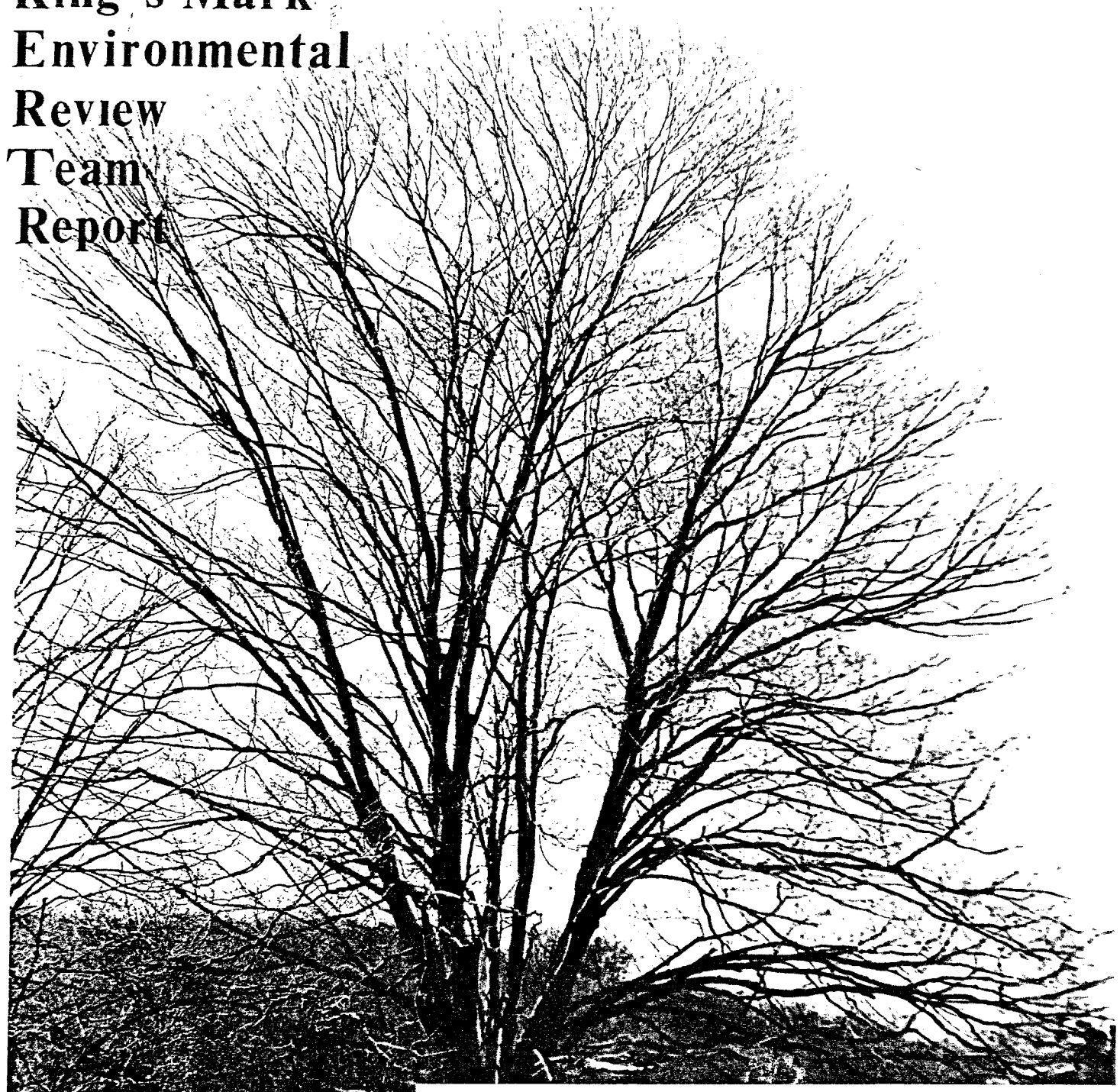
King's Mark Environmental Review Team Report



EMERY PARK

KENT, CONNECTICUT

EMERY PARK

KENT, CONNECTICUT

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

Kent Parks and Recreation Commission

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the Parks and Recreation Commission and the Town. The results of the Team action are oriented toward the development of a better environmental quality and long-term economics of the land use. The opinions contained herein are those of the individual Team members and do not necessarily represent the views of any regulatory agency with which they may be employed.

MAY 1988

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team Coordinator, Nancy Ferlow, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this study:

* William Warzecha, Hydrogeologist
  Department of Environmental Protection - Natural Resource Center

* Kathy Hanford, District Conservationist
  USDA - Soil Conservation Service

* Ann Burcroff, Environmental Analyst
  Department of Environmental Protection - Water Compliance Unit

* Judy Wilson, Wildlife Biologist
  Department of Environmental Protection - Western District

* Ralph Scarpino, Forester
  Department of Environmental Protection - Bureau of Forestry

* Joseph Hickey, Recreational Planner
  Department of Environmental Protection - Parks & Recreation Unit

I would also like to thank Susan Anderson, Secretary of the King's Mark Environmental Review Team for assisting in the completion of this report.

Finally, special thanks to Karen Chase of the Kent Parks and Recreation Commission and Becky Thornton, planner for the Commission, for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

The Town of Kent Parks and Recreation Commission requested that an environmental review be conducted on Emery Park, an approximately 200-acre park/open space area owned and managed by the Town. The area contains two small ponds, an unnamed brook, a small wooded swamp and upland forest. With the exception of a small strip along Route 341, much of the property is very steep. The land adjacent to the road is currently used for active and passive recreation and contains a pond which is used for swimming, a feeder pond, playground equipment, a field proposed for a ball field and picnic tables. The park is open 10 weeks during the summer. Areas across the stream and up the side of the mountain are currently unused and contain second growth forest. The town is studying the potential for managing the forest and cutting timber and fuelwood.

The primary concern of the Parks and Recreation Commission is increasing the attractiveness of the park and upgrading the recreational programs. The town is currently developing a Master Plan for the park. Natural resource management guidelines or alternatives to improve the overall environmental quality, stability and diversity of the resources occupying the site are the goals of this report.

The review process consisted of four phases: (1) inventory of the site's natural resources; (2) assessment of these resources; (3) identification of resource problem areas; and (4) presentation of planning and land use guidelines. Based on the review process, specific resources, areas of concern and development limitations and opportunities were identified. The major findings of the ERT are presented below:

Topography and Setting

The site is located on the south side of Route 341, encompassing Segar Mountain. The underlying bedrock controls the slopes. Maximum and minimum elevations are 1,200 and 410 feet above sea level, respectively. The site is mostly wooded and is surrounded by undeveloped land.

Geology and Geologic Limitations to Development

Emery Park is underlain by metamorphic rock. The valley is underlain by a soft marble known as the Basal Member of Walloomsac Schist. The remainder of the site is underlain by a dark gray to silvery, rusty weathering, coarse-grained schistose gneiss which contains amphibolite layers. The bedrock is the source of water to many homes in Kent. Except for the area near the stream, the surficial geologic materials consist of glacial till. Near the stream surficial geologic materials consist of stratified drift. The large wetland area at the south end of the property contains peat and muck.

From a geologic standpoint, the only area moderately favorable for active recreation is at the northern limits. The slopes and soils could support small playing fields and playground equipment. The remainder of the site could be used for passive recreational uses such as hiking, cross country skiing and picnicking. Steep slopes may limit some hikers and cross country skiers. All trails should be well maintained to prevent erosion.

Water Supply

Emery Park will be served by municipal water. If the need existed, the bedrock is capable of supplying small but reliable yields of water as a supplementary supply. The quality of the groundwater should be good, but high concentrations of manganese or iron may be present.

Septic Systems

Based on information provided, the soils appear favorable for on-site sewage disposal. Further testing and construction should be coordinated with the Torrington Valley Health District.

Hydrology

Emery Park lies within the watershed of the unnamed stream that flows out of Kent Reservoir, Leonard Pond and Hatch Pond. This flows to the Womenshenuk Brook and ultimately to the Housatonic River. Groundwater flow on the site reflects the surface water flow.

The swimming pond is created by a diversion from the outlet stream of Kent Reservoir. The watershed area for the feeder pond is approximately 312 acres. It is possible to estimate the recommended number of swimmers the swimming pond can hold using a formula from the Department of Health Services. During a drought year the swimming pond can support 25 swimmers per day. During a normal year, the swimming pond can support 50 swimmers per day. Before upgrading the pond, it is suggested that the local health department be contacted.

Soil Resources

The developed portion of Emery Park is located on soils derived from sand and gravel deposits. These soils have the fewest restrictions for recreational development. Drainage is the limiting factor, ranging from poorly drained to excessively drained. Areas that are poorly drained are regulated by the Inland Wetlands and Watercourses Act. Excessively drained soils are droughty and may affect the choices of vegetation cover.

The upland section of the park is undeveloped. Soil limitations are steep slopes and shallow bedrock. Some passive recreation and forest management is feasible if erosion controls are employed. The large area of muck soils are regulated by the Inland Wetlands and Watercourses Act.

The feeder pond is slowly filling with sediment. Possible sources for this sediment are the surrounding soils or the drained reservoir. The feeder pond can be dredged but operation costs may be high. Dredged materials should not be placed in a wetland or stream. These materials may be suitable fill for the playing fields. A way to reduce sediment flow into the swimming pond would be to make the feeder pond into a bypass pond. The outflow to the swimming pond may be protected with a gravel envelope. Water seeps around the swimming pond can be controlled with subsurface drainage. If the main seep is a broken pipe, it should be repaired.

The playing field can be expanded slightly but it may not be feasible to accommodate full sized baseball, softball, field hockey, soccer or lacrosse fields. The existing vegetation is sparse and the soil stony. Measures that

can be taken to protect the field include spreading more topsoil and establishing a good vegetative cover. The proposed playing field in the northeast section is not recommended because it would entail filling a wetland.

Winter sports could be developed at Emery Park. These could include ski slopes, cross country ski trails and sledding. Careful planning will be needed. Steepness and stoniness will limit the construction of trails. Trails used by horses, bicycles, and motorbikes may not be suitable. Walking and jogging trails are suitable for the flat portions and hiking trails for the steeper portions. Safe stream crossings and erosion controls should be provided on all trails. The park could be enhanced by adding a variety of theme trails for nature study.

The upper parking area is in good condition. The access road to the lower area is steep. This may be a hazard during the winter. A gate can be used to keep cars out. Current proposals show 3 to 4 stream crossings. This will cause negative impacts to the stream. A reduction in the number of crossings would cause less damage. Erosion and sediment controls will be needed for any work near the stream or wetlands.

Pond and Water Resources

The proposal to drain and fill the wetlands in the northeast section could be detrimental to water quality. The area has GA class groundwater and a municipal well is located downstream. This wetland acts as a filter for the watershed.

The existing water quality in the swimming pond has been tested and found safe. This may be because of the cold temperatures and filtering properties of the wetlands. Silt from the feeder pond and upstream is kept in suspension by swimmers. Dredging both ponds may help to clear the water.

Raising the temperature of the water might be possible. Options include slowing the flow of water, allowing more sunlight to hit the water, warming the air around the pond and/or building a spillway. Directing the water around the perimeter to the shallow end of the swimming pool may help to clean the water and warm it. Insect nuisances can be controlled naturally which will protect water quality.

If an artificial pool is chosen, suggestions include keeping the pool in the same place and eliminating the steep banks down to the pool. Cleaning and repairing the pool is a concern and every effort should be made to keep chlorine out of the stream.

For questions about the use of sewage sludge on the playing fields, the contact person is Simon Mobarek of the DEP Water Compliance Unit. Water quality and health considerations need to be studied.

Wildlife Considerations

The habitat area in Emery Park is hemlock forest with some mixed hardwoods. The only open space is the recreation area which receives high use in the summer. The ponds and stream may have limited use to wildlife because of heavy use. Although Emery Park lacks diversity, it does provide habitat for

highly mobile species such as deer and turkey. The hemlock provides excellent cover and browse. The majority of the area receives little human use because of steep slopes and wildlife is undisturbed.

Greater diversity of wildlife could be encouraged if more habitat areas were found. Limited habitat enhancement work can be done in conjunction with forestry practices. Small patch clearcuts will open up the forest floor and provide early successional vegetation. If forestry cuts are made, snag trees and den trees should be preserved.

The addition of trails should have only a limited impact on the wildlife. Motorized vehicles would have a much greater impact. In the more remote areas, hunting might be considered.

Forest Resources

The forest is classified as mixed softwood/hardwood forest. The dominant trees are hemlocks, but mixed in are birches, tulip poplars, maples and oaks. The commercial value of the wood will fluctuate according to size, species and accessibility. Left undisturbed, the character of Emery Park will not change dramatically but there will be a shift towards shade tolerant species.

Several factors should be considered to maintain a natural forest stand. Wetlands and ridge tops allow for shallow root penetration. Windthrow is a common problem in these areas. Of particular concern are steep slopes and the potential for erosion. Proper control measures should be used. The hemlock wooly adelgid is an insect that attacks hemlocks. It is only controllable in ornamental settings. Kent has has no reports of the insect as yet, but the potential exists for problems. The area has a low incidence of fire.

The Commission has done a good job of preparing for the management of the forest. Two key steps have been taken by identifying the boundary and defining the goals for management. The type of cutting proposed presents no real conflict with the goals although there will be some aesthetic impacts at first. Wildlife populations should benefit from the cuts. The understory of the forest is sparse which may be a function of lack of sunlight and/or the deer population. Cutting will open up the canopy and provide more light, but the deer population may hinder the reproduction of the forest.

Threatened and Endangered Plant and Animal Species

According to the DEP - Natural Diversity Database there are no Federally listed Endangered Species or Connecticut "Species of Special Concern" that occur within the study area.

Recreational Planning

Very little of the park can be managed as general open space. Some trail use is possible along the old woods roads. The trails need to be carefully designed and maintained to prevent erosion. The park protects a key ridgeline in Kent and serves a valuable land use function. It is recommended that other ridgelines be given the same protection.

The major question involved with the park is the swimming pond. The pond is small. The current flow of water allows approximately 50 swimmers per day. Enlarging the pond without installation of chlorination and filtration systems does not seem warranted. Should such an enlargement be considered, it may be possible to create a larger feeder pond to increase the capacity.

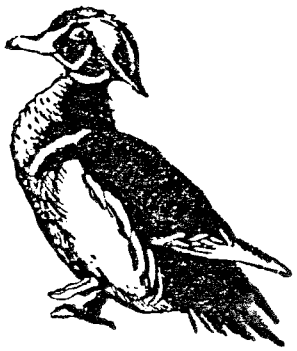
The water temperature is cold. The pond is fed by mountain streams and groundwater. It is also shaded by the mountains. Increasing the shallow water area may increase the solar impact and warm the pool. Another concern is the water quality. Silt from the upper watershed is found in the pool. Swimmers keep the sediment in suspension. Comments on correction and prevention of sedimentation include good watershed management, develop and maintain a good feeder pond/sedimentation basin system, and develop and maintain a proper pool.

RECREATION AND PLANNING CONSIDERATIONS

LIST OF APPENDICES

LIST OF FIGURES

INTRODUCTION



THE ERT PROCESS

Through the efforts of the Kent Parks and Recreation Commission and the King's Mark ERT, this environmental review and report was prepared for the Town. This report primarily provides a description of on-site natural resources, and presents planning and land use guidelines.

The review process consisted of four phases:

(1) Inventory of the site's natural resources (collection of data).

(2) Assessment of these resources (analysis of data).

(3) Identification of resource problem areas.

(4) Presentation of planning and land use guidelines.

The data collection phase involved both literature and field research. The ERT field review took place on April 4, 1988. Field review and inspection of the proposed development site 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. Mapped data or technical reports were also perused and specific information concerning the site was collected. 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 site's natural resource development opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT Coordinator for compilation into the final ERT report.

