environmental review team report

RC&D

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

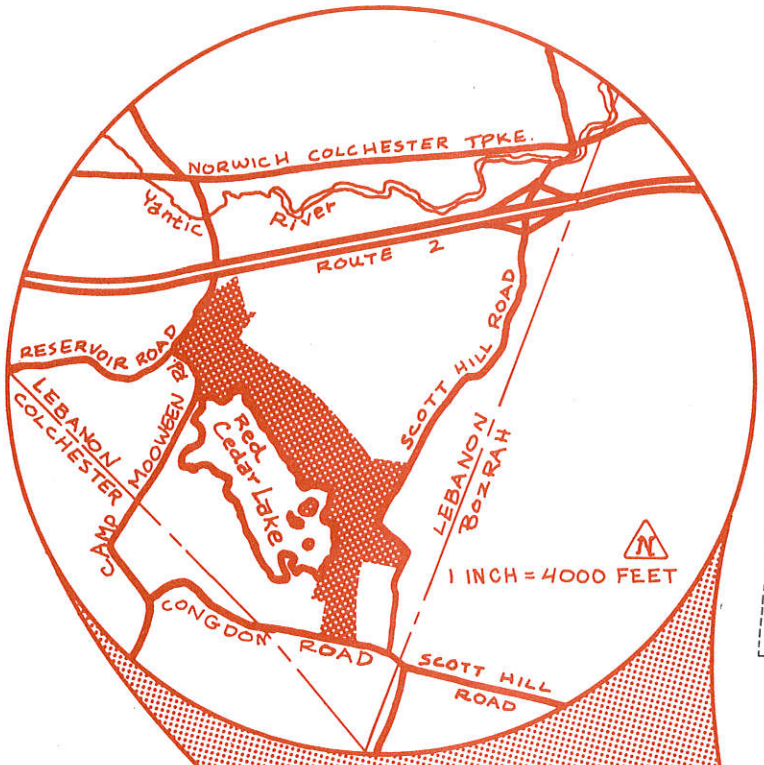
ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES

ENVIRONMENTAL REVIEW TEAM REPORT
ON
RED CEDAR LAKE
LEBANON, CONNECTICUT
FEBRUARY, 1974

Preparation of this report has been, in part, assisted by a grant from the New England Regional Commission administered by the Southeastern Connecticut Regional Planning Agency

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

LOCATION OF STUDY SITE



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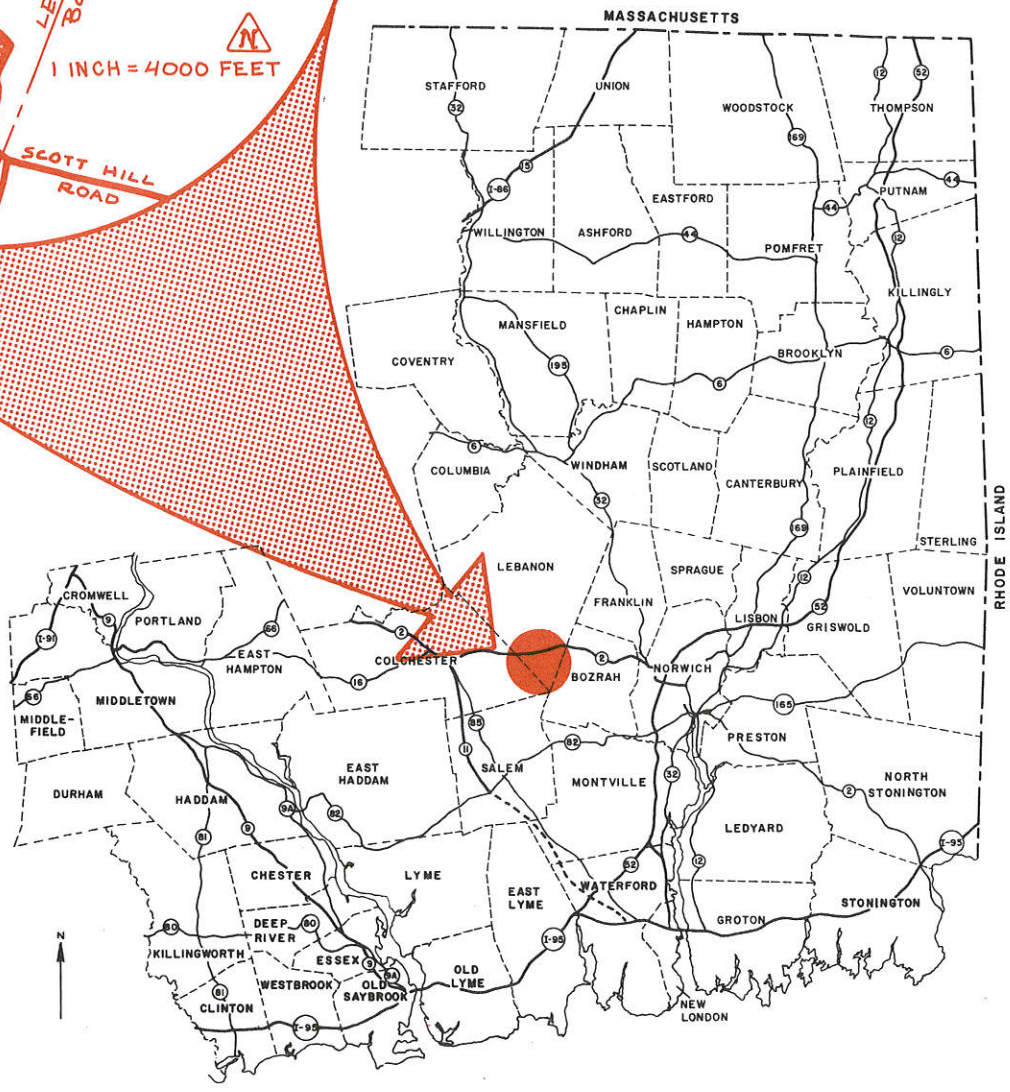


