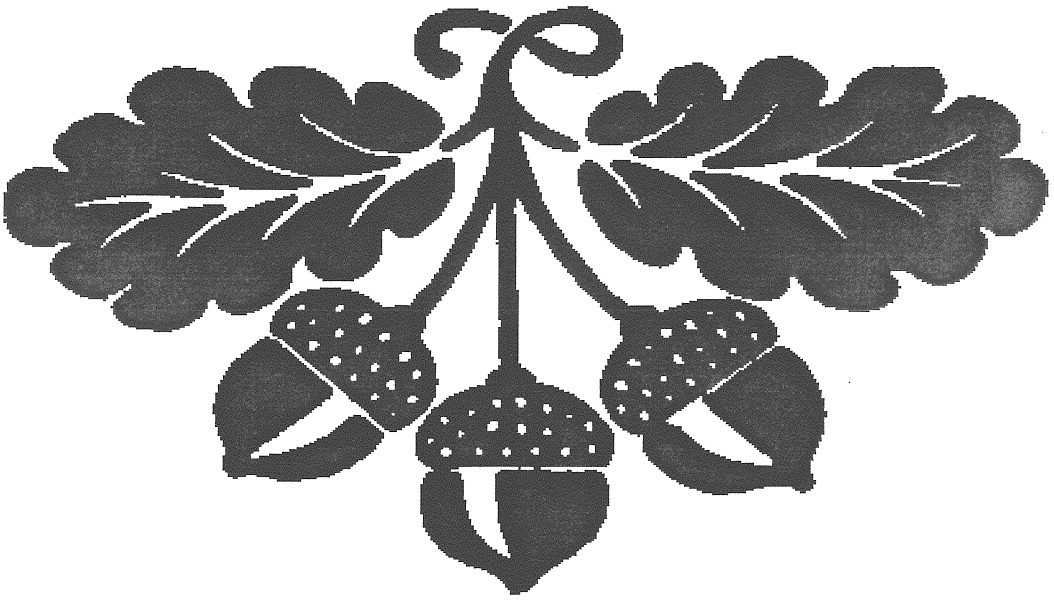
EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT



Camp Oakdale Lake Excavation

Montville, Connecticut

December 1990

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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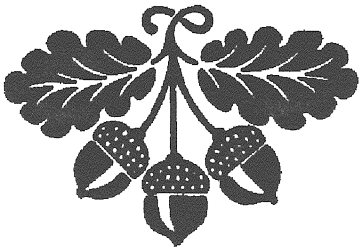

Review Date: September 27, 1990

Report Date: December 1990

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.
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ENVIRONMENTAL REVIEW TEAM REPORT
ON

CAMP OAKDAKLE LAKE EXCAVATION
MONTVILLE CONNECTICUT

This report is an outgrowth of a request from the Montville Parks and Recreation Commission to the New London County Soil and Water Conservation District (SWCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The ERT met and field checked the site on Thursday, September 27, 1990. Team members participating on this review included:

Patrice Beckwith	**Soil Conservationist** **USDA - Soil Conservation Service**
Nick Bellantoni	**State Archaeologist** **Office of State Archaeology**
Dan Mayer	**Environmental Analyst** **DEP - Inland Water Resources Management**
Brian Murphy	**Fisheries Biologist** **DEP - Eastern District**
Nancy Murray	**Sr. Environmental Analyst** **DEP - NRC, Natural Diversity Data Base**
Elaine Sych	**ERT Coordinator** **Eastern CT RC&D Area, Inc.**
Bill Warzecha	**Geologist/Hydrologist** **DEP - Natural Resources Center**

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, and a soils map. During the field review the Team members were given conceptual plans. The Team met with, and were accompanied by the Wetlands Officer, the Town Planner, the First Selectman, the Vice Chairman of the Parks and Recreation Commission and the Parks and Recreation Director. Following the review, reports from each

Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project -- all final decisions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in making your decisions on this proposed excavation to create a lake.

If you require additional information, please contact:

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Haddam, Connecticut 06438
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TABLE OF CONTENTS

TABLE OF MAPS

1. LOCATION, LAND USE AND TOPOGRAPHY

The Camp Oakdale site, which is owned by the Town of Montville and is about 62 acres in size, is encompassed by the Oxoboxo Brook Valley in central Montville. Site boundaries include a Connecticut Light and Power high tension wire right-of-way and an existing sand and gravel removal operation (Kobyluck Sand and Gravel, Inc.) on the west, wooded undeveloped land on the north and south, and Oakdale Road (Route 163) on the east. Oxoboxo Dam Road bisects the northcentral parts of the site in a northwest-southeast direction. Schofield Pond, a privately owned surface water body about 15-16 acres in size, is located south and east of the property and is principally fed by McAlpine Brook and Oxoboxo Brook. Presently the town leases land on the north side of Schofield Pond for a recreational bathing area.

According to a site plan made available to Team members on the review day, the town wishes to excavate a ±13.2 acre recreation lake in the western parts of the site. It would be located south of Oxoboxo Brook just before the brook enters Schofield Pond. The proposed lake would not be fed by Oxoboxo Brook directly but by the groundwater stored in the Oxoboxo Brook Valley aquifer and two east flowing, intermittent streamcourses that emanate from the west. Additionally, a bathing area that includes a beach would occur on the north side of the lake. The existing parking lot facility that serves Schofield Pond would remain. Access to the proposed bathing area would be accomplished by constructing a gravel-based foot-path from the existing parking lot to the beach area. The trail would bridge McAlpine and Oxoboxo Brooks. Although the minimum lake depth was not discussed on the review day, it seems likely that a minimum depth of 7-8 feet deep would be required in order to be sure that enough water is stored in the lake to satisfy bathing load requirements. Present plans indicate that the lake would be about 40-45 feet at its deepest point. The area of the proposed lake is presently wooded and, in part, appears to extend over the Oxoboxo Brook floodplain (north side).

Assuming an average depth of 10 feet for the lake, it is estimated that approximately 6 million cubic yards of unconsolidated materials would be excavated in order to create the lake. This figure will probably be higher due to site grading around the lake and should be computed based on the final elevations. Most of these materials would be composed of gravel but also silt, sand and organic materials, i.e. peats and mucks. The latter will be encountered in low-lying floodplain areas to the north. Town officials noted on the review day that the project duration would be about 5-7 years. The latter depends upon certain factors such as the final excavation area, the demand for the material, the desirability of the material for certain construction uses, and rate of removal. Due to the recent slow down in residential construction and poor economic conditions in the region, there is a possibility that project duration could be longer than the 5-7 Year estimate indicated during the pre-review meeting. Access to the lake excavation area would best be accomplished via the existing Kobyluck Sand

and Gravel operation site on the west. This access would eliminate potential disturbance of the McAlpine and Oxoboxo Brook floodplain/wetlands by an access road for excavation equipment and trucks. A crossing of Oxoboxo Brook already exists on the Kobyluck property to the west.

