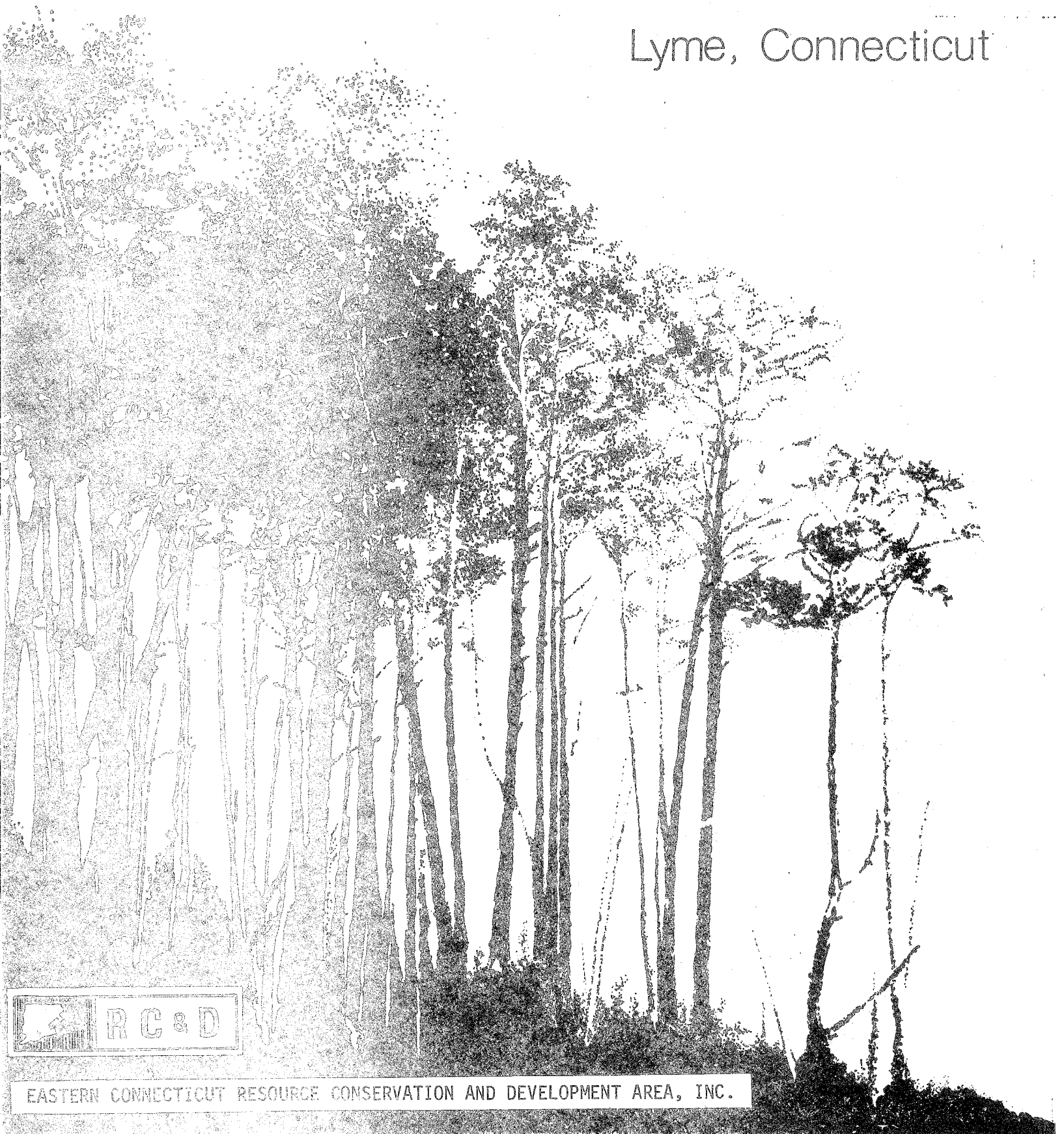
Environmental Review Team Report

Mount Archer Dam

Lyme, Connecticut



R C & D

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

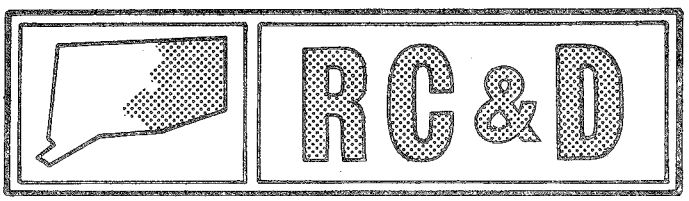
Environmental Review Team Report

on

Mount Archer Dam

Lyme, Connecticut

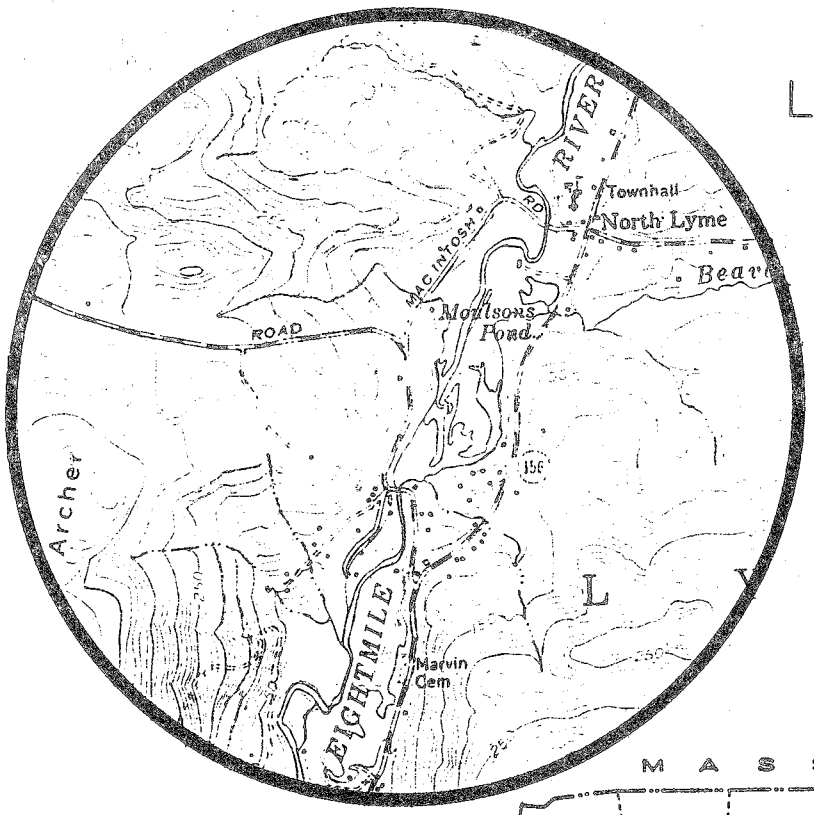
September 1982



Eastern Connecticut Resource Conservation & Development Area

Environmental Review Team
PO Box 198
Brooklyn, Connecticut 06234

Location of Study Site



MOUNT ARCHER DAM
LYME, CONNECTICUT

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
MOUNT ARCHER DAM
LYME, CONNECTICUT

This report is an outgrowth of a request from the Lyme Conservation Commission 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) Area Executive Committee for their consideration and approval as a project measure. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist of the United States Department of Agriculture (USDA), Soil Conservation Service (SCS). Reproductions of the soil survey map as well as a topographic map of the site were distributed to all ERT participants prior to their field review of the site.

The ERT that field checked the site consisted of the following personnel: Gary Domian, District Conservationist, Soil Conservation Service (SCS); Mike Zizka, Geologist, Department of Environmental Protection (DEP); Chuck Phillips, Fisheries Biologist, DEP; Karl Lutz, Wildlife Biologist, DEP; Doug Cooper, Wetland Biologist, DEP; Victor Galgowski, Supt. of Dam Maintenance, DEP; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field checked the site on Tuesday, June 8, 1982. Reports from each Team member were sent to the ERT Coordinator for review and summarization for the final report.

