recreational uses of the lake. The major concern is whether the quality and quantity of water will be sufficient to support the anticipated use.

In this report, a description of the existing conditions will be provided, followed by discussions of excavation and both residential and recreational use of the site. A brief summary will present the major issues to be considered, as seen by the Environmental Review Team.

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

EVALUATION

SITE DESCRIPTION

TOPOGRAPHY

The local landscape is quite rugged in character. There are numerous small hills, ridges, and knolls, composed of sand and gravel materials. Locally, steep slopes lead down to scattered depressions and to the floodplain of Lantern Hill Brook. Local topographic relief is about 50 feet. Some of the depressions stand at or below the ground water level and are swampy or are filled with water. Some of the land on the west edge and at the north end of the site is higher in elevation and is somewhat flatter. The whole area is in a small valley which is dominated by the 400 foot high Lantern Hill to the southeast. The Ottawa Silica Company has an active open pit mine on part of Lantern Hill, about 1500 feet from the site. A topography map of the site is shown on the following page.

DRAINAGE

The area is drained by Lantern Hill Brook which has a drainage area above the site of about 1.4 square miles. The head of the drainage basin is to the northeast of the site on the north side of Route 2 in the town of North Stonington. Land use in this area of North Stonington and along Route 2 will affect the quality and quantity of water in Lantern Hill Brook. To the south of the site, the brook flows through about 20 acres of swamp and into Lantern Hill Pond. The area around this pond is undeveloped except for the southeast side where facilities of the silica mine border the pond. Some of the mine tailings have washed into the pond, discoloring the water, but the actual effect or impact of this was not determined. A map of the local drainage patterns is shown on page 8.

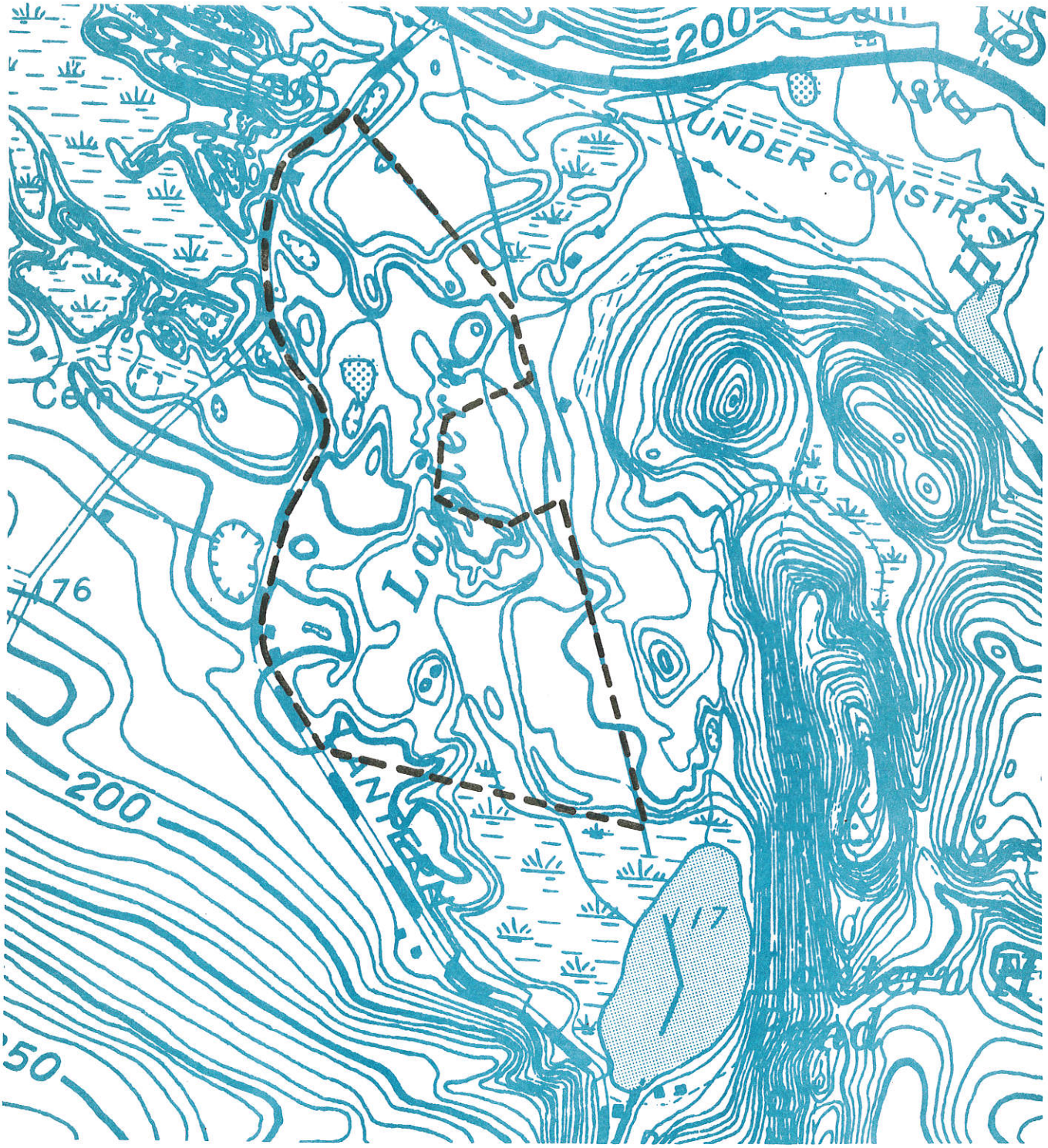
The Department of Environmental Protection has conducted surveys of both Lantern Hill Pond and Long Pond (located south of Lantern Hill Pond). Results of surveys conducted in July, 1973, are included in the Appendix. Mid-summer temperatures range from 77 degrees at the surface to 44 degrees at the bottom (36 feet deep). Transparency is about 10 to 12 feet. Long Pond ranges from 78 degrees at the surface to 42 degrees at the bottom (67 feet deep), with a transparency of 16 feet. Both ponds are well oxygenated.