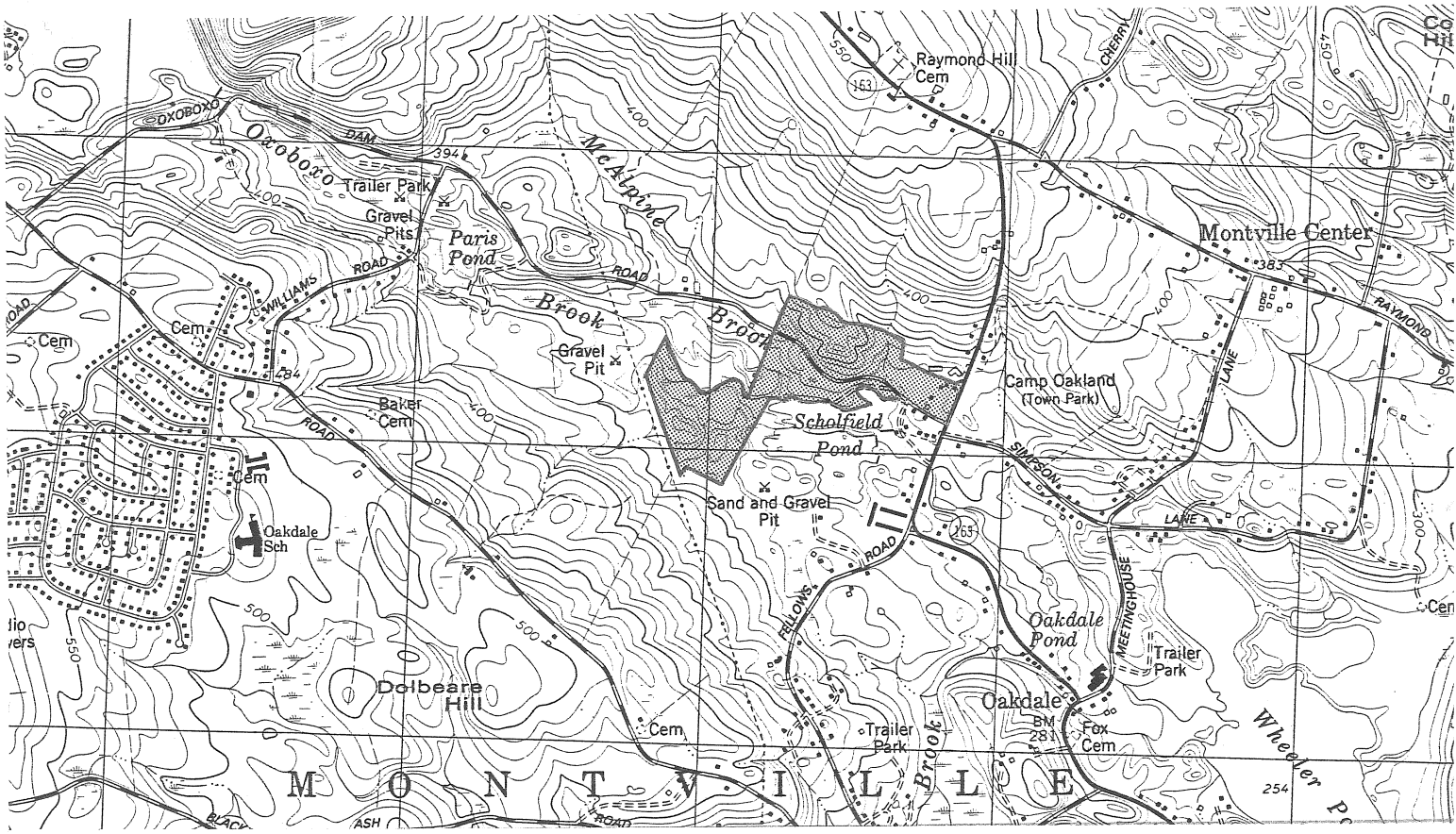
Except for the existing Kobyluck Sand and Gravel, Inc. removal operation in the west, surrounding land uses include mostly low density residential. It is not known whether or not the site's current zoning permits the mining of sand and gravel. If it is not compatible a variance or special exception permit will be required. The site and vicinity appears to have been used mainly for single-family residential.

The proposed lake excavation would be located roughly between Oxoboxo Brook and the on Connecticut Light and Power Company high tension power line right-of-way in the western parts of the site. Level slopes occur throughout the Oxoboxo Brook floodplain. South of this area, the land consists of hummocky and irregular terrain characteristic of sand and gravel deposits.

LOCATION MAP

Scale 1" = 2000'

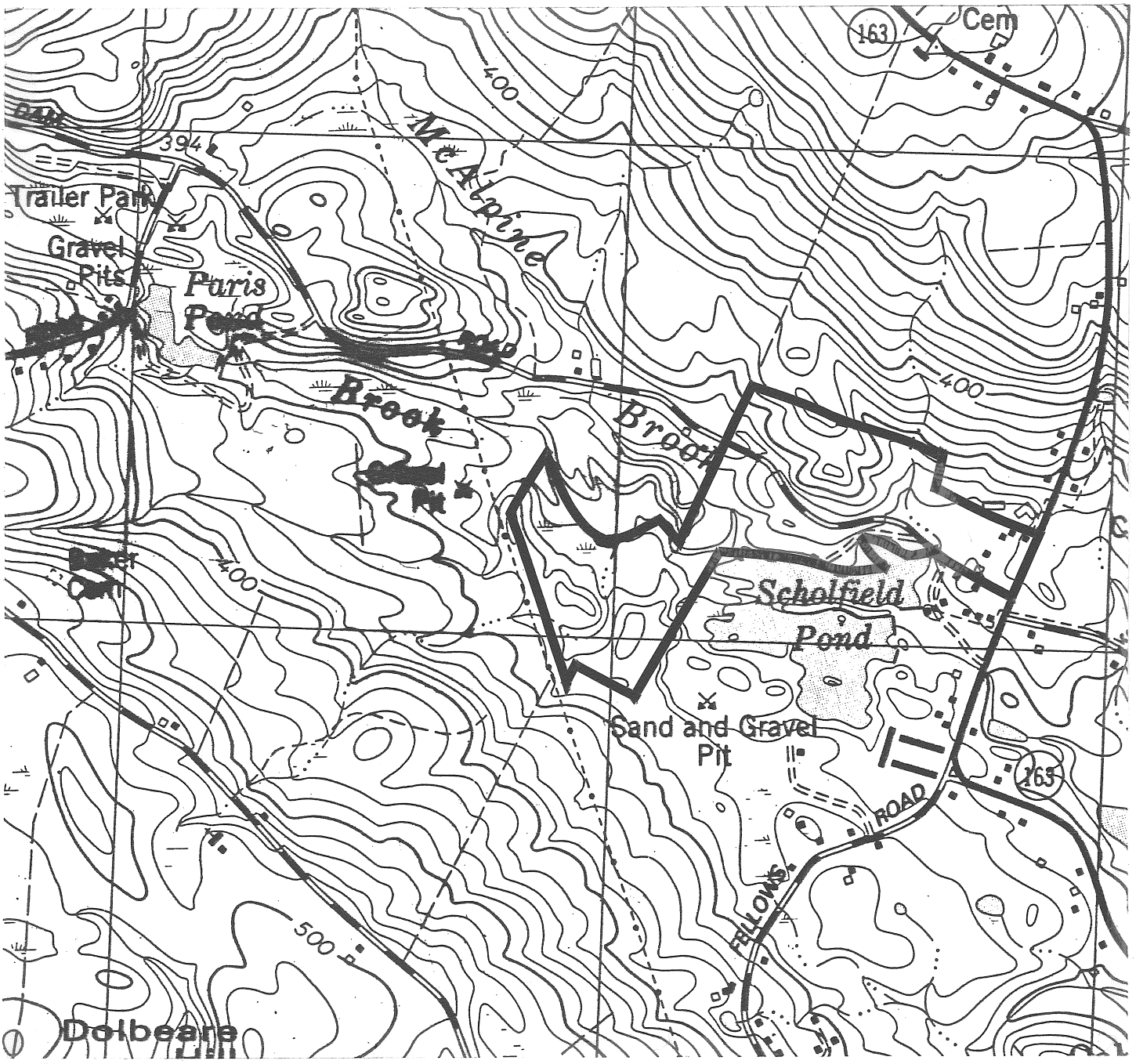
Approximate Site



TOPOGRAPHIC MAP

Scale 1" = 1000'

Approximate Site Boundary



2. GEOLOGY

The site is located entirely in the Montville topographic quadrangle. A bedrock geologic map (GQ-609) and a surficial geologic map (GQ-148) for the quadrangle have been published by the U.S. Geological Survey. Both maps were prepared by Richard Goldsmith and are available at the Natural Resources Center in Hartford. Also, cited for this section of the report is the Soil Survey of New London County. Connecticut and the unconsolidated materials map for the Montville topographic quadrangle.

Bedrock on the site is exposed north of Oxoboxo Dam Road. It was not observed in the area of the proposed lake. Geologic mapping data for the site suggests that the depth to the bedrock surface in the area of the proposed lake is deeper moving southwest to northeast. Excavations or borings that advance through unconsolidated materials in the area of the proposed lake will allow determination of the type, texture, and thickness of unconsolidated materials, depth to bedrock, and depth to the static water table. The location of the borings/deep test holes should be shown on the plan along with a description of the materials encountered in each hole as well as the other pertinent information mentioned above. Lastly, they should penetrate to the desired depth of the lake.

Three, east-west trending rock belts bisect the site. They include an alaskite gneiss, a biotite granite gneiss and a Plainfield Formation subunit. The southern parts of the site are underlain by a light pink to gray, locally red, medium to coarse-grained granitic gneiss. The central parts, which include the site of the proposed lake, consist of interlayered thinly bedded quartzite, mica schist, and dark gray gneiss. It outcrops in the eastern parts of the site. Finally, the northern parts are underlain by a light-pink to gray, medium to coarse-grained alaskite gneiss. Numerous bedrock outcrops of this rock type are visible north of Oxoboxo Dam Road.

All of the rock types (gneisses, schists, and quartzites) underlying the site are metamorphic, which means the rocks have undergone changes as a result of very high pressures and/or temperatures. These changes generally include recrystallization, altered mineral composition, and alignment of elongate minerals.