Figure 1

LOCATION OF STUDY SITE

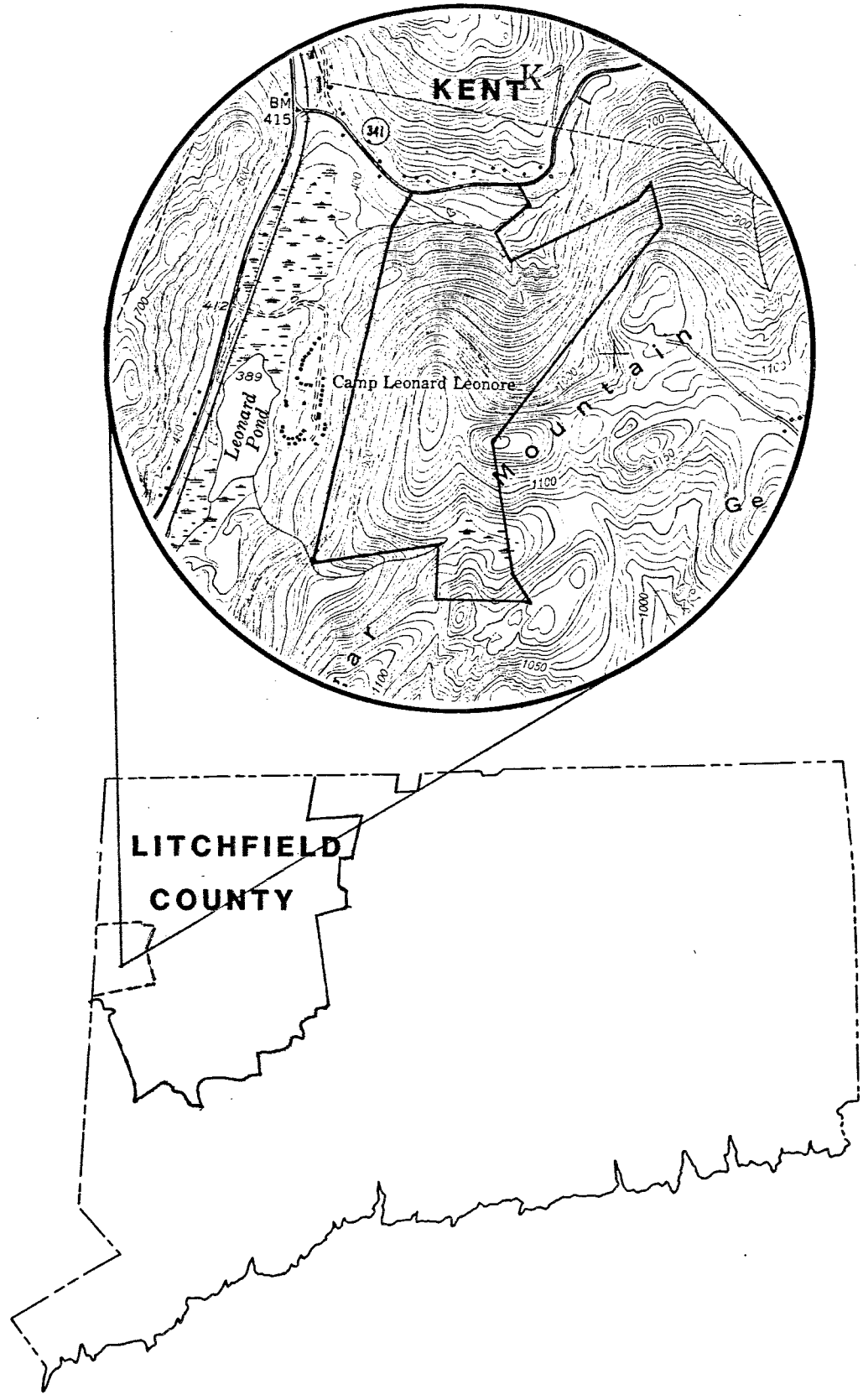
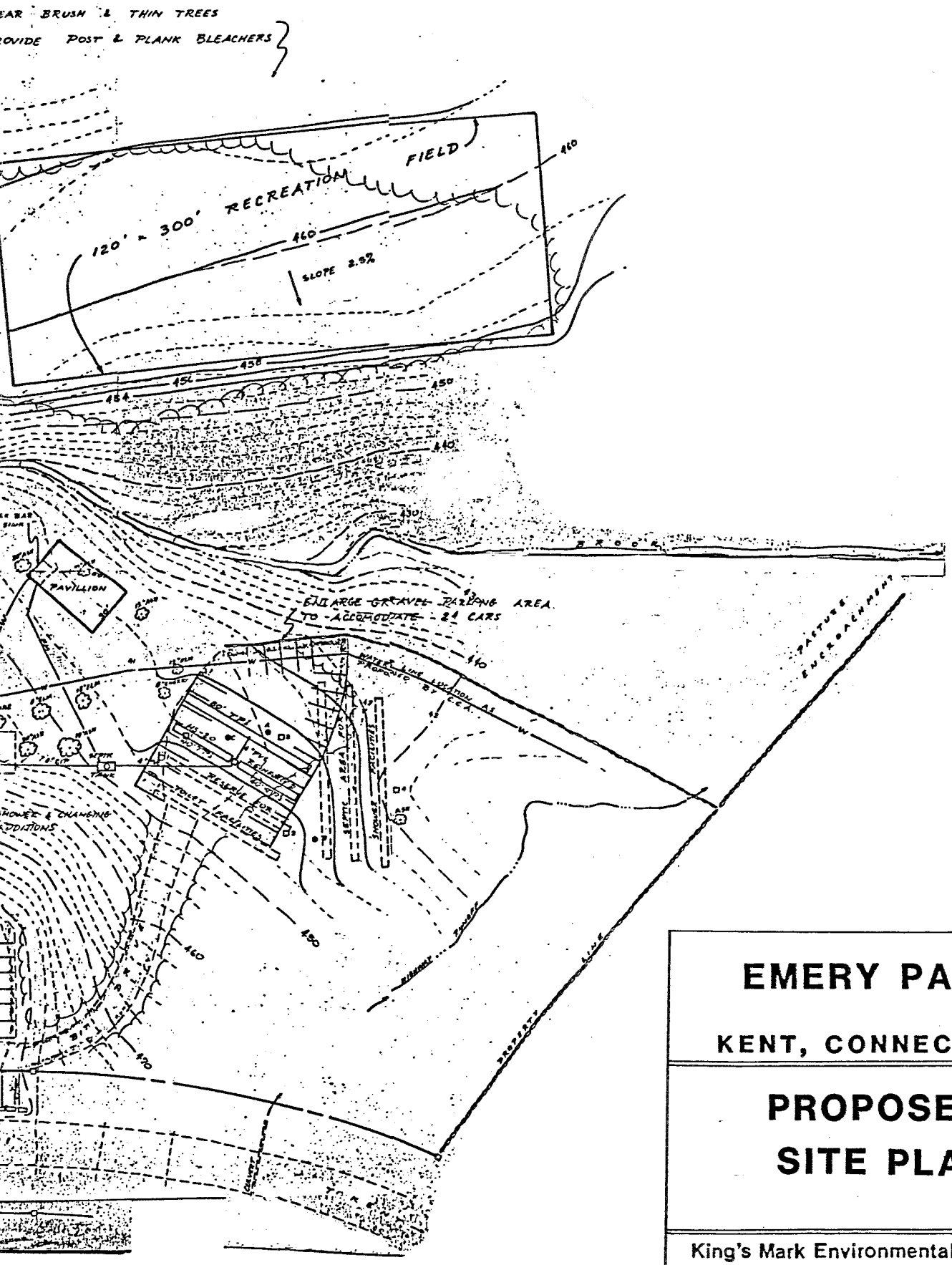


Figure 2



EMERY PARK

KENT, CONNECTICUT

PROPOSED SITE PLAN

King's Mark Environmental Review Team

0 80

The primary goal of this ERT is to inventory and assess existing natural resources occurring on the site as well as providing management guidelines. Specific objectives include:

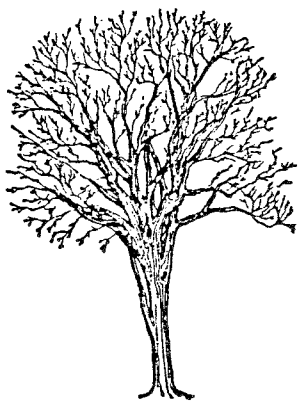
(1) assessment of the feasibility of the park for uses such as trails, sledding or crosscountry skiing;

(2) assessment of the utility of the existing swimming pond. Complaints include cold and dirty water. Assessment of alternative plans for the pond site;

(3) assessment of forest and wildlife management guidelines;

(4) assessment of the expansion possibilities for the park including sanitary facilities, parking and access to the property, picnic areas, trail system and recreational fields and playgrounds.

PHYSICAL CHARACTERISTICS



TOPOGRAPHY AND SETTING

Emery Park consists of an approximately 200-acre piece of town owned recreational land. It is located on the south side of Route 341 just over one mile southeast of the center of town. The site encompasses a rock cored hill locally called Segar Mountain. Bedrock is at or near ground surface throughout the parcel except at the northern limits. As a result, slopes on most of the site, which are largely rough and rugged, are controlled by the underlying bedrock. Flat to gentle slopes characterize the tableland of Segar Mountain and the northern limits. Maximum and minimum elevations on the site are 1,200 and 410 feet above mean sea level, respectively (see Figure 3). This represents a difference of 790 feet between the northern limit and central parts of the site.

Except for the area surrounding the swimming pond, the site is entirely wooded. The site is bounded to the north by Route 341, and to the east, south and west by private, undeveloped land.

The outlet stream for Kent Reservoir flows through the northern limits of the site enroute to Leonard Pond, Hatch Pond, Mill Pond and ultimately Housatonic River. Womenshenuck Brook is the outlet stream for Mill Pond. Several intermittent streamcourses occupy the topographic swales on the mountain sides.

GEOLOGY AND GEOLOGIC LIMITATIONS TO DEVELOPMENT

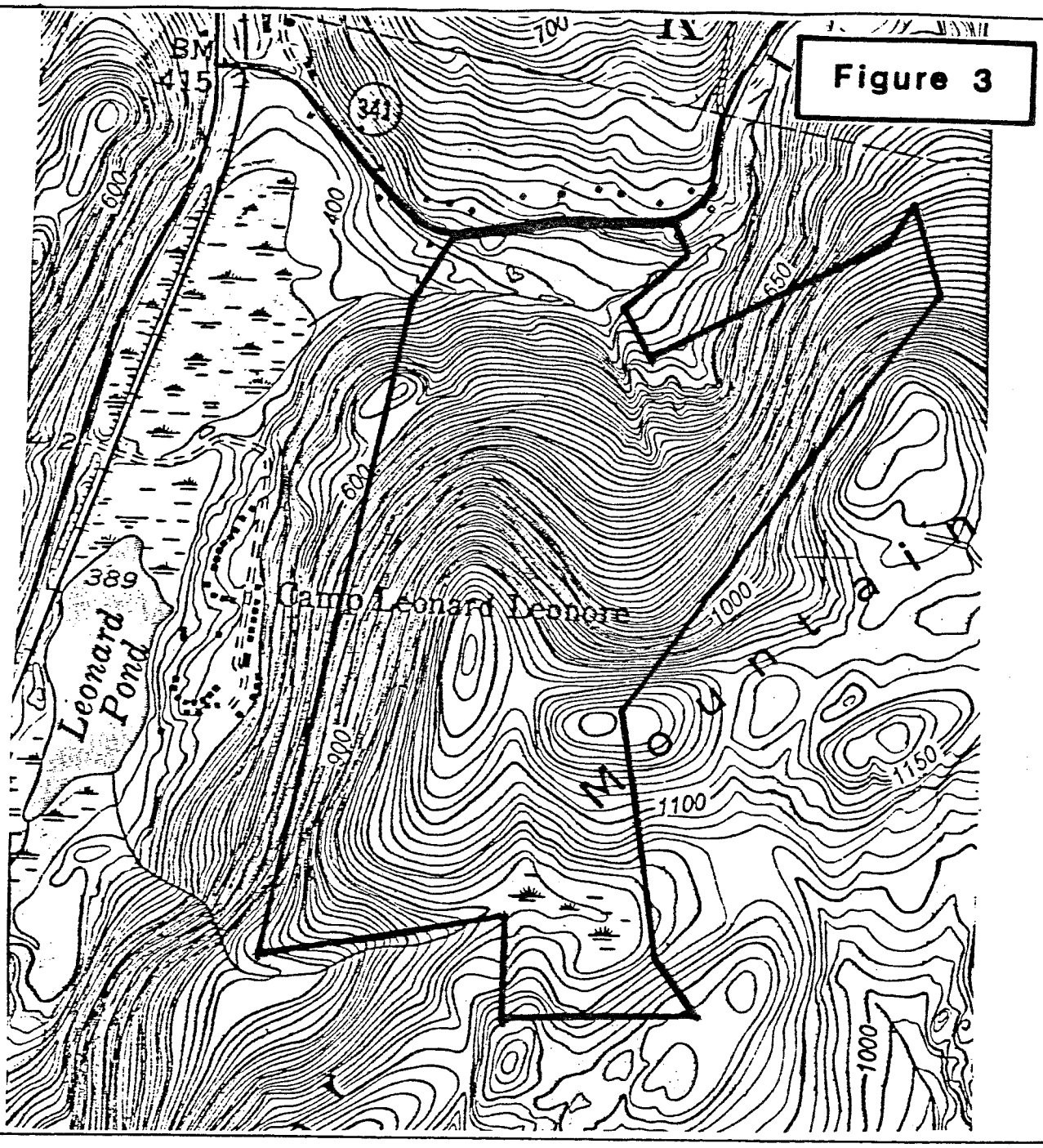
Emery Park lies entirely within the Kent topographic quadrangle. Neither a bedrock nor surficial geologic map has been published for the quadrangle. There is preliminary information for both maps on file at the DEP's Natural

Resource Center in Hartford. Also referenced are the Bedrock Geologic Map of Connecticut (Rodgers, 1985) and the Soils Survey for Litchfield County.

Emery Park in underlain by metamorphic rock, rock which has been geologically altered by great amounts of heat and pressure. The valley area for the outlet stream for Kent Reservoir (northern limits) is underlain by relatively soft marble rock. It is classified as the Basal Marble member of Walloomsac Schist, a dark to light colored schistose marble (see Figure 4). Because the marble is composed of minerals that are more easily susceptible to weathering processes than the minerals composing the surrounding schistose gneiss, bedrock outcrops are scattered and the topography more subdued. The remainder of the site is underlain by a dark gray to silvery, rusty weathering, coarse-grained schistose gneiss which contains amphibolite layers. Bedrock is at or near ground surface throughout most of the site. The terms gneiss, marble and amphibolite refer to metamorphic rocks. "Gneisses" are generally coarse-grained, foliated rocks characterized by alternating bands of light and dark minerals. "Marbles" are limestones or dolostones (composed of dolomite) that have been geologically changed (metamorphosed) by such forces as pressure, heat and chemical changes within the earth's crust. "Amphibolites" are dark metamorphic rocks chiefly composed of hornblende and plagioclase feldspar.

The underlying bedrock is a source of water to many homes in Kent (see Water Supply Section).

Except for the northern limits of the park, along the outlet stream for Kent Reservoir, the site is covered by a relatively thin blanket of a glacial sediment called till (see Figure 5). The till, which was deposited directly from a sheet of glacier ice, consists of a non-sorted mixture of clay, sand, silt, gravel and boulders. Although the glacial till on the site is generally thin, there may be some deep pockets that extend to 10 feet below ground surface.



