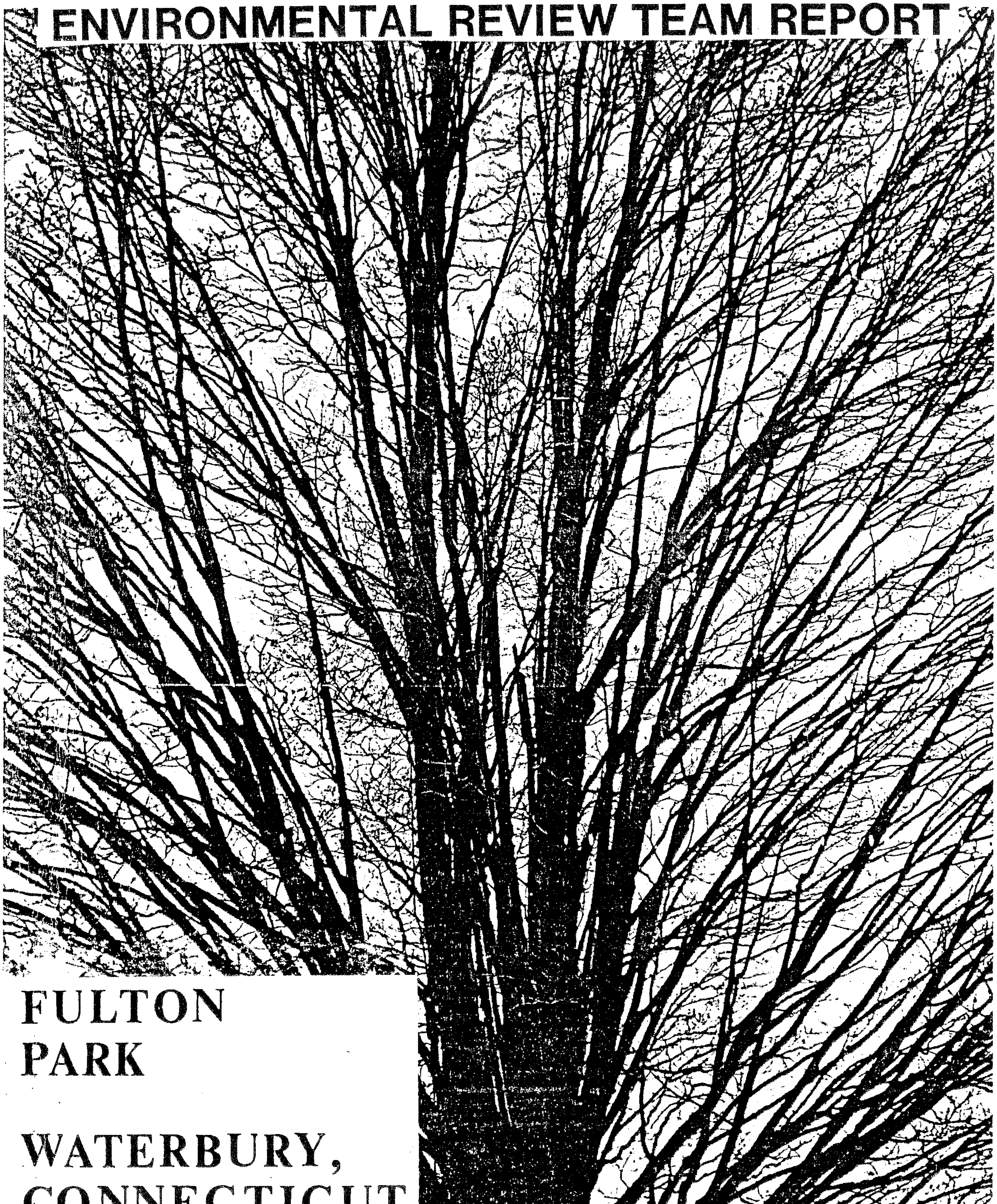
ENVIRONMENTAL REVIEW TEAM REPORT



FULTON PARK

WATERBURY, CONNECTICUT

KING'S MARK RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

FULTON PARK

Environmental Review Team Report

Prepared by the King's Mark Environmental Review Team
of the King's Mark Resource Conservation
and Development Area, Inc.

Wallingford, Connecticut

for the

Office of the Mayor, City of Waterbury

JULY 1986

(4) assess the recreational potential of the park and provide guidelines for improving the aesthetic appeal of the park, and;

(5) identify outside funding sources which are available for park improvement.

* *

The Environmental Review Team process consisted of four phases: (1) inventory of Fulton Park's natural resources; (2) assessment of these resources; (3) identification of natural resource problem areas, and; (4) presentation of park improvement guidelines. The review process enabled the Team members to arrive at an informed assessment of the park's natural resource opportunities and limitations.

Through the inventory and review process, specific resources, areas of special concern, and recreational and landscape planning opportunities and limitations were identified. They fall into three broad categories: (1) physical characteristics; (2) biological resources, and; (3) recreational and landscape planning considerations. They are summarized below.

* *

PHYSICAL CHARACTERISTICS

Pond Hydrology

The City's primary concern with Fulton Park is the accumulation of sediment at the inlets of each pond, causing the pond's aesthetic appearance and environmental health to deterioate. The accumulation of silt at the inlets of the pond has encouraged the encroachment of herbaceous and woody vegetation in these areas.

Stormwater sewers near Fulton Park outlets directly into Upper and Lower Fulton Park Ponds at numerous points. It appears that road sand which finds its way into the stormwater sewer system is ultimately deposited into the ponds. It is probably the greatest contributor of sediment to these ponds.

Because the ponds are hydrologically connected, a pollutant or contaminant affecting water quality in Upper Fulton Park Pond is likely to affect water quality in Lower Fulton Park Pond and Lily Pond.

The introduction of certain nutrients and sediments arising from man-made activities can accelerate a process known as eutrophication of the ponds. Eutrophication is a natural process through which a waterbody gradually increases in fertility and biological productivity, and accumulates organic deposits. As eutrophication proceeds, algae blooms increase in both intensity and duration, and aquatic plant growth becomes more prolific.

It seems likely that the following sources would have the greatest potential for adding nutrients to the ponds: (1) erosion and sedimentation; (2) lawn and garden fertilizers; (3) yard and garden vegetation disposal, and; (4) waterfowl excrement.

Pond Restoration Measures

To alleviate the further accumulation of sediment into the upper pond, an excavated sediment basin could be constructed across the existing outlet channel north of Upper Fulton Park Pond in order to trap and retain road sands and other sediments before they reach the upper pond. The cost of installing a sediment basin will vary depending on contractor costs, in-house capability and equipment, and distance of dredged material disposal location from the dredging site.

The ponds are experiencing moderate growth of weeds and algae, mainly on the perimeter of the ponds. Some common methods for controlling aquatic weed growth include: (1) winter drawdown; (2) weed harvesting; (3) chemical treatment; (4) drawdown and excavation, and; (5) hydraulic dredging.

* *

BIOLOGICAL RESOURCES

Fishery Resources

Bluegill sunfish and largemouth bass were observed in the Fulton Park ponds; other species likely to be found would be brown bullhead, carp, golden shiners, and possibly goldfish.

The sunfish provides good panfishing opportunities for beginning anglers. Anglers also commonly catch largemouth bass from the ponds. Overall, the ponds seem to provide good urban fishing opportunities for beginning anglers and access is excellent.

Though the fisheries habitat looked to be of fair condition during the field review, the ponds do become somewhat "weed choked" during the late spring and summer, potentially reducing public use of the ponds. If the majority of the pond surface area does become infested with aquatic weeds, a less than optimum balance of fish populations would likely develop.

Fishery Management Considerations

Due to adequate fish populations in the Fulton Park ponds, fish stocking is unnecessary. One method of providing more available habitat and therefore, more fish, is to leave downed trees or similar structures in the ponds. This will provide cover, a food source and a means of concentrating fish for the anglers.

The City could provide a fishing area for handicapped individuals. It is also encouraged that the City involve the Boy Scouts, Girl Scouts or other youth groups in all phases of the pond rehabilitation and possibly initiate a yearly children's fishing derby or clinic after the pond restorations are completed.

It would be unnecessary to install aeration systems in the two larger ponds. This is due to their shallow nature and the probability that bubbles or other aerating devices would mix or resuspend bottom sediments into the water column and only cause further problems.

The following practices can be implemented to improve the fishery resource of the Fulton Park ponds: (1) chemical applications; (2) winter drawdown; (3) artificial screens; (4) dredging, and; (5) sediment basins.

* *

RECREATIONAL AND LANDSCAPE PLANNING CONSIDERATIONS

Park Landscape and Design

Fulton Park includes three small ponds connected by a brook, an "interconnecting" path system, an evergreen "grotto," a rock garden, lilac collection, bird sanctuary, ball fields, playground, and pavilion. It appears that the City has implemented those features of the original Olmsted design which were best suited for their needs, resulting in a varied recreational experience.