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 developer and the Town of Lyme. The results of this Team action are oriented toward the development of a better environmental quality and the longterm economics of the land use.

The Eastern Connecticut RC&D Project 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: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, Box 198, Brooklyn, Connecticut 06234, 774-1253.

Topography

0 660'
scale

N

INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment of a proposed hydro-power project on the Eight Mile River at Moulson's Dam in Lyme. The developer intends to use the existing dam to generate limited amounts of power. He is planning to raise the level of the existing impoundment by one foot by means of flash boards inserted into the existing dam. These flash boards would remain in place for approximately six months of the year. Power would be generated with hydraulically driven turbines.

The project will take place in two phases. Phase I will consist of the necessary repairs, modifications and additional new equipment to put an existing hydraulic turbine to the intended service. Repairs will consist of replacement of flume earth banks adjacent to the main house and penstock, installation of a control gate in the flume near the spillway, refitting the underside of the main house to resist higher normal water levels, providing a concrete retaining wall beneath the main house to contain an elevated flume level, provide a suitable trash rack, repair the existing hydro-turbine, provide suitable coupling, speed increaser, generator, connection and control equipment. Phase II of the project will maximise site utilization.

A recent publication of the New England River Basins Commission (NERBC), entitled "Potential for Hydropower Development at Existing Dams in New England", estimates that the current hydropower generation in New England could be doubled by restoring and retrofitting existing dams. Full development of this potential could save up to half million barrels of oil annually.

Presently, 2% of New England's electrical needs are met via hydropower. Assuming average non-space heating household electrical use to be 1,000 kw/month, the annual base load energy potential of existing dams in Connecticut could provide the electrical needs for 18,000 households (roughly 2% of the total households in Connecticut).

Major environmental concerns in developing hydropower are: upstream flooding, fluctuating water levels on impoundments, and restrictions to downstream flow.

Upstream flooding is a serious problem with new undeveloped sites. Flooding could involve considerable loss or gain of wetland habitat, removal of valuable farm land from production, and possibly require the relocation of highways and housing. This problem should be minimal for existing impoundments, as the major disruption would have occurred long ago. If restoration of a dam involves raising its height, some upstream flooding will take place.

Fluctuations of water levels in impoundments could destroy aquatic vegetation in shallow reaches. The amount and timing of such fluctuations and their impacts upon the vegetation should be carefully reviewed, as such vegetation may be providing quality habitat and may also aid in filtering sediments and pollutants from entering surface water. Fluctuation is not expected to be much of a problem with most existing dams, especially the "run-of-the-river" dams, where all the water that enters the impoundment flows out either over the spillway or through the turbine.

Restrictions to downstream flows that may occur with constructing new impoundments or with manipulating water levels could impact downstream aquatic life, particularly fisheries, or could reduce dilution water for any downstream sewage effluent. Again, this could not be too great a problem for run-of-the-river dams. New State Low Flow Regulations (Section 16-141a-1 through 141a-8 of the Administrative Regulations of the Department of Environmental Protection) should provide some protection to fisheries from severe flow restrictions.

The following sections of this report discuss the resource base of the project site and the probable impact of this proposal on that resource base. Given the preliminary nature of information provided to the Team by the developer to date and the actual observation of the site under an additional one to two feet of water (June 8, 1982) the Team has concluded that this project will not be detrimental to the long term viability of this wetland ecosystem.

ENVIRONMENTAL ASSESSMENT

GEOLOGY

Moulson's Pond, an artificial impoundment of Lyme's Eightmile River, is bordered on the east and west by steep banks of glacially deposited sand and gravel. These deposits were formed when stagnant ice masses melted, sending forth torrential streams of water laden with rock debris. Because the water-sorted debris was deposited in layers, or strata, it is called stratified drift.

North of the pond is the broad, fairly flat flood plain of Eightmile River. The sand, silt, and gravel in the upper few feet of the flood plain soils were deposited in geologically modern times by the river. The surficial deposits of the islands in the pond are floodplain sediments. Lack of test-hole data precludes in estimate of the total thickness of the flood deposits, but the deposits are undoubtedly underlain by stratified drift. The stratified drift itself is known to be at least 50 feet deep in one well drilled near the Town Hall. The Town Hall itself may rest on more than twenty feet of stratified drift. On the steep banks east and west of Moulson's Pond, the stratified drift is probably less than twenty feet deep.