The underlying bedrock should pose no major problems with regard to excavating a lake in the western parts. There is a chance that it could be encountered by deep excavations particularly at the western limits of the proposed lake.

If an on-site water supply is needed, the underlying bedrock has potential for yielding low but useful amounts of water to a well, usually 3-5 gallons per minute.

In consideration of soil and surficial geologic mapping data, those unconsolidated materials overlying bedrock in the vicinity of the proposed lake include glacially deposited sand and gravel (ice-contact stratified drift), swamp and alluvial sediments. The latter two deposits are post-glacial and

overlie the sand and gravel. Alluvium consists of silt, sand and gravel recently deposited on the McAlpine Brook floodplain. Swamp sediments consist of partly decomposed organic material mixed or interbedded with silt and sand. They occur in the northern parts of the proposed lake. Since at least a portion of excavated lake to the north would extend into the wetland/floodplain areas in the western parts and since this type of activity will require a permit from the Montville Inland Wetland Commission, the regulated soils (poorly, very poorly and alluvial soils) in the area of the proposed excavated lake should be delineated and flagged by a certified soil scientist. A thin layer of till probably occurs between the stratified drift deposits and bedrock surface on the site.

The proposed lake is located on the south side of a relatively large deposit of sand and gravel located in the Oxoboxo Brook Valley. These materials were deposited by meltwater streams that emanated from chunks of glacier ice located in the Valley. Meltwater streams carried the accumulated rock particles and fragments from the stagnant portions of these ice tongues, depositing the material both near and far from the ice. Where deposited near the ice, the meltwater sediments, which are known as "ice contact stratified drift," principally consist of medium to coarse sand and gravel. Surficial geologic mapping data suggests that the material in the area of the proposed lake consists of gravel.

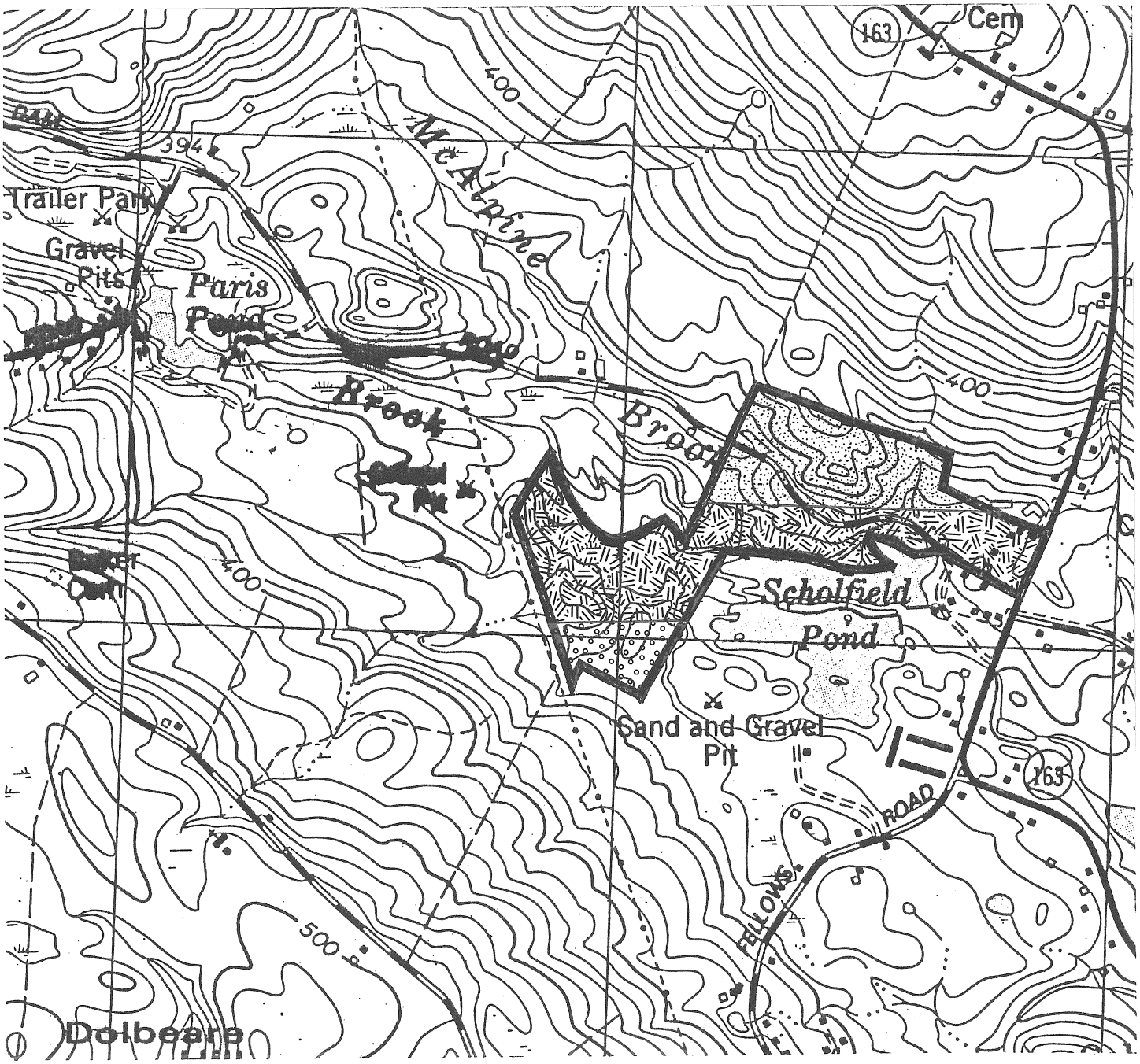
The gravelly deposits in the area of the proposed lake would be favorable for commercial uses mainly in the construction industry. These deposits are also generally rapidly permeable. Where saturated, relatively thick (usually 40 feet or greater) and close to a major streamcourse, they may be favorable for yielding moderate to large amounts of water to individual well(s). Hydrogeologic data suggests that the gravelly deposits in the area of the proposed lake may have aquifer potential but that further investigation i.e., test holes, test wells, etc. would be required to confirm hydrogeologic conditions. It should be pointed out that a community water supply well which taps a sand and gravel aquifer occurs south of Schofield Pond.

North of Oxoboxo Dam Road the site is covered by a relatively thin blanket of till. Till is a glacial sediment that was deposited directly from an ice sheet. The texture of the till is variable, ranging from sandy and loose to silty and tightly compact.

BEDROCK GEOLOGIC MAP

Scale 1" = 1000'

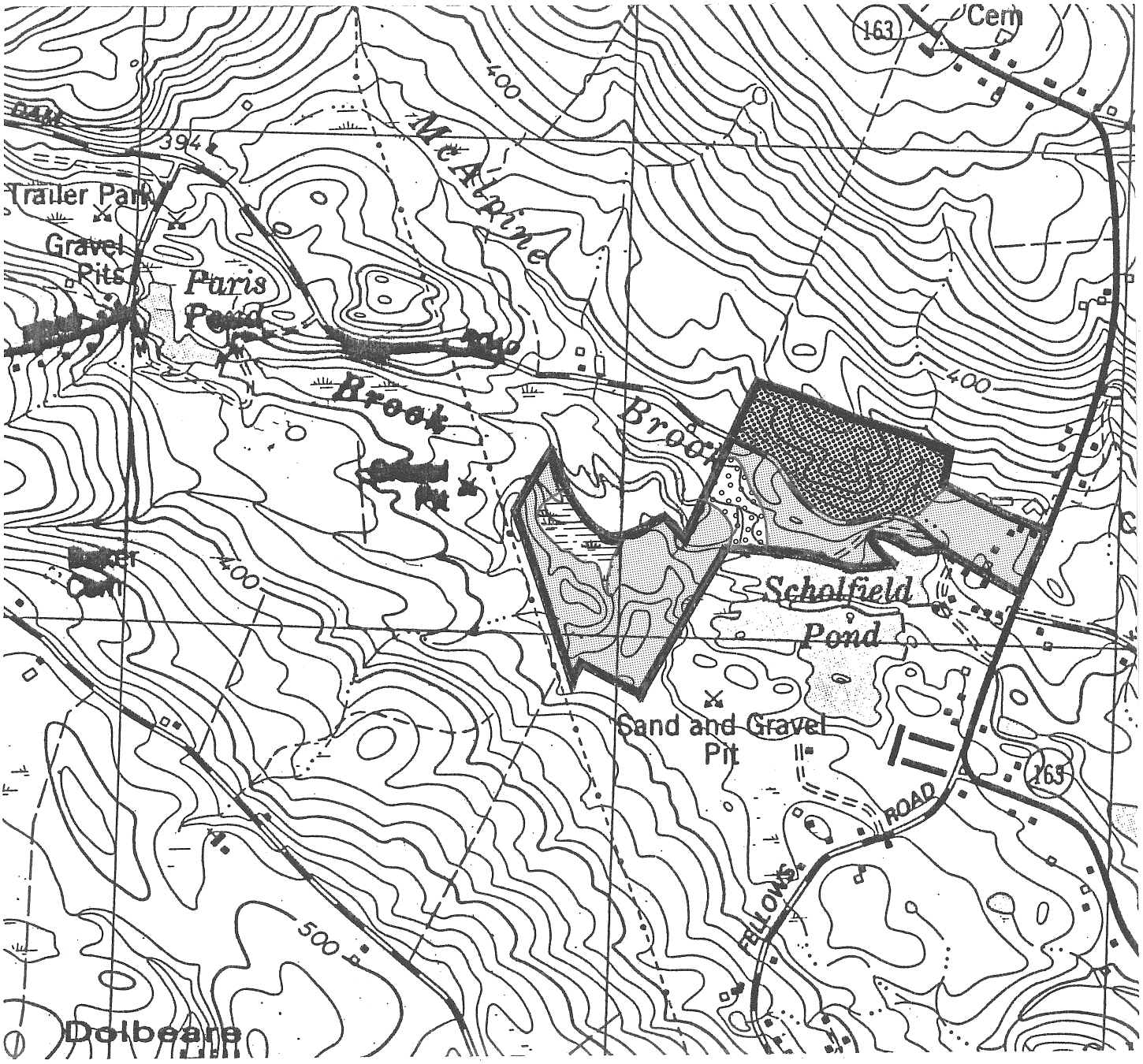
Alaskite Gneiss
Biotite Granite Gneiss
Plainfield Formation Subunit