The sand and gravel materials underlying the site serve to store considerable volumes of groundwater which are discharged into Lantern Hill Brook. Several local residents stated that Lantern Hill Brook seemed to maintain a good flow of clean, cool water even in the summer. Discharge of groundwater from the sand and gravel materials is primarily responsible for maintaining this summer flow.

GEOLOGIC HISTORY

The local area exhibits numerous evidences of its complex and interesting geologic history. The quartz deposit forming Lantern Hill is believed to be related to the nearby intersection of two major fault systems. The Honey Hill Fault extends westward to the Connecticut River and the Lake Char Fault extends northward beyond the Massachusetts border. These faults are believed to have

TOPOGRAPHY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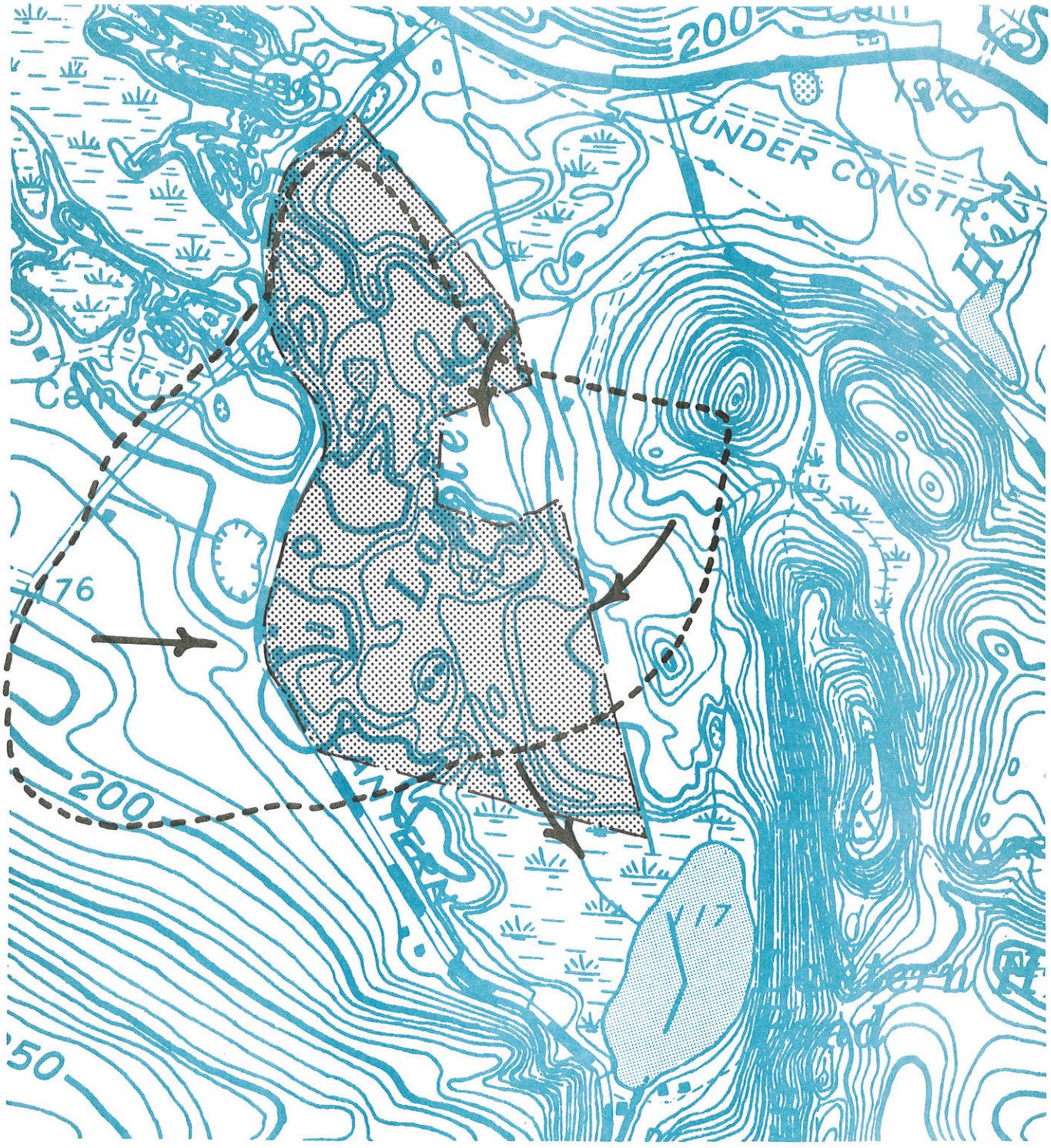
TOPOGRAPHY AND LOCAL DRAINAGE



LOCAL DRAINAGE AREA OF SITE

DIRECTION OF FLOW

PROPERTY SITE

N

0 500 1000

FEET

been active several hundred million years ago causing earth movements and fracturing local rocks. There is no evidence that the faults are presently active or that they present a hazard. They are major features in the geology of the area and are of particular interest to geologists.

The bedrock of the area formed the roots of the Appalachian Mountains. Three hundred million years of erosion has washed away the lofty peaks leaving only the deeply contorted roots of the mountain range.

The melting of the last glacier, approximately 12-13,000 years ago, has had a considerable effect on the local area. During the process of melting, the front of the glacier stood for some time just a few miles to the north. The Ledyard Boulder train is believed to be associated with this stand of ice. The sand and gravel deposits on the site and those to the northwest towards Cedar Swamp are directly related to the nearby location of the front of the melting ice sheet.