HYDROLOGY

Moulson's Pond, an artificial impoundment of Eightmile River, has a drainage area of about 53.6 square miles. Approximately one mile south of the dam, Eightmile River widens into Hamburg Cove. The Cove itself is slightly less than two miles long, and it empties into Connecticut River.

The proposed hydroelectric facility is expected to require a one-foot rise in the water level of Moulson's Pond. Because the land to the north is low-lying and relatively flat, there is a potential for the shallow flooding of considerably more acreage than is presently submerged. An accurate depiction of the total extent of the additional flooding would require a topographic map with one-foot contour intervals. At the time this report was being prepared, the Team was notified that the Conservation Commission of the Town of Lyme had ordered that such a map be prepared. Existing topographic data and visual inspection of the area during and following the flooding events of early June, 1982, suggest that the land subject to shallow inundation by the one-foot increase in the dam spillway level may extend as far as, and possibly north of, MacIntosh Road.

The major effects of the rise in water level will be the shallow submergence of land that might otherwise be used for agriculture, open space, or other purposes; and a probable change in the existing plant communities. The first-named effect needs very little additional discussion. It is worth noting, however, that a one-foot increment would affect land which is already subject to occasional flooding and which is therefore less valuable for development. As to the changes in plant communities, it is clear that the existing vegetation would be replaced by species that are tolerant of shallow-water conditions. The more abundant existing wildflower species may reestablish themselves on the new shoreline, but less common species may be lost to the area.

The artificial ponding will cause groundwater levels to rise somewhat around the periphery of the impoundment. Where the adjoining slopes are steep, this adjustment in groundwater levels will be insignificant. Where the adjoining land is relatively flat, the adjustment may have some effect on potential uses of the land.

As sediment carried in Eightmile River entered the upper reaches of the new impoundment, it would tend to be deposited as the velocity of the water decreased. Since the water in this area would be shallow, it may be expected that some sandy "islands" could ultimately form in the upstream section of the new impoundment. These islands would not rise more than a few feet above the standing water level. Since the impoundment would be longer than it presently is, more of the river's suspended sediment load would be removed and the water at the dam would therefore tend to be less turbid.

SOILS

A detailed soils map of this site and detailed soils descriptions are included in the Appendix to this report, accompanied by a chart which indicates soil limitations for various urban uses. As the soil map is an enlargement from the original 1,320'/inch scale to 660'/inch, the soil boundary lines should not be viewed as absolute boundaries, but as guidelines to the distribution of soil types on the site. The soil limitation chart indicates the probable limitations of each of the soils for on-site sewage disposal, buildings with basements, streets and parking, and landscaping. However, limitations, even though severe, do not preclude the use of the land for development. If economics permit large 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 soils map, with the publication, New London County Interim Soil Survey Report, can aid in the identification and interpretation of soils and their uses on this site. "Know Your Land: Natural Soil Groups for Connecticut" can also give insight to the development potentials of the soils and their relationship to the surficial geology of the site.

The nearly level, poorly drained flood plains are occupied by Rippowam fine sandy loam. Rippowam soils are designated by soil mapping unit symbol 855. They formed in recent alluival sediments. Permeability is moderately rapid to rapid, flooding occurs annually at times of maximum runoff, commonly for 2 to 7 days duration. A high water table exists at or near the surface 7 to 9 months of the year. Surface runoff is slow. Rippowam fine sandy loam is designated as a regulated wetland soil according to P.A. 155.