SURFICIAL GEOLOGIC MAP

Scale 1" = 1000'

Till
Stratified Drift
Swamp Sediments
Alluvium



3. SOIL RESOURCES

Gravel Operation

▲ A complete sediment and erosion control plan should be developed.

▲ Reclaim and regrade each area of one phase to stabilized conditions before proceeding to the next phase.

▲ Replace topsoil, apply lime and fertilizer as recommended by a soil test or at a rate of:

300 lbs per acre 10-10-10 fertilizer
3 tons per acre ground limestone.

▲ Work to a depth of 4 inches. Roll to form a firm seedbed.

▲ Seeding dates are April 15 - June 15 and August 15 - September 15.

▲ Remove all large stones and other debris such as wire or old tree stumps.

▲ Seeding depth shall be 1/4 - 1/2 inch deep. Hydroseeding with mulch may be left on the soil surface.

▲ If frost crack seeding is used, it must be done in late winter or early spring. Correct conditions are freezing nights and thawing days with no snow cover. Seeding shall be increased by 10%. Seeding rates in lbs. per acre are:

Switchgrass	10
Weeping love grass	3
Little bluestem	10
	23
or	
Tall fescue	20
Flatpea with inoculant	30
	50

▲ Temporary mulch shall follow a seeding. Mulching is used to protect exposed soil against erosion and to aid in the growth of vegetation. Apply straw or hay uniformly at a rate of 1 1/2 - 2 tons per acre or 1 1/2 - 2 bales per 1000 sq. ft. Mulch anchoring shall be used on slopes greater than 3%.

Pond Site Evaluation

When designing a pond, it is recommended that the following information be included with the design:

1. A site plan containing the following information:

   ▲ A topography survey of the proposed pond site (include property boundaries, house, wells, and out buildings).

   ▲ Elevations of the pond bottom and water level.

   ▲ Proposed side slopes (3:1 are recommended for recreation ponds, 8:1 for swimming access).

   ▲ Size of pond, width and depth.

   ▲ A plan view and a cross sectional view of the pond.

   ▲ Grading proposed around the pond.

2. A narrative containing the following information:

   ▲ Amount of material to be removed during construction.

   ▲ A schedule for removing the material if it is to leave the site, or description of areas outside wetland areas where material will be spread.

   ▲ Procedure for stabilizing the site after construction, including seeding, fertilizing and mulching plans.

   ▲ Proposed measures to prevent erosion and sediment problems during construction (these could include the use of hay bales or silt fence to protect downstream areas during construction).

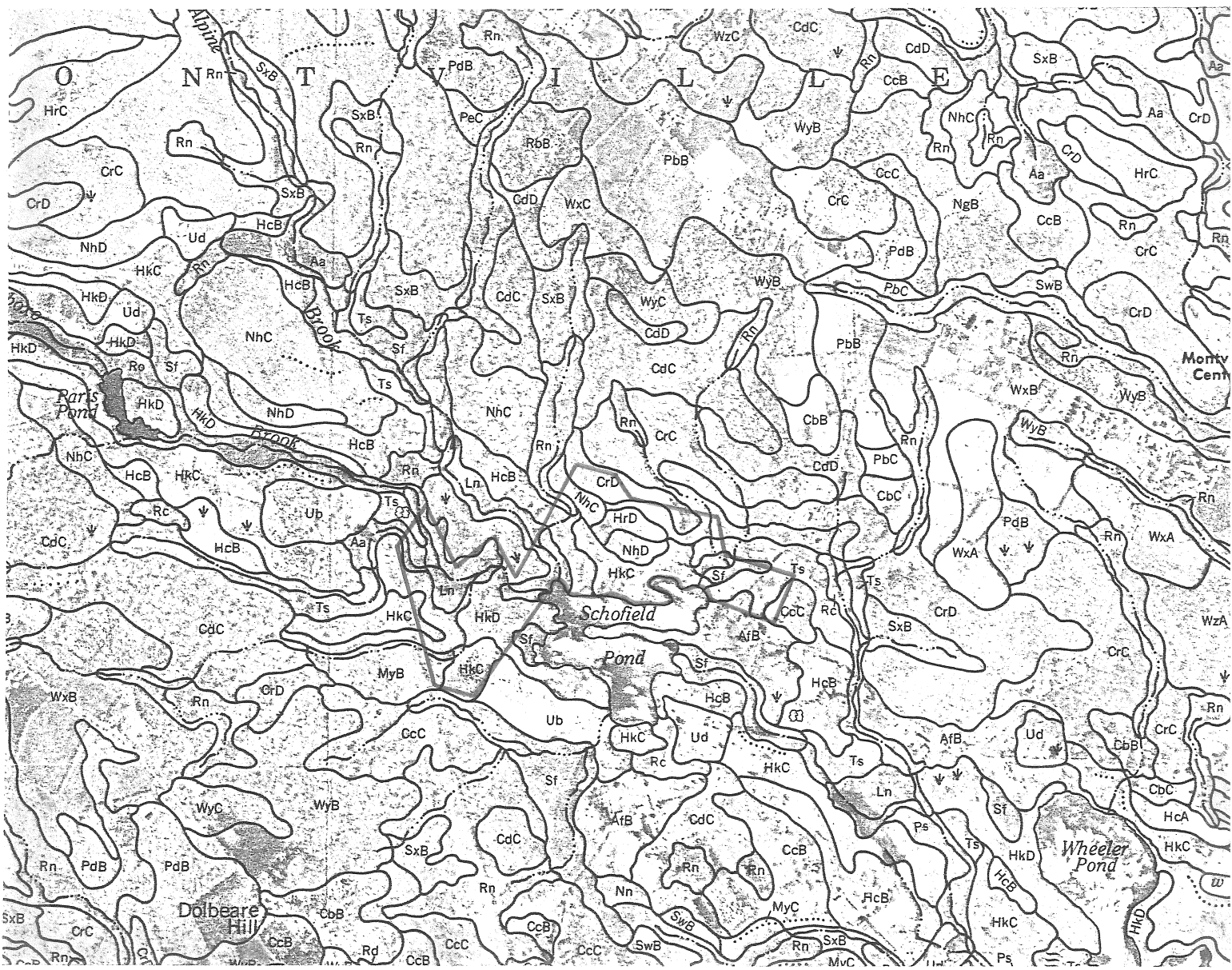
   ▲ Method of stabilizing the area for construction. Construction should take place during the driest time of the year.

   ▲ If you plan to construct a pond over one acre in size, it will be necessary to obtain a permit from the Army Corps of Engineers. They can be reached at 1-800-343-4789.

SOILS MAP

Scale 1" = 1320'

Approximate Site Boundary



Soil Descriptions

CcC - Canton and Charlton very stony fine sandy loams, 8 - 15 percent slopes

These sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 1 - 8 percent of the surface. Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity of these soils is moderate. Runoff is rapid. These soils warm up and dry out rapidly in the spring. It is strongly acid or medium acid. These soils are not suited to cultivated crops. These soils are suited to trees. Steepness of slope is a major limiting factor for community development.