EMERY PARK

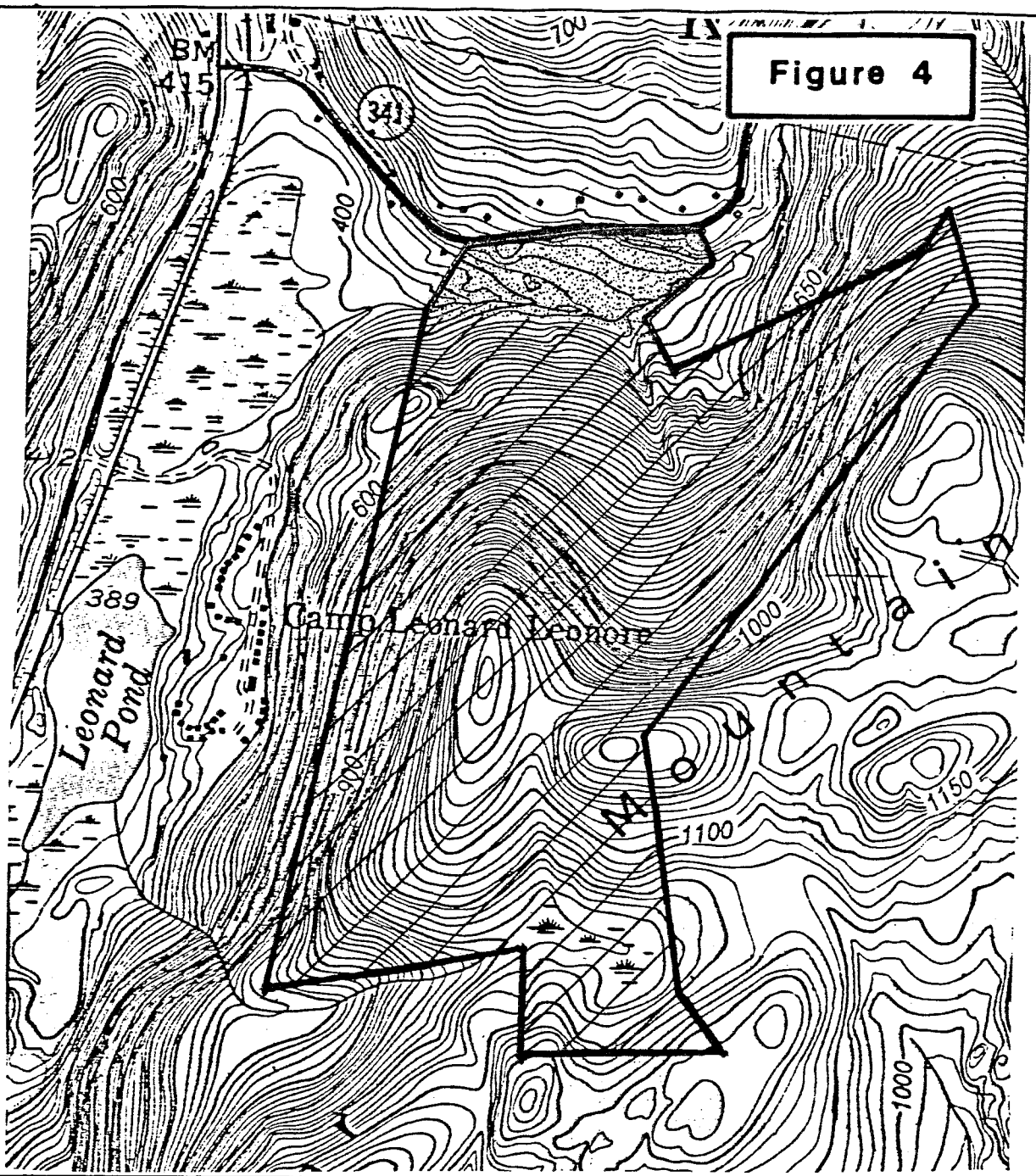
KENT, CONNECTICUT

TOPOGRAPHY

King's Mark Environmental Review Team

0 1000

N



BASAL MARBLE MEMBER OF WALLOMSAC SCHIST

DARK GRAY TO SILVERY, RUSTY WEATHERING, COARSE GRAINED SCHISTOSE GNEISS WHICH CONTAINS AMPHIBOLITE LAYERS

EMERY PARK

KENT, CONNECTICUT

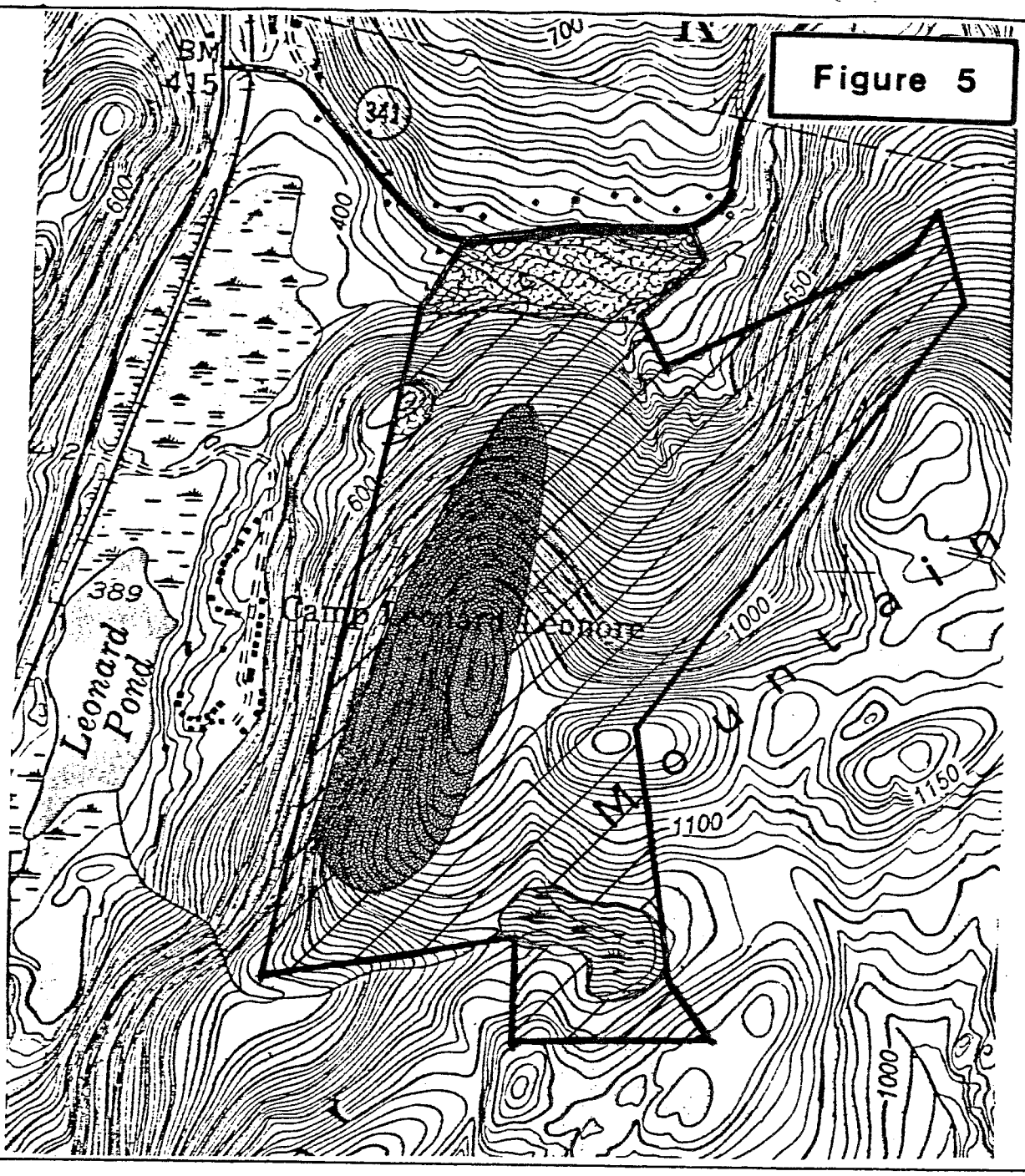
BEDROCK GEOLOGY

King's Mark Environmental Review Team

0 1000

N

Figure 5



STRATIFIED DRIFT

TILL (GENERALLY SHALLOW, 5' OR LESS)

PEAT AND MUCK

ROCK OUTCROP AREA

EMERY PARK

KENT, CONNECTICUT

SURFICIAL GEOLOGY

King's Mark Environmental Review Team

0 1000

N

Overlying bedrock and till at the northern limits are another type of glacial sediment composed mainly of varying amounts of sand, gravel, silt and clay. These deposits, called stratified drift, were formed by the transportation and deposition of glacial rock debris by meltwater flowing from stagnant ice. Sand and gravel are typically the major components of stratified drift. These deposits are probably less than ten feet thick, but like the till they may be thicker in some places.

A relatively large wetland area composed of decayed organic materials (peat and muck) mixed with minor amounts of sand, silt and clay is located at the southern end of the property. At some time in the past, this wetland area was probably a wet basin whose bottom is controlled by the underlying bedrock. Over time, this large basin filled with sediments and vegetation leading to the present swamp. Swampy areas like this one are important in regulating streamflow. They collect and absorb excess runoff and its sediment load, and following periods of rainfall, they act as reservoirs draining slowly into streams. Swamps would also be expected to provide equally valuable ecological benefits.

Team members were asked to evaluate the Park in terms of active and passive recreational uses. From a geological standpoint, the only area moderately favorable for active recreational uses (i.e. ball fields and swimming pond) is at the northern limits. It appears that slopes and soils in the area delineated as Tg on the soils map could support one or two small playing fields (i.e. soccer, softball, etc.) with some grading. The area around the present swimming pond could also be used for playground equipment, play scapes, swings, etc.

The remainder of the site holds little value for active recreational uses mainly due to shallow soil, steep slopes, bedrock outcrops and numerous drainageways. The tableland of Segar Mountain is flat but one would need to

traverse nearly 1/2 mile of rough terrain to reach it. On the other hand, this part of the site has high passive recreational potential such as hiking, cross country skiing and picnicking. The flat area at the top of Segar Mountain could be used for a rest area and picnic area for hikers. It seems likely that areas of steep and precipitous slopes will limit certain hikers and cross country skiers. Hiking trails should be kept well maintained, especially on the moderately steep to precipitous slopes. Failure to maintain this critical area may result in severe erosion problems and become impassible or a hazard for hikers. It is suggested that if hiking trails are created throughout the park, they be maintained on a regular basis.

WATER SUPPLY

Emery Park will be served by municipal water from the Kent Water Company. As a result, there is no need to develop an on-site well. If such a need existed, it seems likely that the underlying bedrock would be the principal source of water to a drilled well. Bedrock is commonly capable of supplying small but reliable yields of groundwater to individual wells. Groundwater moves through bedrock by way of an interconnected fracture system. Most wells that penetrate 150 to 200 feet of bedrock will intersect enough fractures to supply at least 2 or 3 gallons per minute. Some wells, however, fail to intersect any water-bearing fractures. There is no practical way of predicting whether any particular location will be good for drilling a well.

Very few wells in bedrock can be expected to yield 20 gallons or more per minute. However, if the total daily demand for water is only 1,000-2,000 gallons per day, a relatively low-yielding well can adequately serve a supplemental need, if one was desired for Emery Park.

The quality of the groundwater would be expected to be generally good. The bedrock underlying the site may contain a relatively high percentage of iron-bearing minerals. The water extracted from the marble bedrock may be hard which means soap does not lather, plumbing fixtures contain insoluble residues and plumbing fixtures and heating units may become encrusted with mineral scale. Some undesirably high concentrations of iron or manganese may occur in well water drawn from the site, but there are several types of filters available to combat this problem.

SEPTIC SYSTEMS

Based on information supplied to Team Members on the review day which included correspondence from the project engineers and State Health Department, the soils at the northern end of the site appear to be favorable for on-site sewage disposal. The latter is based on an estimated number of 165 persons using the toilet facility and pavilion on a daily basis. Further soil testing and/or the construction of the sewage disposal system should be coordinated closely with the Torrington Valley Health District.

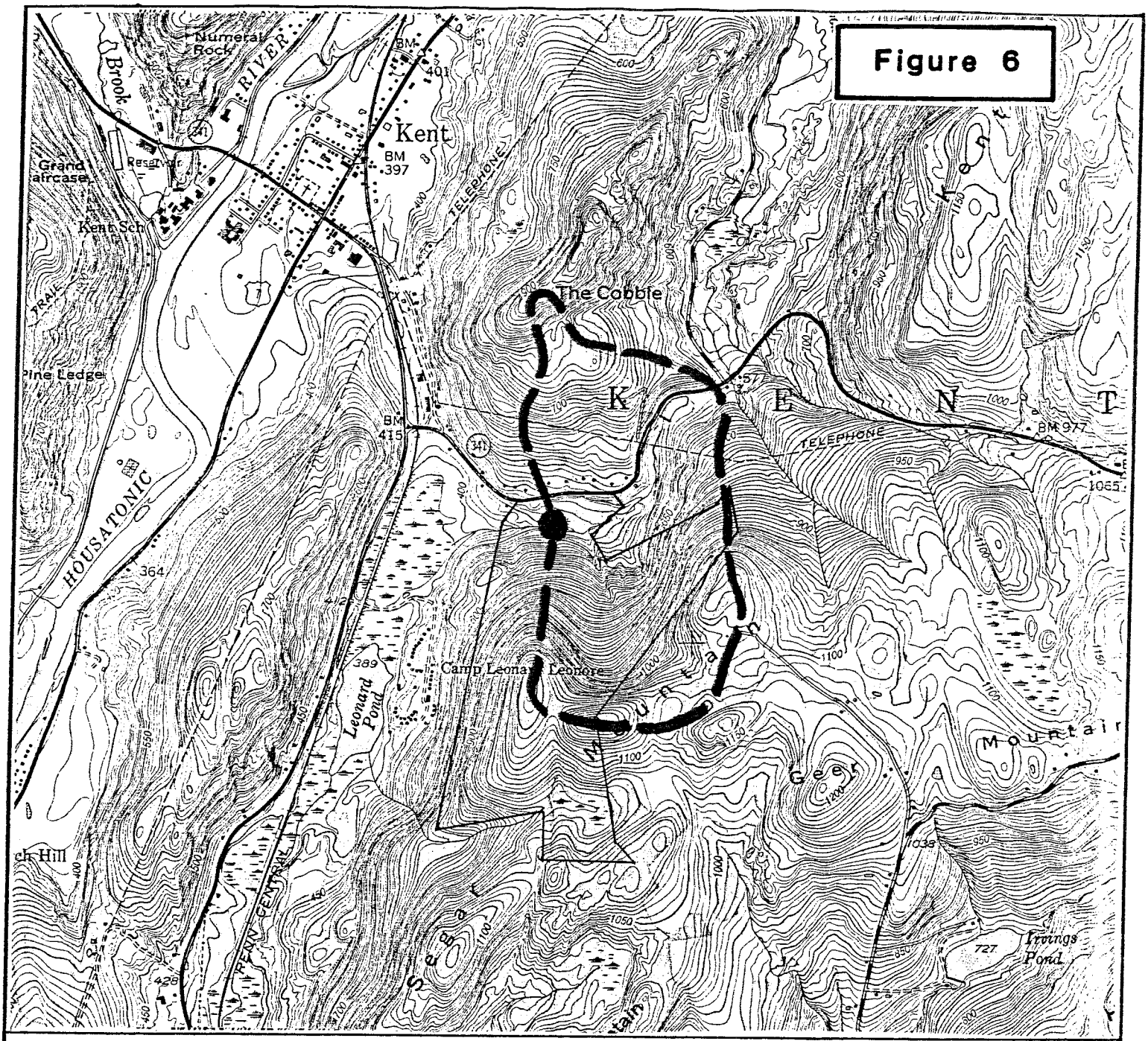
HYDROLOGY

Emery Park lies entirely within the watershed of the unnamed stream that flows out of Kent Reservoir, Leonard Pond and Hatch Pond. It ultimately flows into Mill Pond, whose outlet stream, Womenshenuk Brook, is a tributary to Housatonic River. The total watershed area for Womenshenuk Brook at its point of outflow to Housatonic River, which includes the unnamed streamcourse flowing through the northern parts of Emery Park, is 9.28 square miles or approximately

5,940 acres. The term watershed refers to all the land areas from which ground or surface water ultimately enters the streamcourse. Based on visual observations and air photos of the property, several intermittent streams flow down the steep slopes on the site. Groundwater flow on the site greatly reflects the surface water flow.

Town officials asked Team members several hydrologic questions regarding the swimming pond and its feeder pond located within the Park. Most questions cannot be answered exactly, because bathymetric information is not available for either surface water body. Nevertheless, estimates were made based on some broad assumptions. First, it is understood that the swimming pond on the site is fed by a small man-made pond that diverts water from the outlet stream for Kent Reservoir. From point of outflow (man-made feeder pond), it is estimated that a land area of about 312 acres or about 1/2 a square mile drains to the pond (see Figure 6). This assumes surface and groundwater flow from the land north of Route 341 is fed into the feeder pond. There is a chance that water may be diverted from the pond via road drainage along Route 341. Based on a computerized planimeter, it is estimated that the swimming pond is about .2 acres in size. There is no bathymetric information available for the ponds. If it is assumed that average depth of the ponds is about 4 feet, then it is estimated that there is approximately 250,000 gallons of water in the pond. Again, it must be understood the above figures are only estimates.

Based upon the above figures, it is now possible to assess the potential of the swimming pond for bathing. 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: $N=\frac{(V/180 +F)}{1000}$,



WATERSHED BOUNDARY

POINT OF OUTFLOW FOR THE FEEDER POND

NOTE: ENTIRE SITE ULTIMATELY DRAINS TO WOMENSHENUK BROOK

EMERY PARK

KENT, CONNECTICUT

WATERSHED BOUNDARY

King's Mark Environmental Review Team

0 2000

Another question was about the amount of water flowing out of the man-made pond on the site. Although there is no gaging station for the outlet of the pond, it is possible to estimate the mean annual outflow from the contributing watershed at the point of outflow of the pond by using a method outlined in Connecticut's Department of Environmental Protection Bulletin No. 35 Streamflow Information for Connecticut with Application to Land-Use Planning by Michael A. Cervione, Jr. The mean annual outflow from the pond is estimated to be about .75 cubic feet per second (cfs) or .49 million gallons per day. This equates roughly to 337 gallons per minute. The estimated flow duration characteristics of the outflow stream are tabulated in Appendix A in units of both cubic feet per second (CFS) and million gallons per day (MGD).