The low-lying, nearly level areas along drainageways in the uplands are occupied by Ridgebury, Leicester and Whitman extremely stony fine sandy loams. The soils are designated by the mapping unit symbol 43M. The letter "M" denotes extremely stony. The Ridgebury and Whitman soils formed in compact glacial till; the Leicester soils formed in friable glacial till. The Ridgebury and Leicester soils have moderate to moderately rapid permeability in the surface layer and subsoil and slow or very slow permeability in the substratum (fragipan). The Leicester soils have moderately rapid permeability throughout. The seasonal highwater table for Ridgebury and Leicester soils is at or near the surface 7 to 9 months of the year. The Whitman soils have runoff potential. Runoff is slow to medium in Ridgebury soils and slow in Leicester soils. This soil is designated as a wetland soil and is regulated under Public Act 155.

The moderately steep to steep terraces or outwash plains are occupied by Hinckley gravelly sandy loam. The soil mapping symbol is 60D. The letter "D" denotes a slope range of 15 to 35 percent. Hinckley soils formed in water sorted outwash. The soils are excessively drained and have rapid permeability in the surface layer and subsoil and very rapid permeability in the substratum. Runoff is slow.

The gently sloping stream terraces and outwash plains are occupied by Haven silt loam. The soils are designated by soil mapping unit symbol 63B. The symbol "B" denotes a 3-8 percent slope. Haven soils formed in water sorted loamy material over stratified outwash. The soils are well drained and have moderate permeability in the surface layer and subsoil, and very rapid permeability in the substratum. Surface runoff is medium. This soil qualifies as a Prime Farmland soil in Connecticut.

WILDLIFE

Wildlife that would most likely be found in this type of habitat includes certain fur bearing mammals such as the raccoon, muskrat, mink, otter, and beaver, numerous reptiles and amphibians, and a variety of bird life.

Most wildlife activity will be found near the water's edge and in areas of shallow water. With few exceptions, water that is more than two feet deep is not very attractive to wildlife since it has little to offer in the way of food or cover. The series of islands in the impounded area are good nesting areas for waterfowl because the surrounding water serves as a barrier to nest predators.

By impounding an additional foot of water in this area, a good deal of wildlife habitat will be lost to flooding. However, additional shallow wetland areas will be created farther upstream. These areas have a more diverse vegetative cover and should be more attractive to wildlife. Most wildlife species commonly found in this area will be able to adapt very well to the additional flooding if the water level is raised at the proper time of year. Wildlife disturbance will be minimized by flooding after the nesting season (July 1) and before fall hibernation occurs (September 15).

FISH HABITAT

The Eight Mile River is a high quality stream with limited watershed development. The river is stocked three times annually with brook, brown and rainbow trout. The Mt. Archer Dam represents the first impediment to upstream fish migration; with fish passage facilities several species of anadromous fish might be expected to utilize the Eight Mile River. These would include Atlantic Salmon, shad, alewives and sea-run trout. At present, however, funds are not available to effect construction of a fish passage facility.

As proposed, the project should have little or no effect upon the fish of the Eight Mile River watershed.

INLAND WETLAND/WATER RESOURCE CONCERNS

The date of our field visit coincided with high runoff from the June 4-7 rainstorms. As such, the spillway was being overtopped by what appeared to be 1' or more. The backwater resulting from these high flows gave some indication of the extent and depth of water which may periodically be experienced with flash boards, as proposed, in place.

The increased waterlevels will primarily affect the floodplain and emergent wetlands which have been part of this stream system since the impoundment was installed.

Increased backwater for longer periods of time as a result of this proposal may have the following effects:

a.) some tree mortality of those marginal species on the "island" up stream from the dam and those directly adjacent to the pond.

b.) increase in emergent vegetation on the periphery of the stream and pond.

c.) a slight increase in "wetness" of those alluvial soils adjacent to the pond which are currently somewhat firm and passable during dryer months. This occurs periodically now but only during periods of high rainfall.

In the Team wetlands expert's opinion the potential effects on the wetlands and floodplain will be neither significant nor detrimental to the long term viability of this wetland ecosystem.

The Water Resources Unit Dam Safety Program under the direction of Victor Galgowski has briefly reviewed this proposal. Furthur data will need to be submitted to Mr. Galgowski so that his Office may assess structural and hydraulic considerations necessary for the issuance of a Dam Construction Permit.

