

UPDATED
MASTER PLAN
DESIGN MEMORANDUM NO. 2



**MAY 1987** 

#### CROOKED CREEK LAKE

#### PENNSYLVANIA

# DESIGN MEMORANDUM NO. 2 MASTER PLAN (UPDATED)

#### PREVIOUSLY ISSUED REPORTS AND DESIGN MEMORANDA

Date

Report Upon Reservoir System Project, Allegheny-Monongahela River Basin for the Protection of Pittsburgh, Crooked Creek Reservoir (Definite Project Report)

15 December 1936

Master Land Use Plan, Crooked Creek Reservoir, Armstrong County, Pennsylvania

December 1948

U.S. Army Corps of Engineers
Pittsburgh District
Pittsburgh, Pennsylvania
May 1987

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FOR

CROOKED CREEK LAKE PENNSYLVANIA

DESIGN MEMORANDUM NO. 2

U.S. Army Corps of Engineers Pittsburgh District Pittsburgh, Pennsylvania

# CROOKED CREEK LAKE PENNSYLVANIA

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#### SECTION 1 - INTRODUCTION

#### 1-1 PROJECT AUTHORIZATION

The Crooked Creek Lake project was authorized by the Flood Control Act of 22 June 1936 (Public Law 75-738), Section 5 (H.D. 306), as amended by the Flood Control Act (Public Law 75-761), Section 4, approved 28 June 1938.

#### 1-2 PROJECT PURPOSE

The authorized purpose of the Crooked Creek Lake project is to provide flood stage reduction along the Allegheny and upper Ohio Rivers. The project has a total water storage capacity of 93,900 acre-feet to contain runoff from a drainage area of 277 square miles. Permanent storage capacity is 4,500 acre-feet at a pool level of 840.0 NGVD (minimum pool). The project also provides other important benefits and uses, such as recreational opportunities, land conservation, and fish and wildlife preservation.

#### 1-3 PRIOR REPORTS

The Definite Project Report for Crooked Creek Reservoir was submitted by the Commander, Pittsburgh, PA to the Chief of Engineers on 15 December 1936. Construction work on the project was initiated in November 1937 and the dam was essentially completed and placed in full operation in July 1940. Before the final phase of construction work was completed in May 1951, the Master Land Use Plan was prepared and approved in May 1949. The purpose of the Master Land Use Plan was to develop strategies that would yield the maximum amount of incidental recreation benefits from the project consistent with its primary function.

Subsequent supplementary studies evaluated in greater detail certain aspects of the project. Some of these studies were appended to the Master Land Use Plan, but their contents will be incorporated into the Operational Management Plan for the project. All of these studies which were prepared in the 1970's and 1980's are briefly discussed below in chronological order.

- a. Safety Plan, October 1977 (Appendix E). This plan was developed to help project personnel identify and deal with certain safety hazards and unsafe conditions. It also established standard operating procedures to be followed in case of an emergency.
- b. Forest, Fish, and Wildlife Management Plan, November 1977 (Appendices B and D). This plan states general policies and specific procedures for the protection and management of all biota of the project's lands and waters.

- c. Fire Protection Plan, January 1978 (Appendix C). This plan is intended to guide the Crooked Creek Lake project personnel in the prevention and suppression of forest, grassland, and other fires.
- d. Reservoir Regulation Manual, April 1979. This manual contains specific information and instructions for various District elements regarding flood control and incidental low flow augmentation and water quality control procedures. It also specifies the methods for collection of hydrologic data throughout the river basin above the dam and outlines the regulation of storage and release from the reservoir.
- e. Water Quality, 1980. This report involves the consideration, as required by the Clean Water Act and presidential directives, of such environmental objectives as downstream water quality and associated instream needs which are intrinsically influenced by reservoir storage and releases which occur during flood storage periods when detention is high and the rate of release varies greatly in time and magnitude from natural conditions.
- f. Investigation of Mine Drainage Pollution, Benthic Invertebrate Analysis, 1982. The purpose of the study which resulted in this report was to monitor the impacts of changes in the Pennsylvania Department of Environmental Resources' mine drainage reclamation activities in the Crooked Creek Basin.

#### 1-4 PURPOSE AND SCOPE OF MASTER PLAN

The updated Crooked Creek Lake Master Plan, hereafter referred to as the Master Plan, replaces the Master Land Use Plan of December 1948 which is no longer useful, essentially because of its age and the socio-economic changes that have occurred since its publication. The purpose of this Master Plan is to provide a comprehensive, current review of the existing natural and man-made resources of the project area as well as a comprehensive guide to the sensitive, wise, and orderly use, development, and management of these resources over the next 15 to 20 years.

In keeping with Corps planning policy, the Master Plan is a working document or manual which contains information, analysis, and guidelines for the administration of all land and water areas of the project dedicated to project operation and the enhancement of environmental quality, recreational opportunities, and fish and wildlife management. It should be referred to frequently by District Office and project personnel. Subsequent aspects of planning, development, and management for the overall project and for specific portions of the project, including outgrants, are required to be consistent with the zoning and resource use objectives presented in this Master Plan. The Master Plan is both flexible and conceptual by design and is subject to revision as indicated by changing needs and conditions.

The Master Plan evaluates project resources to develop policies that permit and encourage development and management for their best use. Evaluation is focused on project lands and waters and includes consideration of scenic, cultural, recreational, and fish and wildlife values. The primary project purpose of flood control, as well as the operation and maintenance of structures associated with this purpose, is outside the scope of this study. This plan is, however, based on an understanding of the operation of the project. Accordingly, management recommendations and proposed improvements relative to public use and wildlife management are formulated to be in harmony with primary project purpose.

An inventory of project resources was obtained from existing published reports and studies completed by various local, state, and Federal agencies. Field evaluations of both land and water were completed to obtain more detailed resource information, where needed, as well as to correct any obvious discrepancies found in the published material. Interviews were conducted with Corps personnel associated with or having various kinds of knowledge of the Crooked Creek Lake project to determine those problems relating to the development and management of the project. An analysis framework was then developed to evaluate and analyze resource data in relation to its degree of relevance and impact on the development of the Master Plan.

Estimates of both existing and future recreational demands at the Crooked Creek Lake project were developed. Existing reports and studies, which helped to establish recreational needs and demands for the region were utilized for this purpose. Planning was conducted in conformance with all applicable regulations and other directives. Projected outdoor recreation visitations were developed utilizing, to some extent, procedures specified in Technical Report 2, Estimating Initial Reservoir Recreation Use, partly from historical visitation patterns and partly from maximum practical capacity computations. The estimated visitation data provided the basis for determining the extent of activities, the design loads, and facility requirements. The facility requirements were then compared with the land and water resource limitations to identify potential activity sites.

Resource use objectives and resulting zoning plans for both land and water have been prepared based upon the project's resource potential and the recreational demands that are exerted upon it. These outputs of the master planning process (resource use objectives and zoning plans) represent in themselves ample reason to update a Master Plan that is nearly 40 years old.

Physical plans of development are included in this Master Plan at three levels. The first level is existing development which reflects the project as it was left by the Commonwealth of Pennsylvania in 1981 plus extensive water supply and sanitary improvements and other minor, but necessary improvements, such as guardrails and crushed stone parking areas, carried

out by the District. Also included in the existing development level are improvements accomplished by local organizations which consist of the fishing embayment below the dam and certain public use and certain equestrian facilities in the Manor Recreation Area.

The second or, as it is termed herein, the initial level of development includes sanitary improvements to comply with state standards at the Beach, redevelopment of the Boat Launching Area, a small number of additional facilities in the Main Recreation Area, continued volunteer efforts to provide a fishing pier for the handicapped at the fishing embayment below the dam, and further development in the Manor Recreation Area by Manor Township and their subgrantee, a local equestrian organization. Most actions necessary to complete the initial development are underway or are expected to be started in Fiscal Year 1987 or 1988.

The third development level is identified for possible action in the indefinite future in consideration of the project's resources and demands in the area. Actual implementation of future development would be dependent on national and local priorities and the availability of local and/or Federal funding.