Although the designers have created an interesting and relaxing environment, the Park suffers from several problems such as drainage problems near Lower Fulton Park Pond, drainage/erosion concerns at the north end of Upper Fulton Park Pond, and general lack of maintenance in and around all three ponds.

Picnic Areas

In order to be well used, a picnic area should be relatively close to parking or a short walk from a food source. There are several locations within the Park which may be suitable, but the most scenic would be areas to the south of Lily Pond or near Lower Fulton Park Pond.

Park Improvement Considerations

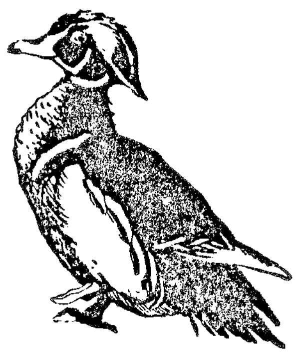
Waterbury has a unique recreation facility in Fulton Park, a well designed urban "oasis." However, it would appear that maintenance is a key issue in the life of the Park. Implementating an adequate maintenance plan is critical to enhancing and preserving the aesthetic quality of Fulton Park.

The Connecticut Historical Commission administers a funding program for restoration of historically significant structures and landscapes. If Waterbury is interested in pursuing additional funding for park restoration, the Commission will supply information and application assistance. They may be contacted at 59 South Prospect Street, Hartford, Connecticut 06106 or 566-3005.

CONTENTS

Figures

INTRODUCTION



INTRODUCTION

Introduction

The City of Waterbury requested that an environmental review be conducted on Fulton Park, a 66-acre urban park in the center of Waterbury (Figure 1). The Park, designed by Frederick Law Olmsted, was originally a bird sanctuary.

The Park is primarily characterized by the presence of three interconnected ponds. They are: (1) Upper Fulton Park Pond; (2) Lower Fulton Park Pond, and; (3) Lily Pond. The Upper Pond is approximately 495 feet in length and 200 feet in width, for a surface area of approximately 2.5 acres. It has a maximum depth of five feet, with an average depth of three feet. Pond volume is approximately 2.4 million gallons. Also, 50 percent of the pond can be drained. The concern here is that the pond has acculmulated silt and sediment over the years, thus encouraging the encroachment of herbaceous and woody vegetation into the pond. The Lower Fulton Park Pond is centrally located and covers approximately three acres. Silt and sediment are also accumulating in this pond, but not as quickly as the Upper Pond. Lily Pond is the third water body in Fulton Park. This is a very small and shallow pond, and vegetation has encroached upon the pond's banks. Thus, increased siltation and sedimentation of the ponds, and the degradation of the pond's aesthetic and environmental quality were the primary concerns that the ERT addressed.

Though the water quality of the ponds has diminished, they still support some fish populations. Bass, yellow perch, and carp inhabit the ponds, and recreational fishing is allowed. Therefore, another concern is the quality of the fishery resource and the recreational fishing opportunities available in Fulton Park.

Fulton Park is also characterized by having many walking paths, ballfields, tennis courts, and a swimming pool. These facilities provide many active and passive recreational opportunities. The City is therefore interested in improving the overall aesthetic appeal of the park. Thus, can the path system be improved to enhance circulation? Can more paths or trails be developed to provide greater opportunities without affecting the resource base? In general, what landscaping techniques can to used to improve the aesthetic appeal and environmental quality of Fulton Park?

Goals and Objectives of the ERT

The overall goal of the ERT study was to evaluate the distribution and quality of the resources in Fulton Park. Specific objectives were the following:

(1) identify the sources of sedimentation and provide mitigative measures;

(2) assess the hydrology and surrounding watershed of the study site;

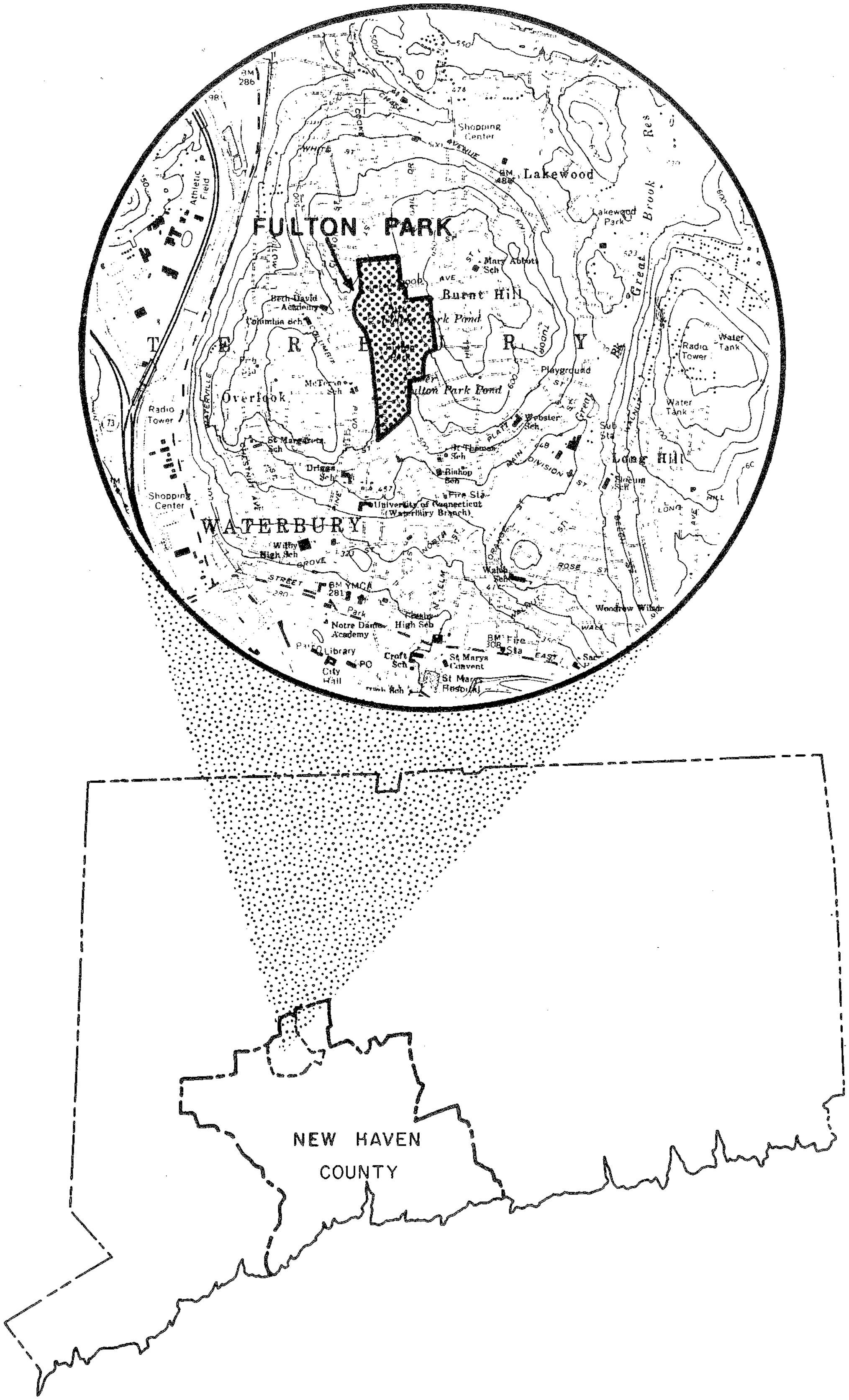
(3) inventory and assess the fishery resource, and provide management guidelines;

(4) assess the recreational potential of the park and provide guidelines for improving the aesthetic appeal of the park, and;

(5) identify outside funding sources which are available for park improvement.

Figure 1

LOCATION OF STUDY SITE



The ERT Process

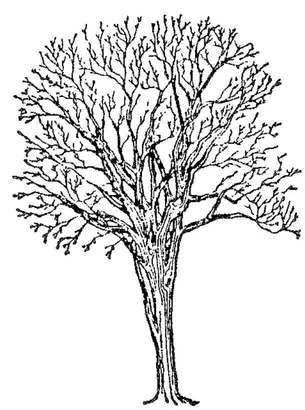
Through the efforts of the City of Waterbury Mayor's Office, Board of Alderman, Parks and Recreation Department, and the King's Mark Environmental Review Team, this environmental review and report was prepared for the City. This report primarily provides a description of the natural resources occurring in the Park and presents guidelines on how to improve the environmental, aesthetic, and recreational assets of Fulton Park.

The review process consisted of four phases: (1) inventory of Fulton Park's natural resources (collection of data); (2) assessment of these resources (analysis of data); (3) identification of natural resource problem areas, and; (4) presentation of park improvement guidelines.