The hydraulic report submitted by the developer in the conclusion mentions an increase of 2 feet in the available head. About half of this increase would be obtained by installing "flashboards" and the other half by lowering tailwater elevation.

The information submitted does not include analysis of structural stability or any measured geometry of the cross-section. Without such

information, it is not possible to add to the comments relative to stability which appear in the memo dated 31 July 1978 (see Appendix B).

In reviewing the hydro computations, it was noticed that a ratio of runoff to precipitation of 0.7 is used. Published USGS data suggest a value of about 0.56. On page 15 of computations, an average annual precipitation of 43.37" is used. United States Geological Survey (USGS) data suggest this should be 50 inches.

Appendix

Soils

0 660
scale

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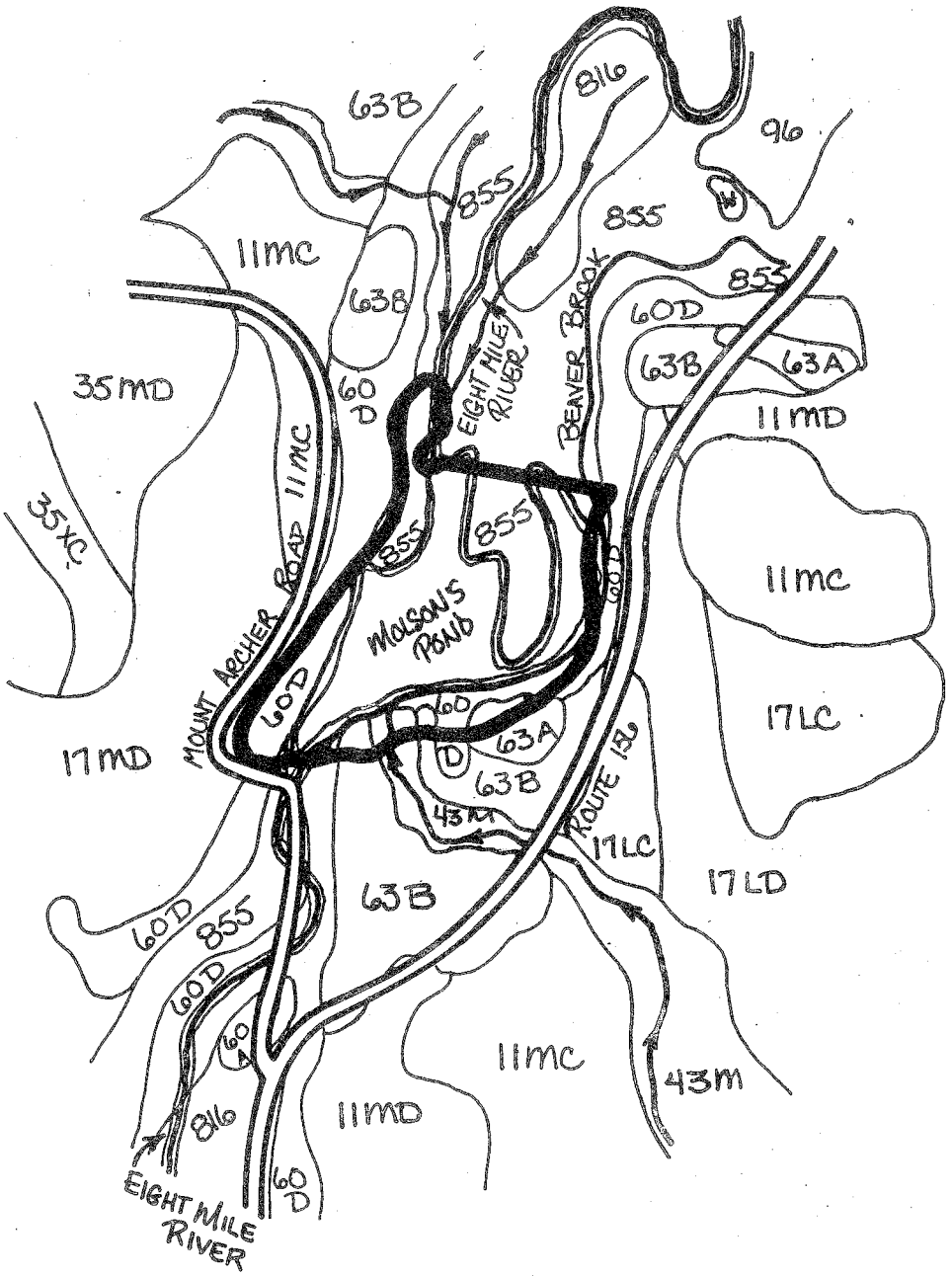