The updating of the Crooked Creek Lake Master Plan has been coordinated extensively with the appropriate Federal, state, county, and local governments and their agencies. An extensive public involvement program also elicited a considerable amount of information and attitudes from local organizations and individuals. Certain actions involving private organizations and a township are completed or underway, but other opportunities have been refused or not yet accepted by state agencies. Where appropriate, coordination and related actions will be continued to a definite conclusion.

#### 1-5 APPLICABLE PUBLIC LAWS, RELATED DOCUMENTS, AND ACTIONS

The authorization for the Crooked Creek Lake project is set forth in Subsection 1-1. The authority to include recreation development at Corps of Engineers projects is contained in Section 4 of the Flood Control Act of 1944, as amended by Section 207 of the Flood Control Act of 1962. Public Law 89-72, The Federal Water Project Recreation Act of 1965, provides for cost sharing of recreation developments at new projects. Its cost-sharing principles were subsequently applied administratively to completed projects such as Crooked Creek Lake. More recently, national priorities have shifted away from recreation to the extent that there are virtually no opportunities for cost sharing at Crooked Creek Lake at this time.

Public Law 85-624, the Fish and Wildlife Coordination Act of 1958, requires that fish and wildlife conservation receive equal consideration and be coordinated with other features of water resource development programs. It further requires coordination with Federal and state fish and wildlife

agencies whenever the waters of any stream or other body of water are proposed for modification for any purpose by a Federal agency or under a Federal permit.

Public Law 86-717 of 1960 requires that reservoir project lands owned in fee be developed and maintained to encourage, promote, and assure future resources of readily available timber and to increase the value of such areas for conservation, recreation, and other beneficial uses. The Chief of Engineers is required by this law to provide for the protection and development of forest or other vegetative cover and the establishment and maintenance of other conservation measures on reservoir lands to yield the maximum benefit and otherwise improve such areas. At Crooked Creek Lake, the intent of Public Law 86-717 has been fulfilled to some degree by an ongoing program for improving wildlife habitat and by regular management practices such as patrolling the project. However, somewhat more emphasis should be placed on management of the project's forests to gain concordance with the law.

The National Environmental Policy Act of 1969, as amended, requires Federal agencies to give appropriate consideration to environmental amenities and values along with economic and technical considerations in their activities and to prepare an environmental impact statement for all major Federal actions significantly affecting the quality of the human environment. The Council on Environmental Quality (CFQ) has issued binding regulations (40 CFR 1500-1508) to be used in complying with the National Environmental Policy Act.

Under the National Historic Preservation Act of 1966, as amended, (PL 89-665), Federal agencies are obligated to establish a program to locate, inventory, and nominate to the Secretary of Interior all properties under the agency's ownership or control that appear to qualify for inclusion on the National Register of Historic Places. Also, with any proposed Federal or Federally assisted undertaking, the agency must take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The Archeological and Historic Preservation Act of 1974 (PL 93-291) provides certain protection and coordination requirements for cultural resources in connection with Federal construction or Federally licensed projects. Federally owned archeological sites and artifacts are protected through provision of civil and criminal penalties in the Archeological Resources Protection Act of 1979 (PL-96-95)

#### SECTION 2 - PROJECT DESCRIPTION

#### 2-1 PROJECT LOCATION

As shown on PLATE 1, Crooked Creek Lake is located in southcentral Armstrong County, Pennsylvania. The dam is about 61/2 miles upstream from the confluence of Crooked Creek with the Allegheny River and approximately six miles south of the Borough of Ford City, Pennsylvania. Located about 32 air-miles from the City of Pittsburgh, Pennsylvania, Crooked Creek Lake is one of the flood control reservoirs nearest to the metropolitan area.

#### 2-2 PROJECT DATA

TABLE 2-1 provides a summary of data concerning the project's features. Although all of these data pertain singularly to Crooked Creek Lake, none are particularly remarkable. They are provided here as a ready reference source.

#### TABLE 2-1

# CROOKED CREEK LAKE, PA. PROJECT FEATURES

#### DAM

Drainage Area at Dam: 277 square miles.

Type: Rolled earth fill with an impervious core.

Top of Dam: Elevation 946.0 NGVD.

Height of Dam Above Streambed (Elevation 803.0 NGVD): 143 feet.

Top Length: 1,480 feet.

Top Width: 25 feet.

Maximum Base Width: 975 feet.

Freeboard: 9.1 feet above spillway design flood, maximum water surface, Elevation 936.9 NGVD.

#### SPILLWAY

Type: Uncontrolled saddle spillway.

Length: Approximately 2,700 feet.

Width: Tapers from 390 feet near entrance to 75 feet at lower end.

Weir Crest: Elevation 918.0 NGVD.

Design Flood:

Inflow: 109,000 cfs. Outflow: 97,800 cfs.

Maximum Water Surface: Elevation 936.9 NGVD.

#### OUTLET WORKS

#### Tunne1:

Diameter: 15.5 feet. Length: 1,320 feet.

Intake Invert: Elevation 809.0 NGVD. Outlet Invert: Elevation 802.5 NGVD.

#### TABLE 2-1

# CROOKED CREEK LAKE, PA, PROJECT FEATURES (cont)

Sluices: Three, each rectangular, 6 feet wide by 13 feet high at invert,

Elevation 809.0 NGVD.

Low-discharge gates: Two, each 24 inches in diameter at invert,

Elevation 814.0 NGVD.

#### Bankfull Discharge:

Design: 7,500 cfs.

Present (since 1972): 5,000 cfs.

Maximum Release Capability at Minimum Pool, Elevation 840.0 NGVD:

Sluices: 7,500 cfs, total.

Low-discharge gates: 190 cfs, total.

#### STILLING BASIN

Length: 155 feet.

Width: Increases from 14 feet at the outflow tunnel to 68 feet at the

downstream end of the training walls.

Crest: Elevation 804.0 NGVD.

#### RESERVOIR

Pool	Elevation (NGVD)	Capacity (Ac. Ft)	Runoff (Inches)	Area (Acres)	Backwater (Miles)	Shoreline (Miles)
Minimum	840.0	4,500	0.30	350	5.25	13.4
Summer	843.5	5,830	0.39	430	6.70	15.0
Total Storage	920.0	93,900	6.36	1,940	14.00	46.0

#### 2-3 PROJECT DEVELOPMENT

The Crooked Creek Lake project was initiated in the 1930's and at least the project land in the vicinity of the dam was acquired by the state. It was authorized as a Federal project as early as 1936. Construction started in November 1937 and had progressed far enough for operation and maintenance to be initiated in July 1940. World War II intervened and all project construction was finally completed in May 1951. Land acquisition, started in 1939, was completed 10 years later in 1949. Relocation of highways (3.2 miles), communication lines (3.7 miles), pipelines (17.5 miles), and transmission lines (0.4 mile) required 11 years, from 1938 until 1949. The total cost of new work from 1937 through the end of Fiscal Year 1985 without recreation expenditures was about \$4,205,000.

When originally offered in the late 1940's, the Commonwealth of Pennsylvania turned down the opportunity to lease most of the project for recreational purposes. Subsequently, in 1949, the original Master Land Use Plan was completed and the District accordingly added basic recreation facilities to the then existing overlook including roads, parking areas, landscaping, and primitive sanitary facilities. Many of these facilities were merely previously existing roads or dam construction roads that were paved or repaved. Other roads may have been developed with crushed stone at that time or they may have simply become established through public use and its attendant compaction. On the right bank, parking and the rest room/concession building were constructed across L.R. 03108 from the project dam tenders' dwellings.

The Commonwealth of Pennsylvania reconsidered their earlier refusal to become involved in recreation at Crooked Creek Lake and, in December 1950, leased 2,440 acres of project land for operation as Crooked Creek State Park. During the existence of the state park the Commonwealth developed and, in some cases, redeveloped facilities in an area of about 325 acres termed the main park area on the left bank of the reservoir. Among the facilities constructed were the Beach, picnic areas, the Boat Launching Area, the access to the Group Camping Area, the Camping Area, 10 vault rest rooms throughout the project, a potable water system, a park office building, two maintenance buildings (the newer and more sound of the two buildings was subsequently removed by the Commonwealth), a residence for the park manager, and several minor supporting recreational facilities.