The data collection phase involved both literature and field research. Mapped data or technical reports were perused and specific information concerning the site was collected. Field review and inspection of the Park proved to be a most valuable component of this phase. The emphasis of the field review was on the exchange of ideas, concerns, or alternatives. Being on site also allowed Team members to check and confirm mapped information and identify other resources.

Once the Team members had assimilated an adequate data base, it was then necessary to analyze and interpret their findings. The results of this analyses enabled the Team members to arrive at an informed assessment of the Park's natural resource opportunities and limitations.

PHYSICAL CHARACTERISTICS



PHYSICAL CHARACTERISTICS OF FULTON PARK

Setting and Topography

Fulton Park consists of an approximately 66-acre urban park located in central Waterbury. The major topographic features on the Park are three hydrologically connected ponds. They are referred to as: (1) Upper Fulton Park Pond in the northern part of the Park; (2) Lower Fulton Park Pond in the central part of the Park, and; (3) Lily Pond in the southern limits of the Park. These surface area of these ponds are approximately 2.5 acres, 2 acres, and 0.5 acre in size, respectively (Figure 2).

All three surface waterbodies are shallow, artificially created impoundments. According to City officials, Upper and Lower Fulton Park Ponds served as public water supply reservoirs in the past. The three ponds are fed mainly by direct runoff from the surrounding land area in the watershed and stormwater discharges from nearby streets.

Fulton Park is flanked on the east by Burnt Hill and on the west by the Overlook section of Waterbury. The majority of the slopes in the Park slope gently to the three ponds bisecting the Park. Slopes are more moderate on the eastside of the Park (see Figure 2).

Geology

Fulton Park is located entirely within the Waterbury topographic quadrangle. A bedrock geologic map (QR-22, by Robert M. Gates) has been published by the Connecticut Geological and Natural History Survey. No surficial geologic map has been published to date for the quadrangle. The Team's Geologist referenced the Soil Survey for New Haven County for the surficial geology portion of the report.

Surficial Geology

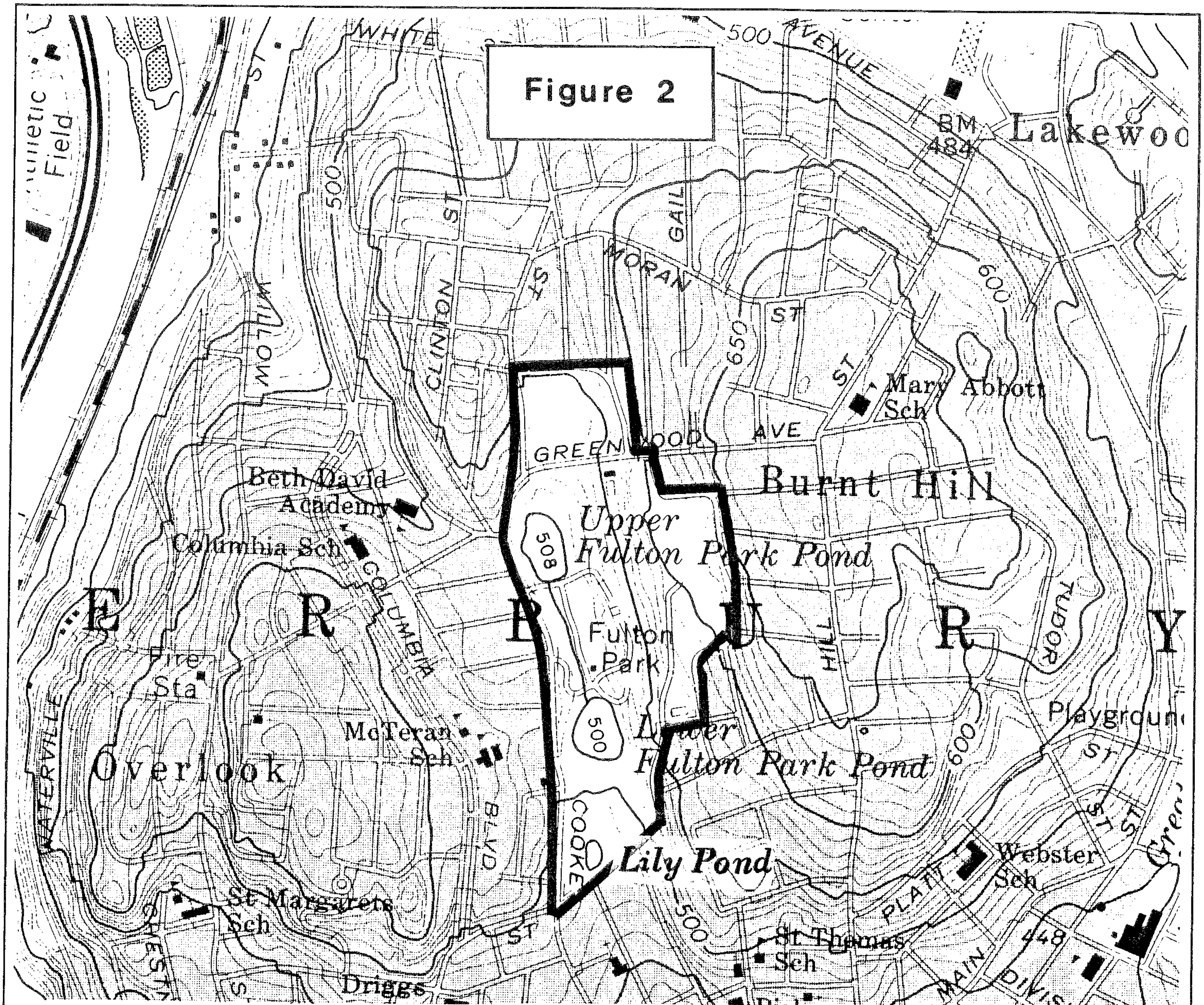
The surficial geological material comprising most of Fulton Park is till (Figure 3). Till is a non-sorted mixture of rock particles ranging in size from clay to boulders. The rock materials were scraped, abraded, and plucked from preexisting bedrock and soil surfaces by glacier ice. They were redeposited directly from the ice without significant redistribution by meltwater. The texture of the till may be highly variable, ranging from a relatively clean sand to silty, stony, tightly compact material that is commonly called "hardpan." Most of the Park is covered by the latter variety of till.

A postglacial sediment called swamp sediments, comprising regulated inland wetland soils, overlies till in the central portions of the Park (see Figure 3). They generally parallel the watercourses connecting the three ponds in the Park, and are generally wettest during winter and spring.

Bedrock Geology

The underlying bedrock does not break the ground surfaces within the Park. Gates has classified the bedrock underlying the Park as Waterbury Formation (Figure 4). He describes them as light gray to dark gray, fine- to medium-grained schists and gneisses. Chief minerals in these rocks include micas (i.e., biotite and muscovite), quartz, and feldspar.

Schists and gneisses are crystalline, metamorphic rocks or rocks that have been geologically altered due to great heat and pressure within the earth's crust.



FULTON PARK

WATERBURY, CONNECTICUT

TOPOGRAPHY

King's Mark Environmental Review Team

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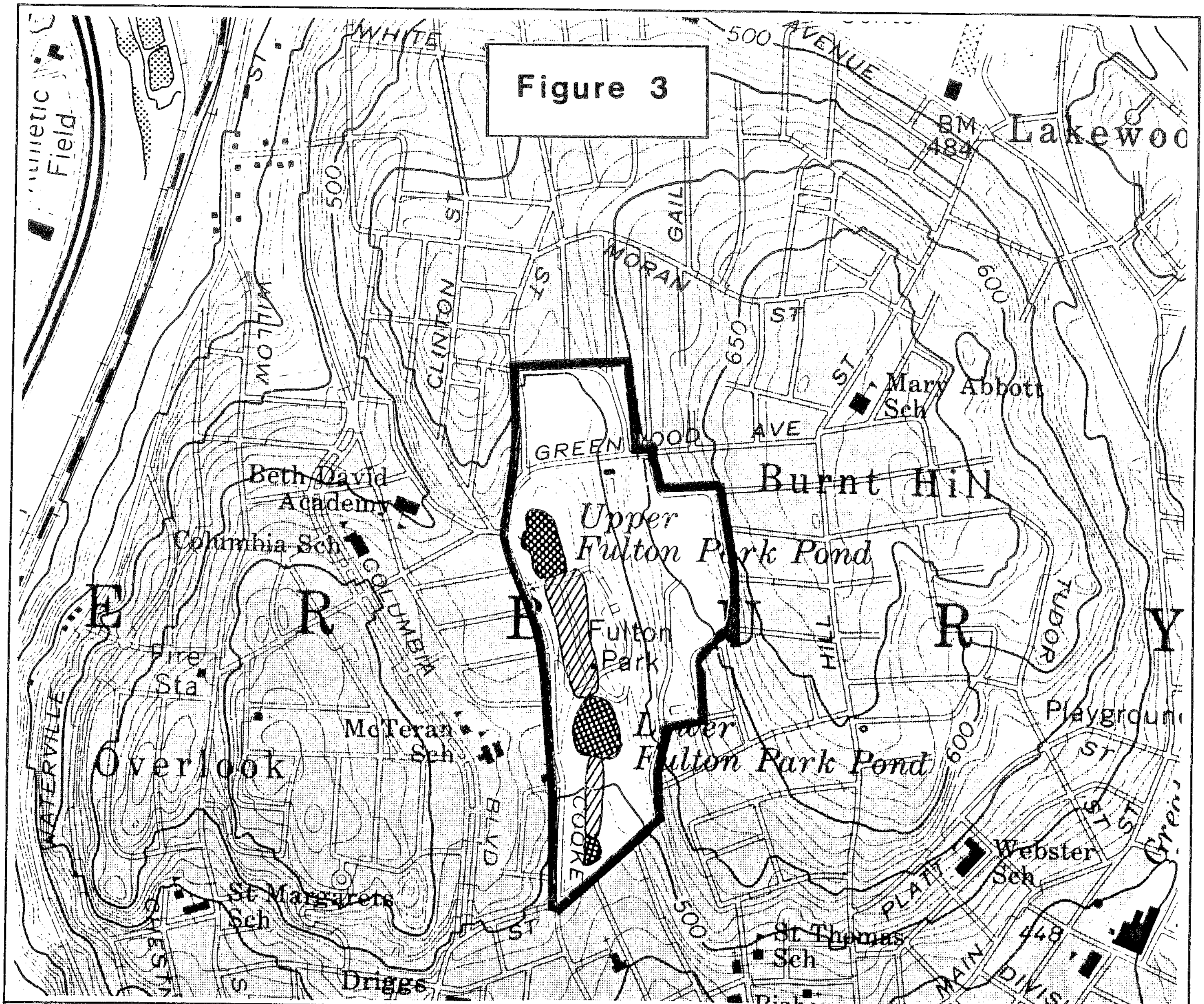