Large blocks of stagnant and melting ice were present in the local area. Water-borne debris (mostly sand and gravel) was deposited on, in, and around the large blocks and tongues of ice. As the large ice blocks melted, the sand and gravel deposits were left as hills, ridges, knobs, and terraces surrounding the depressions where the ice stood. The local area exhibits numerous landforms and features from this glacial history. These are particularly well developed on the western and northwestern part of the site and to the northwest of the site towards Cedar Swamp. A much more complete description of the glacial geology and of the glacial history of the area can be found in Glacial Geology of the Old Mystic Quadrangle, New London County, Conn.; Joseph W. Gafney, 1966, M.S. thesis, University of Massachusetts. A copy of this thesis and the maps of the area are on deposit at the Connecticut Geological and Natural History Survey office of the Natural Resources Center of DEP.

Bedrock Materials. Bedrock was not observed on the site and is estimated to lie a sufficient distance below the surface that it will not be a major consideration in the proposed land uses on the site.

Unconsolidated (Surficial) Materials. The unconsolidated materials consist of materials deposited by the glacial melt water and those materials directly associated with the floodplain of Lantern Hill Brook, the low lying swamplands near the brook, and several of the depressions. The hills, ridges, and terraces are composed primarily of coarse grained sand and gravel materials, including local concentrations of cobbles and boulders. These deposits show rapid changes in texture both vertically and horizontally, and may include concentrations of silt and finer grained material. Cobbles and boulders from 4 inches to more than several feet in diameter were observed on the site.

Lack of test holes and exposures limit specific information on the character of the ground materials in the low lying and swampy area. A shallow auger hole was made about 50 feet west of the brook and approximately 800 feet north of the south property line (just to the west of the point where the brook makes a sharp bend to the east). The hole was made in a broad swampy area which was typical of the low lying lands. The hole showed 1 to 2 feet of organic muck which was underlain by several feet of gray colored fine sand and silt. Silt and fine grained materials represent 30 to 60 percent of the material. At a depth of 3.5 feet the material seemed to be getting somewhat more coarse grained. Several

feet of silty muck underlain by at least several feet of silt may be typical of the deposits in the low lying areas. The texture of the materials below 3.5 feet is not known. It is estimated that the stratified deposits of sand, gravel, silt, and possibly clay extend to depths of at least several tens of feet below the surface in the low lying areas of the center of the site. The character and distribution of these deposits will be of considerable importance to the proposed project. Several test holes should be made at least to the depth of the proposed lake excavations before final planning or approval is given to the proposed project.

SOILS

A detailed soils map of the site is given in the Appendix to this report along with a soils limitations chart. Due to the original scale at which the soils are mapped (1"=1,320') the lines shown on the soils map should not be viewed as precise boundaries, but rather as guidelines to the distribution of soil types on the property. The soils limitations chart indicates the probable limitations for each of the soils for on-site sewage disposal, basements, landscaping, and streets and parking and its suitability as a source of sand and gravel. However, limitations, even though severe, do not always preclude the use of the land for development. If economics permit greater expenditures for land development and the intended use is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used.

Eighty percent of the site consists of soils that have good potential as a sand and gravel source. They are generally less than 20 inches to the beds of sand and gravel. Permeability is rapid. Half of the site (35 acres) is classified as terrace escarpments with slopes greater than 15 percent. The formation of these hills, ridges, and knobs is described above in the section on Geologic History.

The remaining twenty percent of the site consists mainly of the low lying areas (about 1 acre of the site is mapped as rocky upland soil). They are mapped as soil 58, mixed alluvium, which is an inland wetland soil. This soil includes areas on floodplains which are so variable in texture or drainage, or both, that it is difficult to classify the material into series. These areas range in texture from sands or loamy sands to silts and in drainage from well drained to very poorly drained. As described in the Geologic section, the alluvium on this site appears to consist of mostly silt and fine grained materials near the surface. Test holes will be necessary to determine the character of the materials below 3.5 feet.

VEGETATION AND WILDLIFE

The woodland does not have many high quality trees. The Enfield soil (63B) will support both conifers and hardwoods, but presently, due to a lack of past woodland management and the evidence of past fires, it is low in quality hardwoods. The wetland soil is mostly in low quality red maple (swamp maple). Some of the trees may be salvaged for lumber, ties, pallets, or cordwood. A professional forester could give advice regarding the economic feasibility of salvage.

The area presently offers habitat for both upland and wetland types of wildlife. As the canopy is somewhat open, there is a fair amount of brush cover on the forest floor that is providing food and cover for a variety of wildlife. Evidence of both deer and mink were observed on the site. If left as is, the canopy will close, causing a decrease in brush cover and wildlife value. In general, the sand and gravel soils are poorly suited for the production of openland or woodland wildlife, due to their low natural fertility and low moisture-holding capacity. The wetland areas provide wetland wildlife habitat and possibly some woodland wildlife habitat in the drier areas.

Lantern Hill Brook, which flows through the site in the area of the proposed pond, is presently stocked with trout. It feeds into Lantern Hill and Long Ponds, both of which have state boat ramps and receive heavy recreational use. In addition to trout, both ponds contain populations of landlocked Alewives and other fish.

LAND USE

Surrounding land uses are low density residential and undeveloped. About 1/2 mile southeast of the site is a silica mining operation, just east of the Ledyard town line, in North Stonington. Trucks leaving this mining facility travel on Lantern Hill Road adjacent to the proposed development to gain access to Route 2. Approximately 1/2 mile west of the site is the Ledyard Town Park located along Indiantown Road (Route 214). On a land use basis low density residential and recreational uses appear to be compatible.

EXCAVATION

The proposed development plan included the excavation and removal of what the developer estimated to be several million cubic yards of sand and gravel material. The feasibility and impact of this mining process involves a number of considerations.