SOIL RESOURCES

Emery Park is divided into two distinct sections by land use and soils. The developed portion of Emery Park is concentrated along the small section at the base of the hill. The soils in this developed section are generally gently sloping soils formed over sand and gravel deposits. These soils have the fewest limitations for recreational development. The soil drainage ranges from poorly drained to excessively drained in this section. Soil drainage is probably the most restricting soil feature in this area. The Limerick (Lm) and Raynham (Rc) soil series are both poorly drained, having a high water table most of the year. The Limerick soil is also likely to flood. The use of these soils is regulated by the Inland Wetlands and Watercourses Act.

The Terrace Escarpment (Tg) is limited for use mainly due to the steep slopes. The soils in the Terrace Escarpment as well as the Merrimac soils (MyB, MyC) are all excessively drained and may be droughty. This droughtiness will affect the choice of vegetation cover.

The upland section of Emery Park is undeveloped. Two dominant soil characteristics restrict development of this section. They are steep slopes and shallowness to bedrock. Access to the undeveloped portion is also restricted due to these soil features. Some passive recreation and forestry is feasible in this area if erosion controls are employed.

There is a large area of Muck (Pm) soils in the southeast corner of the property. This unique organic swamp deposit is very poorly drained. Its use is regulated by the Inland Wetlands and Watercourses Act.

The soils on the property have been mapped in the Soil Survey of Litchfield County, Connecticut. This map is shown in Figure 7. A brief description of the soils is given in the Appendix B.

Use of the Soils for Recreation

The dominant use of Emery Park is recreation. Several types of recreational activities have been proposed. The following comments refer to the potential of the existing soils for these proposed activities.

Swimming Area: The existing swimming area is a rock lined pond approximately 140 x 60 x 4 ft. in size. This pond holds approximately 250,000 gallons of water. It is fed by a 6 inch pipe from a feeder pond. The feeder pond is approximately 40 x 60 x 4 feet deep. The feeder pond holds approximately 70,000 gallons. The submerged 6 inch pipe between the ponds could allow approximately 1 cubic foot per second (cfs) to flow between the two ponds.

The feeder pond is being filled with sediment. A USDA Soil Conservation Service report to the Kent Parks and Recreation Commission, 9/14/84 states there are two possible potential sources for this sediment. One is that the pond was constructed and located on a Limerick silt loam, a floodplain wetland. The stream above the pond meanders quite heavily through this band of

soil which stretches up to the Kent Reservoir. It is not uncommon for this type of stream to erode its banks during flooding stages and deposit the sediment downstream. The other possibility is that the sediment came from the drained reservoir.

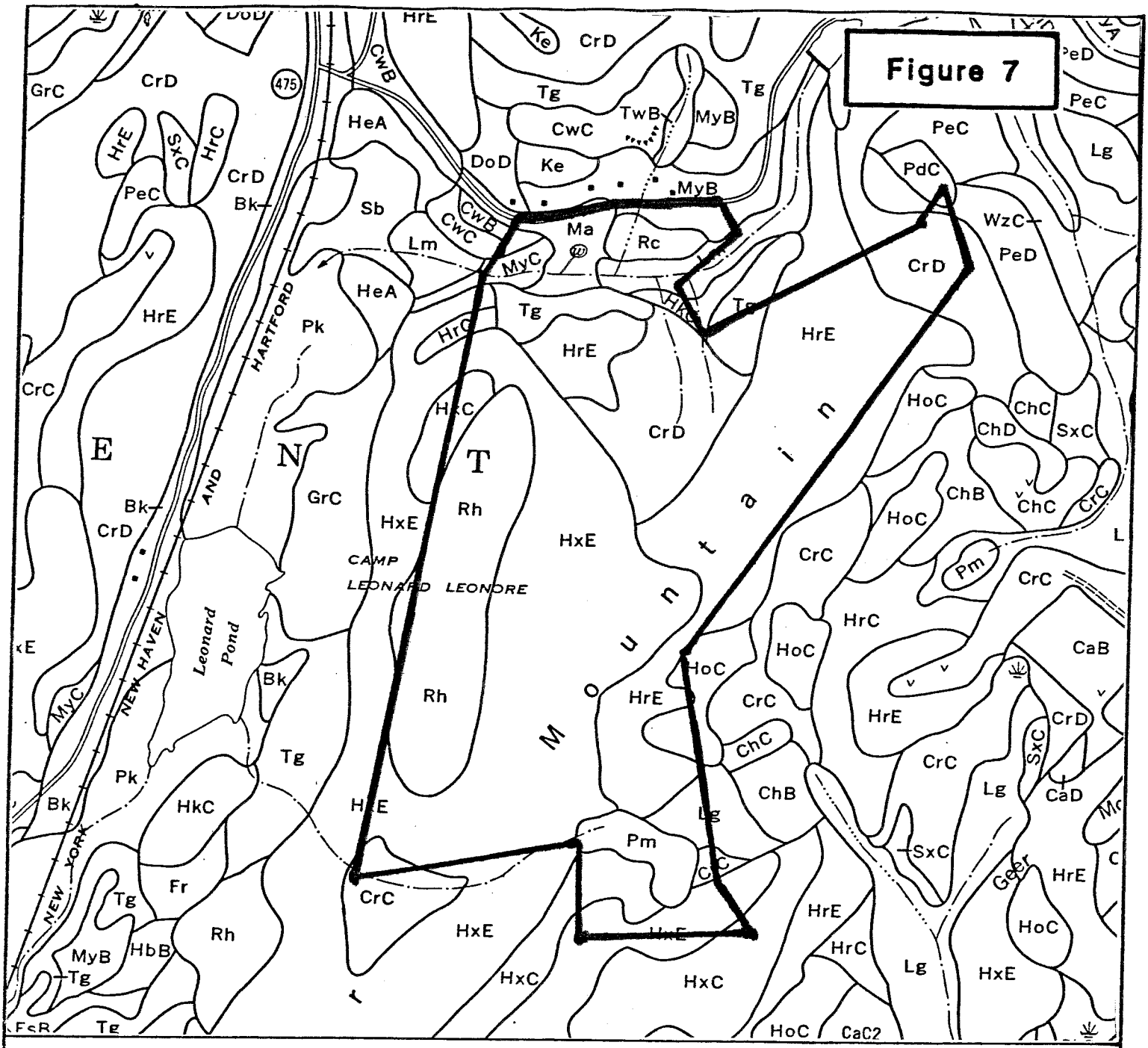
It is quite possible to clean out the holding pond, but since there is little room for heavy equipment to operate this would be quite expensive. Dredged material from the feeder pond should not be placed in the stream or wetland area. Dredged material may be suitable fill for the existing playing fields.

Instead of having the main stream flow into the pond, the report suggested that the holding pond be made into a bypass pond. This can be done with a 4 inch pipe draining off the flow from the stream and thereby reducing the amount of sediment into the pond. Also the inflow pipe draining water from the holding pond to the swimming pool can have a gravel (pea stone) envelope surrounding it thereby reducing the sediment into the pool.

Water seeps out of the ground at the toe of the slope, adjacent to the swimming pond. This water makes the ground adjacent to the pond muddy, and difficult to maintain. Subsurface drainage pipe (4 inch diameter perforated plastic pipe) could be installed around the swimming pond to drain this area.

It appears that a water line has broken underground near the existing changing house. Water is flowing out of the ground in this area. The line should be dug up and repaired.

Playing Fields: The existing playing field is approximately 120 x 300 ft. in size on a 2.5% slope (Carrocao-Covill and Assoc. plan, 12/83). A grassed buffer strip area will be needed along the perimeter of the sports playing area. The dimensions for playing fields with and without buffer strips are shown in Appendix G. To accommodate a touch football field the existing field



Lm - LIMERICK SILT LOAM *
Ma - MADE LAND
MyB - MERRIMAC SANDY LOAM, 3 TO 8% SLOPES
MyC - MERRIMAC SANDY LOAM, 8 TO 15% SLOPES
Rc - RAYNHAM SILT LOAM *
Tg - TERRACE ESCARPMENTS
CrD - CHARLTON VERY STONY FINE SANDY LOAM, 3 TO 15% SLOPES
HoC - HOLLIS ROCKY FINE SANDY LOAM, 3 TO 15% SLOPES
HrE - HOLLIS VERY ROCKY FINE SANDY LOAM, 15 TO 35% SLOPES
HyC - HOLYOKE VERY ROCKY SILT LOAM, 3 TO 15% SLOPES
HxE - HOLLIS EXTREMELY ROCKY FINE SANDY LOAM, 15 TO 35% SLOPES
Pm - MUCK, SHALLOW *
Rh - ROCK LAND

* WETLAND SOILS

EMERY PARK

KENT, CONNECTICUT

SOILS

King's Mark Environmental Review Team

0 1000

N

5) Grass cover is established or feasible to establish on slopes.

6) An area is available at the base of the slope that is suitable for a run-out. A berm may need to be constructed along the stream for safety.

7) Access roads, parking areas, domestic water supply, sewage disposal facilities and electric power exist or are feasible to develop.

8) No unusual hazards or nuisances exist.

Cross country skiing may be feasible on some of the wood roads and potential hiking trails. Switch-backs on hiking trails and steep slopes may prohibit use of portions of these trails for cross county skiing.

Sledding and tobogganing are also feasible on Terrace Escarpment slope. The following list indicates the ideal features for a sledding hill location:

1) Slopes have a minimum grade of 15%.

2) Sites have a minimum vertical rise of 50 feet.

3) Sites have a minimum usable slope length of 300 feet.

4) The direction of slope to depend on average local snow accumulations. (North and east slopes have more snow, but south and west slopes have better crusting.)

5) A suitable area is available at the base of the slope for a run-out. A berm may be needed along the stream.

6) Site is less than 1/2 mile from a residential neighborhood.

7) Grass cover is present or can be established.

8) No uncontrollable hazards or nuisances exist. (Special attention shall be given to slopes over 20% that face south or west where crusting could cause hazardous conditions.)

The use of snowmobiles is generally unsuited to Emery Park due to the steep slopes, stoniness and bedrock outcrops found in much of the property.

Trails: The steep terrain and stoniness severely limit the type of trails constructed on-site. Trails for use by bicycles, horses and motorbikes are generally unsuited to the currently undeveloped portion of Emery Park due to the steep slopes.

Walking and jogging trails are feasible in the currently developed area of Emery Park where slopes are not steep. Jogging trails should have very little grade, surface with no loose stones, no unevenness and marked distances (1/2, 1, 1-1/2, 2 miles, etc.). Walking trails are also suitable in the undeveloped areas. The haul roads and skid trails from the proposed logging operation should be incorporated into any proposed trail system. Walking trails should be 2 to 4 feet in width where feasible.

As a general guide, trails should not exceed a grade of 15% except in extreme cases. Stretches exceeding 15% should be kept as short as possible. Switch-backs will be needed in steep areas to reduce trail slope.

Safe crossings must be provided where trails cross streams, ditches, swamps and other similar areas. Facilities must be provided for surface water disposal on all trails. Water bars should be placed at least one every 100 feet, unless the natural grading sheds water off the trail. The overhead clearance for walking trails should be 8 feet.

The northern and eastern portions of Emery Park are generally better suited to the construction of walking trails. The Rh and HxE soils found dominantly in the southwestern portion of the property are generally unsuited for trail construction due to steep slopes, stoniness and bedrock outcrops.

Emery Park could be enhanced as an outdoor education center through the construction of nature trails. Nature trails are indirect, leading through a variety of interesting conditions. They are usually one-way ending in the same general location as they start or in the form of a figure eight that permits using only part of the trail.

Several themes for nature trails are possible in Emery Park. These are indicated in the following list:

1) Geology Trail: Helps to explain the composition of the earth's surface and how its various features were developed. It contains a geology wall which is simply a stone wall topped by large specimens of the principal rocks and minerals found in the area.

2) Brook Trail: Follows the stream to point out such things as the action of water as a soil builder, the power of water in soil erosion and importance of the surrounding watershed. It illustrates several types of habitats for plants and animals and leads past such watery environments as rapids, slack water and pools.

3) Water's Edge Trail: Follows along the edge of the pond and points out the transition between land and water. The trail could go around the body of water and over it by means of a raised walkway and bridge which would permit extensive observation without destruction of the habitat.

4) Wood Trail: Shows the natural steps in plant succession, particularly from the open area into the forest. It also leads past forest types which exhibit certain characteristics of light tolerance.

5) Timber Trail: Points up the importance of natural forest cover in watershed protection - also mature and straight trees as producers of lumber. Trail should lead through areas under forest management. Signs could explain the importance of forest protection and the effects of shade, humidity and temperature upon forest growth.

6) Soil Trail: Chiefly designed to illustrate the various factors in the formation of soil. It also shows the effects of thawing, freezing, and weathering on soil. It shows how lichens, mosses, ferns, grass, shrubs, trees and animals affect the soil and are related to it.

7) Marsh Trail: A trail that takes the visitor alongside and through as well as over a marsh (Rc or Pm soil areas). The latter can be done by a footbridge. Through proper signs, or explanation by a guide, the story of the relationship of land to water levels can be told.

8) Historical Trail: This trail takes advantage of such man made activities as the charcoal pits, old fire places and camp areas. It relates the history of the area to man's use of the local natural resources. Some experts who would know more about setting up a historical tour are: David Poirier, Connecticut Historical Committee, 566-4337 and Nicholas Bellantoni, State Archaeologist, 486-4194 or 486-4460 at museum.

9) Combination Trails: Includes several of the trails described above.

Site Access and Parking

The upper parking area appears to be in good condition and could accommodate up to 41 cars (Carroccio-Covill Assoc. plan, 12/83). The access road to the lower parking area is steep. A gate may be useful to keep cars out

of the lower parking area during winter months when ice many cause hazardous driving conditions.

The current proposals for Emery Park show 3 to 4 crossings over the stream: 1 for cars and up to 3 for foot traffic. This number of crossings could cause an excessive negative impact on the stream. Each permanent crossing would involve bank disturbance, filling and stream constriction. Having 1 major crossing for logging trucks, service vehicles and foot traffic, with a seasonal crossing at a second location, would cause less damage to the stream corridor. Erosion and sediment controls should be used during all construction activities adjacent to the stream or wetlands. No fill material should be placed in the stream or wetland areas.

A report from the USDA Soil Conservation Service (SCS, 3/1/84) to the Kent Parks and Recreation Department states that a 72 x 44 inch corrugated metal pipe arch with a 6 foot high stone headwall could be used as a suitable stream crossing. The headwalls should have a slope of 1-1/2:1. The length of pipe needed is 35 ft. This size culvert should carry a 25 year, 24 hour storm event.

POND AND WATER RESOURCES

Carroccio-Covill & Assoc., Inc. proposal to drain and fill the wetland northeast of the two ponds in Emery is potentially detrimental to water quality in the park itself and to downstream surface and groundwater. Because this is a GA groundwater area and the municipal wells are less than 1/2 mile downstream, any action taken at this site should be carefully reviewed for its impact on water quality. The wetland is acting as a filter to clarify runoff from the very steep watershed and serves a critical function.

Existing water quality in the swimming pond has been tested for bacteria levels by Dr. Peters of Kent for the past 3 years, and found to be safe for swimming. The clean water is probably due to the cold temperatures and the source of water from mountain springs, as well as to the filtering through the wetland. Limited water clarity has been a subject of complaint by some swimmers. This could be caused by silt coming into the pond from the feeder pond upstream and kept in suspension by swimmers. Dredging of both the feeder pond and swimming pond should help to clarify the water. This could be accomplished most efficiently after dewatering the ponds. Raising the elevation of the invert of the intake pipe in the feeder pond and adding a circular weir to remove sediments should keep the swimming pond water clearer. Surface runoff from the steep banks surrounding the swimming pond should be redirected so that nothing runs into the pool from the lawn.

The dissatisfaction with the cold water temperature is harder to address. Slowing the flow of water so that the water has time to warm might help, but could cause deteriorated water quality. The best possibility for warming the pool water might be to consider how to make use of ambient air temperatures and solar heat. Consideration might be given to adding a concrete spillway for the water to flow over for the last portion of its route from the feeder pond to the swimming pond. This would expose a broad sheet of water to the air and to the sun-heated concrete before it entered the pool. Also the feeder pond might be used as a heat exchanger. Cut any trees around this water body which might shade it so that the sun can warm this water, taking care to prevent erosion into the pond. Cutting any trees which shade the swimming pond and constructing wind baffles and sun reflecting fences, could warm the air around the pool. The Park and Recreation Commission's idea for directing water flow

around the perimeter of the pool to better mix the shallow and deep water should help warm the water and provide cleaner water for the shallow end of the pool.