(surface water bodies symbol)	SURFACE WATER BODIES
(till-based soils symbol)	TILL-BASED SOILS
(seasonally wet areas symbol)	SEASONALLY WET AREAS

FULTON PARK

WATERBURY, CONNECTICUT

SURFICIAL GEOLOGY

King's Mark Environmental Review Team

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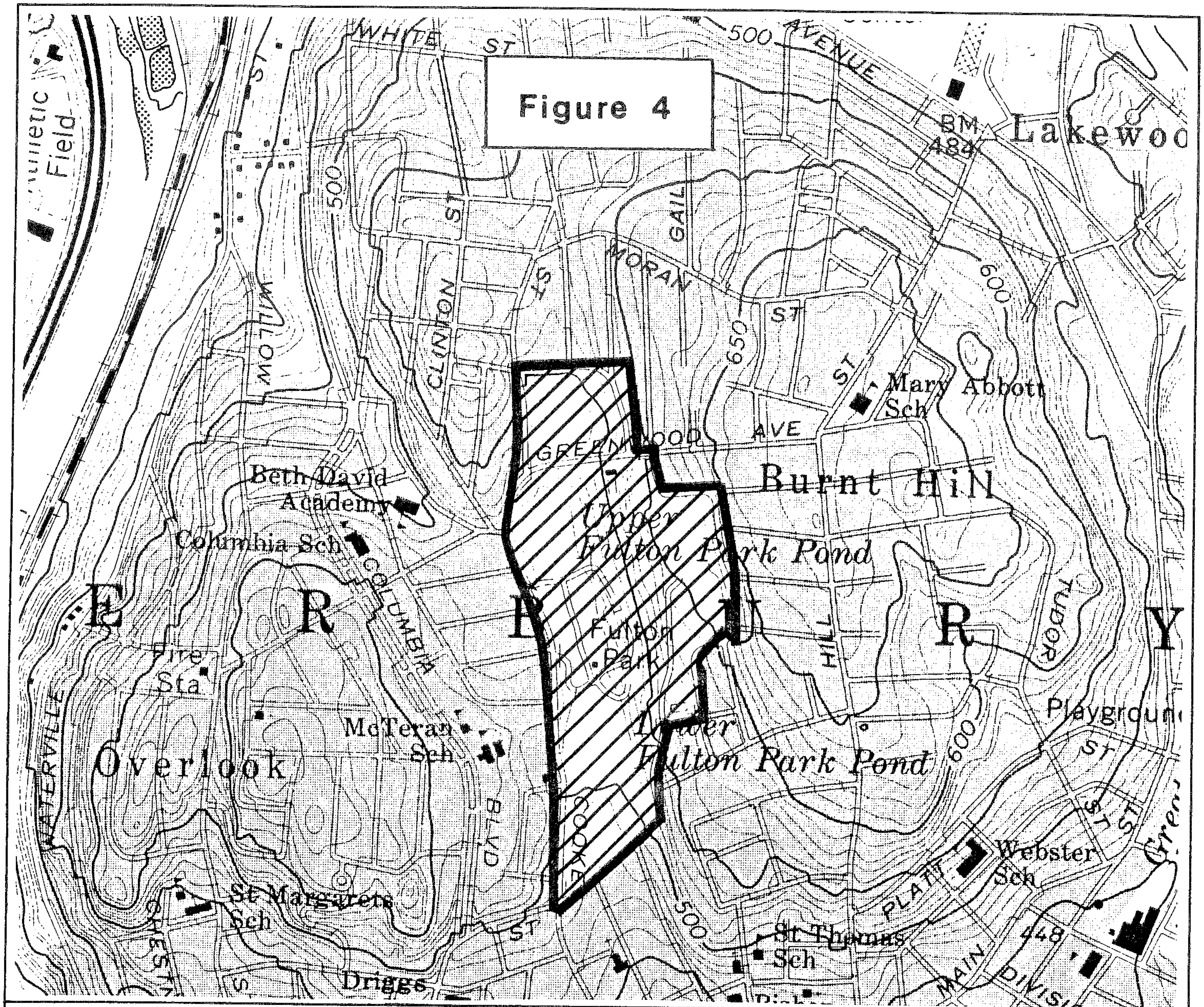

FULTON PARK

WATERBURY, CONNECTICUT

BEDROCK GEOLOGY

King's Mark Environmental Review Team

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Both of these rock types are common throughout upland areas in eastern and western Connecticut. Depth to bedrock throughout the Park is probably not much more than 10 feet below the ground surface.

Description of Watershed Area

The watershed of Upper Fulton Park Pond, Lower Fulton Park Pond, and Lily Pond may be defined as that land area from which all of the natural water input to the three surface waterbodies is derived. As shown in Figure 5, the watershed boundary tends to follow along the crests of local hills. It should be noted that the watershed boundary as depicted in Figure 5 may not account for possible drainage re-routing through man-made structures such as piping. Nevertheless, the watershed as shown, being based on natural topographic conditions, comprises about 224 acres or about 0.35 square miles. Also delineated in Figure 5 are the subwatershed boundaries for Upper Fulton Park Pond and Lower Fulton Park Pond. These waterbodies drain a land area of approximately 93 acres and 173 acres, respectively.

Except for the Park itself, the land area which drains to all three surface waterbodies is characterized by high density residential uses.

Houses in the watershed are served by sanitary sewers, public water, and stormwater sewers. The latter system outlets directly into Upper and Lower Fulton Park Ponds at numerous points. It appears that road sand which finds its way into the stormwater sewer system is ultimately deposited into the ponds. It is probably the greatest contributor of sediment to these ponds.

Because the ponds are hydrologically connected, a pollutant or contaminant affecting water quality in Upper Fulton Park Pond is likely to affect water quality in Lower Fulton Park Pond and Lily Pond.

Precipitation falling in the watershed either takes the form of surface runoff or may be absorbed into the ground. Surface runoff flows across the surface of the land until it is intercepted by a stream, wetland, or stormwater sewer system. It is ultimately transported to the pond. Within the confines of the Park surface, runoff is shed across the land directly into the ponds. Precipatation that is absorbed into the ground may either be returned to the atmosphere through evaporation and plant transpiration or percolate downward to the water table to become groundwater. Once the water reaches the groundwater table, it moves slowly downslope by the force of gravity, ultimately discharging to the surface in the form of a wetland, stream, or directly into the ponds. Generally speaking, groundwater flow in the watershed parallels the surface flow pattern, and is largely controlled by the underlying bedrock or compact layer present in the till-based soils.

Pond Hydrology and Dynamics

The City's primary concern with Fulton Park is the accumulation of sediment at the inlets of each pond, causing the pond's aesthetic appearance and environmental health to deterioate. The accumulation of silt at the inlets of the pond has encouraged the encroachment of herbaceous and woody vegetation in these areas.