MAGNITUDE OF EXCAVATION

In order to remove two million cubic yards of material in a two year period, a loaded ten yard truck would have to leave the site every two minutes, ten hours a day, six days a week, for two years, and the trucks have to return to the site. All of this involves a lot of traffic, noise, and activity over a long period of time.

With the proposed magnitude of the mining process, several questions arise. Does the developer have a guaranteed market for the material? If the market should fall through or decrease, to what extent will excavation be slowed down? What effect would this have on the ultimate use of the site? These are all questions which should be resolved in the planning stages.

QUALITY OF SAND AND GRAVEL

The origin of the sand and gravel deposits indicates that there is apt to be wide ranges in the texture and distribution of the materials on the site. The elevated deposits of the ridges, knobs, and terraces include variable amounts of boulders and cobbles. If the larger materials are to be used, it should be determined whether the crushing operation will be on-site or off-site. Similar consideration should be given to washing or some other separation of fines, if required. Tests should be made to determine whether the materials below the present water levels and in all areas where deeper excavation is planned are usable as construction materials.

WASTES FROM THE MINING PROCESS

The auger hole in the low lying area indicated there was 1-2 feet of organic-rich silt and another foot or so of very fine sand and silt in this area. Excavation of fifteen acres of this type of ground would produce nearly 100,000 cubic yards of silty organic waste. In addition excavation of the whole site would produce several tens of thousands of yards of tree stumps and organic soil materials. Similarly, large boulders and rocks, if not trucked off as part of the sand and gravel material, could add up to a large volume of material.

Organic material, whether it be tree stumps or swamp deposits, should not be disposed of on the site by burial below the water table. The slow decay of these materials could affect the ground water quality.

It should be determined what portion of the material below the water table will be waste. Large quantities of fine grained silts and clays could cause major sediment problems in downstream areas of Lantern Hill Brook and Lantern Hill Pond.

PROTECTION OF LANTERN HILL BROOK

The present high quality and recreational value of Lantern Hill Brook and Lantern Hill and Long Ponds were discussed earlier in this report. A major consideration in the mining process is the protection of the brook from silting or other effects of mining. Excavation of the upland areas should not directly affect the brook if a reasonable buffer is maintained between the mining operation and the brook and its associated wetlands. It would be wise to conduct such mining under the direction of an erosion and sediment control plan.

Mining below the water table may well affect the brook, depending on the degree of water connection between the excavation and the brook and on the amount of sediment generated during the mining. Excavation in a pond adjacent to the brook, but not directly connected to it, might have little effect except if a period of flood overflow occurred.

It is anticipated that actual mining in brook water and in water connected to the brook would have a significant effect on water quality in the brook. A number of factors will determine the degree of this effect, one of the most important being the texture of the materials being mined. If they contain appreciable percentages of silt and clay, turbid water will probably be carried several miles

downstream. Clay sized particles can take days or weeks to settle out even in absolutely still water.

Dredging a recreational pond in the actual brook water itself without causing a major silting problem would be a difficult task, if it can be accomplished at all. A designed silt trap installed at the outlet of the excavation will cause the very fine sands, some of the silt, and larger particles to settle out. Even with such a trap, some of the silt and clay will not settle out and will cause turbidity downstream. More detailed information should be available about the type of material to be mined and a detailed excavation plan should be prepared before the project is given approval.

An alternative to the proposed pond would be a long, narrow pond adjacent to, but not including, Lantern Hill Pond. By using bypass pipes from the brook some circulation of water in the pond could be provided. An undisturbed buffer area of at least 25 feet between such a pond and the brook is recommended. Other advantages of this type of pond will be discussed later.

CONTROL OF EXCAVATION PROCESS

Since the proposal includes an arrangement for the town to take over the pond and some of the surrounding land upon completion, final grades, site conditions, etc., should be carefully worked out in advance. Some kind of performance bond might be required. In addition, a limit should be established on the maximum area of disturbed land at any one time. Some towns use five acres; this type of proposal might have ten acres. The purpose of such a limitation is to ensure the reclamation and final grading of mined out land before huge areas of excavation are created. Once the 5 or 10 acre maximum is reached, an acre must be graded and reclaimed before the mining can move forward into a new acre.

For final grading it is recommended that slopes be no steeper than 3 to 1. Even with this slope it will be difficult to stabilize (seed) due to the coarse sandy-gravelly texture. Seeding would be easier if four inches of topsoil were spread over the slopes.

Another regulatory aspect of the project deals with the inland wetlands. A permit from the local inland wetlands agency will be required. If a permit is granted, a detailed plan showing how sediment from mining will be controlled and kept out of the stream should be required.

PROPOSED DEVELOPMENT

The total parcel owned by Romanella & Sons encompasses approximately 72 acres. The proposed development as shown on the original plan would include a pond of about 25 acres created by the sand and gravel excavation and 19 house lots of at least an acre in size along Lantern Hill Road. The pond would subsequently be given to the Ledyard Parks and Recreation Commission for recreational uses, such as swimming, fishing, and picnicking.

WATER SUPPLY

Residential Use. It was indicated that water supply for the building lots would most likely be from individual on-site wells although there was some possibility for the development of a central or community type water system. The quantity of water required and the geology of the area where the supply(ies) are to be located govern the type of well to be constructed.

Ground water could be produced both from bedrock wells and from wells in the saturated sand and gravel deposits. As is true in other parts of Connecticut, bedrock wells generally provide limited amounts of water but are suitable for individual residences. The sand and gravel materials, especially in the central valley portion of the site could possibly produce significantly larger volumes of water.