EASTERN CONNECTICUT

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
RED CEDAR LAKE
LEBANON, CONNECTICUT

This report is an outgrowth of a request from the Lebanon Planning and Zoning Commission, with the approval of the owner, Development Services, Inc., 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) Project Committee 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 campground consisted of the following personnel: Sherman C. Chase, District Conservationist, Soil Conservation Service (SCS); Edwin L. Minnick, Engineering Specialist, SCS; Richard Hyde, Geologist, Natural Resource Center, State of Connecticut Department of Environmental Projection (DEP); George Cloutier, Forester, DEP; Joseph Piza, Fisheries Biologist, DEP; T.E. Linkkila, Wildlife Biologist, DEP; Malcolm C. Shute, Jr., Senior Sanitarian, State of Connecticut Department of Health; David Miller, Climatologist, Connecticut Cooperative Extension Service; Lester Barber, Planner, Windham Regional Planning Agency; Barbara A. Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on January 3, 1974. 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 both the Town of Lebanon and the developer. 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 Committee 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

Development Services, Inc., is currently proposing a seasonal recreational subdivision on the east side of Red Cedar Lake in Lebanon. A total of 800 lots of 8,000 square feet each (minimum) are proposed for the 230 acre site. Community facilities consist of tennis courts and a community center (with beach). The two areas left as undeveloped on the plans are very wet and have either intermittent or perennial streams flowing through them. Both community water and sewage systems are proposed.

The success of a development of this nature would appear to largely dependent on the aesthetic quality and the recreational opportunities of the site. The relatively high density proposed for this project may substantially reduce the aesthetic appeal of the site as well as overburden the recreational capacity of Red Cedar Lake. With recreation being the central purpose of this development, the proposed facilities appear to be inadequate. Therefore, in preparing a final plan for this development, larger lots, more community recreation and open space, and buffer strips along the lake front are some of the items which warrant serious consideration.

The following report will explore in further detail the various aspects of the proposed development, preceded by a description of the physical resources of the site. Recommendations or comments made within this report are presented for consideration by the developer and town in the preparation and review of the development plans and should not be viewed as mandatory or regulatory in nature.

EVALUATION

GEOLOGY AND SOILS

For purposes of discussion, the geology and soils of a site can be broken down into three parts: bedrock geology, surficial geology, and soils. The bedrock is the consolidated rock underlying the surficial materials and soils. The surficial deposits encompass the relatively unaltered and unconsolidated materials found below the soil zone. The soils comprise a three to five foot zone at the surface which in most cases have developed from surficial deposits as a result of physical, chemical, and biologic forces operating at the land surface.

The bedrock geology, as mapped for the Fitchville quadrangle, U.S. Geological Survey Bulletin 1161-I, is determined to fall within the Hebron Formation. This particular formation includes a variety of granular and micaceous schists and gneisses. On the basis of existing map information the strike or trend of the underlying bedrock appears to be generally northwest by southeast. The beds (individual rock units) dip into the earth in a westerly direction at an angle of 10° to 20°.

At the Red Cedar Lake site there are basically two types of surficial materials, till and stratified drift. Till is a geologic term, commonly referred to by laymen as "hardpan" or "boulder clay." These terms all refer to the predominant type of overburden in Connecticut which was deposited directly when glacial ice melted at the close of the last advance, some 9,000 to 10,000 years ago. Till is defined as a heterogenous material composed of various mixtures of boulders, gravel, sand, silt, and clay particles, none of which are significantly sorted or stratified according to grain size, as is the case with waterlain deposits.

Thicknesses of till at this site vary from place to place, depending on the amount of the original deposition and the extent erosional forces have affected this deposit since its placement. In general, however, thicknesses appear to be at least ten to fifteen feet in the areas immediately adjacent to the lake's northern and eastern boundary, around the area of stratified drift at the southern end of Red Cedar Lake, and along Scott Hill Road. The thickness of till appears to increase, probably up to 30 or 40 feet, moving inland up the hill to the northeast of the lake.

Stratified drift deposits overlie a very thin till layer at the southern third of Red Cedar Lake. These materials are considered to be an ice-contact stratified drift type of deposit. This means they were placed at this location by melt-water streams flowing against, on, or in close proximity to the glacial ice. Characteristically these types of deposits exhibit irregular stratification with large ranges in texture over short distances. Boulders greater than six feet in diameter down to medium to fine sand and silt are not uncommon. At the land surface the materials appear to be cobble gravel and boulder gravel in many places, although in all likelihood the grain sizes vary through a wide

range of size groupings vertically as well as laterally.