While the park was being developed and operated by the Commonwealth, the Corps was slowly developing the small operational areas that were excepted from the state park lease. At the request of local sportsmen, project personnel reopened and slightly improved the road to the area below the dam. This was a fortuitous action since this access was subsequently needed and used for inspection and maintenance activities at the outlet works.

The Spillway Day-Use Area's rest room/concession building and picnic tables were, over the years, augmented with two picnic shelters, a visitor center,

playground equipment, a multiple-purpose court, a ball field area, and a physical fitness trail. This area is now developed to the ultimate practical extent.

Across L.R. 03108 from the Spillway Day-Use Area are the dam tenders' dwellings and a small storage garage. Also in this area was an original field office that was used during construction of the dam and was never removed. In the early and mid 1950's and 1960's, this building was used for several purposes including storage, and in the 1970's it was converted to an Environmental Learning Center. In this capacity it was used for environmental education and interpretive programs sponsored by the Corps and other entities in the community, some of which were given recognition through Corps awards programs. Operational meetings and training courses involving field personnel from all District projects were also held in the center to reduce the costs associated with such sessions. Gradually, the building was improved with an enlarged basement under an outdoor deck and a handicapped access ramp. In January 1982, the Environmental Learning Center caught fire from an undetermined cause and burned to the extent that it was a total loss.

A considerable amount of local and some Congressional concern was expressed regarding the loss of the Environmental Learning Center. After a considerable amount of study, it was decided to replace the destroyed building. It was further concluded that a better location for the building would be above the left bank of Crooked Creek below the dam in an area used formerly as a state park materials storage and disposal site. Two prefabricated buildings were available at the project and these were constructed with hired labor. The third of the three interconnected buildings was also constructed by hired labor.

In 1981, the Commonwealth of Pennsylvania announced its intention to relinquish its leases for a number of state parks at Corps projects. One of these was Crooked Creek and, after a period of coordination and negotiations, it was determined that the Commonwealth would turn back Crooked Creek Lake and that the Corps would try to keep operating the former state park with one activity eliminated and others reduced in scale. Specifically, the Corps was to operate the swimming beach area, the Boat Launching Area, and a portion of the day-use area. The number of picnic tables at the project has, subsequently, been decreased from 450 to 250. Operation of the Camping Area by a concessionaire was to be attempted, but contact with the only known prospective concessionaire proved unsuccessful. The Camping Area, consequently, has been operated by Corps personnel or a Corps contractor since the turnback occurred. The state park staff removed a metal maintenance building and upgraded the roads to and parking areas in the Beach and Boat Launching Areas before the lease was relinquished.

The actual turnback of the park by the Commonwealth of Pennsylvania occurred in October 1981. With the exception of the Beach and its changing

stockades, the boat launching ramp and the state park manager's dwelling, what the Government received was generally an unplanned, often poorly managed, and generally worn out park. Heavy use, never accommodated by design or management, and the improvised day-to-day and year-to-year problem solving of an overburdened state park staff with few resources at its command generally resulted in an inefficient park layout and use, as well as poor visual aesthetics for park visitors.

During the years the park was operated by the Commonwealth, capital improvements were minimal. Most of the original roads were not constructed for the level of use they received and are, consequently, costly to maintain.

Sanitary facilities in the former state park were limited to old vault rest rooms, all of which were subsequently determined to be leaking. It was recognized that, during the park's management by the Commonwealth, the sanitary facilities were seriously inadequate when compared with the Commonwealth's own standards. The public water system consisted of hand washing facilities at the two Camping Area vault rest rooms and 12 drinking fountains scattered throughout the main recreation area.

The state park maintenance building is structurally unsound in some respects, and the former state park office is totally inadequate for the District staff required to manage the entire project. A trailer was added to the administration complex to temporarily alleviate this latter deficiency.

Other subsequent remedial actions accomplished by the District since the park turnback include the acquisition of a right-of-way for a short section of the road leading to the Boat Launching Area, the addition of guardrails where needed, the delineation and placement of crushed stone on parking areas along several existing roads, and repaving of some roads and parking areas.

In recognition of the shortcomings of the former state park and its deteriorated condition, plans for sanitary, recreation, and administration and maintenance were accelerated ahead of completion of the Master Plan and presented in the First and Second Increments of the Updated Master Plan and other correspondence. A water and sanitary plan incorporating three water-borne rest rooms with sand mound septic treatment systems in the Main Day-Use and Camping Areas was included in the First Increment Report. This plan also featured new vault-type rest rooms below the dam, at the day-use area adjacent to the Boat Launching Area and at the Beach and was sub-sequently approved and, with the exception of the sanitary improvements at the Beach, was funded. Most of these sanitary improvements are nearly complete and have become part of the existing development set forth in this report. Except at the Beach, the old vault rest rooms have been razed. Rehabilitation of recreation facilities and the addition of new camping

facilities generally will be subject to cost sharing, 100 percent non-Federal development or SRUF funding and are, for the most part, the future development level for this Master Plan, together with appropriate supporting sanitary facilities. Redevelopment of the Boat Launching Area for safety purposes, however, was mandated by the Office of the Chief of Engineers and, together with a new bathhouse, is included in the initial development level.

Other actions proposed and authorized by approval of the First Increment Report were the construction of new maintenance and administration buildings. Also approved was the development below the dam, essentially by local interests, of a fishing embayment, together with remedial erosion repairs and diversion construction in the Manor Recreation Area north of the spillway. These items are also included in this Master Plan's existing level of development.

To accelerate outgranting of the Manor Recreation Area and the route of an equestrian trail throughout the Crooked Creek Lake project, the Second Increment of the Updated Master Plan was prepared and, subsequently, was approved. The Second Increment Report provided the authority for the existing 25-year lease for the Manor Recreation Area with Manor Township and a subsequent subagreement between the Township and the Fort Armstrong Horsemen's Association. A route for the equestrian trail surrounding the project was selected and trail construction is more than one-half completed under a license with the Fort Armstrong Horsemen's Association. Some of the day-use and equestrian facilities in the Manor Recreation Area as well as the equestrian trail around the project are categorized as existing developments because they are ongoing at this time, but are also available for use.

A utility service contract with the Manor Township Joint Municipal Authority for provision of potable water in an eight-inch main to and through the project has been negotiated. The project now has water service from the Authority, although a few minor construction items remain to be completed. Rebates to the Federal Treasury of connection charges paid by private customers along the waterline leading to the project have been initiated and will continue for about nine more years.

A contract for installation of waterlines from the Manor Township Joint Municipal Authority's main to rest rooms, fire hydrants, and water fountains and for three sand mound septic systems for the waterborne rest rooms was awarded in 1986 and work under it is nearly complete. The three waterborne rest rooms in the Main Recreation Area and the one vault-type rest room in the Boat Launching Day-Use Area are now complete.

Below the dam, a prefabricated vault-type rest room was installed and has been in use since late 1985. Only electric power has yet to be furnished to this rest room and for lighting. The addition will make the rest room's use considerably more pleasant and use of the area safer. Power will be

supplied below the dam from and only after the maintenance building has been constructed and supplied with power.

Because of the high prices originally bid, the new administration building and maintenance complex were redesigned and simplified. Both of these facilities are under construction and should be available for occupancy later in 1987.

#### 2-4 RESERVOIR PLAN OF OPERATION

Crooked Creek Lake is a single purpose flood control project and is currently operated between minimum and full pool elevations of 840.0 NGVD and 920.0 NGVD, respectively. These pools as well as the five-year flood frequency pool at elevation 889.0 NGVD are shown on PLATE 2. There is no official recreation or conservation pool at the project; however, because of the difficulty inherent in constantly monitoring inflow, the project was originally actually operated through a range of minimum pool elevations between 840.0 and 845.0 NGVD. When flood storage occurs, the primary objective is to return the pool elevation as quickly as possible back to the operational range of the minimum pool in case of another event requiring storage. The bankfull capacity 5,000 cfs below the dam is somewhat restrictive and not conducive to a rapid release of flood storage. The highest pool elevations normally occur during the late winter or early spring, although experience indicates that substantial filling of the reservoir can occur any time during the year.