Concerning the insect nuisance around the pool, the best system for control is to encourage natural predators by building bird and bat houses (see Appendicies H and I). This provides both a day and a night shift for reducing the insect population. This might take care of the insect problem and make pesticides unnecessary.

If these and other ideas do not make the swimming more pleasant and the facility more utilized, and an artificial, chlorinated pool is decided upon, the following are suggested:

1) Keep the pool in the same area. Many people will continue to use the park only for swimming and the convenience of having the pool near the road and the parking lot is important. Those with families and many things to carry, as well as the elderly and handicapped would be best served by this location.

2) Raise the surface of the water to be level with the banks surrounding the present pool or bulldoze the banks so that the steep slopes down to pool level are eliminated. In addition to convenience, this would eliminate surface runoff into the pool and the soggy surroundings now present.

3) Another very important reason is economy. Building the pool on the far side of the brook would involve massive bridge, road and parking lot construction according to the proposal. It should not be necessary to spend all the money derived from the logging operation on an oversized, unneeded bridge.

Another very important consideration at Emery Park is the conservation of environmental values now present in the park. The wilderness setting, the clean, free flowing brook and the large level field, all valuable assets, would be badly impacted by building across the brook. Given the small drainage area and extremely steep gradient of this park, erosion and sedimentation would be severe problems if proposals to build a large bridge, structures and a pool on the far side of the stream were carried out. The Town Conservation Commission

and the Inland Wetland Commission should be consulted on the advisability of any of these plans. If a simple, one lane bridge could be built for service vehicles only, the park would maintain its assets in better condition. Foot bridges should be built to accommodate baby carriages, wheel chairs, skiers and walkers so that those using picnic areas, changing houses, playing fields, trails, etc., would have adequate access to that side of the park.

If a chlorinated pool is installed, a major concern is the question of water disposal if it becomes necessary to clean or repair the pool. The DEP Water Compliance Unit suggests discontinuing addition of chlorine or other pool chemicals and running the circulating pump until levels of residual chlorine drop below detectable limits when tested by either an empirametric titrator or the DPD method. The Sewage treatment plant operator should have the equipment and expertise to do these tests. The rate of flow from such a discharge should not add more than 10% to the brook flow.

Another question at the field review was the possible use of sewage sludge to encourage better grass growth on the playing field. Contact person at the Department of Environmental Protection is Simon Mobarek, Water Compliance Unit, 165 Capitol Ave., Hartford, CT 06106 (566-3282). He would need to have the proposal in writing with a map of the location, names of receiving waters in drainage area, date of proposed action, contractor's name and control method to prevent runoff. Even though Kent may have sewage relatively free of hazardous materials, the fact that the field is in a GA groundwater area and directly over a brook, makes the chances of a positive response to this proposal very slim. The health considerations of having sewage sludge on a field where children play should also be considered.

Comments about some of the other proposals for Emery Park, considering their impacts on water quality, include:

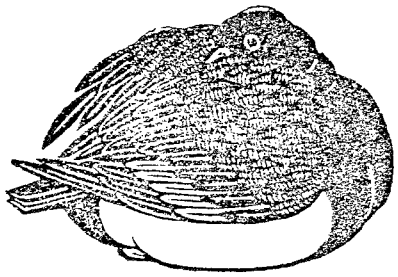
1) The snack bar sink is 4 feet below the septic tank level. The septage would need to be pumped to tank. It might be better to raise the location of the snack bar to allow gravity flow.

2) Leach field as shown in Carroccio-Covill and Assoc., Inc. 1983 plan will need to be carefully planned. Flooding by runoff from the very steep driveway could cause flushing of septic field directly into brook.

3) Winter use of lower parking lot would necessitate use of much salt and sand on the steep driveway. The runoff of these materials over the frozen ground and into the brook needs to be prevented. Winter parking at road level only might be a better option.

Although many of these comments seem to be negative, the time to prevent environmental degradation is before action is taken. The water systems at Emery Park are particularly fragile due to very steep slopes, the small drainage area and the critical water use downstream. Making the best use of the Emery Park environment may mean doing a minimum of ground disturbance.

BIOLOGICAL RESOURCES



WILDLIFE CONSIDERATIONS

Description of Area/Habitats

Emery Park is approximately 200 acres in size. The majority of the area is composed of mature hemlock cover. There is some open area near the north end of the property, near Route 341, which is used for recreational purposes. Areas of mixed hardwoods and hemlocks occupy some of the lower slopes of the area. There is a small unnamed brook which flows through the area. At the very southern end of the property is a small wooded wetland area within the hemlock forest.

There are two ponds in the park. The feeder pond is used to divert water from the brook to feed the concrete swimming pool or pond. Because both the brook and the feeder pond are within the recreation area which would receive high use, their usefulness to wildlife is probably limited. The feeder pond is also very small which would further limit its usefulness. The concrete swimming pond would serve recreational needs only.

The park occupies a level area off of Route 341 and rises to encompass the top of a ridge which forms part of Segar Mountain. The majority of the area is steep and rugged. There are numerous boulder and rock outcroppings within the hemlock forest. Small streams cascade down through some of these rock outcroppings on the westerly side. From the southwestern portion of the property there is a good view of the ponds and hills to the southwest. Aside from its value to wildlife, the area does have aesthetic appeal.

Primarily, the area currently offers mature hemlock habitat to those species which specifically require this type of habitat and those which use habitat to satisfy some of their requirements for food, water, shelter (cover) and space.

Wildlife Habitat/Recommendations

Habitat is said to be that complex of vegetative and other physical features (i.e. brooks, cliffs, den trees) which satisfy the needs (food, shelter, water and space) of a species or population.

A habitat for a species may consist of a single vegetative or cover type such as grassy clearings for meadow voles or a mature mixed stand for gray squirrels. In general, most species require a diversity or variety of cover types in order to best meet their requirements.

Although the area encompassed by Emery Park itself may lack a diversity of cover types, it does have value as habitat for wildlife. An area such as this should be looked at in relation to the surrounding area and the types of habitat offered there. On a large scale, a variety of habitats (i.e. wetlands and open fields) are available outside the park that would be useful to wildlife, especially highly mobile species. For mobile species such as deer and turkey, the hemlock stand offers excellent cover, and the younger hemlock stand is a source of browse for the deer at various times of the year. Except for the small developed recreational area close to Route 341, the majority of the area at this time receives little use from humans because of the undeveloped trail(s), an absence of roads for vehicles and the rugged terrain. There appears to be little disturbance to wildlife at this time.

Some species of wildlife, while perhaps not highly mobile, are able to derive all or almost all of their habitat requirements from one habitat type, as is found in Emery Park. An example of such an association with a conifer (evergreen) stand is the golden-crowned kinglet, which could nest and feed there. Another example, the red squirrel, could possible derive all of its requirements from the type of hemlock forest habitat found in Emery Park.

In general, a greater diversity of wildlife could be encouraged to use the area if more habitat types were found there. Because of the natural limitations of the property, habitat enhancement work would probably be limited to the creation of some openings within the forest. These openings could be made in conjunction with the planned forestry cuts being recommended by the forester.

A small patch clearcut (one-half to two acres, linear and irregular in shape if possible) would remove all of the trees in the area and allow sunlight to reach the forest floor. This would encourage the growth of both plant and tree species dependent on full sunlight for growth. The diversity of vegetation which could be expected to grow up in these areas would include blackberry, pokeweed, birch, cherry and sugar maple. The early successional vegetation provided in these openings would provide both cover and food for a variety of wildlife such as birds, turkey and deer.

If forestry cuts are made, snag trees (dead trees) and den or cavity trees (trees with a hole in them) should be preserved if at all possible. Snag trees are a source of insects for insect eating birds such as woodpeckers. Den or cavity trees are trees with a hole in them which can provide a nesting place for birds such as owls and woodpeckers or a den for a species such as the raccoon.

The remaining hemlock stand would continue to provide cover and/or food to those species that utilize it on a continual basis or intermittently. Species such as turkey vultures, ruffed grouse, deer, certain raptors and many songbirds use conifers as preferred roosting and/or loafing cover. Some species such as the mourning dove, goshawk, sharp-shinned hawk and robin may frequently use hemlock stands for nesting. Snowshoe hares and ruffed grouse utilize stands of conifer for cover.

Hemlock stands can also provide food for a variety of wildlife. The foliage of hemlock is eaten by deer and porcupines. The small winged seeds are important food for the pine siskin, the crossbills and several rodents including the red squirrel.

Conifer stands such as this area of hemlock, satisfy a variety of needs and possess value to wildlife. How much value they possess is dependent of conifer species, age (or height) of the stand, stand size, configuration and juxtaposition to other habitat elements (diversity of habitats). Regeneration of the hemlock should be encouraged where and when possible in order to provide hemlock for future use by wildlife. The hemlock forested area could be more valuable if there were patches of young conifers (which would typically be shorter and provide cover close to the ground) interspersed with the more mature trees. This in conjunction with several openings, would help to increase habitat diversity.

The addition of walking or hiking trails and cross country ski trails should have only limited impact on wildlife's use of the area. Unless use of the area was tremendously increased (use of motorized vehicles, etc.) in the undeveloped areas, most species of wildlife presently utilizing the area should suffer no long term adverse impact. In coordination with other planned recreational uses in the more remote areas of the park, hunting could also be considered an additional compatible recreational activity.

FOREST RESOURCES

Vegetation

The forestland in Emery Park can be generally categorized as a mixed softwood/hardwood forest. The dominant trees are hemlocks, but mixed in are black and yellow birch, tulip poplar, red and sugar maple and scattered oaks.

Historically the forest was a source of charcoal, as were many of the country's woodlands. This resulted in an even-aged hardwood stand because the trees started after a clearcut. The hemlock is probably a bit older than the hardwoods. Commonly, the hemlock was found in the understory of hardwood stands. Once the hardwood was cut, the hemlock was able to become a dominant part of the forest.

Commercially, the value of the wood is going to fluctuate greatly. Tree size, quality and species are the underlying variables. Sawtimber size trees (sawtimber trees are greater than 12" in diameter measured at breast height, dbh) are more valuable than smaller stems, and as a general rule, hardwood species are more valuable than softwood species. The smaller diameter hardwood trees (4-10" dbh) are generally thought of as the "cordwood trees." These are of low value as the value of standing firewood is not high. Another significant variable on this lot is access and operability. The steep terrain and limited access will negatively impact the value of any wood products.

The forest is dominated by steep slopes. Of notable exception would be the bog area in the southern end of the property. This area is quite different and would offer a totally unrelated group of plant and insect life.

Left undisturbed the character of Emery Park will not change dramatically, but there would be a long term shift toward the more shade tolerant species.

Limiting Conditions

Several factors need to be considered in the maintenance of a natural forest stand. Wetland soils have a water table close to the surface of the ground, which allows only shallow tree root penetration. Windthrow is a potential hazard here. Large openings and clearings in and along side wetland areas should be avoided. These soils as a whole are more sensitive to disturbance.

Trees growing on ridge tops may also be subject to windthrow damage. These stems quite often grow in very thin soil (perhaps only a few inches thick) and may quite easily be toppled if exposed to heavy winds. As in wetland areas, trees rely on each other for stability, and heavy cutting or clearings may lead to wind related problems.

Of particular concern in harvesting should be the slopes and erosion control measures. Although as a general rule erosion is not a serious problem, it can be in specific locations. The Commission should be concerned with the slopes and soil types involved. Erosion should not be an insurmountable problem. Proper precautions such as timely mulching and properly installed water bars can control the type of problems that might occur.

The hemlock wooly adelgid is an insect that was unknown in Connecticut prior to 1985. Since 1985 severe infestations have developed in several parts of the the state, killing large areas of hemlocks. It appears this insect may severely impact all of Connecticut's hemlocks and may have the potential to spread beyond this state. Control of this insect is only feasible in ornamental settings. Although the Kent area has not had any reports of this insect, the possibility does exist for problems. Because Emery Park contains a high percentage of hemlock, the Commission is undoubtedly interested in the potential for devastation and a change in the landscape. The harvesting of some of the timber now gives the Commission several advantages because some of the hemlock will be gone if an infestation becomes a reality, and they will get experience in the sales of timber.

Wildfires are always a concern in the forestlands. Although several thousand acres burn each year in Connecticut the chances of any one acre burning is low. Traditionally, this area has had a low incidence of fire, and there is no reason to believe that record won't continue.

Forest Management Alternatives

The Commission has done a good job of preparing for the management of the forest. Two key steps have been taken by identifying on the ground the boundary lines and defining their goals for management. The goals as defined by the commission are as follows:

-Open the area to further recreational development.

-Improve the health of the forest.

-Protect and provide for wildlife populations.

-Provide for future cutting of the forest.

-Produce income for the Park for improvements.

The type of cutting proposed presents no real conflict with the goals as listed. It should be pointed out that there will be some disruption from the aesthetic viewpoint which will be most evident right after harvest and diminish with time. As a general rule, wildlife populations are beneficially affected by timber harvesting of this kind. The increased amount of sunlight reaching the forest floor will encourage new growth which is used for cover, browse and nesting. An effort should be made to maintain some snags and den trees.

The understory of much of the present forest is sparse. This is a function of several things, one of which is the dense shade provided by the overstory. Another potential reason for the lack of an understory, and one which may hinder the development of a new forest, is the deer populations and excessive browsing. The adjoining property to the east had some sawtimber removed several years ago, and there is a noticeable lack of tree reproduction. The deer herd may be a part of the cause.

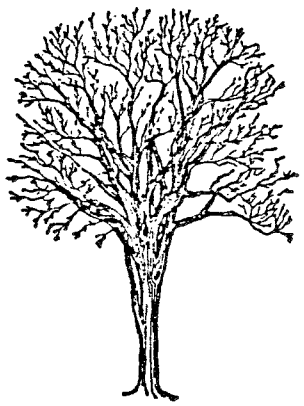
In general, the accessible and operable areas of Emery Park, considering the commission's goals, will benefit from some form of timber harvesting. The type of harvesting proposed will tend to increase the percentage of trees in

younger age classes and promote an uneven-aged forest. Uneven-aged management is pleasing to the eye because of the variety of size and age classes of trees, and when harvesting takes place the number of trees cut per acre is relatively small.

THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

According to the DEP - Natural Diversity Database there are no Federally listed Endangered Species or Connecticut "Species of Special Concern" that occur within the study area. The Natural Diversity Database contains the most current biological data concerning endangered or threatened plant or animal species. On-going research continues to locate additional populations of species or locations of habitats of concern as well as existing data.

RECREATION AND PLANNING CONSIDERATIONS



Size: The pool is indeed small. However, it is fed by a watershed approximately only one square mile in size, part of whose water yield is tapped upstream as a source of water supply. When this limited supply is weighed against a State Health Department rule of thumb of low flow of 50,000 gallons/square mile/day (with low flow most apt to occur during the recreational season) and its standard of 1,000 gallons/swimmer/day, it can be seen that the feeder brook is likely to have an average maximum daily capacity of 50 persons. Therefore enlargement of the pool without installation of an expensive filtration and chlorination system does not seem warranted. However, should such enlargement be considered, it may be physically possible to develop an impoundment along the brook with greater water (and swimmer) capacity than the existing feeder pond.

Water Temperature: Because it is fed by a mountain brook and apparently some seepage of groundwater from adjoining slopes, the pool water is cold. Furthermore, the pool's location in a deep hollow rimmed by a high hill to the south is apt to reduce the normal warming effect of the sun. Some improvement may be possible by constructing the pond suggested under "Size" above, if an increase of shallow water area and consequent solar impact can be achieved.

Water Quality: Because it is located downstream from a water supply reservoir, the brook and the pool it feeds should contain good quality water. Furthermore there appears to be no upstream source of pollutants or nutrients save possible roadwash off Route 341. A source of turbidity may be in the fact that the valley above the pool is underlain with soils composed of silt and fine sand, some of which will be carried downstream through normal geologic erosion. Similarly, although the surrounding hills are protected by a heavy forest cover retarding erosion, their steep slope also implies at least some

degree of geological erosion and consequent washing of soil materials downhill. Another source of water turbidity can be human activity stirring up fine sediments which previously had settled out of the water.

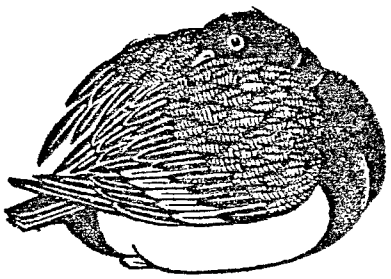
To correct and prevent intensification of this problem, these actions are suggested:

1) A good watershed management is needed to prevent Route 341 stormwash from impacting the brook. Rigorous control of land uses including homebuilding and forestry is needed to prevent erosion and downstream siltation.