For an individual house lot, the quantity of water needed for normal domestic purposes is relatively low. This being the case, drilled wells, although generally having a lower yield, would be preferred to dug wells, as the former generally assures water of better sanitary quality. As noted, a considerable portion of the material overlying the water table consists of sand and/or gravel. Where the water supplies are derived from a shallow aquifer and individual on-site sewage disposal systems are in the same general area, there is a possibility for sewage effluent gaining entrance into the water-bearing formations.

A central or community water system, if provided, would certainly allow for more adaptability as regards on-site sewage disposal. A well for this type of a system would need sufficient yield in order to meet the average daily consumption of the project. In this respect, a gravel (dug) well would provide more water than a rock (drilled) well. However, because of the greater yield of the well and soil conditions, it would be most important to locate the well as far removed as possible from potential sources of pollution. As this would be a public water supply, it would be expected that at least a 200 foot separating distance be maintained from any sewage disposal system. In addition, the well site should be on ground which is higher than where waste disposal systems are located and where the normal movement of ground water flow would be expected to carry any existing or potential sources of pollution away from the well.

Recreational Use. In considering the sanitary evaluation of inland surface waters (lake, stream, etc.) for bathing purposes, there are four basic considerations which should be taken into account. They are the sanitary quality of the incoming water, the amount of dilution water in the bathing area, the sanitary condition of the watershed area, and the size of the bathing area.

The general water quality in this part of Lantern Hill Brook seems to be good, although no specific determinations were made. The contributing watershed has been sparsely developed and thus there should be little, if any, potential for sewage pollution. It would seem that the main potential source would be from farm animals rather than domestic households. The fact that Lantern Hill Brook is a good trout stream also reflects high water quality.

For regulatory purposes, it has been concluded that inland surface waters showing a coliform bacteria count of 1,000 per 100 ml, or less are acceptable for bathing purposes unless it is shown that untreated sewage is being discharged in the immediate vicinity of the bathing area. On large bodies of water, where

the watersheds are relatively clean, the coliform content should generally be under 200 per 100 ml.

In order to prevent a build-up of bacteria from the bathers during bathing activity, there should be at least 1,000 gallons of dilution water flowing through the bathing area for each bather using the facility during the course of the day. The amount of dilution water required is based on the average number of bathers. Higher usage can be accommodated provided the peak usage does not exceed several days. In addition to the dilution water provided by the watershed, a substantial amount of dilution water is also available from the natural circulation of water stored within the lake or impoundment. Therefore, the larger the volume of the impoundment the more available dilution water there will be.

Under normal conditions, waterflow in this brook is estimated to fall in the range of 0.4 mgd (million gallons per day) for the 2 year, 30 day low flow to 2.0 mgd for the estimated mean flow. During extremely dry periods, low flow could be much less, and obviously flood flow would be considerably higher. A 25 acre pond, 10 feet deep would hold about 82 million gallons of water. July evaporation off of a 25 acre pond would be about 0.1 mgd. This would represent a loss of 25% of the through-flowing brook water under a 2 year 30 day low flow situation. The local sand and gravel material might discharge something in the order of 0.04 mgd into the proposed pond, offsetting almost half of the evaporation loss. Using the formula used by the State Health Department, an average of approximately 800 swimmers could be accommodated each day.

$$\text{Number of swimmers} = \frac{\frac{V}{180} + F}{1000}$$

V = Volume of pond in gallons
F = Minimum inflow in gallons/day

The design and actual construction of the bathing area will be important. There should be at least 50 square feet of surface bathing area per swimmer to ensure sufficient dilution water within the immediate bathing area. This will generally correspond to having at least one foot of beach front per bather. From a safety standpoint, slopes of 12 feet horizontal to 1 foot vertical are suggested in the beach area, including the area within the pond.

The preliminary water volume calculations indicate a good potential for the proposed recreational use. Estimates of future use by town personnel indicated an average of 200-300 persons per day with a peak usage of 1000. If the town decides to move forward with the proposal, it should get the assistance of a trained recreational planner to design all aspects of the water body (shape, size, depth, area, beach slopes, etc.). The plan should be finalized before excavation is started.

The creation of a lake in the brook will change the temperature of the water. The effect of this on water life should be investigated. Proper design of the lake can minimize the impact. Alternatives will be discussed later in regard to fish and wildlife.

In conjunction with the development of a public bathing area, a potable water supply will have to be developed. Considerations would be similar to those of residential water supplies.

WASTE DISPOSAL

As there are no municipal sewerage facilities, sewage disposal for the proposed subdivision and recreation area would be by individual on-site subsurface sewage disposal systems. Except in areas of excessive slope, the coarse grained sand and gravel and relatively deep water tables would not seem to pose any serious problems for on-site waste disposal; however, there is at least a serious conceptual conflict between the use of the adjacent land as a swimming area and the row of twenty houses discharging septic waste into the same water-bearing sand and gravel deposits. The sand and gravel materials will tend to rapidly transmit septic wastes down to the water table where they will move relatively freely into the recreation pond. The specific concentrations of contaminants or degree of renovation of wastes is difficult to predict. The design of a series of houses with on-site septic disposal systems discharging into permeable sand and gravel materials surrounding a swimming recreation pond presents a conflict of resource use and should be discouraged. In addition to the sanitary aspects, the effluent may be a source of nutrients for algae or water weeds.

Any septic systems should be placed as far from the lake as possible. As was discussed in the field, there may be merit in having a cluster type development towards the northern end of the property rather than a series of individual lots. It seems desirable to not have any house lots bordering on the area which would be developed into the main bathing beach.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

The plan showed portions of the pond bank with a slope of 1 1/2 feet horizontal to 1 foot vertical and as much as 40 feet or more above the pond level. As was mentioned earlier, it is recommended that slopes be no steeper than 3 to 1 and that 4 inches of topsoil spread on the surface would facilitate reseeding. Even 3 to 1 slopes can be a safety hazard to small children. Therefore, in the beach area slopes of 12 to 1 are suggested.