At the time of initiation of work on this Master Plan, it was pointed out by project personnel that a pool elevation averaging one foot higher than that which had been maintained would more frequently make the beach considerably more desirable for use. Since that time, an attempt has been made to operate the minimum pool between elevations 841.0 and 846.0 NGVD without any appreciable loss of flood control capability.

A recreation or conservation pool at an elevation above the effective minimum pool range would be beneficial to recreation through the provision of a larger body of water for at least part of the year. A 730 acre summer recreation pool at elevation 860.0 NGVD was, in fact, found several years ago to be feasible with an insignificant loss of flood control potential. This larger pool would also negate the effect of siltation that has limited use of the lake above the existing boat launching area. However, it was quickly determined at the outset of this updating effort that any pool raise beyond the one foot increase in elevation already effected would be deleterious to use of the popular beach.

#### SECTION 3 - RESOURCE INVENTORY

#### 3-1 GENERAL

This section is concerned with the Crooked Creek Lake project's resources and those in its vicinity. Of chief interest is these resources' significance to the project and its use. Generally, none of the project's resources are unique. They are, to a great extent, typical of those found in the southwestern Pennsylvania region. Much of the project region has been subject for a century or more to heavy and extractive industries, and some of its resources have been misused or abused to an extent that has become detrimental to the project. This section presents the inventoried resources and analyzes them according to their importance to the project.

#### 3-2 NATURAL RESOURCES

Most of the resources considered are natural as opposed to man-made, although some of these have been considerably altered from their natural state by human intervention for nearly two centuries.

a. Climate. The project is located in the temperate and humid continental climatic zone, a region of seasonally widely varying temperatures and moderate year-around precipitation which increases slightly during the warmer months. It is geographically in a region of variable frontal activity, being subjected to alternate polar and tropical air mass invasion. The prevailing wind direction is from the west or has a westerly component. Normal monthly temperatures at the dam range from 28.4°F in January to 70.5°F in July, with an average annual temperature of 48.9°F. Temperatures of 90°F or higher are normally recorded about 10 days per year, while temperatures below zero (F) are recorded about seven days per year. Extremes on record are 98°F and -23°F. The average annual frost free period is about 150 days, although variations can occur from one part of the project to another because of topography.

A normal annual precipitation averaging about 42 inches falls fairly uniformly over the Crooked Creek basin. Ranging from 2.7 inches in January to 4.4 inches in July, it is fairly well distributed throughout the year. The period of heaviest precipitation is usually April through August when most of the 15 to 25 annual thunderstorms occur. Measurable precipitation can typically be expected on about 92 days of each year. In the summer, precipitation is usually associated with thunderstorms resulting from convectional activity and is generally confined to small areas with short durations and high intensities. During the late autumn through early spring months, precipitation is usually caused by the passage of a low pressure system over the basin. Occasional stagnation and stationary development produce prolonged precipitation which usually travels slowly in a northeastward direction.

The average seasonal snowfall over the basin is about 41 inches. Snow cover is generally subject to melting throughout the winter season and is frequently a contributing factor to winter and early spring flood runoff. The several freeze/thaw cycles upon which snow melt throughout the winter is dependent also have implications for development and maintenance of facilities. These cycles have a particularly devastating effect on road and parking area pavements.

Climate has a significant influence over recreational use of the project. Although some winter sports (ice skating, cross country skiing, sledding) are pursued at Crooked Creek Lake, the bulk of visitation occurs during the summer months. The beach is most affected by the weather in summer. Although it may typically receive some use any time it is open and the temperature is above 80°F, it is the hot (+ 88°F or above) sunny weekend days that attract great numbers of users. On one such Sunday in 1982, 3,600 people were observed on the beach peninsula at one time. Camping, too, is highly weather dependent with precipitation being the crucial element. Wet or cool summers such as that in 1976 also are reflected in use patterns, although such weather for an entire season or a substantial part of one usually represents an aberration rather than the norm.

- b. Geology. Crooked Creek Lake is situated geographically in southcentral Armstrong County and physiographically in the northern part of the unglaciated Kanawha section of the Allegheny Plateau. The project area is composed of high, rugged, rolling hills which generally rise 400 to 500 feet above the valley bottoms. This area was once covered by a vast inland sea on the bottom of which sand, clay, and lime and organic materials were deposited. The deposition process was interrupted by recurrent uplifts that raised the sea bottom out of the water resulting in periodic erosion of previously deposited materials which, in turn, is responsible for irregularity in the rocks. The project area is in a region where the plateau has been dissected by erosion into rolling hills which in some areas take the form of closely packed oval mounds and sharply cut stream valleys. All types of topography from sheer cliffs where the creek or its tributaries have cut through shale and sandstone formations to nearly flat alluvial plains near the main stream are evident in the project area. Total relief ranges from elevation 1720.0 NGVD at the northeastern basin divide to elevation 769.0 NGVD at the mouth of Crooked Creek. In the upper reaches of the stream, the basin occupies an open valley with prominent flood plains reaching up to one-half mile in width at some points. In the lower reaches, however, the valley becomes gorge-like, steep bluffs are conspicuous, and the flood plain is more narrow.
- (1) Bedrock. All of the rock appearing at the surface in the watershed is of sedimentary origin. These sedimentary rocks comprise a variable series of shales, sandstones, claystone, coal, and a few lime-stones of variable thicknesses. Along the lower reaches of Crooked Creek, the formation underlying the valley bottom and forming the lower part of

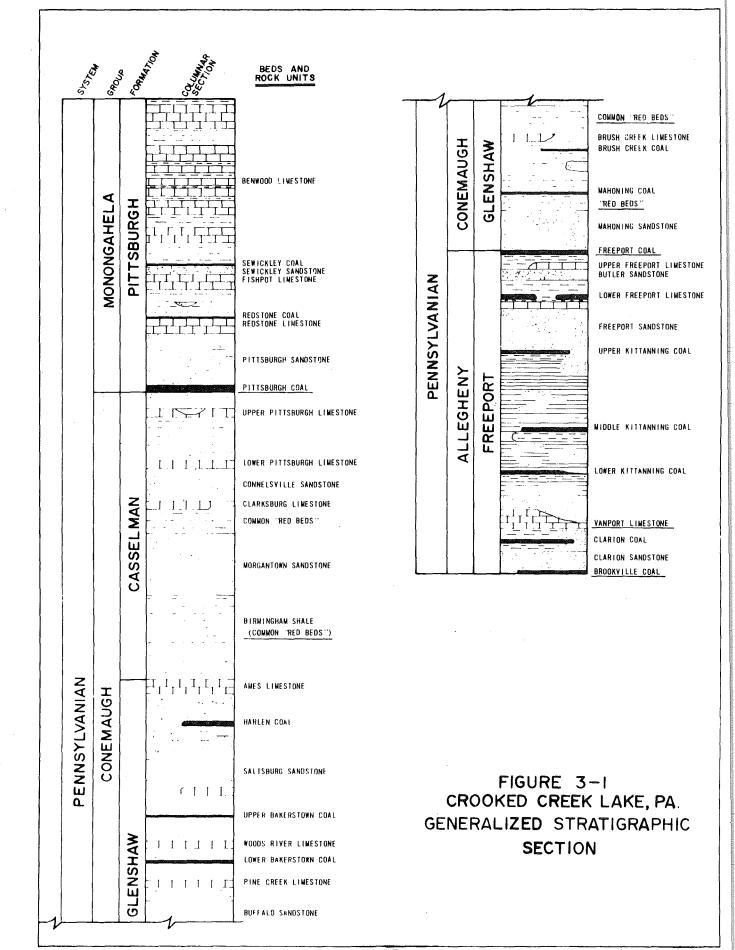
the valley walls is predominantly shales. In these reaches, too, are several prominent sandstone members, several recognized coals and a persistent bed of limestone (Vanport) ranging from six to 12 feet in thickness. In the upper part of the valley walls there are two economically recoverable coals, the Pittsburgh and the Upper Freeport.