It is possible to find layers or lenses of till at depth within the stratified materials. Situations of this type occurred when, during glacial ice retreat, so much ice had melted, making the glacier composition rich in composition and saturated with water, that the solid particles were capable of flowing similar to a mudslide.

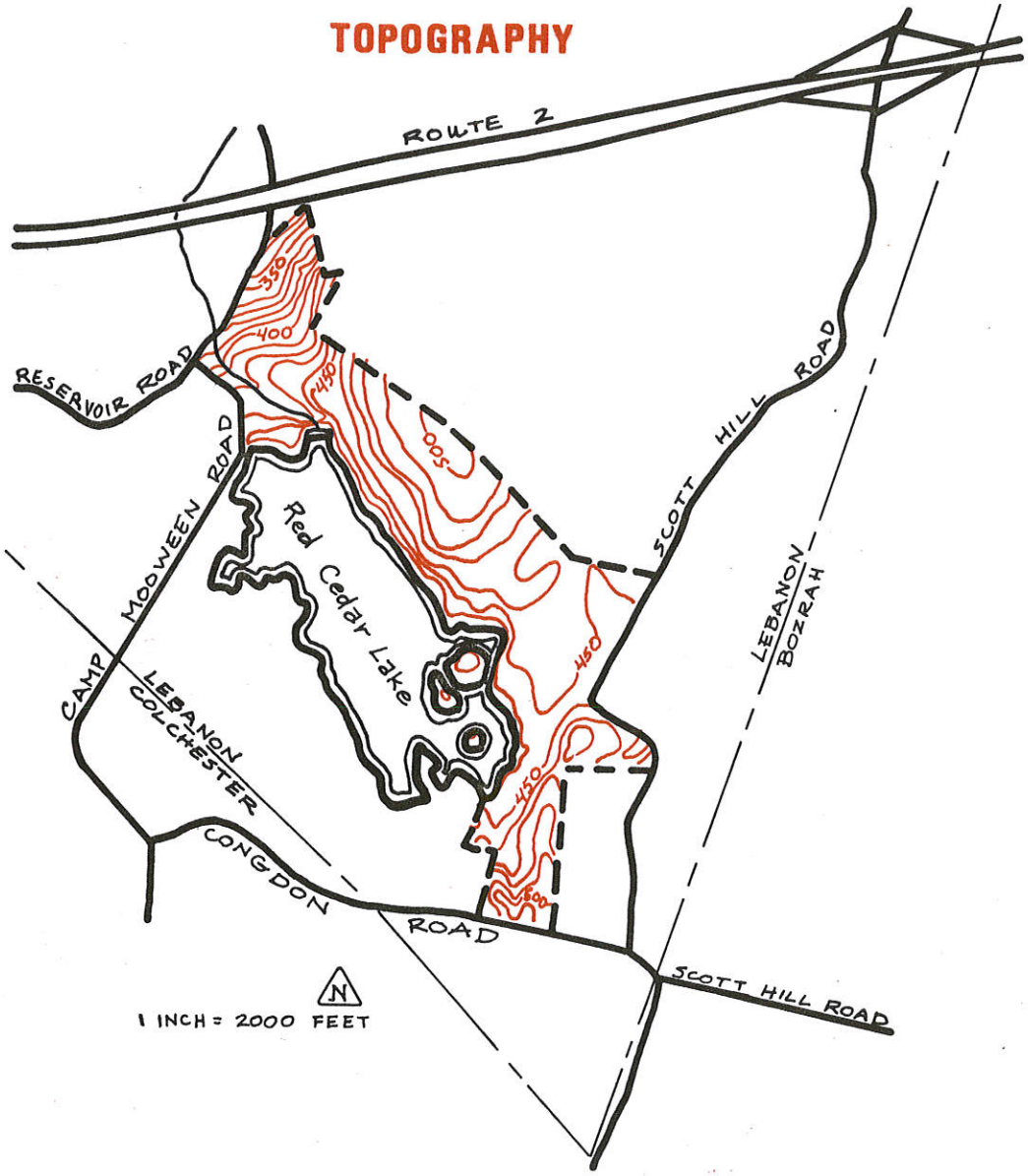
A detailed soils map of this property is given in the Appendix to this report along with a soils limitations chart. Due to the original scale at which the soils are mapped (1"=1,320') the lines shown on the soils map should not be viewed as precise boundaries, but rather as guidelines to the distribution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

The predominant natural soil group on the site is C, upland soils over compact glacial till, encompassing 181.1 acres or 79.0 percent of the site (individual soil types: 35MA, 35XB, 35MC, 85MC, 31 MA, 31MC, 31MD). These soils generally occur on the tops and slopes of drumlins, hills that were smoothed and elongated north to south by the movement of glaciers. The soils are underlain by compact glacial till and have a hardpan 16 to 36 inches below the surface. This pan drastically reduces percolation rates. During wet seasons, excess water in the soil moves downslope above the hardpan. On the lower slopes, a moderately high seasonal water table is created in the early spring (within 15 to 20 inches of the surface).