These soils are in capability subclass VIs.

CrD - Charlton-Hollis fine sandy loams, very rocky,15 - 45 percent slopes

This moderately steep to steep complex consists of somewhat excessively drained and well drained soils on glacial till uplands. Rock outcrops cover up to 10 percent of the surface. Stones and boulders cover 1 - 8 percent of the surface. Permeability of the Charlton soil is moderate or moderately rapid, the available water capacity is moderate. Permeability of the Hollis soil is moderate or moderately rapid above the bedrock, the available water capacity is low. Runoff of these soils is rapid or very rapid. These soils warm up and dry out rapidly in the spring. They are strongly acid or medium acid. These soils are not suited to cultivated crops. The Hollis soil has a shallow rooting depth and is droughty. These soils are suited to trees. Windthrow is common on the Hollis soil because of the shallow rooting depth. The major limiting factors for community development are steepness of slope, shallow depth to bedrock, and rock outcrops.

These soils are in capability subclass VIIs.

** HkC - Hinckley gravelly sandy loam, 3 - 15 percent slopes

This gently sloping and sloping, excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. The available water capacity is low. Runoff is medium or rapid. Hinckley soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is suited to cultivated crops. Hinckley soil is droughty, and irrigation is needed. The hazard of erosion is moderate or severe. This soil is suited to trees.

This soil is in capability subclass IVs.

HkD - Hinckley gravelly sandy loam, 15 - 35 percent slopes

This moderately steep and steep, excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. The available water capacity is low. Runoff is very rapid. Hinckley soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid. This soil is poorly suited to cultivated crops because of the steep slopes. Hinckley soil is droughty. The hazard of erosion is severe. This soil is suited to trees. Steepness of slopes is the major limiting factor for community development.

This soil is in capability subclass VIIs.

/* Ln - Limerick Variant silt loam

This nearly level, poorly drained soil is on flood plains along major rivers and streams. The Limerick Variant soil has a seasonal high water table at a depth of about 6 inches. It is subject to frequent flooding. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is high. It warms up and dries out slowly in the spring. It is strongly acid in the upper part of the soil and strongly acid through slightly acid in the lower part; it is medium acid or slightly acid within a depth of 40

inches. This soil is suited to cultivated crops. Wetness and flooding are the major limitations, but this soil is seldom flooded during the growing season. The hazard of erosion is slight. This soil is suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. This soil is poorly suited to community development.

This soil is in capability subclass IIIw.

* MyB - Merrimac sandy loam, 3 - 8 percent slopes

This gently sloping, somewhat excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Merrimac soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is medium. Merrimac soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. It is droughty during the drier periods in summer. The hazard of erosion is moderate. This soil is suited to trees.

This soil is in capability subclass IIs.

NhC - Narragansett extremely stony silt loam, 3 - 15 percent slopes

This gently sloping and sloping, well drained soil is on glacial till upland hills, ridges, and plains. Stones and boulders cover 8 - 25 percent of the surface. Permeability of the Narragansett soil is moderate in the surface layer and subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. Runoff is medium to rapid. Narragansett soil warms up and dries out rapidly in the spring. It is very strongly acid through medium acid. This soil is not suited to cultivated crops. The hazard of erosion is moderate or severe. This soil is suited to trees. This soil is suited to community development.

This soil is in capability subclass VIIs.

NhD - Narragansett extremely stony silt loam, 15 - 25 percent slopes

This moderately steep, well drained soil is on glacial till upland hills, ridges, and plains. Stones and boulders cover 8 25 percent of the surface. Permeability of the Narragansett soil is moderate in the surface layer and subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. Runoff is very rapid. Narragansett soil warms up and dries out rapidly in the spring. It is very strongly acid through medium acid. This soil is not suited to cultivated crops. The hazard of erosion is severe. This soil is suited to trees. The major limiting factor for community development is steepness of slope.

This soil is in capability subclass VIIs.

*** Rn - Ridgebury, Leicester, and Whitman extremely stony fine sandy loams

These nearly level, poorly drained and very poorly drained soils are in drainageways and depressions of glacial till upland hills, ridges, plains, and drumloidal landforms. Stones and boulders cover 8 - 25 percent of the surface. The Ridgebury and Leicester soils have a seasonal high water table at a depth of about 6 inches. The Whitman soil has a high water table at or near the surface for most of the year. Permeability of Ridgebury and Whitman soils is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The Ridgebury and Whitman soils are strongly acid through slightly acid. Permeability of Leicester soil is moderate or moderately rapid, it is very strongly acid through medium acid. Runoff for the Ridgebury and Leicester soil is very slow or slow. Whitman soil runoff is very slow, or the soil is ponded. The available water capacity for these soils is moderate. These soils are not suited to cultivated crops. The erosion hazard is slight. These soils are suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. The major limiting factors for community development are the high water table and the slow or very slow permeability in the substratum.

These soils are in capability subclass VIIs.

*** Sf - Scarboro mucky fine sandy loam

This nearly level, very poorly drained soil is on stream terraces and outwash plains. The Scarboro soil has a high water table at or near the surface for most of the year. Permeability is rapid in the organic layer and rapid or very rapid in the mineral surface layer and substratum. The available water capacity is low. Runoff is very slow, or the soil is ponded. Scarboro soil is very strongly acid through medium acid. This soil is not suited to cultivated crops. The hazard of erosion is slight, and controlling erosion is easy. This soil is suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. The major limiting factor for community development is wetness.

This soil is in capability subclass Vw.

* Ts - Tisbury silt loam

This nearly level to gently sloping, moderately well drained soil is on stream terraces and outwash plains. The Tisbury soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is moderate. Runoff is slow or medium. Tisbury soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. The hazard of erosion is slight. This soil is suited to trees. The major limiting factor for community development is the seasonal high water table.

This soil is in capability subclass IIw.

*** - Prime Agricultural Farmland**
**** - Farmland of Statewide Importance**
***** - Wetlands**

4. HYDROLOGY

Several streamcourses occur on the site. The two principal streamcourses, McAlpine Brook and Oxoboxo Brook, occur in the central parts. They drain areas of .94 square miles (602 acres) and 22.3 square miles (14,272 acres), respectively. Oxoboxo Brook is the main feeder stream to Schofield Pond. McAlpine Brook flows into Oxoboxo Brook near its inlet to Schofield Pond. The three remaining streamcourses, all unnamed, occur in the eastcentral and western parts. Based on the plans made available to Team members, the proposed lake would be located approximately between the two unnamed streamcourses in the western parts. Both of these streamcourses, which emanate west of Old Colchester Road would feed the proposed lake. It is estimated that the drainage area for the proposed lake, which includes both of the unnamed streamcourses that would feed the lake is about 363 acres. Road drainage from Montville Manor and Old Colchester Road appear to contribute to these streamcourses.

Groundwater in the vicinity of the proposed lake is classified by the Connecticut Department of Environmental Protection (DEP) as GA, which means that it is suitable for private drinking water supplies without treatment. According to the Water Quality Classification Map of Connecticut by J.E. Murphy, 1987, all the watercourses on the site except Oxoboxo Brook have not been classified by the DEP, and, as such, are considered Class "A" water resources by default. Class "A" water resources may be suitable for drinking, recreational or other uses and may be subject to absolute restrictions in the discharge of pollutants, although certain discharges may be allowed. Oxoboxo Brook is classified as B/A, which indicates that currently the water quality is known or inferred to be degraded. "B/A" resources are generally suitable for recreational agricultural or certain industrial uses such as process or cooling water. However, it is the DEP's goal to improve, through management, the water quality to that of an "A" water resource.

The stratified drift deposits (sand and gravel) which will be mined during the lake excavation are primarily recharged by infiltrating precipitation. They also obtain recharge from the infiltration of streams and other surface flow from surrounding upland areas and by man-made sources such as road drainage and septic systems. Sand and gravel (stratified drift). because of its permeability and topographic position, receives more infiltrating precipitation than bedrock or till. Recharge to bedrock and till is estimated to be about one third of that seen in stratified drift.

The northern half of the proposed recreation lake would be excavated into the sand and gravel deposits in an area where the water table is very close to the surface. To the west, the water table is separated by an unsaturated soil zone of varying thickness due to the hummocky terrain and the permeable nature of the sand and gravel. Assuming that upon completion, the lake has a medium depth of 10 feet and is 13.2 acres in size, then its total capacity is estimated to be about 43 million gallons. The latter is based on a storage volume of 13.2 acre/feet. [One acre foot is equal

to the amount of water to a depth of 1 foot over 1 acre, a total of 325,851 gallons.]