The rock in the Crooked Creek area is all of the Paleozoic Era and predominantly of the Pennsylvanian Age as shown on the Generalized Stratigraphic Section, FIGURE 3-1. There are three groups of rocks that are important in the general Crooked Creek area. These are the Allegheny, Conemaugh, and Monongahela. The valley walls in the reservoir area are composed primarily of rocks of the Conemaugh Group. Some characteristics of the Conemaugh Group are poor quality and thinness of coal. Shale is the predominant rock of the group, but the sandstone beds of the lower part are the most conspicuous features. Where the hills are capped with a resistant sandstone, distinct benches protrude from the hillsides and can be tracked from hill to hill. The hills are more flat-topped when capped by a sandstone instead of a shale which produces a more rounded topography.

(2) Minerals. Clay, natural gas, and bituminous coal are important mineral resources that have been intensively developed in the project area. The Upper Freeport Coal at the top of the Allegheny Group is the only commercial coal in the area. It occurs at elevations which bring this outcrop above the maximum pool level established at 920.0 feet NGVD. The average thickness is 40 inches and its quality compares favorably with other commercial coals in the area. Acid drainage from active and abandoned surface and deep bituminous coal mines has been the most serious and long standing water quality problem in the Crooked Creek basin. Mining has been widespread, but the principal sources of acid mine drainage are concentrated in two areas: the immediate project area, and the Ernest Mine Complex upstream from Creekside, Pennsylvania near the communities of Home, Marion Center, and Ernest.

The Ernest Mine Complex is the more significant of these two acid mine drainage producing regions. The Ernest Mine is an underground complex of abandoned mine workings in the Upper Freeport coal seam. The main complex is about 11 miles long and varies in width from 1.5 to four miles, covering an area of about 21 square miles. Adjacent mine workings also add to this area through subsurface headings which connect with the Ernest Complex.

Acid mine drainage in the project area is contributed intermittently by at least one abandoned mine with a partially open shaft on project land southwest of the Boat Launching Area. Surface runoff from strip (surface) mined areas adjacent or near to the project is also probably acidic. In Coal Bank Hollow, there are at least five open mine shafts (four on one side of the valley and one on the other) varying in size from about a foot in diameter to an eight-foot wide and four-foot high opening. These shafts do not appear to be contributing any acid mine drainage to the lake, but the



larger ones constitute a safety hazard as does the one southwest of the Boat Launching Area. The five Coal Bank Hollow shafts will soon be sealed by the Pennsylvania Department of Environmental Resources. For the protection of the visiting public and to decrease the Government's potential liability, measures to eliminate the accessibility of the open coal mine near the Boat Launching Area should also be pursued at the earliest opportunity.

(3) Soils. The soils in the Crooked Creek region are generally residual in nature. Residual soils are those which have developed and remained in place directly over the rocks from which they were formed. They typically have a well developed soil profile grading gradually from soil through to bedrock. Primarily because of the thinness of the soil type, these soils often do not cause engineering problems, although poor drainage can sometimes limit their usefulness.

Soils in the Crooked Creek basin vary widely in their characteristics. Permeability varies considerably from high to low depending on the grain size. The soils are shallow to deep and drainage varies from poor to good depending on the variety of parent rocks which can be any combination of sandstone, siltstone, shale, or claystone.

The project's soils are almost evenly divided between three kinds. The first are residual types formed on uplands from acid shale, siltstone, and sandstone bedrock. These upland soils occur on a range of moderate to steep slopes that are moderately to well drained internally. With very shallow soil, the steep slopes are generally very rocky.

Residual types formed on stream terraces from acidic source rocks are the second division of project soils. Occurring on level to moderately sloping benches along Crooked Creek, these terrace soils range from well to poorly drained. Many sites with these kinds of soils are subject to periodic short-term flooding by the reservoir.

The third division encompasses the alluvial types formed out of material deposited by water along Crooked Creek and its tributaries and originally washed from the acid-soil uplands. These alluvial soils are mostly on bottomland flats, and internal drainage ranges from poor to moderate. Inundation is frequent and ponding occurs on a long-term basis.

There are about 20 different soil series in the Crooked Creek Lake area. They are further divided into stratigraphic units primarily on the bases of slope and type of soil. Volume I of the Armstrong County, Pennsylvania Interim Soil Survey Report, Soil Interpretations prepared by the USDA Soil Conservation Service, The Pennsylvania State University, and the Pennsylvania Department of Agriculture provides detailed analyses and indicates the suitability of each soil type for various uses including recreation, wildlife management, and woodland management. The project areas suited to these uses are shown on Plate 5, Soils Suitability Analysis.

Practical experience at Crooked Creek Lake has shown that, despite the way that the various categories of soils are shown on maps, such information can only be considered a gross representation of actual conditions. Considerable variations can, in fact, occur over areas as small as one or two hundred square feet. Therefore, construction or any other kind of action where soils are an important consideration should be accompanied by test borings or pits, as appropriate.

(4) Topography. The Crooked Creek basin is characterized by widely variable topography. Steep sided stream valleys are commonly capped by adjacent relatively level hilltop areas. In some places, too, stream valleys are quite wide and have fairly level flood plains, while in others, flood plains are nearly nonexistent and almost all of the valley bottom is occupied by the stream. Relief in the basin varies from about elevation 803 NGVD to about elevation 1620 NGVD.

Above Crooked Creek Dam, the basin is comprised of steeply rolling lands with numerous streams and tributaries traversing the area. In the head-water reaches of the Crooked Creek valley, the stream bottom gradient is steep at approximately 20 feet per mile. The average gradient of the original streambed in the immediate project area represents a drop of about six feet per mile.

For the most part, the project lands' topography is similar to that throughout the basin. The two major exceptions are the Main Recreation Area and the Manor Recreation Area north of the spillway. Much of the former was a borrow area for dam construction fill, while a considerable portion of the latter was a disposal area for unsuitable material that was removed from the dam foundation. The Main Recreation Area was flattened somewhat and made slightly more usable as a result of borrow removal. In the Manor Recreation Area, the topography was smoothed out by the placement of the unsuitable material and covering with soil. This action may have contributed to the two deep eroded gullies in the area that were recently repaired through the efforts of local interests.

Topography has had significant effects on use of the project. It has forced recreation development, with the exception of the beach and the boat launching area, onto the more level lands that are high above the lake. In addition, it has rendered much of the project unsuitable for intense development and use which appears to be considered by much of the project's local constituency to be beneficial rather than detrimental. The other recreation facility affected by the project's topography is the equestrian trail surrounding the project which, in many places, has been developed on private land or public roads adjacent to project lands.

(5) Sediment. Sedimentation surveys at Crooked Creek Lake have been performed three times, in 1946, 1964, and 1984. In each of these cases, a report of findings was submitted to higher authority in the year following the survey.

The first survey was conducted five years after reservoir operation began and showed little sedimentation in the minimum pool area. Conducted a little over 24 years after initiation of project operation, the second survey showed sediment deposits up to elevation 855.0 NGVD. At that time, however, only a 1.62 percent reduction in the gross capacity of the reservoir was recorded. Although insignificant from a viewpoint of flood storage capacity, the stream channel and reservoir about 1,000 feet upstream of the boat launching area embayment had, by 1964, become filled with silt which reduced the size of the minimum pool for water-dependent recreation from 350 acres to about 250 acres.

By 1984 or 441/2 years after initiation of project operation, sediment accounted for a 1.98 percent reduction in the reservoir's capacity. It was concluded that the rate of sedimentation is not excessive and appears to be decreasing. The area of the minimum pool that was previously inaccessible did not grow significantly between 1964 and 1984. As part of the updating of this Master Plan, reduction in the elevation of the minimum pool during the winter and spring of one year in order to permit natural scouring of the sedimentation affecting recreation use was considered. Such action, however, would probably open only a narrow channel of dubious recreation value and could conceivably create sedimentation conditions downstream in the reservoir that would be inimical to recreational use of the pool.

c. Basin Hydrology. Crooked Creek Dam subtends a drainage area of 277 square miles. Roughly rectangular in shape, the basin above the dam extends about 29 miles to the east and is about 10 miles wide on a north-south axis. Between minimum pool, elevation 840.0 NGVD, and full pool, elevation 920.0 NGVD, the flood storage capacity of the reservoir is 6.06 inches. This runoff capacity is the greatest of all the Corps' flood control dams in the Pittsburgh District. At full pool, the reservoir would cover 1.940 acres and create backwater in the main stream for 14 miles.