Also of significance on this site are the 39.9 acres of soils (17.4% of the site) mapped as 91, 754, and 43M. These are all very poorly drained soils which are defined under P.A. 155 as inland wetlands. Their high water table makes them generally unsuitable for development.

The map on the following page shows the topography of this site. The central portion of this site lies on the western side of a drumlin, with a fairly regular topography with slopes ranging from 3 to 15 percent. The majority of the proposed development would be located in this area. The northern and southern portions of the site exhibit a more irregular topography and contain most of the wetter soils.

TOPOGRAPHY



WATER SUPPLY

In locating any source of water, whether for individual dwellings or municipal supply, the questions of availability, recoverability, and inherent quality must be evaluated before final development site plans have reached a point where they cannot be altered. This includes not only insuring against future water quality changes as a result of surface and subsurface contamination, but the protection of the aquifer's water yielding capacity through the installation of the proper number of wells, their placement, and pumping levels to meet the characteristics of that particular aquifer.

Water supply wells can be considered as falling into one of two types: bedrock well or screened well placed into unconsolidated materials. Bedrock wells derive their water from the fluids which flow through the cracks, joints and fissures of the rock

while screened or dug wells take the water flowing through saturated unconsolidated deposits.

From extensive investigations by the U.S. Geological Survey, cracks or joints within the rock are most numerous and in general larger within the two hundred feet of rock closest to the land's surface. Wells located within this rock environment usually yield small but dependable quantities of water. From the compilation of well drilling records for the surrounding area, 9 out of 10 bedrock wells yield at least 3 gallons per minute while "dry holes" and wells yielding up to 100 gallons per minute are extremely scarce.

Dug or screened wells placed in till usually cannot produce the required yields necessary for a municipal supply, although they may be capable of supporting individual homes. Till tends to be found in rather thin deposits and its water transmitting capacity, as a result of the high silt and clay content, is slow.

Screened wells located within thick saturated sand and gravel deposits are by far the most desirable in terms of water availability, well recovery, and overall chemical quality for municipal sources. As was indicated previously the ice contact deposits along the southern third of Red Cedar Lake do exhibit, on the surface at least, cobble and boulder gravel texture (this can vary considerably with depth). The U.S. Geological Survey, Water Resources Division, in the "Lower Thames and Southeastern Coastal River Basin Study," has indicated these deposits to be capable, on the average, of yielding 11 gallons per minute. This would mean a single well would be capable of furnishing roughly 16,000 gallons per day. Therefore, it would require nearly 10 wells to supply the 155,000 gallons of water needed if complete development of this site were to occur. Since these figures represent averages, a subsurface exploratory program is essential to determine this particular ice-contact deposit's water-yielding characteristics. From a review of the published information the most favorable location for a well field in this area appears to be within the esker deposits which run northwest by southeast, east of the small swamp located south of Red Cedar Lake.

The water supply, as proposed, would be a community well system. The pumpage rate would probably be greater than 9 gallons per minute. This would require an owner-controlled radius of 150 feet surrounding the well, or 200 feet if the pumpage rate should exceed 49 gallons per minute. No subsurface sewage disposal system or other form of pollution could be located within the above radius. A sewer pipe constructed of extra heavy cast iron pipe with leaded joints or equal shall not be located nearer than 75 feet (or 100 feet with greater pumpage rate). The distances involved could eliminate a number of lots.

Some difficulty can be expected during the installation of the transmission lines due to the stoniness and the high water table exhibited in many soils.

There is one adverse effect associated with using water from this drainage basin to supply the community system and ultimately disposing of the used water in another drainage basin. It was indicated that the effluent from the sewage treatment plant would be pumped to the top of the drumlin and be disposed in the drainage basin to the east. The treatment plant will be capable of processing 155,000 gallons per day. This quantity, if we assume it will be taken from the Red Cedar Lake hydrologic system, will mean roughly a 7 inch loss to the level of the lake over a period of a year (based on 200 days of withdrawal).

Another possible water supply would be connecting to the Norwich public water supply located at the Deep River Reservoir. It might necessitate providing a water main and pumping station, but it would provide an approved source of drinking water and eliminate the necessity of reserving some lots strictly for the community well or wells.

WASTE DISPOSAL

Community system. Lakeside developments are more easily protected when municipal sewerage systems rather than on-site systems are utilized to dispose of household sewerage. However, great care is a necessity for the location and construction of sewer lines and package treatment plants. A leaky system can easily result in severe pollution problems to the lake. In addition, the combining of sanitary sewers and a storm sewer system may operate efficiently in normal times, but during wet years or seasons heavy runoff may result in the spilling of raw sewage into the lake from overflows of manholes and junctions. For this reason sewer and storm systems should always be completely separated.

The waste disposal system for the proposed Red Cedar Lake development is to include an activated sludge secondary treatment plant and tertiary filtration. Once sewage has been passed through this plant the remaining fluids are to be sprayed on the land surface in the adjacent drainage basin to the east. It was indicated 10 acres had been set aside for this purpose, although the developer felt 2 acres would be sufficient to handle the quantity of fluids generated from this system.

Following are calculations which estimate the quantity of fluids that will have to be disposed of assuming, first, maximum development and use of the project and second, development and use as anticipated by the developer.