Using a publication entitled "Building a Pond", U.S. Department of Agriculture, Farmers Bulletin No. 2256, the approximate number of acres needed in the watershed above the proposed recreation lake for each acre foot of water to be stored is estimated to be roughly 231 acres (1.75 acres for every acre foot of water stored). The drainage area for the proposed lake, which is about 363 acres, thus representing about 1.6 times the acreage that would be required using the above figures.

Team members were asked to comment on the potential of the excavated lake for swimming purposes. The Department of Health Services uses the following formula to estimate the maximum number of swimmers per day that should be allowed to utilize a waterbody: $N = (V/180 + F/1000)$, where N is the number of swimmers, V is the volume of the waterbody and F is the inflow provided by streams or other sources. This formula is useful only if the initial natural quality of the water is acceptable and if other safety factors such as beach space and lake bottom conditions are satisfactory. The existing Kobyluck Sand and Gravel operation and storm drainage emanating from Montville Manor and Old Colchester Road would be potential threats to adverse water quality.

Since no volumetric information was available for the lake, the volume of the lake was estimated by multiplying the surface area times an assumed average depth of 10.0 feet. The latter figure is used only as an estimate and is subject to change depending upon final plans. Using an average depth of 10.0 feet and a surface area of 13.2 acres, the volume of the proposed lake was estimated to be about 13.2 acre feet or 43.0 million gallons. The inflow rate (F) is variable, but for the purpose of this report the amount of dilution water available was determined by calculating the area of watershed tributary to the proposed lake (363 acres) and using a standard estimated minimum stream flow figure for Connecticut of 50,000 gallons per day per square mile of watershed. The estimate is 28,360 gallons per day. Plugging the above numbers into the Department of Health Services formula, the number of swimmers that could use the lake each day during worst case conditions is estimated to be about 267.

During more typical summer flow conditions (an in-flow rate equalled or exceeded 90 percent of the time or about 100,000 gallons per day per square mile), the permissible number of swimmers per day would be about 296. These figures suggest that the proposed lake can be a useful swimming facility for the Town, provided all Department of Health Services' factors can be made acceptable. It should be kept in mind that the above estimates assume the average depth of the lake is 10 feet; as it could be more or less than 10 feet the the maximum bathing load requirements may vary.

Another important factor that needs to be considered is the size of the bathing area. If bathers are concentrated in a small area, localized bacterial pollution can occur, even with sufficient dilution water flowing through the lake. The Department of Health Services suggests that there be at least 1,000 gallons of water within the immediate bathing area for each bather

using the bathing area during the course of the day. If it's assumed that 50 square feet contains approximately 1,000 gallons of water, then there should be 50 square feet allocated per bather. This will help to prevent the possibility of bacterial deterioration and to allow for swimming activity. Using the 296 bather figure for a potential beach, then a bathing area of 14,800 square feet should be required. This would be an area of about 200 feet by 75 feet. It is suggested that the Town contact the Uncas Health District and Department of Health Services (566-1259) for recommendations regarding the development of a bathing area at the proposed lake site. The site plan indicates that the proposed beach would be located on the northeasterly side of the lake in or in proximity to the Oxoboxo Brook floodplain. The concern here is that the beach front area could be damaged from time to time by floodwaters. Consideration should be given to moving the proposed lake and beach front area outside of areas subjected to flooding, i.e., the 100 and 500-year flood zone. The boundaries, which range between 100-200 feet wide, parallel Oxoboxo Brook and the unnamed streamcourse that flows into the north end of the proposed lake.

Details for the proposed excavation lake including the manner in which the unconsolidated materials (sand and gravel and organic materials) would be removed. These were not available during the pre-review meeting. Considering the location of the proposed lake it seems likely that the materials, especially below the water table would probably be removed by dragline bucket.

If permitted the excavation and dredging of the lake will inevitably disturb and mobilize fine-grained particles. In order to avoid environmental damage to local watercourses on and off site, it will be important to contain and filter disturbed water. As such, a thorough erosion and sediment control plan will be required and should be strictly enforced by the town. The plan should provide protection to contiguous wetlands/floodplains during the excavation period. The use of hay bales, silt fences, anti-tracking devices, and settling basins will help to protect off-site transport of fine-grained earth materials. In addition, a phasing plan should describe clearing, grubbing, stockpiling of materials, finished grades for the side banks of the lake which should not be steeper than 3:1, reseeding, and final reclamation of the area. Connecticut Guidelines for Soil Erosion and Sediment Control. as amended, should be referenced during the preparation of the plan. Details on the lake outlet if proposed should be included with the plan.

Finally, the applicant and prospective contractor must fully understand the hydrogeologic characteristics of the sand and gravel in the vicinity of the excavated lake and their responsibility for maintaining existing water quality. Of special concern, will be methods for the appropriate handling, storage and disposal of excavation machinery, especially hydrocarbons and petroleums used for equipment maintenance and fuel. These materials should not be stored on the site. Also, refueling and maintenance of excavation equipment should not take place over the sand and gravel aquifer considering its existing and future use.

At least initially, it seems likely that there would be a minor drain on

the sand and gravel aquifer system in the immediate area to fill the lake. As each dragline bucket is removed, water will fill the voids draining the local water from around it. This effect would be gradual, a one time event and would stabilize once the excavation was completed. Nevertheless, there is a chance that nearby wells, especially the dug type, which tap the local water level, may be temporarily affected by the work. If these type of wells exist in proximity to the proposed lake, background data (water quality, quantity, etc.) should be collected and groundwater levels monitored during the lake construction to verify whether or not there are significant changes.

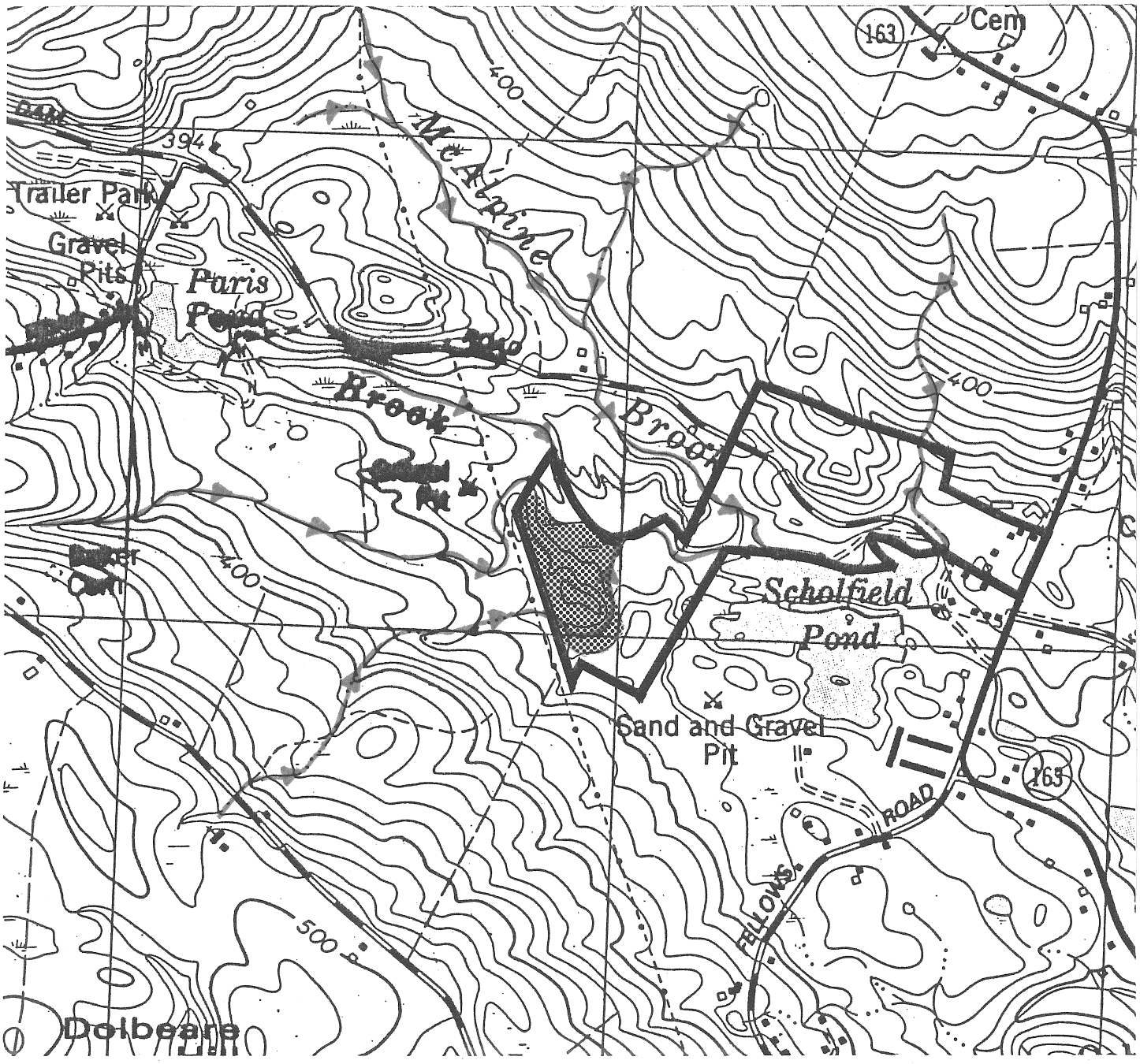
The wetland/floodplain areas to be excavated serve many obvious hydrological and ecological functions. They act as natural runoff retention basins, reducing downstream flood flows during storms. They trap sediments from upstream areas. They change water quality through biochemical processes, often resulting in clearer water. They also serve as habitat for many species of animals and plants. For these reasons and others, the proposed ±13.2 acre lake needs to be studied very carefully from a hydrologic, ecologic, and biologic standpoint.