Sand and gravel materials generally provide a good base for foundations whether for homes or recreational facilities. However, the excessive slopes (over 15%) which prevail over much of the site will require careful design and/or reworking of the site. The wetland soils on the site (58) have severe limitations for construction due to variable drainage and texture.

Erosion and sediment control was discussed in conjunction with the excavation process. It will also be important during residential development to keep sediment from entering the pond or brook.

ROADS

Concern has been expressed with regard to the ability of Lantern Hill Road and Route 214 to accommodate the increased traffic movements of excavation, recreation, and residential development. Lantern Hill Road is presently a fairly narrow and winding road. Some of the specific problems which could arise are as follows:

1. If excavation is carried out at the level proposed, the trucks could present a definite hazard. The present use by the Silica Company must also be considered.

2. The recreation area will tend to have heavy concentrations of traffic, particularly at the beginning and end of swimming classes.
3. The driveways of 19 house lots exiting onto Lantern Hill Road and Route 214 could present definite hazards. The winding nature of the roads, the proximity of Route 2, the intersection of Route 214 and Lantern Hill Road, the proposed recreation area, and the Silica Company trucks all magnify this hazard.

In order to minimize these potential conflicts, some upgrading of Lantern Hill Road would be desirable. Improving the alignment and widening of the road in the vicinity of the recreation area entrance will probably be necessary. If this is done prior to excavation, it would also reduce the potential hazards of the truck traffic.

In order to reduce the problems related to housing, an alternative scheme of development has been suggested. Clustering homes on the northern portion of the site with a single access to Route 214 or Lantern Hill Road would significantly reduce the traffic hazard. This would also allow additional area for off-street parking in the recreation area, an item which appears quite limited in the current proposal. Also, controlled access to Lantern Hill Road by means of a traffic light that could be activated when the recreation area is in use could help alleviate future accidents at the entrance to the beach parking lot.

FISH AND WILDLIFE

The value of Lantern Hill Brook and Pond and Long Pond as a fish habitat has been well documented. The area presently receives heavy recreational pressures. There are several possibilities which could help protect the existing waterbodies and improve the potential for the proposed pond.

First of all, designing a pond which would not include Lantern Hill Brook would eliminate or minimize most of the potential problems of increased water temperature, turbidity, and siltation of the stream bed. This would necessitate construction of a long narrow pond. In general, a long narrow pond will keep the water colder than a wide shallow pond, whether it is fed by springs or stream.

The stream could be tapped to permit a portion of the flow to enter and leave the pond, thus creating a by-pass pond. By controlling the stream flow through the pond, the temperature effect on the brook will be negligible and the pond will still receive some benefit from the flow.

The depth of the pond will also affect its water quality. In a shallow pond the water will warm up and tend to encourage weed and algae growth and cold-water fish, such as trout, would not survive. In constructing ponds in sand and gravel, at least one-quarter of the pond should be over 12 feet deep if trout fishing is desired. Excavating this pond to a depth of 30 to 35 feet, except in the beach area, is recommended and will ensure sufficiently cold water temperatures.

With respect to wildlife, the site presently offers fair to good habitat for wetland wildlife and fair habitat for upland wildlife. The pond, when constructed, will provide considerable value for wetland wildlife and some value for upland wildlife.

AESTHETICS

The site has numerous scenic attributes. The Pequot Trail and several unorganized trails cut across the undulating topography. Wear indicates a medium to high recreational usage at present. Also, the site is visible from a branch of the Narragansett Trail that traverses Lantern Hill. The area offers a panoramic view of rural agricultural and forest land, dotted with a few structures. The only detraction is the Ottawa Silica Company.

The development, as proposed, would detract from the scenic quality for several reasons. The major factor is the combination of residential and recreational land uses. Because of the open character of the pond and recreation area, the residential development will be quite noticeable throughout the site, thus reducing the "naturalness" of the area.

From a noise viewpoint, the noise generated by a recreational facility will have a negative impact on the residential development. Noise from the adjacent roads could also have a negative impact on both residential and recreational uses. Separating residential and recreational uses on the site will minimize their conflict. A strip of evergreens along the roads is recommended as a noise and visual buffer.*

The appearance of the pond and its water will contribute to its use and enjoyment. Constructing side slopes no steeper than 3 feet horizontal to 1 foot vertical (12 to 1 at beach) and revegetating them are recommended. Control of algae and water based weeds is desirable. If necessary, copper sulfate should be used to prevent surface growth. Placement of septic systems away from the pond and constructing a deep pond will also assist. If it is determined that the water level is likely to drop significantly during the summer, it may be desirable to treat the pond with a sealant (e.g. Bentonite) to aid in water retention.

The pond, as proposed, has two sections, to the north and south of the property. It is unclear whether the northern portion would have adequate circulation and turnover to support recreational activities and avoid problems of algae and weeds. A trained recreational planner should evaluate the plans to determine the probable future condition of this portion of the pond.

If the residential development were to be eliminated from the proposal and only a pond constructed, the pond could enhance both the immediate and the overall landscapes. So as to add to the enjoyment of pond users, it is recommended that a buffer of evergreen trees be planted along Lantern Hill Road and towards the Ottawa Silica Company. Rerouting the trails on the site and/or adding a branch trail to gain access to the lake is suggested.

With the evidence of high recreational use in the vicinity of the site, both on the trails and along the watercourses and waterbodies, it is important the scenic quality of the area be preserved.

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* More detail on noise abatement measures can be gained from : Cook, David and VanHaverbeke, David. Tree-covered Landforms for Noise Abatement. USDA, FS, University of Nebraska Experiment Station, Research Bulletin No. 263, July, 1974.