Maximum Development:

Assumptions:
1. 800 lots and dwelling units
2. Average 3 persons per dwelling unit.
3. Average 55 gallons of water per day per person required.

4. 200 day residency per year permitted.
5. All water requirements are used and pass into the treatment plant.
6. 1" rain = 27,200 gallons of water per acre.

This results in 165 gallons of water per household per day, 132,000 gallons of water for the development per day, and 26,400,000 gallons of water per year. For a 10 acre disposal area, this would be a total of 97 inches added per acre per year. For a 2 acre disposal area, this would be roughly 485 inches.

Developer's Estimates:

Assumptions:
1. Only 40 percent of the 800 lots would actually have dwellings constructed (320 dwellings).
2. Average 3 persons per dwelling unit.
3. Average 55 gallons of water per day per person required.
4. 200 day residency per year permitted.
5. All water requirements are used and pass into the treatment plant.
6. 1" rain = 27,200 gallons of water per acre.
7. Only 25% of the dwellings would be occupied at any one time (80 occupied dwellings).

This would result in only 13,200 gallons of water required per day for the development, with a yearly total of 2,640,000 gallons. Distributed over a 10 acre disposal area, this would be an increase of about 10 inches per acre per year. For a 2 acre disposal area, it would mean an additional 48 inches per acre per year.

The average rainfall for this portion of Connecticut is 46 inches per year. Of the total approximately 22 inches are lost through the combination of evaporation of water from the land surface and transpiration effects of the vegetative cover. The remaining 24 inches travel to the sea in the form of surface water runoff and groundwater runoff. In general, however, it can be said roughly 7 to 8 inches of precipitation actually make their way into soils formed from a till overburden. The remaining 16 to 17 inches therefore tend to flow over the land and eventually enter the natural stream and river system. This is not to imply that more rain water or sprayed secondary treatment effluent cannot infiltrate into the land. Under natural conditions the application of rain is usually intense and periodic. If precipitation, or sprayed effluent, were spread more evenly over time then a greater opportunity would occur for increased infiltration.

The results of the calculations above and the rainfall data indicate that thorough investigations should be undertaken in determining the size of the area necessary for the disposal of

treated effluent. Other subjects of critical importance that will have to be addressed by the developer, the town, and the Department of Environmental Protection will include such things as the effects of the spray technique to the adjacent drainage basin and its streams, the maintenance and care of the disposal land, and the protection and enrichment of nearby surface water bodies.

There is an excellent report available from the Corps of Engineers, U.S. Army, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, entitled Wastewater Management by Disposal on the Land, Special Report 171. In general, the report favors spray irrigation to overland runoff and rapid infiltration due to a higher degree of reliability and potential longevity. Careful management of both the disposal site and treatment plant are necessary to provide optimum results. Some overdesign of the site may be desirable to compensate for current uncertainties in this method of disposal, though this may be partially accomplished through overestimating population and waste volumes.

On-site sewage disposal. In the event that a sewage treatment plant is not approved by the Department of Environmental Protection, the limitations of the soils for on-site sewage have been given in the Appendix. On-site investigations would still be necessary for each system.

The inland wetlands have very severe limitations for on-site sewage disposal due to a high water table and should not be used. The hardpan soils, which represent the majority of the site (79.0%) have severe limitations due to conditions such as hardpan, stoniness, slope, and a moderately high seasonal water table, individually or in combination. Due to the number of proposed homes and possible problems of water control drains, fill, and erosion, it would probably be necessary to engineer a subsurface sewage disposal system for each lot and present all of the lots together as a total plan to prevent one lot from having an adverse effect on another. It certainly does not appear feasible to locate 800 homes with on-site sewage disposal at this site.

Through the use of on-site septic systems along waterfront properties the possibility for septic effluent to reach the water is greatly magnified. Septic effluent is so rich in nutrients that upon its entrance into a pond or lake the eutrophication process is greatly accelerated and the water body can quickly become despoiled. The time factor in this process will be determined primarily by the quantity of nutrients entering, the size of the waterbody, and how rapidly the pond water is replaced by the entrance of water from upstream. In extremely small drainage basins, as in this particular situation, the turnover of standing water may be extremely slow.

Eutrophication in a natural situation is a slow process and

takes many years, but through man's artificial enrichment the complete destruction of a waterbody is a possibility in merely a few years. Therefore, if possible, it would be desirable to avoid on-site sewage disposal systems and the possibility of increased eutrophication of Red Cedar Lake.

Refuse Disposal. The refuse generated by the proposed development at maximum density could amount to approximately 1,400 tons each season. According to Mr. Thomas Pregman, Solid Waste Section, Department of Environmental Protection, this would be equal to one third of the present generation from the entire town for one year. Therefore, this might result in the lowering of the life expectancy of the present refuse disposal site. A lower degree of actual development would result in a correspondingly lower amount of refuse.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

Substratum support for buildings and roads appears adequate. Basements may not be practical on many lots due to the seasonal high water table. It was observed at one location to be within 12 to 18 inches of the surface. Drainage could be a corrective measure, but should be planned for the entire development prior to construction. Since no underground storm water system is planned, the feasibility of installing footing drains will depend on the topography of each lot. On some areas, drainage should also be considered for slab construction.