2) Develop and maintain a good feeder pool/siltation basin to act as a sediment trap. This basin should be periodically cleaned to maintain its proper functioning and to remove materials which otherwise could be carried downstream during major storms.

3) Develop and maintain a proper pool. If the existing pool continues to be used, it should be cleaned or flushed periodically to remove any accumulated sediments. Indeed, while visiting the site on 4/14/88, a substantial amount of silty material could be seen on the floor of the drained pool. This alone could account for the existing turbidity problem as discussed under "Water Quality" above, from human activity stirring up such fine sediments. If a new pond or pool is built, a clean bottom (concrete or relatively coarse sand) is recommended combined with periodic removal of accumulated sediments. Beyond these recommendations, the Town of Kent's only other option is to install a filtration and chlorination system or attempt to find a more desirable alternative location.

APPENDICES



Appendix A: Estimated Flow Duration Characteristic for the Outlet Stream for the Feeder Pond at Emery Park

TABLE 1: ESTIMATED FLOW DURATION CHARACTERISTIC FOR THE OUTLET STREAM FOR THE FEEDER POND AT EMERY PARK

Percent of time flow equalled or exceeded	1	10	30	50	70	90	95	99
Flow equalled or exceeded in million gallons per day	2.5	.97	.8	.31	.16	.045	.03	.013
Flow equalled or exceeded in CFS	3.8	1.5	1.25	.49	.25	.07	.047	.02
Gallons per minute (GPM)	1705	673	561	220	112	31	21	9

Appendix B: Soils Chart

Location	Soil	About Soil	Drainage	Slope
Developed Park Area	Lm	Derived from floodplain Sediments, sand subsoil	Poorly drained	0-3%
	Ma	Made land	-	Variable
	MyB	Underlain by stratified sand and gravel	Excessively drained	3-8%
	MyC	Underlain by stratified sand and gravel	Excessively	8-15%
	Rc	Developed in deep silt and very fine sand	Poorly drained	0-3%
	Tg	Gravelly and sandy material	Excessively drained	>15%
Undeveloped	CrD	Developed from glacial till, sandy loams	Well drained	15-25%
	HoC	Shallow to bedrock; sandy loam	Well drained	3-15%
	HrE	Shallow to bedrock, many rock outcrops, sandy loams	Well drained	15-35%
	HyC	Shallow to bedrock, stony surface, exposed bedrock, sandy loams	Well drained	3-15%
	HxE	Shall to bedrock, stony surface exposed bedrock, sandy loams	Well drained	15-35%
	Pm	Organic material 3-25 ft. deep	Very poorly drained	0-3%
	Rh	Rock land, exposed bedrock		Variable

Appendix C: Plants for Use at Recreational Facilities

PLANTS FOR USE AT RECREATIONAL FACILITIES

Tree Resistance to Recreation Impact

The following list shows the ability of hardwood and conifers to withstand the impacts of recreation use. Species are listed in order of decreasing ability. Conifers generally rank lower than two-thirds of the hardwoods.

Species Ranking*

1. Hickories
2. Sycamore
3. White Ash
4. Beech
5. Sassafras (short-lived)
6. Yellow-poplar
7. Dogwood
8. Yellow Birch
9. Red Maple
10. Black Birch
11. White Oaks
12. Black Walnut
13. Red Oaks
14. Black Locust
15. Magnolia
16. Black Cherry
17. Blue Beech

*Abstracted from Southeastern Forest Experiment Station, Research Note 171, Ashville, North Carolina -- February 1962, Thomas H. Ripley, Project Director

SOME SUITABLE GRASS MIXTURES FOR RECREATION AREAS

		Rate per 1,000 sq. ft.
1.	Kentucky 31 tall fescue	5-6 lbs.
2.	Kentucky 31 tall fescue Kentucky Bluegrass (Merion should comprise at least half of bluegrass portion. Others may be Fylking, Kenblue, Pennstar, South Dakota, or Windsor	4-1/2 lbs. 1-1/2 lbs.
3.	Kentucky 31 tall fescue -- 40-50% Kentucky Bluegrass (Merion or Common) - 20-30% Red fescue (Pennlawn, Illahee Common Creeping Red or Chewings, listed in order of preference) -- 20-30%	4-5 lbs.
4.	Merion Kentucky Bluegrass -- 100%	2 to 2-1/1 lbs.

Appendix D: Guidelines for Sanitary Facilities

GUIDELINES FOR SANITARY FACILITIES

The following guidelines are provided to give planners information on sanitary facilities for recreation areas. The information will tend to provide a healthy, safe and desirable environment for users of recreation areas.

It is suggested that the following guidelines be met unless state or local requirements are higher.

1. Every beach over 0.5 acre needs a bathhouse or a clothes changing facility.

2. Toilets are necessary for all beaches.

3. Every bathhouse needs toilets.

4. Sanitary facilities attached to picnic shelters shall have flush toilets. Where vault toilets, chemical toils or privies are used, these shall be separate from the picnic shelter. (Minimum distance 100 feet and preferably down slope).

5. Flush toilets are always preferred. Waterless flush toilets are satisfactory for this requirement if approved by local or state authorities.

6. When an absorption field is being considered, provide consultant with adequate soils map and interpretations. Minimum distance from stream, lake or impoundment shall be 150 feet.

7. Toil vaults are to be leakproof.

8. Chemical toilets are recommended in preference to privies. Remote isolated areas may be the exception.

9. Use privies only as a last resort, where use is light. Privies should only be used with documented approval of local and state health authorities.

10. When recreation facilities are constructed in phases (over a period of years) sanitary facilities need to be installed before the area is open to the public.

11. Provide a minimum of one lavatory for each two toilets.

12. Guidelines for individual activity are given in the following tables. However, flush toilets should be installed in at least one activity area when the full development has a design capacity exceeding 1,000 or the annual recreation visits exceed 50,000. Unisex toilets may be used in lieu of separate facilities for each sex unless combined with showers and/or changing facilities.

13. Siting. Sanitary facilities need to be located above the 25 year, 24 hour flood elevation. However, privies and latrines may be located above the 10 year, 24 hour flood elevation, if necessary. When it is impractical to locate the sanitary facilities above these elevations they need to be flood proofed to protect them from storms of these magnitudes.

SANITARY FACILITIES
(Defined in order of preference)

1. Flush Toilets - are preferred by the majority of recreation area users. They are esthetically acceptable and convenient, but require a water system and usually a central treatment plant. Each toilet in a busy park may require up to 400 gallons of water per day.

2. Recirculating Chemical Toilets - are an acceptable alternative to the flush toilet where sewer lines are not available or where a treatment plant would be uneconomical. This type requires periodic serving and cleanout.

3. Vault Toilets - consists of a shelter and fixtures constructed over a concrete watertight receptacle or pit. This system does not include a supplementary treatment of the sewage, therefore, insect, odor and health problems are sometimes present. The settled and partially decomposed solids must be removed periodically. On many sites where adequate water and interior plumbing are impractical and where use is low, the vault toilet may be a practical solution.

4. Privy or Latrine - This is the cheapest and simplist form of excrete disposal. Except in cases of unfavorable soil conditions and high water tables, it can provide a simple method of disposal for human wastes. This method consists of a shelter built over a dug pit. Because of inherent health and odor problems its suitability for recreation facilities is limited.

MISCELLANEOUS CONSIDERATIONS

1. Trash cans need covers. Some state health codes require this.

2. Where gravel walks lead to an entrance, install metal grating or concrete or rock stoop at the doorway to minimize tracking of mud.

3. Screens on windows, doors and vent areas are needed to reduce insect problems in restrooms.

4. Floor drains are better for cleaning sanitary facilities than wall ports near the flood. Provide hose bibs for cleaning.

5. Floors need to be sloped toward the drains to prevent puddling.

6. Facilities need to be provided for the handicapped. Approaches to the facilities should be of suitable slope and materials for an easy entrance.

7. Buildings should have doors. Even removable doors (for summer use) are better than none at all. Buildings open year round are more subject to vandalism.

8. Hand driers (if included) should be safely wired.

GUIDELINES FOR SANITARY FACILITIES

Activity	Estimated Recreation Visits (RV)		Toilets		Comments
Area	Design Capacity[1] (DC)	Annual	Min. Type[2]	Number[3]	
Swimming Beach	Over 300	Over 25,000 RV	Flush	1 each sex per 100 DC swimmer 1 additional for every additional 200 RV	No overlapping with picnic area
	Less than 300	Less than 25,000 RV	Vault or flush	Same as above	Same as above
Picnic Area	Over 300 or over 75 picnic tables	Over 25,000 RV	Flush	Parking places or tables ÷ 20 = No. of toilets needed for each sex	
	Over 125 or over 30 tables	10,000 to 25,000 RV	Vault or flush	Same as above	
	Less than 125 or less than 30 tables	Less than 10,000 RV	Portable, chemical toilets, privies or better	Same as above	Only with documented approval of local and state health authorities[4]
	Auxiliary areas-less than 5 tables		None		Only with documented approval of local & state health authorities[4]

[1] Same as People At One Time (PAOT) or Instantaneous Capacity used by other agencies.
[2] Facility type is based on Design Capacity or Annual Recreation Visits, whichever is greater.
[3] Urinals may be substituted for 40 to 50% of toilets in mens restrooms. When unisex toilets are planned, in lieu of separate facilities for each sex, reduce the combined number by one-third.
[4] In the absence of local and state laws use "Environmental Health Practice in Recreational Areas" HEW Publication No. (CDC) 78-8351, January 1978.

Appendix E: Water Requirements

WATER REQUIREMENTS FOR RECREATION AREAS*

Camps	Per Person
Campgrounds (tents)	25 gpd**
Daycamp (no meals)	15 gpd
Water supply & dry toilets	5 gpd
Water supply & flush toilets	25 gpd
Water supply, flush toilets & showers	40 gpd
Picnic Areas	
With bathhouse, showers, flush toilets	20 gpd
With toilet facilities only	10 gpd
Dry toilets	2.5 gpd
Swimming Areas	
Beaches - flush toilets	10 gpd
Beaches - flush toilets & shower	25 gpd
Pools	10 gpd

*Adapted from "Environmental Health Practice in Recreational Areas" DHEW Publication No. (HSM) 72-10009) Formerly PHS Publication No. 1195-1972, USHEW Rockville, Maryland 20852

**gpd - gallons per day

B. Water Quality for Bathing Waters

Recreation facilities should not be constructed until water quality meets state or federal standards, whichever is higher.

The following may be considered guidelines.

Temperature:

Preferred	68°-86°	Short duration of lower or higher temperatures can be tolerated. Example 50° or 95° F for a 30 minute period for most individuals.

Clarity:
For safety, visual appeal and enjoyment
Visible Secchi disc 4'
Learn to swim areas - To bottom

pH:

Ideal	7.4
Preferred Range	6.6 - 8.3
Acceptable Range	5. - 9.

Coliform: (Unless state standards are higher

5 or more tests in 30 day period

Fecal coliform - should not exceed log mean of 200/100 ml

10% of samples should not exceed 400/100 ml

Fecal streptococcus - use state standards

EVALUATING SITE POTENTIAL FOR SWIMMING BEACH DEVELOPMENT AT EMERY PARK

Key Elements	Multi Plier (M)	Rating (R) High 4	Moderate 3	Fair 2	Poor 1	Rating	Score
*Water Quality *** (exclude from development, sites with rating of Poor)	4	Fecal coli- 100/100 ml	100-200/100 ml	200-400/100 ml	400+/100 ml	3	12
	4	pH 7.4	pH 6.5-8.3	pH 8.3-9 and 5-6.5	pH 9 and 5	3	12
	4	Temp. 68-86° F.		50-67° and 87-94° F.	50° and 95° F.	1	4
Water Frontage	4	Over 1000 ft., 10% slope or less	500-1000 ft.	200-500 ft.	Under 200 ft.	1	4
Land Area	3	Over 15 acres	10-15 acres	5-9 acres	Under 5 acres	3	9
*Water Color	3	Clear Secchi disc 6'+	Fairly clear Secchi disc 5-6'	Brown stain Secchi disc 4-5'	Green or muddy Secchi disc 4'-	1	3
Total Water Area	1	150-300 acres	50-150 acres	25-50 and over 300 acres	Under 25 acres	2	2
Shoreline Type	2	Sand	Gravel	Rocks	Mud-clay	1	2
Exposure to Sun	2	South	West	East	North	1	2
Upland Beach Slope	2	2-4%	4-7%	7-10%	Over 10%	4	8
Water Depth of Impoundment	1	80% over 5' and 50% over 10'				0	-

Key Elements	Multi Plier (M)	Rating (R) High 4	Moderate 3	Fair 2	Poor 1	Rating	Score
Water Fluctuation **	3	Under 1'	1-2'	2-5'	Over 5'	4	12
"Water Flow By" ***	2	1.5 cfs	1-1.5 cfs	.75-1 cfs	Under .75 cfs	1	2
Well Capacity	2	Public water system	Over 25 gpm	10-25 gpm	Under 10 gpm	4	8
Soil Limitations for Septic Tanks	2	Public sewer or none to slight	Moderate	Severe	Very severe	2	4
Distance from Users	2	Under 1/2 hour	1/2-3/4 hour	3/4-1 hour	Over 1 hour	4	8
Distance to Surfaced Road	1	Under 3 miles	3-5 miles	5-10 miles	Over 10 miles	4	4
Aesthetics	1	Excellent	Good	Fair	Poor	3	3
Soil Limitations for Road Construction	1	None to slight	Moderate	Severe	Very severe	4	4

Formula: (MxR) = Score

Maximum Possible Score = 144
High Potential 109-144
Medium Potential 73-108
Low Potential 36- 72

Total 103

* Conditions are assumed.
** Fluctuation from normal pool level between June 1 and September 5. Frequency not to exceed once in five years.
*** Or equivalent State Standard.

Appendix F: Recreational Facility Planning for the Handicapped

RECREATIONAL FACILITY PLANNING FOR THE HANDICAPPED

As more and more of us turn to the outdoors for rest and recreation, the need for structures which accommodate the needs of the handicapped becomes apparent.

The American Standards Association (ASA) published "American Standard Specifications for Making Buildings and Facilities Accessible To, and Useable By, the Physically Handicapped" in 1961. These standards were reaffirmed in 1971. These are the principal bases for most state or local laws. PL-90-480 does not cite ASA standards but names certain U.S. officials as responsible for prescribing standards, lists exceptions waived under some conditions. The checklist may be useful as an aid in checking work plans, construction drawings, and specifications to assure that making public buildings and facilities accessible to the physically handicapped by elimination of architectural barriers has been properly considered and all feasible steps have been taken to comply with PL-90-480. This checklist is believed to contain all important points in the ASA guidelines, but is no substitute for study of the details or sincere attempts to identify problem areas and design or build buildings and facilities accessible to the physically handicapped.

Parking Areas

Spaces 12-feet wide
Located near entrances to activity areas or buildings
30 inch minimum openings in automobile wheel stops or curbs
Passage not required behind parked cars.

Walks

48-inch minimum width
5 percent maximum grade
No steps or abrupt changes in level
Level at crossings with other walks
"Feathered" edges or level with ground - no dropoffs

Ramps (Slopes over 5 percent)

8.3 percent maximum grade
Handrails at least on one side, 32-inches high
Non-slip surfaces
Slope no longer than 20-feet (20-inch rise)
Level rest areas between 20-foot segments of ramp if ramp is longer than 20-feet
Level rest areas 3-feet long minimum
Level areas 5-feet by 4-feet minimum where ramps end at doors swinging out, level one foot on each side of door
Level areas 3-feet by 5-feet minimum where ramps end at doors swinging in, level one foot on each side of door

Buildings

At least one main entrance level with ground or walk, or accessible without steps (by a ramp).

Doors
Clear opening 32" minimum
Flush threshold
Handles 36" high
Outer and inner doors have minimum 6'6" separation
Recommended additional features
- Automatic or minimal resistance
- Door closers - hjydraulic or pneumatic - time suspension
- Knurled or other surfaces recognizable by blind

Floor non-slip hard surfaces (concrete, tile, wood, etc.)

Avoid thick pads under carpeting.