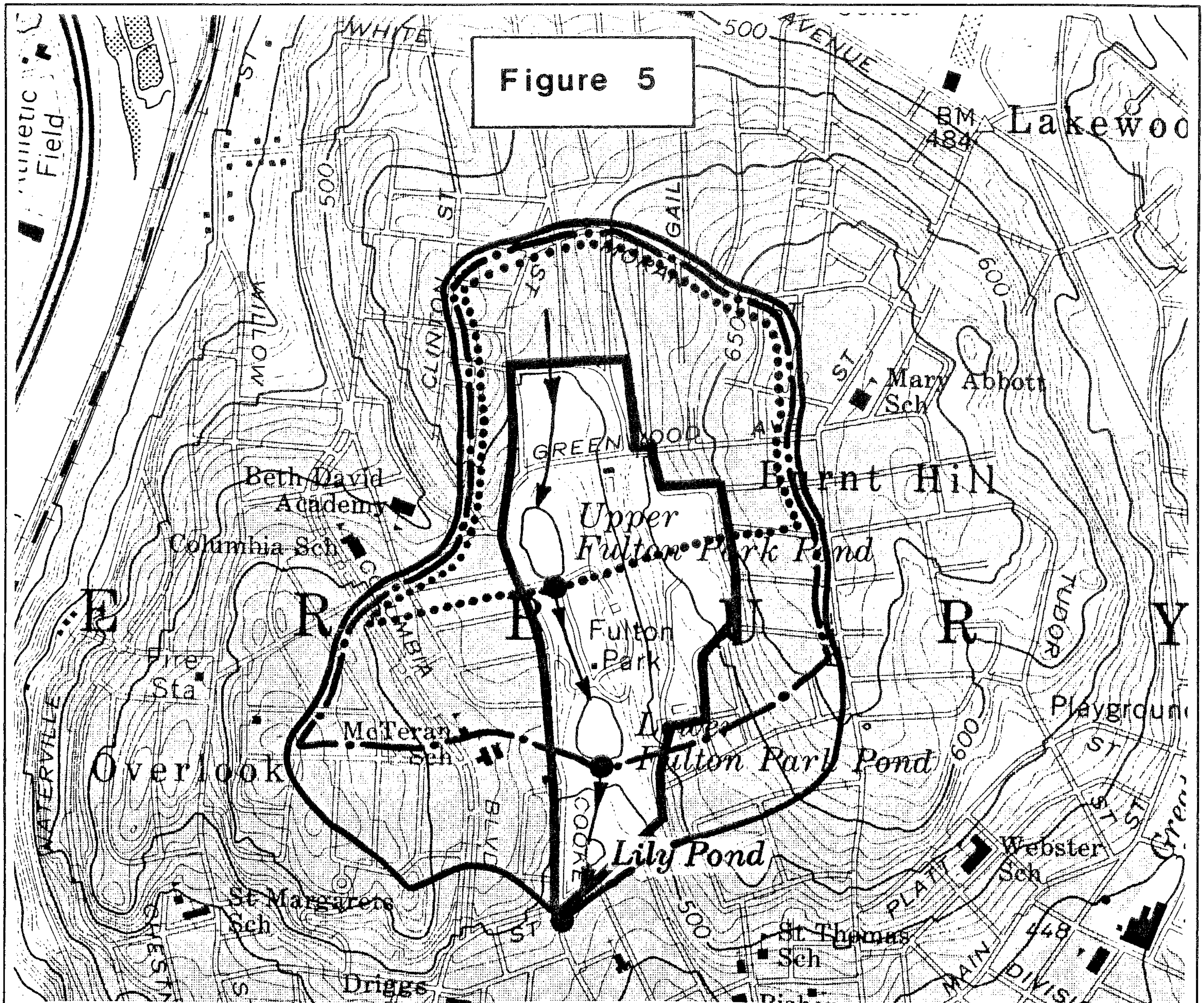

Figure 5

WATERSHED BOUNDARY AND RESPECTIVE POINT OF OUTFLOW FOR UPPER FULTON PARK POND, LOWER FULTON PARK POND AND LILY POND

WATERSHED BOUNDARY AND RESPECTIVE POINT OF OUTFLOW FOR LOWER FULTON PARK POND

WATERSHED BOUNDARY AND RESPECTIVE POINT OF OUTFLOW FOR UPPER FULTON PARK POND

WATERCOURSES SHOWING DIRECTION OF FLOW

FULTON PARK

WATERBURY, CONNECTICUT

WATERSHED BOUNDARY

King's Mark Environmental Review Team

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The exact stage of eutrophication of Upper Fulton Park Pond, Lower Fulton Park, and Lily Pond is unknown at the present time, but it probably lies somewhere between mesotrophic and eutrophic.

Phosphorous has been identified as the growth limiting nutrient in the majority of Connecticut lakes or ponds. The term "limiting nutrient" refers to the nutrient which is in the shortest supply relative to growth requirements. In general, algae and macrophytes will grow until the supply of some basic nutrient is depleted. Then any increase in that nutrient will result in a corresponding increase in biological productivity. Enrichment of a lake or pond with plant nutrients is the fundamental cause of eutrophication.

Because much of the land use in the watershed is characterized by high-density residential development, nutrient loads to the ponds is much greater than if the watershed was characterized by low-density residential development or undisturbed woodlands. For example, residential and commercial land typically contribute more than 10 times the nutrient loading that results from woodlands.

It should be noted that the DEP has recently revised (1984) a report entitled "A Watershed Management Guide for Connecticut Lakes." The DEP report discusses in detail the process of eutrophication and methods of control. According to the report, the following factors may contribute nutrients to a waterbody, and therefore accelerate the eutrophication process:

(1) erosion and sedimentation;
(2) septic systems;
(3) lawn and garden fertilizers;
(4) yard and garden vegetation disposal;
(5) agricultural land;
(6) timber harvesting;
(7) stormwater runoff;
(8) waterfowl excrement;
(9) atmosphere, and;
(10) lake sediments.

It seems likely that the following sources would have the greatest potential for adding nutrients to the ponds in question.

<u>Erosion and Sedimentation</u>

Erosion and sedimentation within a lake watershed is a natural process, but the rate of erosion or sedimentation can be greatly increased by human activities that disturb the land.

Eroded soil contributes to eutrophication in several ways. Nutrients associated with the soil particles are introduced to lake waters. Sedimentation reduces water depths creating conditions conducive to the growth of aquatic weeds. Organic matter, associated with the soil particles, is decomposed by the soil bacteria which depletes oxygen overlying the lake sediments. Since most of the watershed is developed, there appears to be little chance for new development. Nevertheless, if any development does occur within the watershed, the City should require the applicant to develop erosion and sediment control guidelines in compliance with Connecticut's "Guidelines for Soil Erosion and Sediment Control," particularly if it is in close proximity to Fulton Park. Also, local officials should see that road sand, particularly after the winter months, is swept up throughout the watershed area especially those areas served by storm sewers that discharge directly to the ponds. Large accumulations of road sand was visible on several streets in the watershed, in particular near Fulton Park. If not picked up, this sand will eventually find its way into the stormwater sewer system and ultimately discharge to the ponds in the Park.

It should be noted that a wetland area in the central parts of the Park have been recently disturbed. According to the Park Superintendent, this area was disturbed in order to minimize mosquito breeding areas. Disturbing sediment in wetlands directly contacting water mobilizes fine-grained particles. These particles wash into the stream connecting Upper Fulton Park Pond and Lower Fulton Park Pond, and are ultimately deposited into Lower Fulton Park Pond.

Lawn and Garden Fertilizers

Lawns and gardens are generally very efficient at utilizing soil nutrients and preventing their loss through runoff and leaching. However, runoff and leaching of nutrients can occur if fertilizer applications exceed nutrient requirements, or if fertilizers are applied prior to storm events causing runoff. These situations can be avoided if fertilizers are matched to soil requirements, and if applications are timed to avoid periods of runoff. In this regard, the Park Superintendent should be cautious when applying fertilizers to lawns in the park, since it may runoff indirectly into the ponds. The Cooperative Extension Service in Hamden and the Agricultural Experiment Station in New Haven should be contacted to acquire information on soil testing and lawn fertilizers.

Yard and Garden Vegetation Disposal

Leaves, grass clippings, and other vegetative material from yard and garden maintenance should not be deposited in a location where the material may be washed into the ponds. Vegetative material will add to the sediment in the ponds and will provide plant nutrients upon decomposition.

The Park Superintendent should select a suitable site away from the ponds for the composting of vegetative material.