Construction of any sort poses a potential for erosion. Earth movement for reasons of grading, the building of roads, and utility installation are the primary causes for rapid increases of sediment loads in local streams and drainage systems. The prevention of soil erosion from the land is the most logical and practical method for sediment control.

Some construction practices which reduce the erosion potential would be: cuts and fills no steeper than one vertical to three horizontal; fertilize, seed (or sod), and mulch disturbed areas as soon as practical; and use temporary seeding on disturbed areas that are not complete, but will be left barren for a considerable length of time. There are also vegetative and mechanical measures, such as sediment basins, which can be used to control erosion that does occur. It is recommended that an erosion and sediment control plan be developed for the project prior to the start of construction. The Erosion and Sediment Control Handbook for Connecticut, published by the Soil Conservation Service, provides standards and specifications for erosion control measures. Copies of this handbook, as well as technical assistance in preparing an erosion control plan, are available from your county Soil Conservation Service office.

ROADS AND UTILITIES

The site is within a favorable distance of major highways. Upgrading of portions of Camp Moween Road and Scott Hill Road to their connection with Route 2 to the north may be necessary as the development proceeds.

A reduced pavement width and the use of natural swales for drainage within the proposed site appears desirable. However, gullying may occur along the roadside drainage swales where the roads are placed perpendicular or nearly perpendicular to the contours. These swales should be constructed to handle the design storm without excessive velocities. The frequency of the design storm should be in compliance with local regulations.

Considering the density of the proposed development and the proposed reduction in road widths, prohibition of on-street parking would be essential. Special parking requirements might be instituted to insure adequate on-lot parking. Street layout should discourage all through traffic, a necessity with the narrow roads.

Extensive use or heavy equipment should not be permitted on the existing access road at the northern end of the site which crosses the impoundment structure.

If underground utilities are planned, some difficulty can be expected during installation due to the stoniness or high water table.

HAZARDS

Natural. The structural stability of the existing impoundment of Red Cedar Lake is dubious. The possible failure of this structure is not so much a hazard to people or property but to the economics of the proposed project. The dam appears to be in need of redesign and reconstruction.

The drainage area contributing to Red Cedar Lake is approximately four hundred acres. Therefore, the drainage area to lake area ratio is about 2.7:1. This indicates a strong possibility of a drop in the lake level during droughty periods. This could affect the recreational benefit of the lake, particularly since it is already shallow in depth (a Lebanon resident indicated it to be about 4 feet in depth). The existing natural drainage system should be consciously preserved since it helps supply and maintain the water level of the lake. The major portion of the land drainage system is readily defined and delineated on the detailed soils map within the Appendix. It consists primarily of the inland wetland soils mapped as 91, 754, and 43M. Filling of this area would result in a lowering of the low flow of the streams feeding Red Cedar Lake and an increase in peak storm runoff.

Man-made. Uncontrolled construction with no control of erosion and sedimentation could reduce the lake to nothing more than a sediment trap and render it unusable for recreational activities. The means for prevention and control were discussed previously.

All lakes and ponds serve as natural traps for nutrients and sediments. To better assess the scope and affects development will have on these processes, the well planned community will include, in its initial stages, detailed studies to define the natural base level of nutrient and sediment loading the surrounding drainage area delivers to the waterbody. With the use of background information of this nature, projections may be made concerning the lake's loading limits which cannot be exceeded to maintain it in a healthy and vigorous state.

Lawn fertilizers, petroleum products, droppings from animals, etc., are chronic problems which can never be entirely eliminated from developments of this type, but they can be minimized. Some steps to achieve this goal would include the education of homeowners on the proper allocations of fertilizer and the proper types and amounts of pesticides to suit specific needs or problems. Private owners should be encouraged to plant grasses and shrubs with low fertilizer requirements. Open space should be maximized and these areas left in their native vegetative covers. The planting of large lawns should be discouraged.

It logically follows that acceptable development levels and densities may be determined for Red Cedar Lake based on the base loading levels existing today and the expected increase to those levels from fixed amounts of development. Planning along these lines will help to avoid ecological disruption which only serves to destroy the very qualities which initially induced development.

AESTHETICS AND PRESERVATION

Forestry. This site is a highly productive forest stand composed of mixed hardwoods, principally oak, birch, maple, and ash, with a scattered understory of hemlock, white pine, cedar and shrubs. Preservation of the forest amenities is a most important consideration in such a development. Research by the New England Forest Experiment Station and the University of Massachusetts shows that preserving large trees on lots increases the value of the lots. Prelogging of home sites to remove large trees over 16 inches in diameter that are, or will be, hazardous to future occupants, would allow for an economical cutting and salvage of a needed resource.

Hemlock and white pine, highly desirable evergreen species, are shallow-rooted trees. Extreme care should be exercised during construction of roads and utilities to prevent unnecessary damage. Education of future owners in selection and care of tree and shrub growth would help preserve and maintain the forest

amenities. Principal species to conserve are hemlock, white pine, white ash, sugar maple, red oak, and dogwood.

There are several large outstanding specimen trees scattered on the site which should be preserved. Removal of hardware, unsightly platforms, and dead limbs would improve their appearance.