Stairs
- Replace with ramps where feasible
- See ASA standards for recommended design where necessary

Corridors, Aisles
- 5' wide
- No protruding fixtures
- No steps or abrupt changes in level
- Non-slip surfaces

Drinking Fountains
- 3' maximum height
- Controls on front
- Not in alcove
- If protruding from wall, underneath clearance 30"

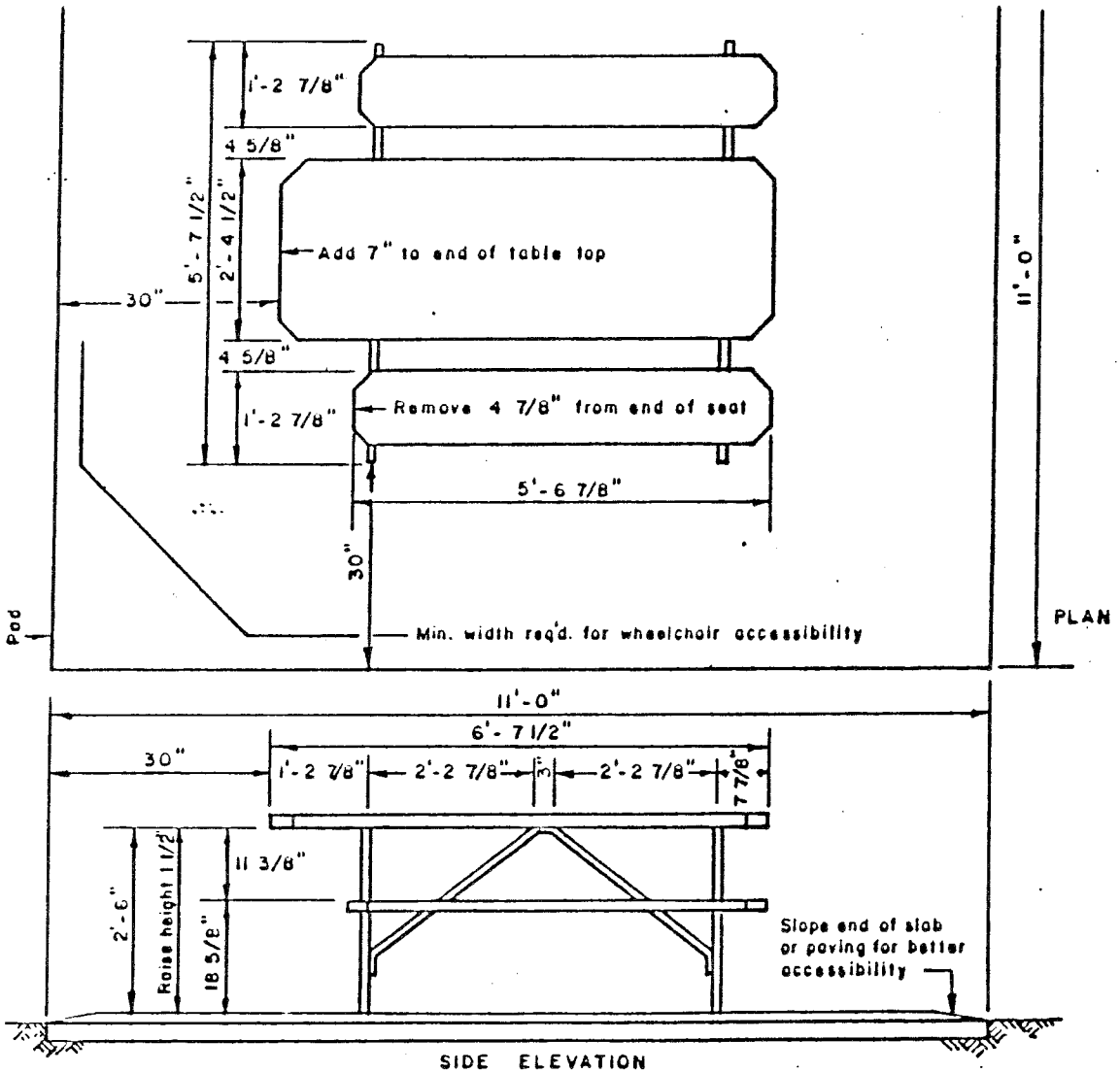
Restroom Stalls
- 32" minimum width door openings
- 20" closet height, 19" urinal height
- 36" minimum width
- 60" minimum depth

With handrails 33" from floor, 1-1/2" diameter, 1-1/2" from wall

Sinks or Lavatories
- Underneath clearance 30"
- Narrow aprons
- Lever faucet handles
- Mirror - 40" minimum to bottom edge
- Towel dispsenser 40" maximum floor to bottom
- No exposed hot water pipes.

Picnic Table for the Handicapped

The picnic table sketched below is designed to permit a person in a wheelchair to join a family group around the table with ease. One end of the table top extends beyond the usual six-foot long portion with attached legs, leaving ample clearance for wheelchair to ease under from the end or the side. The sketch below was recommended by Richard L. Austin, a Texas landscape architect.



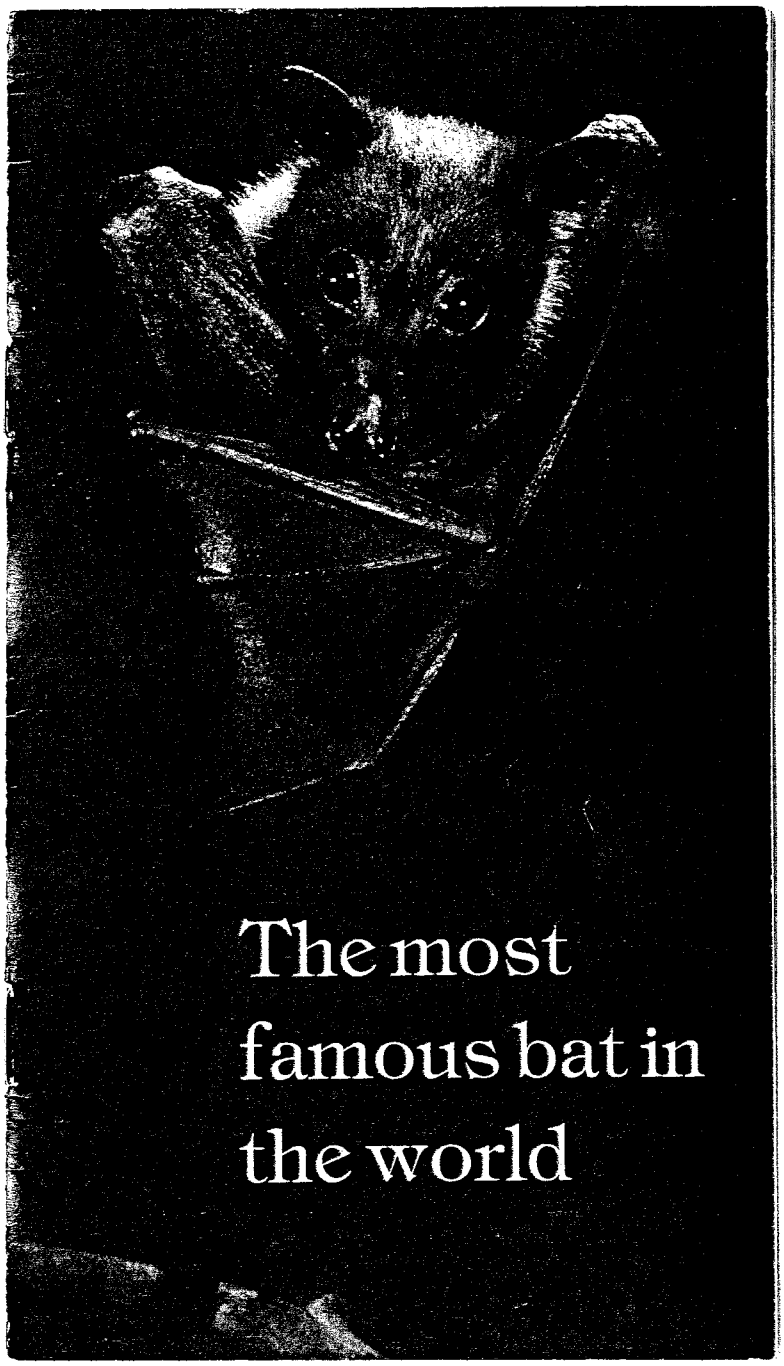
Appendix G: Dimensions of Game Areas

DIMENSIONS OF GAME AREAS - REQUIREMENTS FOR GAMES AND SPORTS

Game	Dimensions of Game Area Feet	Dimensions With Buffer Strip	Area Size Sq. Ft.
Archery	15' x 300'	75' x 390'	28,600
Badminton	17' x 44' (Singles)	25' x 60'	1,500
	20' x 44' (Doubles)	30' x 54'	1,700
Baseball (Little League)	60' Diamond	Foul line 200'	53,000
9-12 years	Pitching 46'	Outfield 200' - 250'	131,000
Baseball (Official, Babe Ruth)			168,000
13-18 years	90' Diamond	Foul line 320'	
	Pitching 60'6"	Outfield 400'+	
Basketball (Collegiate)	50' x 94'	70' x 114'	8,000
Basketball (High School)	50' x 84'	70' x 104'	7,300
Field Hockey	180' x 300'	200' x 320'	64,000
Football	160' x 360'	172' x 372'	64,000
Football (Touch & Flag)	120' x 300'	132' x 312'	41,200
Horseshoes	10' x 50'	20' x 70'	1,400
LaCross (Men)	180' x 330'	200' x 350'	70,000
LaCross (Women)	150' x 360'	170' x 380'	64,000
Soccer (Men)	225' x 360'	245' x 380'	93,000
Soccer (Women)	180' x 300'	200' x 320'	64,000
Softball (12')	Baseline 60' (Men) Baseline 45' (Jr.) Pitching 46' (Men) Pitching 40' (Women) Pitching 35' (Jr.)	275' Radius	90,000
Volleyball	30' x 60'	50' x 80'	4,000

Adapted from "Planning and Design of Outdoor Sports Facilities" 1975. Departments of Army, Navy and Airforce. Technical Manual 5-803-10. Superintendent of Documents, U.S. Printing Office, Washington, D.C. Stock No. 008-020-0588-6.

Appendix H: The Most Famous Bat in the World


The most
famous bat in
the world

This is the most famous bat in the world, the stylized bat in the registered bat device trademark of Bacardi rum. The cover picture happens to be a fruit bat (*Pteropus giganteus*) from Asia and the picture is upside down so you can see right side up a bat who normally rests upside down. Is that clear?

When you have finished skimming this short booklet, your knowledge of bats will place you in the top one-tenth of one percent of the world's population.

That will give you confidence that: first, bats are among the most beneficial, least understood and most maligned animals in the world; second, you will be the first in your neighborhood able to bat the facts around.

We should explain why Bacardi Imports loves bats.

Our bat, as distinguished from lesser bats, has adorned the Bacardi rum label ever since the company began selling rum in 1862.

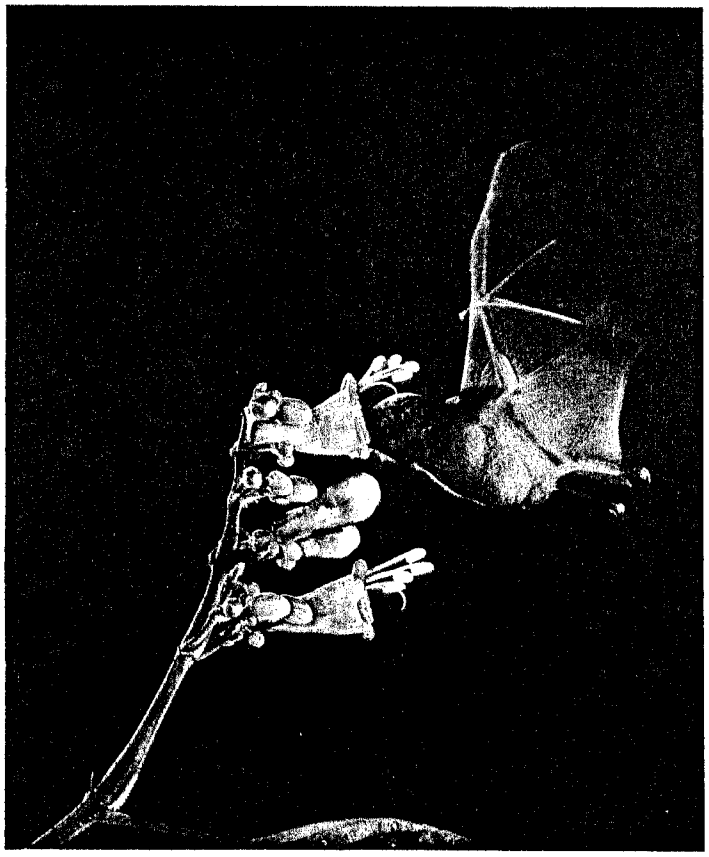
You see, in those days (as in these) not everyone read well. So, Don Facundo Bacardi, who developed the secret for the rum that now out-sells every spirit in the world, placed a trademark, a "logo," on his product. That way, even those who couldn't read would still recognize their favorite rum—Bacardi rum. You can read, so maybe you never noticed. Pick up your nearest bottle of Bacardi rum and take a look.

See? There he is—our good-luck symbol, the trademark that helped us make Bacardi rum the biggest selling spirit *ever*.

Back to Don Facundo.

Why a bat?

Well, when he figured out how to make the world's greatest rum, he had bought a small distillery in Cuba and there were some friendly fruit



Common Long-tongued Bat (*Glossophaga soricina*), Latin America, hovers hummingbird-style to sip nectar and, while sipping, pollinates the flower.

bats hanging out (literally) under the eaves and in nearby trees. Don Facundo's wife suggested that a bat would make a great trademark.

Chances are you never saw a fruit bat—known in some parts of the world as a flying fox. In the United States you're most apt to see bats swirling around a streetlight or pulling five G's in an Immelmann or an aileron roll as they devastate your local mosquito population. And at de-bugging, bats wrote the book. Bats are the only major predators of night-flying insects and one (endangered) gray bat may eat up to 3,000 insects in a single night. There's one colony of free-tailed bats in Texas, for example, that does away with more than 250,000 *pounds* of insects nightly.

Now, honestly, can you touch that with your blue-light bug zapper or your spray can? No way.

Chances are you never really saw a bat up close. You've seen pictures of mean-looking bats with funny ears, snarling and looking altogether unfriendly.

You know what? Virtually every one of those pictures you've seen was taken by a photographer who knew less about bats than he knows about pterodactyls. He had someone holding the poor little bat by the wings. This isn't comfortable and, being scared to death anyway, the bat tends to shut its eyes, droop its head and hope for the best. The result: a very dull picture.

So, it's been standard procedure for these people

to tease the bat or blow in its face until they get it to snarl and—click—a great picture of a "vicious" bat. Trouble is, it gives exactly the wrong impression because bats are, in truth, very gentle, intelligent little animals.

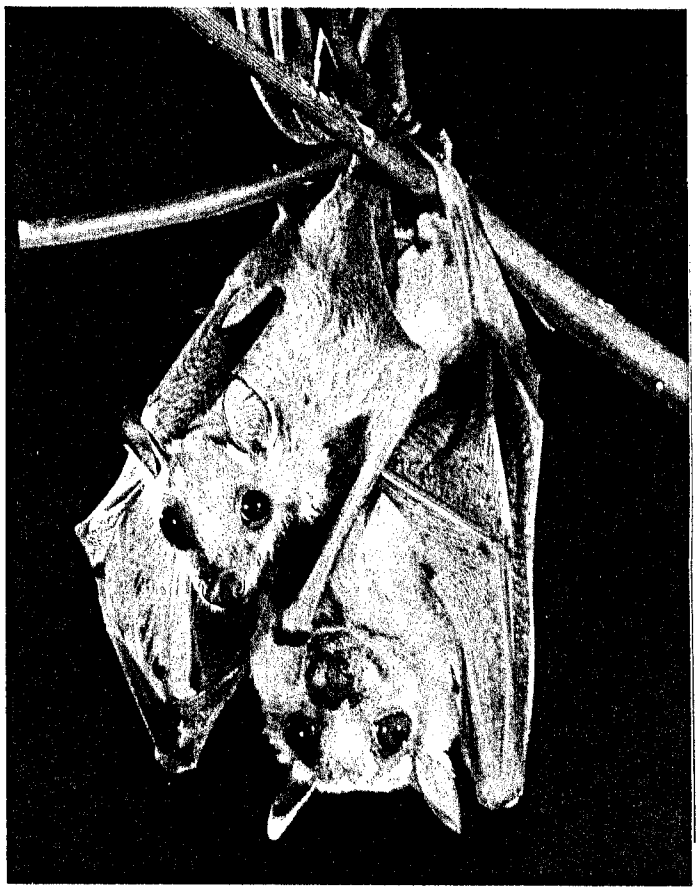
Before we get back to fruit bats, we should clear up some myths—a lot of things you already know about bats that aren't true.

One. A lot of people think bats are rodents, kind of a flying mouse. *WRONG.* In nature's scheme of things, bats are much more closely related to you than they are to mice. And unlike mice, they reproduce slowly—in most species a female has but one baby per year, at most. You've heard how mice carry on!