Flowage records are available at the damsite from October 1909 through the current year. Average discharge for the 74 years of record is 421 cubic feet per second (cfs). Extremes for the same period are: maximum discharge, 21,000 cfs, 18 March 1936; minimum observed, 0.1 cfs on 8, 11, 20, 25, and 26 September 1932.

The only other large impoundment in the Crooked Creek basin is Plum Creek Reservoir (Keystone Lake) located on the North Branch of Plum Creek. This impoundment is one source of cooling water for the coal-fueled Keystone Generating Station of the Pennsylvania Electric Company. The drainage area above this dam is 20.6 square miles, or 7.4 percent of the drainage area above Crooked Creek Dam. Plum Creek Reservoir has a surface area of 1,009 acres and a storage capacity of 13,800 acre-feet.

d. Water Quality. The report, "Crooked Creek Lake, Water Quality" by the Pittsburgh District, 1980, describes the water quality of the project

area in detail. This report was based on a comprehensive lake survey conducted in 1979, other previous surveys, and other data collections which began in 1952.

The overwhelming influence on water quality in the project area has been acid mine drainage from deep and strip coal mines in the drainage basin. Crooked Creek was grossly degraded before construction of the dam, but showed gradual improvement from 1952 to 1968. The first year that outflow from the dam did not violate Pennsylvania minimum criteria for pH was 1976. Effluents from one of the largest sources of acid mine drainage, the Ernest Mine Complex, were treated by the Carl A. White Mine Water Reclamation Plant between 1978 and the plant's closing on 8 May 1980. Without treatment, these effluents along with other acid mine drainage sources have forestalled further improvements in project water quality and the productivity of the reservoir.

Water quality regulation is not an authorized project purpose, and the lack of any authorized storage in the lake for that function precludes most opportunities for downstream water quality management. During periods of low runoff, the outflow normally approximates the pattern of inflow with only slight change in reservoir storage or downstream flow conditions. However, during flood storage periods when detention is high and the rate of release varies greatly in time and magnitude from normal conditions, downstream water quality is intrinsically influenced by storage and release, and associated instream needs are considered in the operation of the project. The project's primary water quality benefit is in reducing the percentage contribution of the severely acid mine drainage degraded Kiskiminetas River water to the lower Allegheny River from becoming excessive.

The presence of the reservoir modifies the water quality of Crooked Creek which itself is influenced by acid mine drainage upstream of the dam. Even though the reservoir's retention time is short, it does cause a general demineralization and clarification of the inflow and moderates acid slug events. Without any upstream acid mine drainage treatment facilities, the project will continue to play a major role in protecting the downstream water quality.

During the summer months there is a moderate thermal/chemical stratification in the lake. Its influence is diminished, however, by the reservoir's short retention time and the disruptive effects of major storm inflows.

Anoxia, for example, can develop below 15 feet, but it is short lived and confined to a small area. The outflow at all times of the year is well aerated by the outlet works' hydraulic design so that dissolved oxygen levels are near saturation. The reservoir delays thermal changes between inflow and outflow on a seasonal basis and moderates the magnitude of diurnal variations. Nevertheless, its effect on downstream biota and water use is not significant.

With present conditions, the project generally benefits the water quality downstream. No significant changes in inflow water quality are expected, and no modification of project operation is planned, so that the water quality conditions should continue as they have in the past.

e. Vegetation. Slightly less than one-half of the Crooked Creek drainage basin is forested. The bulk of this forested area is in the head-waters area. Although the project has extensive cleared areas, most of the upstream part of the project is forested.

On the basis of ecoregion categorizations, Crooked Creek Lake lies within the Appalachian Oak Forest section of the Eastern Deciduous Forest. This forest type is dominated at the project by white oak and black oak, with co-dominants of black cherry, scarlet oak, and chestnut oak. It is characteristically found on upland sites except along the lower portions of steep north and east slopes and in narrow ravines. The microclimatic conditions in these latter habitat types favor species more typical of the Northern Hardwood Forest ecoregion such as eastern hemlock, sweet birch, sugar maple, and American beech. The influence of the Mixed Mesophytic Forest which extends from the southern Appalachians into southwest Pennsylvania may also be seen at the project.

Most, if not all, of the project has been logged, grazed, or farmed at one time. Some parts of the project area are continuing under intensive modification such as at the damsite, the administrative and recreation areas, and the game management areas. The vegetation in the flood plain now receives more frequent and extensive inundation of longer duration because of the presence and purpose of the dam, so that this area must also be considered to be a modified vegetative community. The remainder and majority of the project, however, receives no active management and is in various stages of natural succession.

The most thorough description of project vegetation is contained in the project's "Forest, Fish and Wildlife Management Plan," Appendices B and D to the Master Plan, prepared in 1977.

f. Fish and Wildlife. Project lands were managed by the Pennsylvania Department of Environmental Resources between 1950 and 1981. During this period, no wildlife management activities were undertaken and much of the project reverted from formerly cultivated land to young growth forest. After the state relinquished project management to the Corps in 1981, the Pennsylvania Game Commission declined the District's offer to manage project lands through an outgrant. Project personnel subsequently initiated wildlife management activities established in the project's Forest, Fish and Wildlife Management Plan. Management of the fishery has been overseen by the Pennsylvania Fish Commission since 1950. They have a Department of the Army license to manage the fishery through June 2004.

(1) Fishery. The Pennsylvania Fish Commission has an overall management objective of maintaining a quality warm water fishery in Crooked Creek Lake. Their specific objectives are to maintain a self-sustaining largemouth bass fishery, to maintain a quality walleye fishery through the stocking of fry or fingerlings, and to maintain a trophy tiger muskellunge fishery through the stocking of fingerlings. Stocking needs and management objectives are evaluated through biological assessments of the fishery conducted by Fish Commission personnel at approximately six-year intervals. The two most recent surveys were conducted in 1976 and 1983.

The Fish Commission initiated a varied stocking program of the lake in 1950 which met with limited success due to the marginal, but improving water quality. This program was discontinued in 1966. In 1969, the mean annual pH fell back to 4.8, but as coal mine reclamation activities increased, the pH improved again so that by 1976 it had been restored to acceptable levels. After the Fish Commission's 1976 survey, stocking activities resumed, concentrating on walleye and tiger muskellunge. These stockings were suspended in 1980/81 following acid mine loading of the lake when operation of the Carl White Mine Water Reclamation Plant was discontinued in 1980. Stocking of these two species was resumed in 1984.

The health and productivity of the lake's fishery is largely dependent upon inflow water quality which continues to be degraded by acid mine drainage. Low growth rates of largemouth bass, particularly in the 1980 year class, appear to be due, in part, to a poor forage base. The recommended stocking of emerald shiners may improve this situation, but the detrimental influence of untreated mine drainage from the abandoned Ernest Mine Complex as well as disruptive fluctuations in pool level during spawning will continue to be major limiting factors controlling the fishery success.

Without additional treatment of the upstream sources, the inflow will chronically degrade the reservoir's water quality. However, because the reservoir moderates incoming acid "slugs" and provides general demineralization and clarification of the inflow, the downstream water quality and fishery will continue to benefit from the reservoir's presence.