The plan, as presented to the review team, will destroy much of the charm and aesthetics that now exist. Consideration should be given to increasing the amount of community shorefront property and/or increasing the size of the shorefront lots. Also, prohibiting construction 100 feet from the shore line would provide an attractive background for the lake, help protect the lake from siltation, and serve as a buffer against the prevailing winds on the lake. Special deed restrictions (conservation easements) could provide for mandatory preservation of forest on part of each lot, with allowances for replacement and maintenance.

Wildlife. The present condition and stage of succession of the vegetation provides good forest game habitat. The value of this habitat decreases as the forest becomes more mature and shades out the valuable understory plants. The planned development will eliminate all wildlife except for a few species of song birds. Limited wildlife populations can only be maintained if there is provision to provide open space in an area of a minimum size of 10 acres.

Fish. A Lebanon resident present on the field review of this site mentioned a fish kill that occurred from a freeze-over of the lake. This would indicate that the lake is marginal for fish due to its shallow depth. It does have some value for ducks, muskrats, and other aquatic forms of wildlife.

Protection of the lake from excess nutrients and silt will be necessary in order to protect its existing value for fish, wildlife, and recreation. Because the lake is shallow, there is an even greater potential for widespread weed growth and algae problems.

Aesthetics. As mentioned earlier, the site consists of a mixed hardwood forest with a scattered understory of evergreens and shrubs which is generally pleasing. Portions of the southern half of the site exhibit interesting topographic variety near the lakeside and mature trees of considerable aesthetic value. In addition, there is a large island which has been proposed for subdivision into several private lots.

The density of lots as proposed severely limits the ability to site structures, driveways, and parking facilities to reflect and protect significant natural features. A somewhat less dense development would permit greater flexibility in locating lots and structures. The large island is particularly interesting and should remain as common property rather than private lots.

The lakeshore and the lake are the two prime material features of the development. The amount of shorefront devoted to community use seems disproportionately small compared to the number of interior lots proposed. More community frontage on the lake as well as better pedestrian and open space connection with lakeside facilities would seem desirable.

Strict setback and easement controls should be established to minimize visual and physical disturbance of the shoreline. As mentioned earlier, a buffer zone of at least 100 feet is recommended. This would also conform with the intentions of the "Streambelt Map" prepared for Lebanon by the Soil Conservation Service.

SERVICES TO SUPPORT DEVELOPMENT

Assuming seasonal occupation, the principal burdens likely to be placed on the town are fire and police protection and possible upgrading of portions of Camp Moween and Scott Hill Road. At full development of this and other lake communities, the creation of a fire station in this part of town might be necessary.

Within the development, services to support recreational activities need to be considered further. Based on the Soil Conservation Service's guide for recreational facilities, Red Cedar Lake can support the following:

260 fishermen (shore)
352 fishermen (anchored boats)
192 fishermen (trolling boats)
64 canoes
21 sailing or other boats
13 water skiing boats

Any combination of boats and/or fishermen will result in lower amounts of each. Assuming a 50 percent development with one boat per dwelling, the lake would provide a less than adequate supply in all areas of boating and fishing. Also to be considered is use of the lake by property owners on the other side of the lake. Boat launching areas should be identified on the plans.

With the approximately 80,000 square feet of beach proposed on the plan, 1,600 swimmers can be accommodated. This is about 57 percent of the projected population at 100 percent development. Guidelines call for 3 percent use at any one time. Providing the water quality of the lake is adequate, the beach area should be of sufficient size to support the development. It has generally been recognized that there should be 1,000 gallons of dilution water flowing through a bathing area for each bather using the area during the course of a day. The dilution water available can be calculated by estimating the turnover, watershed dilution, and any springs feeding the lake. Actual flow should be measured during the summer months.

Approximately 3 acres of parking are necessary to facilitate the swimmers' automobiles. Fewer lots and/or easy pedestrian access might reduce this somewhat. Additional parking would be needed at the boat launching area.

As the lake is an important adjunct to the development, it is suggested that an investigation be made to determine the adequacy of the dam. This structure appears to be weak and could conceivably be washed out during a heavy storm flow.