Waterfowl

Ducks and geese are generally considered attractive wildlife assets which enhance the aesthetic appeal of a lake or pond. However, large numbers of migratory waterfowl which spend considerable periods of time on a lake or pond can contribute appreciable loadings of phosphorus and nitrogen to surface waters. In a study of a Connecticut lake, it was estimated that the phosphorus in the excrement of four geese in one month was equivalent to the total annual loading of phosphorus from 2.5 acres of watershed land. In order to quantify the impact of waterfowl on a lake, it is necessary to develop accurate information on waterfowl population numbers, feeding habits, resting areas, and periods of occupancy. According to the Park Superintendent, the duck and geese population on the ponds is not very great at the present time, but they have been sighted in the past. He also noted that gulls frequently utilize the ponds as well. In order for the City to control the eutrophication process in the ponds, they will need to control the nutrient enrichment from waterfowl. In the absence of detailed information, it should be recognized that large flocks of migratory waterfowl stopping at a lake or pond for many weeks can be an important factor in the eutrophication process. As a result, park visitors should not be encouraged to feed ducks or geese, which could lead to a greater population.

Pond Restoration Measures

Based on pictures of Lower Fulton Park Pond, which were distributed to the Team members during the field review and based on verbal discussions with City officials, the ponds are experiencing moderate growth of weeds and algae, mainly on the perimeter of the ponds.

Some common methods for controlling aquatic weed growth include the following:

Winter Drawdown

If a spillway has the capacity to effectively lower the water level, a surface waterbody can be drawndown in the fall to expose the sediments. Over the winter, the bottom freezes and destroys roots, vegetative parts, and susceptible seeds. Winter drawdown will not kill algae, however. Winter drawdown should be coordinated with fisheries experts to prevent impacts on fish population (see Biological Resources section). It appears that water levels in Upper Fulton Park Pond and Lily Pond can be lowered. If this control measure was implemented by the City, it may also be an opportune time to remove the sediment accumulated at the inlets to these two ponds. (see Drawdown and Excavation Method).

Weed Harvesting

Weed harvesting entails the mechanical cutting of the weeds. Although the method provides immediate relief, it may have to be repeated at periodic intervals. Winter drawdown, however, would probably be more effective than weed harvesting.

Chemical Treatment

The use of any algicide or herbicide within the waters of the State is governed by statute (Sec. 430 of Public Act 872) and permits are required from the Pesticide Compliance Unit of DEP.

Chemical treatments are generally only "cosmetic" and repeated applications may be necessary.

Drawdown and Excavation

Drawdown and excavation is sometimes employed to remove the substrate utilized by the plants for growth. The process increases water depth to levels where plants growing on the bottom will not receive enough light to survive. The effects of this method are generally long-termed.

The drawdown and excavation process requires the use of heavy equipment and it must be determined whether the pond bottom could support this weight.

This method has a relatively high capital outlay. However, the restorative effects are long-termed.

If this method is given further consideration, a feasibility study should be conducted to "map" pond sediments according to depth, composition, and underlying substances. Final disposal of excavated sediments should also be explored during the feasibility study. Hydraulic dredging (see discussion below) accomplishes the same goal as drawdown and excavation, but is more costly due to increased specialization and complexity.

Hydraulic Dredging

Under this method, specialized sediment dredges are employed to remove underwater sediment by suction as a slurry. The slurry must be dewatered prior to final disposal, and the decant water usually must be treated to remove solids and nutrients prior to disposal. The development of dewatering containment basins of suitable size and location is a major and expensive undertaking. However, where environmentally and financially feasible, this method can provide improvement if other methods are unsatisfactory.

approximately 19 inches, and gravelly, sandy loam texture to 60 inches or more. Whitman soils have a fine sandy loam texture to approximately 22 inches, and gravelly, sandy loam texture to 60 inches or more.

Due to the high water table and surface water runoff, the three existing ponds have been developed within this drainage area.

Charlton Soils - CfB, CfC

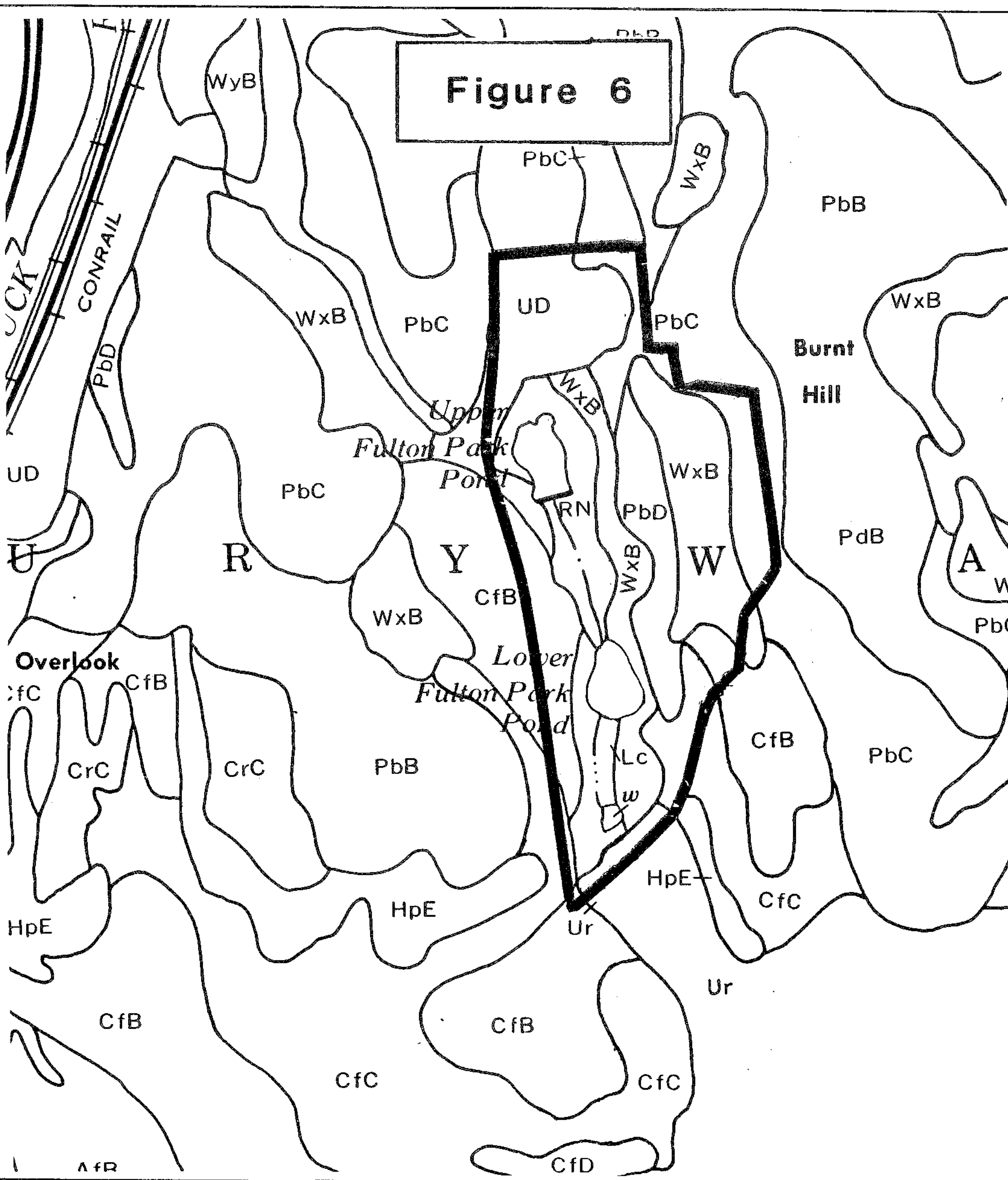
These soils are composed primarily of Charlton soils on slopes less than 15 percent. Charlton soils are very deep and well-drained. Textures are dominantly fine sandy loam to a depth of 60 inches or more. Charlton soils occupy broad hill tops and side slopes of hills and ridges (see Figure 6).

Woodbridge Soils - WxB

These soils are composed primarily of Woodbridge soils on slopes less than eight percent. This soil is gently sloping, moderately well drained in a slight depression and at the base of a drumlin on glacial uplands. Woodbridge soils have a fine sandy loam texture to a depth of approximately 25 inches and gravelly fine sandy loam to 60 inches or more. This substratum is described as very firm. Permeability is moderate in the surface layer and slow in the substratum (see Figure 6).

Udorthents - UD

An area north of Upper Fulton Park Pond is mapped UD or Udorthent. These soils are adjacent to urban areas and are occupied by tennis courts and ballfields (see Figure 6).



FULTON PARK

WATERBURY, CONNECTICUT

DISTRIBUTION OF SOILS

King's Mark Environmental Review Team

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existing outlet channel north of Upper Fulton Park Pond in order to trap and retain road sands and other sediment before they reach the upper pond. For example, the construction a 50' wide by 50' long by 12' deep sediment basin north of the upper pond would cost approximately \$2.50 to \$3.00 per cubic yard or approximately \$3,500.00. This cost estimate will vary depending on additional contractor costs, in-house capability and equipment, and distance of dredged material disposal location from the dredging site. A deeper and larger sediment basin will have higher initial costs to construct but it will have lower maintenance costs since it will only have to be cleaned or dredged to remove accumulated sediment once every 10 to 12 years. On the other hand, smaller sediment basins have a lower initial cost, but will have to be regularly maintained in order for it to remain effective in collecting sediment before it enters the pond.