(2) Wildlife. The variety of habitat types and successional stages at the project permits a diverse wildlife population structure. Some of the more common game species include the whitetail deer, eastern cottontail, woodchuck, eastern gray squirrel, raccoon, American Woodcock, Ruffed Grouse, and Wood Duck. Migratory waterfowl frequent the project, but the success of management efforts for waterfowl and other wetland-dependent species is hampered by the smallness of the pool, the irregularity of pool level fluctuations, and the lack of wetland habitat types. Upland habitat manipulations to maintain a variety of interspersed successional stages and to provide wildlife food plantings benefit both game and nongame species. Wildlife habitat management is performed by project

personnel in the areas designated for wildlife management on Plate 6. Their efforts are generally in accordance with the "Forest, Fish and Wildlife Management Plan." With the exception of a small subimpoundment proposed for development and management by a local organization to attract a resident waterfown population, no significant changes in wildlife habitat or population status are expected in the near future. The limited wildlife habitat management activities are designed to maintain habitat diversity and interspersion in the upland areas. The development of wetlands in the flood plain and management of the reservoir to improve the project's value for waterfowl and other wetland species, although desirable, is restricted to the Robb's Bridge Flat area by the flood control function of the project.

Based on information provided by the State College, PA office of the U.S. Fish and Wildlife Service, three Federally listed endangered birds may occur as transient species in the project area: Bald Eagle, Peregrine Falcon, and Kirtland's Warbler. There is no listed critical habitat for these species in the project area. Bald Eagles may be attracted to the dam and tailwaters during migration, and subadult eagles may use the area as wintering habitat. The other two species are not expected to be regular visitors to the area.

An endangered plant, the small whorled pogonia, might possibly occur in the habitat types found at the project. However, at present the only populations known statewide are in Centre and Venango Counties. It has been found in a variety of conifer/hardwood habitat types in the eastern United States, but most often occurs in mixed second growth hardwoods with a relatively open canopy and little shrub or herbaceous cover. Information on specific locations of this plant are not, and should not be, released.

The Pennsylvania Game Commission lists the following special status species of concern as occurring in the general project area:

Species	State Status
phecies	plate status

Upland Sandpiper
Henslow's Sparrow
Eastern Bluebird
Cooper's Hawk
Purple Martin
Vesper Sparrow
Red-headed Woodpecker
Marsh Wren

State Threatened State Threatened Species of Concern Species of Concern

g. Unique Environmental Resources. There are no unique environmental resources at Crooked Creek Lake.

h. Scenic Aspects. About 37 percent (949 acres) of the project's land has been designated as scenic compartments in the "Forest, Fish and Wildlife Management Plan." The forested corridor of the creek and its tributary streams comprise most of this acreage whose scenic value derives from its natural-appearing setting. Especially in the upper reservoir, man's disturbance of the surrounding lands is largely screened from the reservoir by the project's vegetation, providing boaters and hikers with a sense of escape and solitude.

In addition to the river corridor vegetation, the floral and vegetative displays of an upland area, Compartment 17 as identified in the "Forest, Fish and Wildlife Management Plan," have been declared a scenic resource. Although this 32-acre area was previously stripmined, its dogwood and other flowering tree and shrub displays are noteworthy. This compartment also has the highest project elevation from which one may observe scenic views of the lake and surrounding lands.

In addition to the project's vegetation, the sinuous meanders of Crooked Creek, from which the creek derived its name, are of interest. The exceptional series of meanders at the project have been classified by the Pennsylvania Geological Survey as an "outstanding scenic geologic feature" of the Commonwealth.

#### 3-3 REAL ESTATE

Originally initiated by the Commonwealth of Pennsylvania, but completed by the Corps of Engineers, the real estate acquisition for the Crooked Creek Lake project included both lands for which fee ownership rights were purchased as well as those over which only perpetual flowage and clearing or road easements were bought. Public ownership of the streambeds in the project area was asserted by the Federal Government and, as a result, no acquisition for these areas was undertaken.

- a. Boundary. Very little project land above the full pool, elevation 920.0 NGVD, was acquired for the project except in the vicinity of the dam where additional uplands were needed for construction and borrow and spoil areas. The resulting boundary is shown on Plate 2 and several other plates where it is identified as the "U.S. Government Property Line." Monumentation of the project boundary is complete and the monuments are well maintained. Project boundaries are routinely checked. Through the provision of more ready access, this activity has been aided by the equestrian trail surrounding the project developed by the Fort Armstrong Horsemen's Association.
- b. Ownership. A total of 2,563.57 acres were acquired in fee for the project. No mineral rights were acquired for most of the project. No project lands have ever been sold, although three parcels were reported to the General Services Administration as excess to project requirements because they have been separated from the main body of project lands by

relocated roads. Two of these parcels are in the Robb's Bridge Flat area and consist of 2.25 and 7.59 acres. The third parcel of 13.65 acres has been leased to Manor Township as part of the Manor Recreation Area and, despite its separation from the bulk of the recreation area, the township does not wish to relinquish it. Because of their very steep topography, it is difficult to imagine commercial interest in any of the parcels reported to the General Services Administration.

Five tracts in three areas comprising a total of 98.19 acres of land had only perpetual flowage and clearing easements acquired. Since the Federal Government exercises no control over these tracts except for the prohibition of certain activities such as permanent human habitation, no planning for them is included in this Master Plan.

Perpetual road easements were acquired over two tracts which comprise 1.79 acres of land. One tract of 1.55 acres was acquired for relocation of L.R. 03108 and is now, for all intents and purposes, part of the state's right-of-way for this road. The other (0.24 acre) was acquired recently to assure public access to the Boat Launching Area, since Bethel Township abandoned the road providing such access many years ago. These rights-of-way are not considered further in this Master Plan.

About 250 acres of land that were creekbed before construction of the dam were not acquired, but now are an integral part of the project. For nearly all purposes, this area is treated as if it was acquired in fee. Added to the project lands acquired in fee, the streambeds comprise part of the 2,813.57 acres of land that are primarily controlled by the Corps of Engineers.

c. Existing Land Use. Current project land use is essentially reflected on Plate 11, Zoning Plan. The northern area of the project is intensively used for the dam, spillway, and outlet works, project administration and maintenance facilities including three Government dwellings, the Environmental Learning Center and both day-use and camping facilities. Upstream of the developed recreation areas, project lands are used lightly for recreation including hunting, fishing, and canoe, raft, and small boat launching. The areas on Plate 11 identified as "Wildlife Management" have been developed to benefit and maintain habitat for various wildlife species.

On project lands, there are a potential total of four encroachments by neighboring property owners. Three of these are minor encroachments involving mowing, grazing, a woodpile, barbed wire fencing, and possibly the drainage of sewage. These are considered minor in that they can be cured without resorting to major construction above the surface of the ground. The major encroachment involves a barn and fence that may be located in part on Government property. This area and the site of one

minor encroachment are upstream, while two of the three minor encroachments are located in the vicinity of the Main Recreation Area.

d. Project Structures and Utilities. The major project structures consist of the dam, the outlet works, and the spillway. These occupy a very small percentage of the total project area, although, if all of the areas that contributed to their construction were included, the percentage of total project area would more than double. Upstream, away from the project structures, little land above the full pool, elevation 920.0 NGVD, was acquired. Where lands lying above this elevation were acquired, the action was based on sound real estate practices, loss of access or a more manageable boundary.

There are numerous utility lines adjacent to and crossing Crooked Creek Lake project lands, although few of these actually serve the project. Many existing utility lines were in place when the project was originally constructed.

The project itself has utility service only in the vicinity of the dam. Electric power and telephone service has been available in this area since the time of project construction. Natural gas was provided to the Environmental Learning Center when it was reconstructed since it was available nearby off the project. Little additional extension of the existing gas line on the project was required to provide gas for water heating and building heating at the new administration and maintenance buildings. The single Government dwelling beside the road leading to the area below the dam has also benefitted from an economical connection. The oil-fired heating plant in the dam control tower has been replaced with a propane fired system which will be converted to use of natural gas after service is furnished to the right bank. It will be easy to then provide service to the two original Government dwellings and the rest room in the Spillway Day-Use Area which is scheduled to be winterized.

e. Leases, Licenses, and Easements. There are three kinds of leases in effect at Crooked Creek Lake. Adjacent to the Beach is a small boat rental and food and drink sale concession operated from a small trailer on one acre of land. This operation under a lease represents a continuation of a service to the public that was provided at the same location when it was part of the state park. The concession appears to be operating successfully, provides a valuable public service, and has caused no significant problems to project management. It should be continued under a lease.