In reviewing the proposal, the Inland Wetland Commission needs to determine the impact of replacing the wetland with an open waterbody. If the Commission determines the wetland/floodplain is serving an important hydrological or ecological function and that the impact of the activity will be significant they may deny the activity altogether or, at least, require measures that would minimize the impact, such as reducing the size of the lake, limiting lake construction to upland areas and locating the proposed lake so that the unnamed streamcourse at the northern limits bypasses the lake. The latter would result in the loss of a drainage area of about 190 acres. The existing Kobyluck Sand and Gravel, Inc. operation west of the proposed lake site is excavating below the water table at several locations. The final grading plan for the property is unknown. However, if mining occurs below the water table and another surface water body is created perhaps an arrangement can be made to utilize this area for a Town bathing area.

WATERSHED BOUNDARY MAP

Scale 1" = 1000'

Approximate Site Boundary
Approximate Excavation Area
Watercourses Showing Direction of Flow



5. WETLAND REVIEW

Site and Project Description

The proposal is for the creation of a ±13.2 acre recreational lake, with a beach, on existing Town owned property adjacent to Oxoboxo Brook. The lake would be created by the excavation of sand and gravel from a portion of floodplain south of Oxoboxo Brook. In addition to the lake the proposal includes the construction of an access road with bridges over Oxoboxo Brook and McAlpine Brook to provide access to the proposed lake from an existing parking area off of Oxoboxo Brook Road. During the review it was indicated that the excavation of material would take approximately 3 to 5 years to complete. The area which is proposed for excavation is a nearly level portion of property which extends south of Oxoboxo Brook, immediately west of Scholfield Pond. As proposed the excavated area would intercept two small watercourses which flow from the west through the site and into Oxoboxo Brook. Much of the area is floodplain for Oxoboxo Brook and possesses a dense forested habitat with a thick shrub understory. As defined by the U.S. Fish and Wildlife Service this wetland area is classified as:

PSS1E **Palustrine, scrub-shrub, broad-leaved deciduous, seasonally saturated.**

PFO1E **Palustrine, forested, broad-leaved deciduous, seasonally saturated.**

The preliminary plans did not contain an intensive soils survey of the property, however, an overlay of the New London County Soil Survey was provided with the plans. Based upon this map the following approximate amounts of State defined wetlands and watercourses will be impacted, ±2 acres of poorly drained floodplain soils (Limerick), ±1.5 acres of very poorly drained organic mucks (Adrian and Palm), and ±1200 feet of streamcourse.

Project Impacts and Recommendations

The area proposed for excavation provides numerous functions in its present condition, including wildlife habitat, water quality renovation, storage of flood waters, recreational and educational opportunities, and sediment and pollution filtration. The location of this area adjacent to an operational excavation operation increases the value of this area for water quality improvement and sediment filtration. Existing recreational and educational opportunities are greatly enhanced due to the public ownership of the property and the location of several schools within reasonable driving distance of the property. The excavation will reduce much of the diversity which presently exists at the site, and will also reduce the quality of wildlife habitat provided by the site. The project will also have impacts to the overall quality of the Oxoboxo Brook corridor. The 1990 aerial photos reveal that considerable work has been performed within the watershed in the last five years. Additionally, the sand and gravel operation located to the south of Scholfield Pond has also created a large pond since 1986.

Based upon consideration of the above mentioned facts and additional research into the proposed activities the following comments and recommendations are made.

1) Based upon the information provided it appears that the proposed activities will result in significant impacts to the wetlands located on the site. However, a more accurate assessment of wetland and watercourse impacts cannot be made until an intensive site analysis is performed, including an intensive soils delineation and environmental assessment.

2) The issue of alternatives should be given considerable attention prior to proceeding any further with development of these plans. As was indicated, the Town of Montville presently owns ample waterfront property on Scholfield pond, but does not own the pond itself, and must lease the right to use the pond for swimming on an annual basis. While this present situation may be inconvenient for the Town it does not establish a definite "need" for the Town to have a pond. In light of the recent creation of a pond to the south of Scholfield Pond, it is the opinion of this office that the creation of a third pond within this corridor would not be prudent. Given the location of the Town's property and the existence of two ponds within close proximity to this property numerous alternatives exist for the establishment of a wholly town-owned facility. Until all possible alternatives which would not result in significant wetland impacts or modifications have been exhausted the construction of a new pond should not be considered at this location.

3) Based upon a calculation of the contributing watershed the present proposal will require a Water Diversion Permit from the DEP, Inland Water Resources Division. The preliminary design receives water from approximately ±205 acres of watershed and intercepts two watercourses. If the Town of Montville should have questions concerning Water Diversion Permits they should contact Mr. Bob Gilmore at 566-7160.

In conclusion, the preliminary design of this project, if implemented, would result in significant impacts to the wetlands located on the site. There is little demonstration of need for the proposed activities, and the existing property and nearby waterbodies present numerous alternative opportunities. If the construction of a new pond were to be pursued further it is likely that a Water Diversion Permit would be needed from this office.

6. THE NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files have been reviewed regarding the project site. According to the information, there are no known extant populations of Federally Endangered and Threatened species or Connecticut "Species of Special Concern" occurring at the site in question.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

7. FISH RESOURCES

This section of the report will address impacts to fisheries and wetland resources due to the proposed sand/gravel excavation and ultimate lake creation and delineate appropriate measures to mitigate impacts.

Fish Population

Oxoboxo Brook borders the proposed 13.2 acre lake at its northern end. This stream is annually stocked by the DEP Inland Fisheries Division with more than 200 yearling brook trout (6 - 8"). In addition to supporting a native brook trout fishery, the following fish species can be expected to inhabit this watercourse: blacknose dace, longnose dace, fallfish, common shiner, white sucker, and American eel. Due to existing impoundments on Oxoboxo Brook, several warmwater fish species such as largemouth bass, brown bullhead, and bluegill may also utilize this stream.

Surface waters of Oxoboxo Brook are classified as "Class B/A". Designated uses for this classification are: fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses.

Two feeder streams that are tributaries to Oxoboxo Brook, one intermittent and one perennial, flow through the property. Neither of these streams support fish populations. These watercourses and associated riparian wetlands function as water sources to Oxoboxo Brook. The perennial stream has been polluted due to sediment deposition. The suspected source of this sedimentation is the existing sand and gravel operation.

Impacts

The following impacts can be expected if proper mitigation measures are not implemented:

1. Loss of wetland habitat. The proposed lake creation will result in an undetermined amount of wetlands to be flooded, resulting in a permanent loss of invaluable wetland habitat. Wetlands serve many vital functions such as controlling flood waters, trapping sediment from natural and man-made sources of erosion, and helping to filter-out pollutants from runoff before they enter watercourses. The loss of these wetlands will impact the water quality and flow regime of Oxoboxo Brook. Local flood storage and sediment trapping capabilities will be lost with the removal of wetlands.

2. Loss of Stream Habitat. The two streams that run through the town's property will be lost due to lake creation. As previously mentioned, these streams provide a source of water to Oxoboxo Brook. Also, the perennial stream has been acting as a sediment trap effectively reducing sediment input to Oxoboxo Brook. The loss of waters may significantly impact stream

flows. The reduction of flows is most critical in the summer during normal summer low flow periods. Reduced stream flows would impact local and downstream fisheries by increasing water temperatures, decreasing dissolved oxygen levels and reducing overall usable habitat for fishes and aquatic insects. Lake creation in this area may be considered a water diversion, and as such, may require a State of Connecticut Water Diversion Permit. The Town of Montville should contact the DEP Water Diversion Program Coordinator, Bob Gilmore, at 566-7160 for further details.