RECREATIONAL DEVELOPMENT

As mentioned before, it is suggested that if both recreation and residential uses are to be developed on this site, that the house lots be restricted to the northern portion of the site and the recreation area to the south. From a recreational viewpoint, this type of design would offer the opportunity of a buffer zone between the homes and the active recreation area. A portion of the buffer zone could be thinned on a selective basis and used for a picnic area.

Wherever possible on the site, an attempt should be made to retain the canopy of trees and the existing topography. The wooded areas should be under a forestry management plan for maximum tree vigor since the trees, or lack of them, will determine much of the area's desirability.

Before the final plans for the site are prepared, the town should consider its future use of the site and all the alternatives. In these considerations, it should be determined what the future population of Ledyard is likely to be, where it will be located, the probable recreational needs, and the amount of land presently owned by the town which is suitable for recreational expansion. If the town determines that this site will be a major recreation area, it may be desirable to obtain additional acreage around the pond for future expansion. The expansion capability would probably be in the area of passive recreation.

Even if obtaining additional acreage would mean outright purchase of land, it should be recognized that future development will not only increase recreational demands, but also increase the price of remaining open space. Any purchase agreements entered into can spell out the conditions whereby the property would be acceptable to the town. A performance bond on the excavation process is also a possible means for guaranteeing the final site configuration.

COMPATIBILITY OF SURROUNDING LAND USES

With respect to adjacent land uses, recreational and low density residential uses appear to be compatible. Avoidance of strip residential development along Lantern Hill Road and Route 214 is desirable. In regard to the specific site, separation of the two land use types will also minimize potential land use conflicts. Some consideration should also be given to the probable future development of adjoining properties; it would be much easier to incorporate buffers into the initial plans than at a later period in time.

SUMMARY

The overall intent of the proposal, to create a public recreation area as the end product of an excavation process, has real merit. It also seems probable that there will be water of sufficient quantity and quality to support the future recreational uses. However, there are a number of aspects which should be carefully investigated before final plans are prepared and approval given. In all probability, the town and developers should anticipate at least a year of detailed planning before actual excavation might begin.

From an excavation viewpoint, the major question concerns the composition of the material to be mined. Handling of large rocks and boulders, separation of fines, and erosion and sediment control are all issues which cannot be fully answered until more information is obtained on the characteristics of the surficial materials. The marketability of these materials must also be assured if the project is to be a success.

Other questions directly related to the excavation process concern the hazards and nuisances of truck traffic, disposal of organic wastes, protection of Lantern Hill Brook, and control of the mining operation.

Design of the pond will determine its suitability for recreational uses and its impact on Lantern Hill Brook. A long, narrow pond adjacent to but not including, the brook is preferred, particularly if the excavated materials contain a high percentage of silt and clay. By-pass pipes between the brook and the pond could be installed. A deep pond, in the range of 30 to 35 feet, is also recommended.

With the final reclamation and development of the site, the major issue to be resolved is the ultimate use of the site and the layout of thoses uses. By restricting the site to recreational uses, decisions regarding the location of the pond and related facilities, areas to be left in their natural state, and access roads and parking facilities will be the prime concerns. If a combination of recreational and residential uses is decided upon, consideration must also be given to a buffer area, location of septic systems, and access and traffic problems. It is strongly reommended that residential development not be permitted along the roads and/or adjacent to the pond for reasons of water quality, traffic control, aesthetics, and a conflict of land uses.

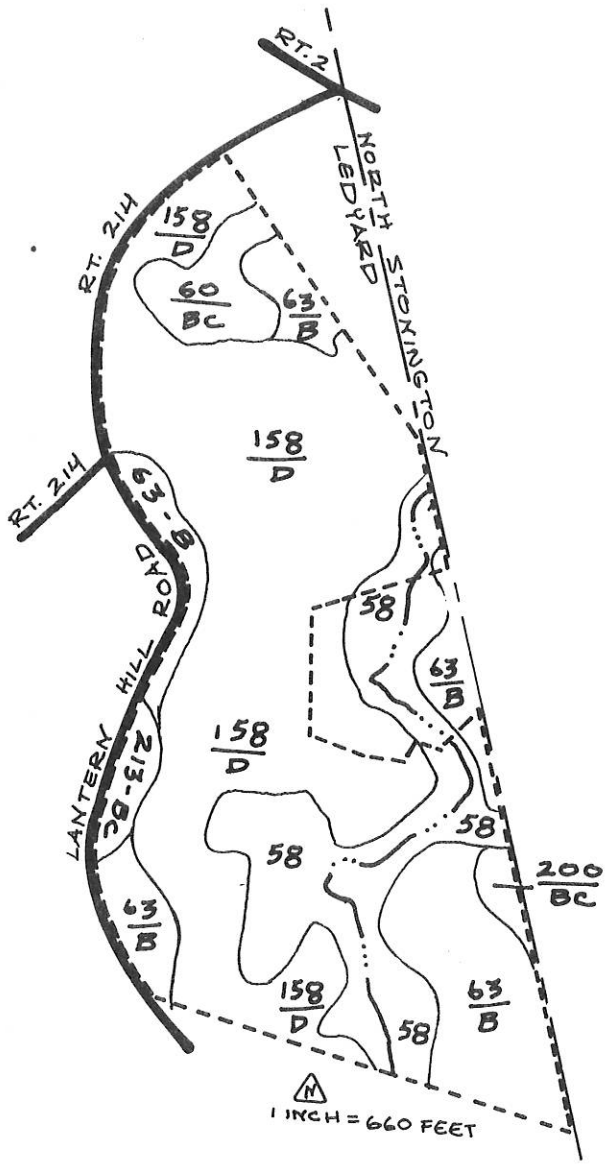
For this project to be successful, cooperation between the town and the developers in both the planning and development stages is a must. There are benefits to be derived by both parties, but it will take considerable time and effort. However, it seems that there is sufficient potential on the site to warrant the further investigation and consideration of this project.