True, some bats have funny ears and some have funny noses, but by and large, bats are extraordinarily beautiful little creatures. The out-sized ears and nostrils on some are adaptations that permit them to employ a sonar system that is a thousand times more sophisticated than the best black boxes "invented" by man.

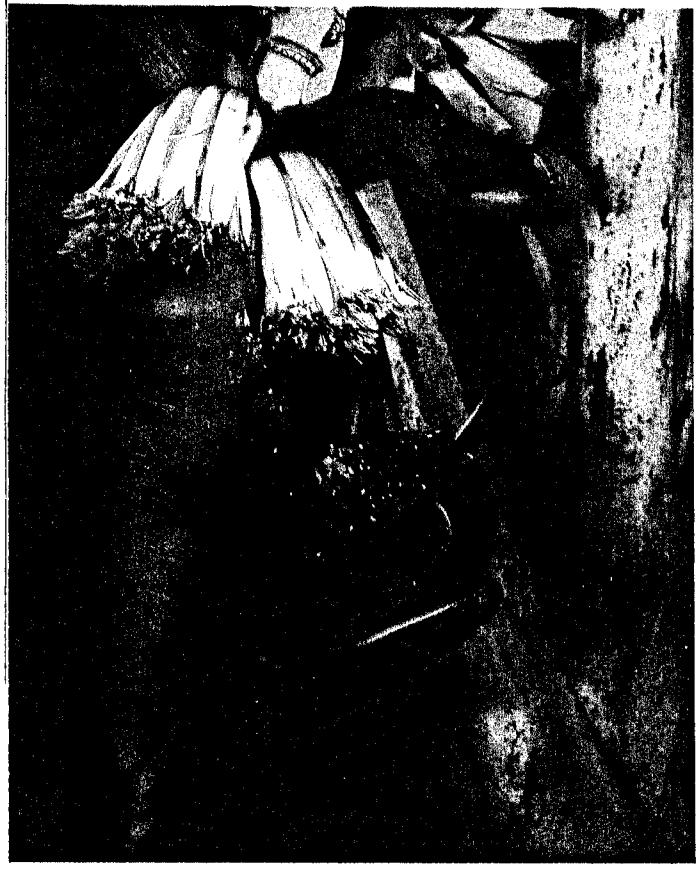
Two. A lot of people think they have all that sonar equipment because they're blind. Again, *WRONG.* Bats see quite well. But if you make your living by warring on gnats and mosquitoes in the dark, good eyesight isn't enough; you have to be high-tech or you get awfully hungry. Sonar's the answer.

Three. A lot of people think bats are not only



Mother and "child," epauletted bats from Africa (*Epomophorus gambianus*). Young bats, like young humans, sometimes con Mom into taking care of them long after it's necessary.

Greater Short-nosed Fruit Bat from Asia *(Cynopterus sphinx)* pollinating a wild banana flower.



creepy and try to get into women's hair, but that they're dirty and carry strange diseases as well. They think, for example, that most have rabies. This is not only *WRONG,* it's ridiculous.

Bats have no interest at all in getting in your hair. If a bat can detect a mosquito in the dark, he sure as heck isn't going to blunder into your head. They are exceptionally clean little animals and having a colony of bats for neighbors should be cause for rejoicing.

And that business about rabies resulted from mistakes made by researchers some 50 years ago. They thought bats were unaffected by rabies and reasoned that, therefore, many bats would get and carry rabies because none of them would die of it. You know how bad news is: you can't kill bad news with a stick; it's the good news you have to push.

It turned out, when some *good* research was done, that the bats they'd looked at had a Rio Bravo type of virus, which is not harmful either to bats or to people. Unfortunately for *mice,* Rio Bravo virus is fatal to them and the early researchers had tested their theory by injecting mice. So the bad story got started. The tested bats weren't rabid at all.

Do everyone a big favor and help kill off that old myth.

Bats *can* get rabies, of course, just as dogs and cats and skunks and foxes can. A leading expert on bats—Dr. Merlin D. Tuttle, president of Bat Con-

servation International and curator of mammals at the Milwaukee Public Museum—says that less than half of one percent of bats contract rabies and, unlike most mammals, even when rabid, bats rarely become aggressive. Only 10 people in all the U.S. and Canada are believed to have gotten rabies from bats in the past four decades. In contrast, more people die annually from dog attacks, food poisoning contracted at church picnics or even at the hands of their own spouses. When people are endangered, it is usually because they have foolishly picked up a sick bat that bites in self-defense. Simply leave bats alone and they'll be happy to return the favor. For that matter, the same holds true for any other wild animal you might encounter; do not go around trying to pick up friendly looking bears, lions, wolverines, cobras, crocodiles, or whatevers.

Enough about things you knew that weren't true. On to things you probably didn't know at all.

Throughout the world's tropics, fruit-eating bats are nature's most important seed-dispersing animals, and nectar bats are absolutely necessary for the pollination of countless tropical and sub-tropical trees and shrubs. (You thought bees were doing all that work, didn't you?)

Well, if it weren't for bats, we might never have had peaches, plantains, bananas, breadfruit, mangoes, guavas, figs, avocados, cashews, cloves, tequila (of which, Bacardi Imports' Don Emilio is what you should buy), chicle latex for chewing gum, balsa wood, manila and sisal fibers for rope, and kapok for bandages and life preservers. And bat guano is still a valuable source of fertilizer.

Dr. Tuttle says that the loss of bats could seriously threaten the survival of tropical rain forests, and scientists know now that rain forests are vital to maintaining our climate worldwide.

With all this going for them, bats have had a bum rap. Indeed, they are actively persecuted and exterminated by people who just don't know better.

Now that you're feeling better disposed toward bats, let's get back a moment to our Bacardi rum bat.

It really wasn't odd that Don Facundo's wife picked the bat for a trademark—bats had long been used in heraldry as the symbol of watchfulness and this probably was well known to Don Facundo Bacardi y Maso, who was born in Catalonia, in northeast Spain, in 1816.

For years a bat had been included in the coat of arms of Barcelona and is still prominent in the coat of arms of Valencia's capital.

History dates the association of the bat with Valencia back to 1238 and King James I, known to Spaniards as the "Conqueror" for his victory over the Arabians who had occupied part of Spain. According to the legend, a bat once perched on the King's helmet and the King had it included in the heraldry of the area.

In many parts of the world, particularly in the

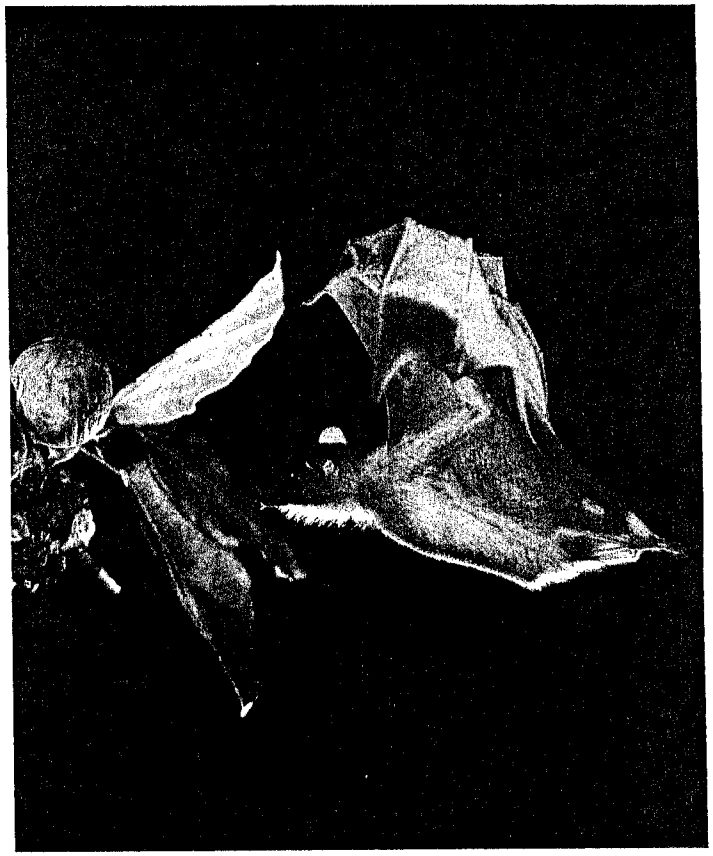
East, the bat is the symbol of happiness and family unity.

Perhaps that's because the highly social little animals fly together in large numbers, wing-tip to wing-tip as if holding hands.

Some make devoted mates, can barely tolerate separation and engage in elaborate courtship displays that outdo those on popular soap operas. Admittedly, some bats philander and some even have harems. But soap operas have all that, too, so don't be shocked into being anti-bat.

In China, we're told, the word for bat—though written differently—is pronounced exactly like the word for happiness: "fu." So, it has become an important factor in the expression of congratulations and good wishes. The bat also is a common motif in Chinese decorative arts. As you know, there's a lot of Chinese influence in the rest of the world and you can amuse yourself by looking for bat figures in art, ceramics, and furniture almost anywhere.

In the United States, there are 39 species of bats and almost all of them are working conscientiously to keep the mosquitoes and no-see-'ums from bugging you. (Three species are nectar lovers.) Bats, as we said earlier, can see just fine but in pitch dark, any flying insect is a no-see-'um and that's why bats are the world's leading experts on sonar. During flight, they emit high-pitched sounds and listen for the echo, thus homing in on flying insects—and, not incidentally, managing not



Dwarf Epauletted Bat (*Micropteropus pusillus*) is one of several species critically important to the maintenance and regeneration of forests in Africa. This one stalks a wild fig.

to bang into walls when they're going home to a dark cave. Man-made sonar doesn't come even close to the sophistication of the bats' sonar.

When migrating, bats often climb up to a good cruising altitude, sometimes more than 10,000 feet, turn off the sonar and just fly along like migrating birds. And like birds, this often brings them to grief on foggy nights when they fly into high buildings. You may think that's pretty careless of the bats but we bet you've ridden around some without your seat belt on and that's not so bright, either.

All in all, there are some 1,000 species of bats—about 70 percent of them the bug-chasing kinds of bats. The big fruit bats, or flying foxes, don't have sonar. Some of them have wingspans of up to six feet. And the tiniest mammal of all is a bat about the size of a bumble bee.

Yes, there are vampire bats—about one-third of one percent of bats and all of them in Latin America—and they're a nuisance to cattle owners. But they're nothing at all like Count Dracula.

A few more points just to make sure you can fascinate your friends and turn them into bat conservationists.

Bats are the only truly flying mammals and the unquestioned champions of aerobatics. Like we said earlier, they're our own distant relatives and the bones in a bat's wing are essentially the same as those in human arms and hands. Thus, the name of the scientific order for bats—*Chiroptera*, meaning "hand-wing."

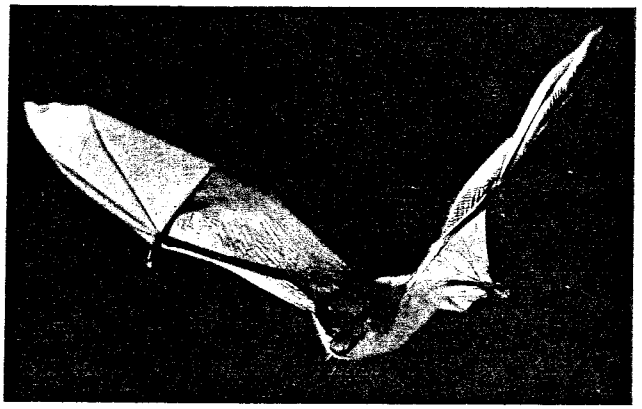
And finally, many bats hibernate, like groundhogs. Except, bats can hibernate almost at will. If there is a bug recession because of a cold snap or something, the bat can just shut things down and take a snooze until better times, if the recession isn't very long.

Even so, these sophisticated animals are disappearing rapidly, victims of thoughtless human persecution. They are among the world's most beneficial, yet vulnerable, mammals. Several species are already extinct, and many more may soon become extinct without better human understanding.

Now that you're way ahead of just about everyone else on the subject of bats, you might think about trying to be a real friend to these valuable, intelligent and friendly little animals. Did you know that in some parts of the world people erect bat houses the way other people put up bird houses? And, of course, you could make a tax-deductible donation to Bat Conservation International (and they'll send you some bat house plans).

All in all, it's no wonder that Don Facundo Bacardi selected a bat for one of his rums' trademarks. The other is, of course, the name BACARDI. It was a number one choice and if he were here today, he wouldn't be a bit surprised that Bacardi rum is the number one selling spirit.

The Gray Bat (*Myotis grisescens*), United States, can nip off up to 3,000 insects per night.



For information on how you can help save bats (or to make a tax-deductible contribution) write to:

Dr. Merlin D. Tuttle
Bat Conservation International
C/O Milwaukee Public Museum,
Milwaukee, Wisconsin 53233 USA

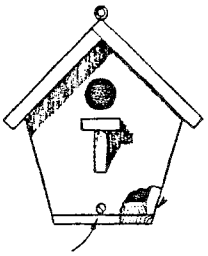
For additional copies of this booklet, write to:

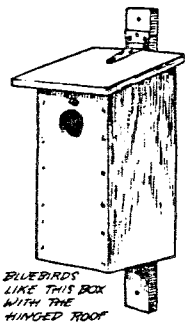
Bacardi Imports, Inc.
Bat Booklet
7475 N.W. 7th Street
Miami, Florida 33126

All photographs by Dr. Merlin D. Tuttle.

Appendix I: Homes for Birds

HOMES for BIRDS

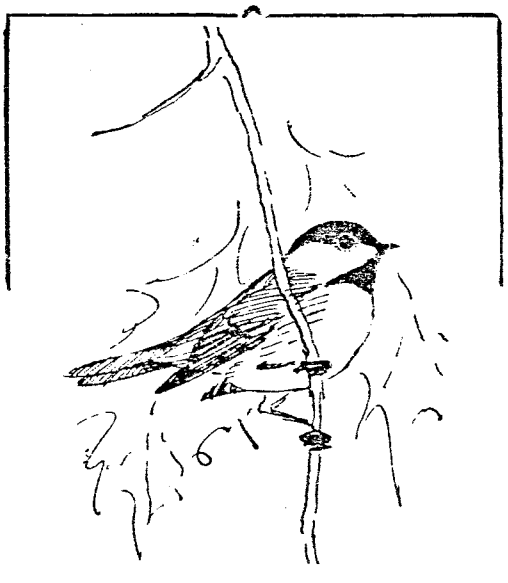




BIRD HOUSE DIMENSION CHART

Species	*Floor of cavity*	*Depth of cavity*	*Entrance above floor*	*Diameter of entrance*	*Height above ground*
	Inches	Inches	Inches	Inches	Feet
Bluebird	5 x 5	8	6	1½	5-10
Robin	6 x 8	8	(3 sides open)		6-15
Chickadee	4 x 4	8-10	6-8	1⅛	6-15
Titmouse	4 x 4	8-10	6-8	1¼	6-15
Nuthatch	4 x 4	8-10	6-8	1¼	12-20
House Wren	4 x 4	6-8	1-6	1	6-10
Tree Swallow	5 x 5	6	1-5	1½	10-15
Purple Martin	6 x 6	6	1	2½	15-20
Crested Flycatcher	6 x 6	8-10	6-8	2	8-20
Flicker	7 x 7	16-18	14-16	2½	6-20
Downy Woodpecker	4 x 4	8-10	6-8	1¼	6-20
Screech Owl	8 x 8	12-15	9-12	3	10-30
Sparrow Hawk	8 x 8	12-15	9-12	3	10-30
Wood Duck	10 x 18	10-24	12-16	4	10-30

1. Don't try to make apartment houses, except for martins. Most birds that nest in birdhouses like privacy, and will drive away other birds of the same species that come too close to their homes.
2. Don't make the holes too large. Every bird has its own requirements as to the size of the hole. Make the hole to fit the bird that you want to nest in the house. Also, don't make the hole too close to the bottom of the house. Birds like to be out of sight as they sit on their eggs.
3. Don't use tin cans for birdhouses. The sun beating down on tin will heat up the inside and bake the young birds.
4. Don't set up too many birdhouses in a small area. Three or four to an acre is the largest number that should be set up, as a general rule.
5. Don't expect birds to nest in dirty houses. After each nesting, clean out the box so that the new tenant will have a clean nesting place.
6. Don't build "birdhouses." Build wren houses, bluebird houses or tree swallow houses. In other words, build a house that will attract a specific kind of bird.
7. Don't make houses that cannot be easily cleaned; that are not well ventilated; and that will not drain off rain that may leak or blow in. The purpose of a birdhouse is to help birds raise their young. They must be cool and dry.



Connecticut Audubon Society

2325 Burr Street

FAIRFIELD, CONNECTICUT

NOTES

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 Nancy Ferlow, 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.