MOUNT ARCHER DAM
LYME, CONNECTICUT

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Wildlife Habitat Potentials				
					Grasses and Legumes	Wild Herbaceous Plants	Wetland Plants	Hardwood Trees	Shallow Water Areas
Haven	63B	1	5%		Good	Good	Poor	Good	Very Poor
Hinckley	60D	5	25%	Slope	Poor	Fair	Very Poor	Poor	Very Poor
Ridgebury, Leicester and Whitman	43M	1	5%	Wetness, stones	Very Poor	Poor	Good	Poor	Fair
Rippowam	855	5	25%	Wetness, Flooding	Fair	Fair	Good	Fair	Good
Water		8	40%						
		20	100%						

SOIL INTERPRETATIONS FOR URBAN USES

The ratings of the soils for elements of community and recreational development uses consist of three degrees of "limitations":slight or no limitations; moderate limitations; and severe limitations. In the interpretive scheme various physical properties are weighed before judging their relative severity of limitations.

The user is cautioned that the suitability ratings, degree of limitations and other interpretations are based on the typical soil in each mapping unit. At any given point the actual conditions may differ from the information presented here because of the inclusion of other soils which were impractical to map separately at the scale of mapping used. On site investigations are suggested where the proposed soil use involves heavy loads, deep excavations, or high cost. Limitations, even though severe, do not always preclude the use of land for development. If economics permit greater expenditures for land development and the intended land use is consistant with the objectives of local or regional development, many soils and sites with difficult problems can be used.

Slight Limitations

Areas rated as slight have relatively few limitations in terms of soil suitability for a particular use. The degree of suitability is such that time or cost would be needed to overcome relatively minor soil limitations.

Moderate Limitations

In areas rated moderate, it is relatively more difficult and more costly to correct the natural limitations of the soil for certain uses than for soils rated as having slight limitations.

Severe Limitations

Areas designated as having severe limitations would require more extensive and more costly measures than soils rated with moderate limitations in order to overcome natural soil limitations. The soil may have more than one limiting characteristic causing it to be rated severe.

To	NAME: Victor F. Galgowski	TITLE: Supt. of Dam Maintenance	DATE: 31 July 1978
	AGENCY: Environmental Protection	ADDRESS:	
From	NAME: Charles J. Pelletier	TITLE: Consultant	TELEPHONE:
	AGENCY: Environmental Protection	ADDRESS:	

SUBJECT

Moulsons Dam L-3, Lyme

This dam was inspected on July 17, 1978. At the time of inspection, the flow was estimated to be about 100 to 125 c.f.s. The spillway masonry could not be observed because of the heavy overflow.

The dam has an "L" shaped spillway with total length of about 70'.

At the right abutment, there is 6' diameter pipe which passes under an adjacent roadway and feeds a canal.

The bridge crossing immediately downstream from the dam is founded on ledge and has a clear span of about 54'. Projecting ledge between the dam and the bridge further restrict the channel capacity.

The roadway is about 7 or 8 feet above the spillway crest and forms the right hand end of the dam.

The concrete abutment at the left hand end of the spillway is only 2' above the spillway crest and probably has been overtopped in the past. However, ledge in the area would limit loss of embankment by erosion.

The dam appears to be in good alignment and no significant defects were observed except for the left abutment. A sudden failure of this dam releasing a large volume of stored water has a low probability.

There are at least two buildings at low elevations downstream which could suffer damage in the event of a failure.

Except for the left abutment, no condition needing repair was observed.

Water Resources Unit

CJP:ljk

About the Team

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

The Team is available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activitis. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.