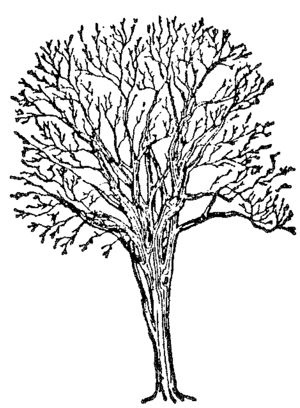
Therefore, if a sediment basin is planned for the Upper Fulton Park Pond or any other ponds in Fulton Park, it is encouraged that a maintenance program be developed (i.e, to clean out any proposed sediment basins) because maintenance of the entire interconnected pond system will be simplified, manageable, and less costly in the long-term. Planning and design principles for sediment basins can be found in Chapter 8 of "Guidelines for Erosion and Sediment Control" (1985). For further assistance on sediment basin design, contact the New Haven County Soil and Water Conservation District in Wallingford, Connecticut.

Potential Funding Sources for Dredging

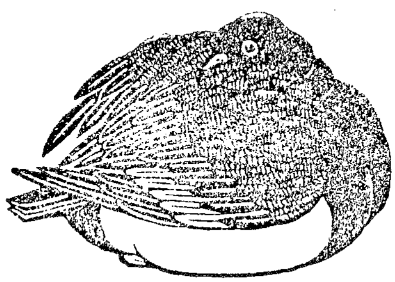
Though federal and state grants for urban park improvement have been reduced over the past few years, there are sources of outside funding available that assists towns and cities with park improvements, including dredging of park ponds. It is encouraged that the City of Waterbury contact:

Mr. Charles Reed
Department of Environmental Protection
Land Acquisition and Management
State Office Building
Hartford, CT 06106
566-2904

This office will be able to provide information on Federal and State funding mechanisms available to improve the overall quality of Fulton Park.



BIOLOGICAL RESOURCES



BIOLOGICAL RESOURCES OF FULTON PARK

Fishery Resources

Bluegill sunfish and largemouth bass were observed in the ponds during the field inspection of the ERT. Other species likely to be found would be brown bullhead, carp, golden shiners, and possibly goldfish. The sunfish provides good panfishing opportunities for beginning anglers. Based on fishing reports from the Park Superintendent, anglers also commonly catch largemouth bass from the ponds. Overall, the ponds seem to provide good urban fishing opportunities for beginning anglers and access is excellent. Though the fisheries habitat looked to be of fair condition during the field review, the ponds do become somewhat "weed choked" during the late spring and summer, potentially reducing public use of the ponds. If the majority of the pond surface area does become infested with aquatic weeds, a less than optimum balance of fish populations would likely develop. Controlling weed growth can also help influence the fish populations by enhancing angling opportunities. Finally, water turbidity seemed to be low during the field review.

Fish Habitat

Upper Fulton Park Pond

Area A in Figure 7 includes very shallow water created by silt deposition below the watercourse. In fact, the existing penninsula (Area B) was created in this manner and is now a stable land mass, occupied by abundant vegetation. It is suggested that the penninsula remain in place and the extremely shallow area (A) around it be dredged for the following reasons:

(1) the established green vegetation will reduce nutrient inputs into the pond by assimilating or utilizing existing nitrogen and other nutrients (i.e., assumed excess nutrients and/or nitrogen in inflowing waters since the pond experiences algal blooms in the summer);

(2) increases shoreline development, a desired feature in providing more fish habitat in a pond, and;

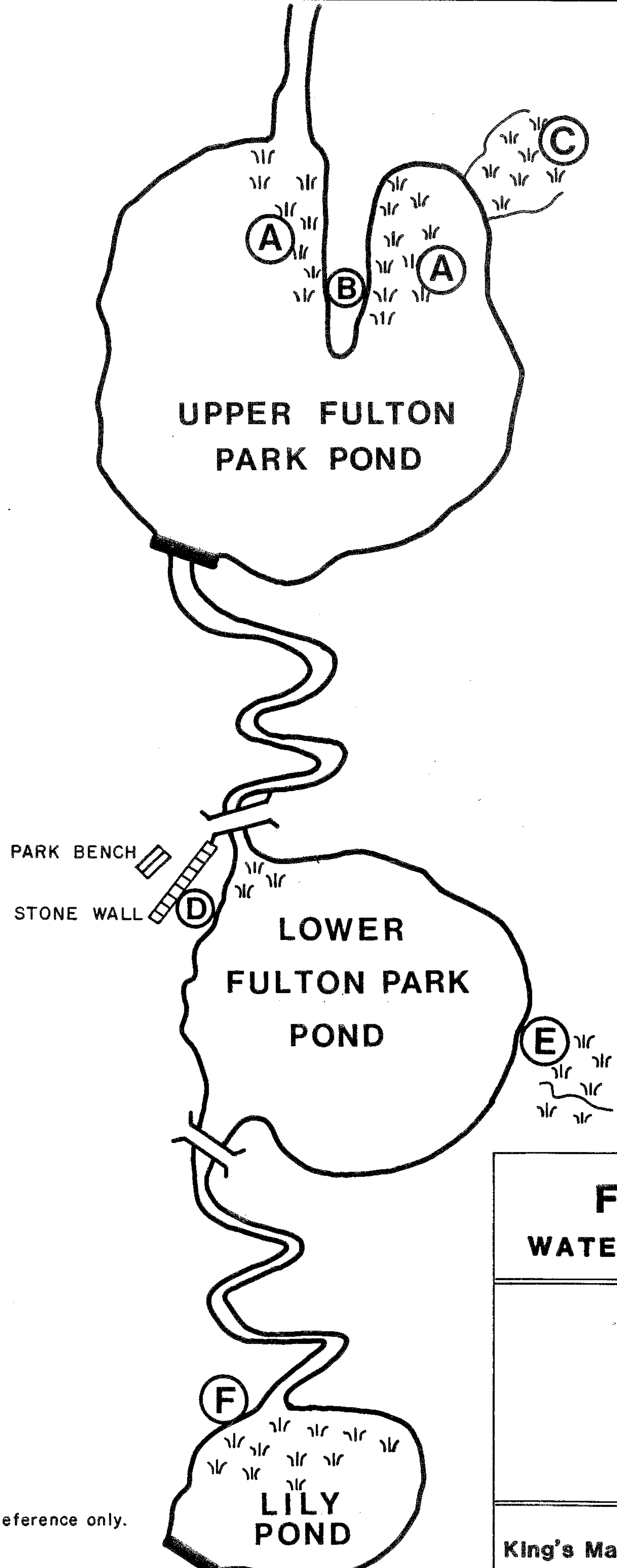
(3) provides more access for anglers to the deeper, central portion of the pond.

Fish habitat in the upper pond can be increased by dredging the areas around the penninsula. Area C in the northeast corner of the pond was extremely wet and a gravel lined ditch could aid drainage of seeping water into the pond.

Lower Fulton Park Pond

Area D depicted in Figure 7 is the single steep bank area in the pond system. There is presently a park bench, a stone wall, and a steep, vegetated bank. During periods of precipitation, this bank must be vegetated to reduce erosion and additional inputs of silt into the pond. The shallow area below the input stream could be dredged but this doesn't seem necessary. A seepage area at point E (see Figure 7) on the eastern bank should be alleviated. Presently, water runs over the sidewalk and keeps the area muddy. A drain would improve both safety and aesthetics.

Figure 7



Map drawn for reference only.
Not to scale.

FULTON PARK
WATERBURY, CONNECTICUT

FISH HABITAT

King's Mark Environmental Review Team

Mitigative Measures to Improve the Fishery Resources

Chemical Applications

Applications of the chemical Cutrine at specific times could substantially reduce the algae problem. This chemical comes in granular form and can probably be dispersed by hand while walking around the pond. A liquid form may be more effective but is difficult to apply. Direct applications to algae beds is best. To avoid killing fish by suffocation, ponds that are heavily infested with weeds or algae should be treated one-half at a time, three weeks apart. A permit must be obtained from the DEP Pesticide Compliance Unit prior to use.

Winter Drawdown

Late autumn drawdown of water levels to expose rooted aquatic plants will help control these types of vegetation. Drawdown will not control algae. Make sure that spring flows from streams will be sufficient to refill the pond the following year. The following procedure is suggested: Drawdown all ponds starting at the upper pond and continuing down to last pond. This should be done in the fall of the year and sedimentation traps (i.e., hay bales, tobacco netting, etc.) should be installed between each of the ponds to reduce sediments being moved from one pond to the next. Refurbish flashboards at outlet structures of all ponds to facilitate yearly (or as needed) pond level drawdowns. By utilizing pond level drawdowns and maintaining open areas, predatory fish such as largemouth bass are better able to prey upon forage species and exert some control over their populations.