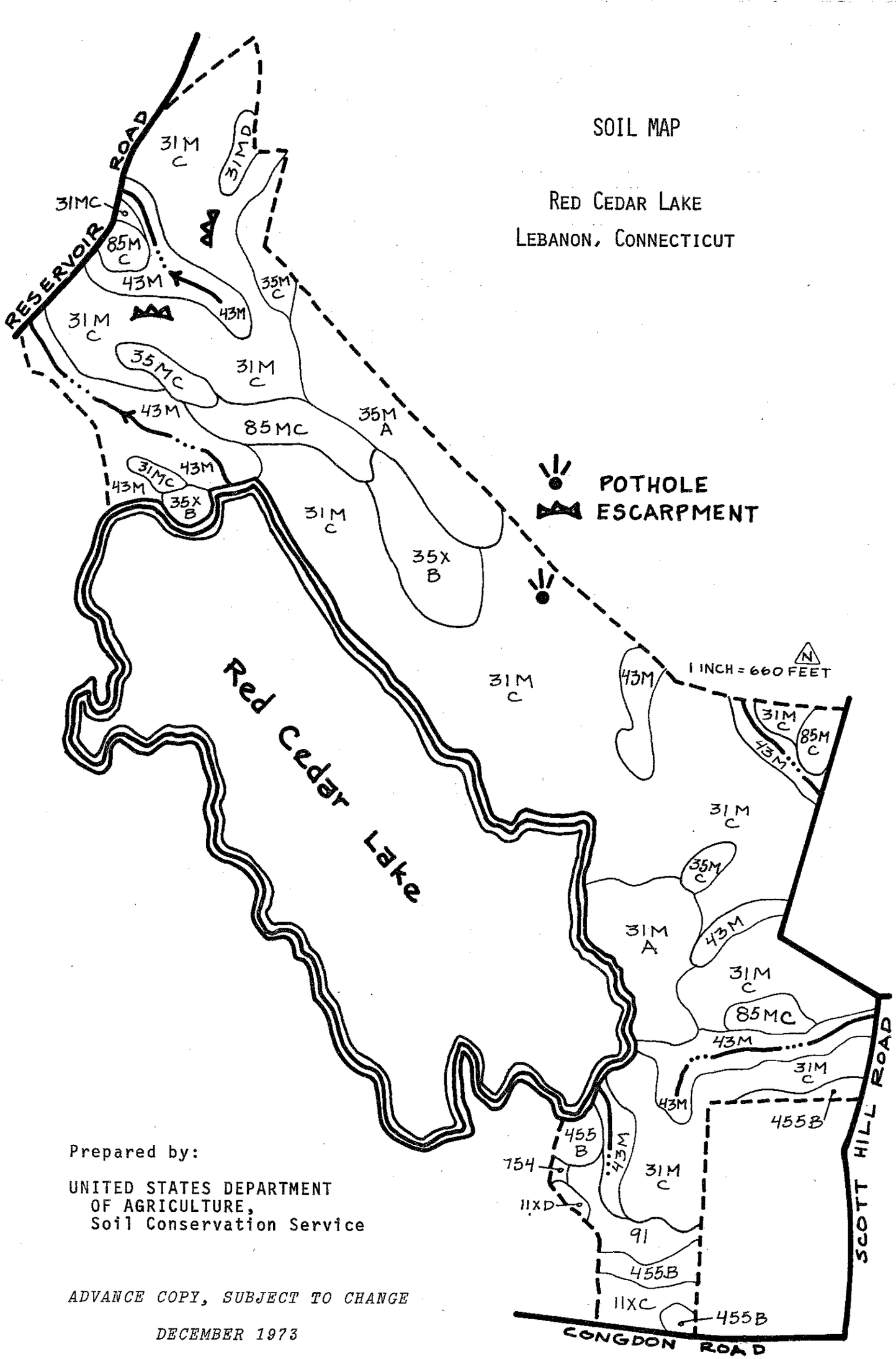
COMPATIBILITY OF SURROUNDING LAND USES

The general vicinity of all lakes in the region are zoned for small lot recreational development. Considerable development has already occurred across the lake from the proposed project. Other adjacent uses now consist of scattered residential homes and woodland. The proposed development is not out of character with similar lakeside developments. However, the proposed 8,000 square foot lots are not compatible with the 12,000 square feet required under the recently amended town zoning regulations.

ALTERNATIVE LAND USES FOR AREA

Given the presence of a community sewage system, greater use of clustered and attached dwellings would permit better siting of urban features, reduce road length, create a greater feeling of openness, and more carefully protect the shorefront. Camp use, as has previously occupied the site, could well utilize the site again. It would also be suitable for a town park. Without community water and sewer, only very low density residential construction would seem feasible due to the limitations of the soils. The site seems well suited for recreational uses sensitively sited.

APPENDIX



Prepared by:

UNITED STATES DEPARTMENT
OF AGRICULTURE,
Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE

DECEMBER 1973

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(s)
A-2	455A, 455B	5.1	2.2	2	2	2	2	Seasonal high water table
A-3b	91, 754	4.9	2.1	4	4	4	4	High water table
B-1b	11XC	2.5	1.1	2	1	2	3	Slope 8-15%, droughtiness
B-1d	11XD	.6	.3	3	2	3	3	Slope 15-25%, droughtiness
B-3b	43M	35.0	15.3	4	4	4	4	High water table
C-1a	35MA, 35XB	22.3	9.7	3	1	1	2	Fragipan, slope 0-8%
C-1c	35MC, 85MC	17.7	7.7	3	2	3	3	Fragipan, stoniness, slope 3-15%
C-2b	31MA, 31MC, 31MD	141.1	61.6	3	2	3	3	Fragipan, stoniness, seasonal high water table, slope 0-25%
		229.2	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; 4-very severe.

SUMMARY OF LIMITATIONS

	Slight		Moderate		Severe		Very Severe	
	Acres	%	Acres	%	Acres	%	Acres	%
On-Site Sewage	-	-	7.6	3.3	181.7	79.3	39.9	17.4
Basements	24.8	10.8	164.5	71.8	-	-	39.9	17.4
Landscaping	22.3	9.7	7.6	3.3	159.4	69.6	39.9	17.4
Streets and Parking	-	-	27.4	11.9	161.9	70.7	39.9	17.4