APPENDIX

SOIL MAP

ROMANELLA PROPERTY

LEDYARD, CONNECTICUT



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE, Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE *FEBRUARY, 1975*

SOILS LIMITATIONS CHART

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For: ** On-Site Sewage	Basements	Landscaping	Streets and Parking	Principal Limiting Factor	Suitability as Source for Sand & Gravel
A-1b	60BC	4	5.7	2	1	3	2	Slope 3-15%, droughtiness	good
A-1b	63B	15	21.4	1	1	1	2	Slope 3-8%	good
A-1b	213BC	2	2.9	2	1	2	2	Slope 3-15%	good
A-1c	158D	35	50.0	3	3	3	3	Slope over 15%, droughtiness	good
D-1	200BC	1	1.4	3	3	3	3	Shallow to bedrock, stoniness, slope 3-15%	poor
E-3a	58	13	18.6	3	3	3	3	Variable drainage and texture	poor
		70	100.0						

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups.

** Limitations: 1-slight; 2-moderate; 3-severe.

LANTERN HILL POND, NORTH STONINGTON
July 25, 1973
Chemistry
Station A

Depth in Feet	Water Temp. in C°	Water Temp. in F°	Oxygen P.P.M.
Surface	25	77	7.0
1	24.5	76.1	6.9
2	24	75.2	6.8
3	24	75.2	6.8
4	23	73.4	3.1
5	22	71.6	3.0
6	21	69.8	3.7
7	20	68.0	4.3
8	19	66.2	4.7
9	17.5	63.5	6.1
10	16	60.8	7.1
11	14.5	58.1	7.1
12	13.5	56.3	7.2
13	12.5	53.6	7.0
14	11.5	52.7	6.9
15	11	51.8	6.8
16	10.5	50.9	6.6
17	10	50.0	6.6
18	9.5	49.1	6.4
19	9	48.2	6.2
20	9	48.2	5.7
21	8.5	47.3	5.4
22	8	46.4	5.1
23	8	46.4	4.4
24	8	46.4	4.1
25	7.5	45.4	3.6
26	7.5	45.4	3.4
27	7.5	45.4	2.5
28	7.5	45.4	1.7
29	7.3	45.1	0.9
30	7	44.6	0.3
31	7	44.6	0.1
32	7	44.6	0.1
33	7	44.6	0
34	7	44.6	0
35	7	44.6	0
36	7	44.6	0

Calibration of oxygen made at sea level
Air Temperature 34°C
Weather - Sunny with little wind
Time - 11:00 a.m.

Transparency - 10'
pH - 6.4

Pond raised since last survey by higher impoundment at Silica Company
Emergent vegetation (Pickerel Weed, Pond Lillies & Spatterdock)
Submerged vegetation (Common Bladderwort, Watermilfoil spp. & Little Floating Bladderwort)

Taken by:
R. Capiga
J. Piza

LONG POND, LEDYARD-NORTH STONINGTON
July 31, 1973
Chemistry
Station A

Depth in Feet	Water Temp. in C°	Water Temp. in F°	Oxygen P.P.M.
Surface	26.5	79.7	7.8
5	26.5	79.7	6.4
6	26.5	79.7	6.3
7	26.5	79.7	6.0
8	26	78.8	5.4
9	26	78.8	5.2
10	25.5	77.9	5.0
11	24.5	76.1	4.2
12	23	73.4	4.7
13	21	69.8	5.5
14	20	68.0	6.0
15	18.5	65.3	6.5
16	17	62.6	6.8
17	15.5	59.9	6.8
18	14.5	58.1	6.8
19	13.5	56.3	6.8
20	12.5	53.6	6.8
21	11.5	52.7	6.8
22	11	51.8	6.7
23	10.5	50.9	6.5
24	10	50.0	6.5
25	9.5	49.1	6.4
26	9	48.2	6.4
27	9	48.2	6.3
28	8.5	47.3	6.3
29	8	46.4	6.4
30	8	46.4	6.2
31	8	46.4	6.1
32	7.5	45.4	6.0
33	7.5	45.4	5.9
34	7.5	45.4	5.8
35	7.3	45.1	5.5
36	7	44.6	5.4
37	7	44.6	5.3
38	7	44.6	5.2
39	7	44.6	5.1
40	7	44.6	5.0
41	7	44.6	4.9
42	6.5	43.7	4.9
43	6.5	43.7	4.8
44	6.5	43.7	4.8
45	6.5	43.7	4.8
46	6.5	43.7	4.7
47	6.5	43.7	4.6
48	6.5	43.7	4.3
49	6.5	43.7	4.4
50	6.5	43.7	4.2

Depth in Feet	Water Temp. in C°	Water Temp. in F°	Oxygen P.P.M.
51	6.3	43.3	4.1
52	6.3	43.3	4.0
53	6.3	43.3	4.0
54	6	42.8	3.9
55	6	42.8	3.8
56	6	42.8	3.7
57	6	42.8	3.6
58	6	42.8	3.6
59	6	42.8	3.6
60	6	42.8	3.5
61	6	42.8	3.4
62	6	42.8	3.3
63	6	42.8	3.2
64	6	42.8	3.1
65	6	42.8	3.2
66	6	42.8	3.2
67	6	42.8	3.2

Calibration of oxygen made at sea level
Air Temperature Station A 23°C
Weather - Cloudy and foggy wind light from south
Time Station A - 10:30 AM
Transparency - 15' 5"
pH - 7.2

Siltation of pond occurring at north end from Silica Company
Emergent Vegetation (Pickerel Weed & Pond Lillies)
Submerged Vegetation (Common Bladderwort)
Vegetation growing in shoal areas of the pond

Taken by:
R. Gapiga
J. Piza