Artificial Screens

Install Dartex or Aquascreen around edges of pond down to three or four feet deep. Approximately one-half of the pond circumference should be covered either in patches or one continuous strip. This material would prohibit weed growth along the pond edges and enhance both the fisheries habitat (by adding diversity) and the angling opportunities (by keeping sections of the pond weed free).

Dredging

If financially feasible, conduct some dry-dredging along edges of all three ponds. This should be done during the drawdown and after the exposed sediments have had time to dry out. If possible, it would be advantageous to increase the depth along the pond edges to approximately three feet.

Sediment Basins

Install rip-rap sedimentation basins at stream and stormwater sewer entrances, and maintain these on a yearly basis.

RECREATIONAL AND LANDSCAPE PLANN ING

CONSIDERATIONS

RECREATIONAL AND LANDSCAPE PLANNING CONSIDERATIONS

Introduction

Fulton Park was designed in 1921 by the Olmsted Brothers firm in Massachusetts. The original design featured three ponds (Fulton Pond (Upper Fulton Park Pond), Swimming Pond (Lower Fulton Park Pond), and the Lily Pond). A bird sanctuary, picnic grove, lilac collection, ball fields, tennis courts, wading pool, and a bath house were also proposed. All of these elements were not included in the design as constructed.

Description of Park Landscape and Design

Fulton Park presently includes three small ponds connected by a brook, an "interconnecting" path system, an evergreen "grotto," a rock garden, lilac collection, bird sanctuary, ball fields, playground, and pavilion. It appears that the City has implemented those features of the original design which were best suited for their needs, resulting in a varied recreational experience. Although the designers have created an interesting and relaxing environment, the Park suffers from several problems. These include drainage problems near the steep slope down to the "Swimming Pond" (Lower Fulton Park Pond), drainage/erosion concerns at the north end of Fulton Pond (Upper Fulton Park Pond), and general lack of maintenance in and around all three ponds. On the day of the field review, debris which had either been thrown in or had blown in from the street was observed in each of the ponds. Lily Pond in particular was in poor condition due to the accumulation of debris. All of the ponds are suffering from sedimentation and should be dredged to maintain the original depth of water. Sedimentation of Upper Fulton Park Pond is so severe that an island delta or pennisula has been formed.

Path System

A number of areas in the path system will need repairs due to tree root damage. Roots obstructing the paths could become a liability to the City should anyone stumble on them. All bridges over the stream system need repointing and repair. Benches should also be replaced. In certain areas, plant materials need restoration, specifically the Rhododendron Sanctuary, the Laurel collection, and the rock garden. In each instance, the collection could be increased and improved by including new species. Throughout the Park, light stanchions should be replaced with those of a matching style and wiring should be placed underground. The unpaved path which runs on the western side of Upper Fulton Park Pond needs a new base course which will help eliminate existing muddy areas. A number of trees were uprooted in the bird sanctuary, and those near the paths should be removed for aesthetic reasons.

At the easternmost side of the Park, near the bowling green, the parking area at the rotary needs to be repaved and the evergreen screen between the road and the compost area needs to be restored.

Picnic Areas

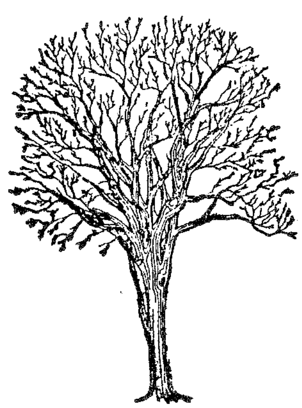
The City was also concerned about location of a picnic area in the Park. In order to be well used, a picnic area should be relatively close to parking or a short walk from a food source.

There are several locations within the Park which may be suitable, but the most scenic would be areas to the south of Lily Pond or near the Swimming Pond (Lower Fulton Park Pond).

Discussion

Waterbury has a unique recreation facility in Fulton Park, a well designed urban "oasis." However, it would appear that maintenance is a key issue in the life of the Park. Implementing an adequate maintenance plan is critical to enhancing and preserving the aesthetic quality of Fulton Park.

The Connecticut Historical Commission administers a funding program for restoration of historically significant structures and landscapes. If Waterbury is interested in pursuing outside funding for park restoration, the Commission will supply information and application assistance. They may be contacted at 59 South Prospect Street, Hartford, Connecticut 06106 or 566-3005.



APPENDIX A

EXAMPLES OF POND RESTORATIONS

PROJECT LOCATION: GORTON POND, EAST LYME, CT

TYPE OF MITIGATIVE TECHNIQUE: Drawdown and Excavation.

OBJECTIVE: Removal of sand and silt to improve recreational opportunities.

SCOPE: 200,000 cubic yards in situ (in place) bottom material.

PROCESS: Pond dewatered to repair dam. Sediments removed with conventional earth moving equipment: bulldozers, frontend loaders, and haul trucks. Pond had hard bottom; organic silts removed when frozen.

DATES OF PROJECT: Pond dewatered August 1984; Excavation accomplished October 1984 to May 1985.

DISPOSAL OF EXCAVATED MATERIALS: Nearby Town property.

EXCAVATION COST: $4.50 per cubic yard; $900,000 total.

CONTACT/REFERENCE: Alphonse Letendre, DEP Water Resources Unit.

PROJECT LOCATION: 1860 RESERVOIR, WETHERSFIELD, CT

TYPE OF MITIGATIVE TECHNIQUE: Hydraulic Dredging.

OBJECTIVE: Organic silt and peat removal to improve recreational opportunities.

SCOPE: 140,000 cubic yards, in situ (in place) bottom material (70,000 cubic yards dry).

DATE: Construction 1984/1985; Dredging 1985 to 1987 (est.).

PROCESS: Hydraulic dredge (Mudcat MC - 915), booster pump station, physical settling, chemical flocculation, continuous flow mode.

SEDIMENT BULKING FACTORS: 1.5 to 2.0.

BASIN CAPACITIES: Dewatering: 86,000 cubic yards (nine acres).
Flocculation: 7,000 cubic yards (one acre).

BASIN CONSTRUCTION COSTS: $145,000.

Includes earth wall basins, pipes, outflow structures, drainage swales, underdrains, silt fence, and safety fence.

Natural topography flat to moderately sloped; earth for berm walls available on site; site previously cleaned.

ESTIMATED CHEMICAL FLOCCULANT COST: $27,000 for project.

ESTIMATED ANNUAL PRODUCTION: 56,100 cubic yards (350 per day, 170 days).

REFERENCES: Assessment of the 1860 Reservoir dredging project conducted by the Baystate Environmental Consultants, Inc., January 30, 1984.

Mr. James Sheehy, Town of Wethersfield, Engineering Department.

PROJECT LOCATION: BANTAM LAKE, LITCHFIELD AND MORRIS, CT

TYPE OF MITIGATIVE MEASURE: Hydraulic Dredging.

OBJECTIVE: Removal of lake sediments of varying composition to improve recreational opportunities.

SCOPE: 230,000 cubic yards in situ (in place) bottom material.

DATE: Construction 1982; Dredging: 1982 to 1987 (est.).

PROCESS: Hydraulic dredge (Mudcat MC - 915), physical settling, chemical flocculation, batch mode.

SEDIMENT BULKING FACTORS: 1.0 to 1.8 (sand - peat).

BASIN CAPACITIES: North site dewatering: 17,000 cubic yards. (1.5 acres).
North site flocculation: 0.75 acre.
South site dewatering: 47,000 (10 acres)*.
South site flocculation: 2 acres.

* Two basins parallel.

BASIN CONSTRUCTION COSTS: $345,000.

Includes earth wall basins, pipes, outflow structure, and site drainage. Earth for berms available on-site.

ANNUAL CHEMICAL FLOCCULATION COST: $10,000.

PRODUCTION (1984): 50,000 cubic yards.

REFERENCES: "Application of Dredging and Weed Harvesting," Purcell Associates, June 1978.

Mr. Apley Austin, Town of Morris, Project Administrator.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists, landscape architects, recreational specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC & D) Area - a 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns and/or developers within the King's Mark RC & D Area - free of charge.

PURPOSE OF THE ENVIRONMENTAL REVIEW TEAM

The Environmental Review Team is available to assist towns and/or developers in the review of sites proposed for major land use activities. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments, and recreational/open space projects.

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 site, and highlighting opportunities and limitations for the proposed land use.

REQUESTING AN ENVIRONMENTAL REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality, or the chairman of an administrative agency such as planning and zoning, conservation, or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District, and the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should investigate. When this request is approved by the local Soil and Water Conservation District and King's Mark RC & D Executive Committee, the Team will undertake the review. At present, the ERT can undertake two (2) reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil and Water Conservation District or Keane Callahan, ERT Coordinator, King's Mark Environmental Review Team, King's Mark Resource Conservation and Development Area, 322 North Main Street, Wallingford, Connecticut 06492. King's Mark ERT phone number is 265-6695.