3. Site soil erosion and sedimentation of Oxoboxo Brook from sand/gravel excavation. Proposed sand and gravel mining activities may introduce suspended sediments to this watercourse especially if gravels will be washed on-site. If not properly controlled, suspended sediments will cause stream degradation in downstream areas. Excessive sediment deposition could damage the aquatic ecosystem in the following ways:

(1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.

(2) Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

(3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to disperse to other areas not impacted by siltation.

(4) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can effectively limit fish population levels.

(5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.

(6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes (CTDEP 1989). Eroded soils contain plant nutrients such as phosphorous and nitrogen. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.

(7) Sediment contributes to the depletion of dissolved oxygen (CTDEP 1989). Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

4. Blockage/impedance of fish passage within Oxoboxo Brook due to

roadway crossing. To obtain access to the newly created lake, the brook will have to be crossed at one location. If crossed with box culverts placed at streambed elevations, fish passage may be prevented due to: (1) increased water velocities within the culvert during periods of high river flows, and/or (2) insufficient water depth within the culvert during summer low flow conditions. Native fish populations may become segregated due to culvert placement. If this occurs, reduced spawning interactions will result in decreased fish populations.

Recommendations

The following recommendations are provided to the Town of Montville.

1. Investigate other feasible and prudent alternatives to the existing proposal. The town should investigate purchasing the property rights to Scholfield Pond, which it currently leases. Beach expansion on Scholfield Pond may readily satisfy recreational swimming requirements, totally eliminating the need for new lake creation. Regulatory agencies will request that the town review such alternatives.

2. The extent of wetland disturbance should be minimized. No information was available on the day of the field review regarding the specific acreage of wetlands that will be lost due to lake creation. If projected wetland losses are considered to be significant by local, State, and Federal regulatory agencies, it is doubtful that this project will receive approval. Recent policies of these agencies are geared towards "no-net" loss of wetlands. The town should determine if a smaller lake which will disturb a significantly reduced acreage of wetlands will be a feasible alternative.

3. A detailed hydrologic analysis should be completed to investigate impacts to Oxoboxo Brook. The Inland Fisheries Division will request detailed information regarding the extent to which existing stream flows will be diminished due to the loss of on-site wetlands and the two watercourses. Information will also be requested regarding projected increases in stream water temperatures.

4. It is highly recommended that at the minimum, a 100 foot open space buffer zone be maintained along the wetland boundary of Oxoboxo Brook. No construction nor alteration of existing habitat should be allowed in this zone. This buffer can be an effective mitigation measure at this development location. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985).

5. Oxoboxo Brook should be crossed with a span bridge rather than with box culverts. Span bridges will allow trout and other resident fish species to move freely and unimpeded within the brook and also preserve natural instream substrate.

Bibliography

CTDEP (Connecticut Department of Environmental Protection) 1989. Non-Point Source Pollution: An Assessment and Management Plan. CTDEP, Hartford.

ODFW (Oregon Department of Fish and Wildlife) 1985. The Effects of Stream Alterations on Salmon and Trout Habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon. 70 pp.

USFWS (United States Fish and Wildlife Service) 1984. Habitat Suitability Information: Rainbow Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82(10.124). 64pp.

USFWS (United States Fish and Wildlife Service) 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82/(10.60). 65pp.

8. ARCHAEOLOGICAL REVIEW

In 1977, Aigner, DelBene and Feder from the University of Connecticut undertook an archaeological reconnaissance survey for proposed improvements to Camp Oakdale. This survey identified no prehistoric Native American sites associated with McAlpine and Oxoboxo Brooks. However, they did report the historic archaeological sensitivity of the Schofield Pond area.

The archaeological survey located the remains of two stone structures south of Oxoboxo Brook Road and east of Route 163. Documents indicate that these ruins were part of a mill complex which originally belonged to the Schofield family and are probably tenements associated with a mill on Schofield pond. The remains are of considerable importance as this mill was only the third woolen mill constructed in the United States.

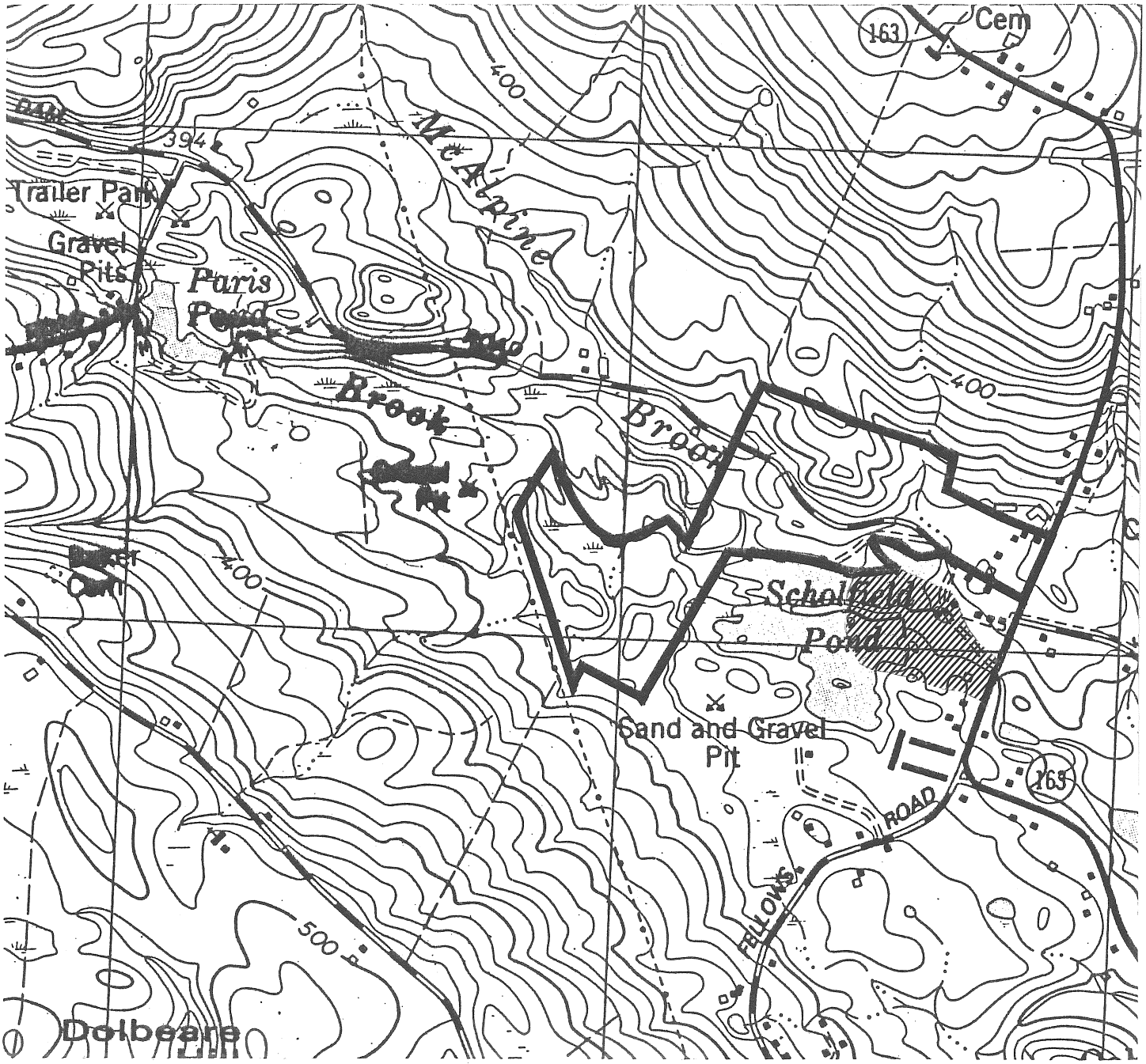
Present plans to excavate gravel to create a lake with a beach area and a trail system surrounding it do not appear to impact the stone structures. However, we highly recommend that Robert R. Gradie, Department of Anthropology, University of Connecticut, Storrs, be consulted regarding his participation of the original 1977 survey and information on the distribution of archaeological resources within the Camp Oakdale excavation area. The historic archaeological sensitivity may warrant further detailed archaeological studies depending on the results of Gradie's review.

The Office of State Archaeology is prepared to offer the Town of Montville any technical assistance in preserving its archaeological heritage in the Schofield Pond area.

ARCHAEOLOGICAL SENSITIVITY

Scale 1" = 1000'

Area of Known Archaeological Sensitivity



ABOUT THE TEAM

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

The services of the Team are available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, 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 official 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 and the ERT Coordinator. A request form should be completely filled out and should include the required materials. 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 and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.