In accordance with the report termed the "Second Increment" of this updated Master Plan, the Manor Recreation Area was leased to Manor Township who, in turn, has outgranted the area to the Fort Armstrong Horsemen's Association under a recently executed agreement. This lease covers approximately 113 acres for a term of 25 years and contemplates the somewhat intensive development of equestrian facilities as well as a small number of day-use

facilities. Construction of two rings and a parking area as well as improvement of an access road have been initiated by a local coal company for the Horsemen's Association. In addition to a multiple purpose building, an announcer's booth, bleachers, a rest room, barns for temporary boarding of horses, and other facilities that the Association has proposed for the Manor Recreation Area, the Manor Township Supervisors have proposed construction of a target shooting range. Permission to provide such a facility was originally denied because the proposal at that time was not thoroughly developed and such use may not be compatible with equestrian activities. However, should the township wish to pursue the shooting range proposal, every effort should be made to help them find an acceptable plan for implementation, since a considerably wider spectrum of visitors would, thus, benefit from use of the area.

The third kind of lease in effect at the project is that for natural gas and oil. There are currently 12 such leases in effect that are held by four owners. All of these leases are indefinite and many, if not all, merely converted the status of oil and gas operations that were existing prior to project construction. The most well known facility associated with one of these leases is the gas well adjacent to the change shelters and rest rooms at the Beach. Operation of this well recently ceased.

At Crooked Creek Lake, there are four existing and one proposed license in effect which range in significance from great to minor. The most important existing license is that issued to the Pennsylvania Fish Commission. Involving 400 acres of water for fish conservation and management purposes, this license, which expires in 2004, formalizes the Commission's work in the minimum pool.

The next most significant licensing action is quite recent. This license is for the Fort Armstrong Horsemen's Association's equestrian trail around the project, the route of which has been definitely established for most segments by project and Association personnel. Part of the approximately 27-mile length of this trail is on the project while part, because of topographic considerations, is on private lands or public roads. The equestrian trail has the potential for opening previously inaccessible parts of the project to other than the primarily intended equestrian or secondarily intended hiking use. On the other hand, it will enhance access to such areas for inspection and patrolling purposes. Because of the undesirable use of the trail that could occur and because of the damage that could be caused by equestrian use of the trail, the license for it should initially be issued only for a period of five years.

The three remaining licenses are minor and two have no great impact on the project. All of them expire in 1989.

The Pennsylvania Department of Transportation (PennDOT) has a license for storage of road maintenance equipment and supplies in two areas with a

total acreage of 2.75 acres. One area is adjacent to the spillway and the Manor Recreation Area along L.R. 03108 and the other is along L.R. 03051 in the Robb's Bridge Flat area. These are "stand alone" facilities and the latter appears to be used only infrequently. Because their use for road maintenance is unrelated to project operation, it has been recommended that the license should be permitted to expire without renewal. outgranting of the area at Robb's Bridge Flat is not defensible, but the area adjacent to the spillway is valuable to both the project and to PennDOT. Because of its relationship to the spillway, this latter area should be retained in Federal ownership. Its present use is not harmful to project operation, however, and the project and its users benefit from the outgrant. L.R. 03108 is always in good repair, snow removal from it is more immediate, and the guardrails along the road atop the dam are more often in a safer condition because of the location of the PennDOT facility on project land. Therefore, it is recommended that an outgrant for the area adjacent to the spillway be continued, but that the area at Robb's Bridge Flat be excluded from the outgrant and be integrated into project management.

In the upstream part of the project, a license for a private access road has been granted and, adjacent to the existing campground, a license for a utility pole is in effect. These should be renewed upon request.

Currently, there are 85 outgrants for various utility and road rights-of-way in effect for various parts of the project. In the cases of 74 of these easements, the underlying properties were acquired for the project subject to the easements. The most recent easement granted is for a right-of-way, 25 feet wide, along L.R. 03108 and extending below the dam for the Manor Township Joint Municipal Authority's water main which provides potable water to the project.

#### 3-4 CULTURAL RESOURCES

Prior to construction of the Crooked Creek Lake project, no formal archeological survey or historic studies were conducted in connection with the project. The term "cultural resources" refers to tangible evidence of any prehistoric or historic district, site, building, structure, or object which is a manifestation of human activity that may be significant in an understanding of American prehistory and history. Judgments of significance are made through application of National Register of Historic Places eligibility criteria (36 CFR 60.5). Federal historic preservation laws provide significant cultural resources with certain protection and privileges with respect to Federal activities. The District is, therefore, required to consider the effect of its activities on cultural resources.

a. Prehistoric. Before 1986, only two archeological sites were officially recorded on project lands. However, given the general knowledge of settlement patterns in western Pennsylvania, much of the project has a high

archeological potential. Flood plains, particularly at stream junctures and Indian path crossings, are likely to contain sites. The larger, upland sites are most likely to occur below hilltops in saddles or benches with south and east exposure where the slope is less than 15 percent. Medium to large sites are generally located where a variety of habitats can be exploited, and where access to water and lithic resources is available.

In 1986, the District undertook a cultural resources survey of the project consisting of a literature search of the entire project area and a field survey over about 760 acres. The specific areas surveyed include the administrative and outflow areas near the dam and the five recreation development areas shown on Plate 12. This study located 23 prehistoric archeological sites, nine historic archeological sites, one historic archeological district (the former Cochran's Mills) and two existing steel truss bridges of some potential historic interest.

Archeological sites were located in each of the separate study areas. Their specific locations are described in the report "PHASE I ARCHEOLOGICAL LITERATURE SEARCH AND FIELD TESTING OF CROOKED CREEK LAKE, ARMSTRONG COUNTY, PENNSYLVANIA," December 1986, which is on file at the District Office. The specific site locations are to be treated as confidential to protect against vandalism, and, therefore, are not to be released to the public. The widespread occurrence of archeological sites at the project indicates that unsurveyed areas are also likely to contain sites.

The importance of the findings of the 1986 study is that development at the project could affect potentially significant cultural resources which are protected by various Federal laws. If this development cannot avoid impacting these sites, further archeological studies and coordination with the Pennsylvania State Historic Preservation Office will be required to determine their significance and any required mitigation before development may proceed.

b. Historic. The first permanent settlement in this area by Europeans is attributed to Captain Andrew Sharp and his family. They established a farm around 1784 in an area east and upstream of the project in what is now Plum Creek Township. The risk of Indian raids, however, discouraged any major settlements until after 1796. Shortly afterward, a number of mills and their attendant communities sprang up in the Crooked Creek basin.

The first gristmill was built around 1801-02 at the mouth of Cherry Run. A carding and fulling mill followed at this same location in 1822. This community later took the name "Cochran's Mills" and became the birthplace of Nellie Bly (nee Elizabeth Cochran) who was the United States' first prominent female newspaper reporter and advocate of women's liberation in the early part of this century. Another early gristmill and sawmill was built in 1805 downstream of the present damsite. In 1836, a gristmill was

erected upstream of the dam where the builders tunneled through rock to construct a special head race powered mill. The community that developed around it became known as Tunnelville and it was situated near the project's swimming beach. In the year 1811, the manufacture of gunpowder commenced along Crooked Creek at the mouth of Pine Run. An explosion at this plant in 1826 abruptly ended the operation. Another powdermill possibly operated at the mouth of Fagley Run, or thereabouts, above Cochran's Mills.

The development of major transportation routes began with the Pennsylvania Canal in the 1830's along the Kiskiminetas River and the railroad in the Allegheny River valley in the 1850's. Industrial development in this area subsequently took place along these routes. The Crooked Creek basin has remained primarily agriculturally oriented except for some coal extraction. The towns at Tunnelville and Cochran's Mills were razed during the construction of Crooked Creek dam and little, if any, physical evidence of their prior existence remains.

#### 3-5 EXISTING RECREATION AND OTHER RELATED FACILITIES

Crooked Creek Lake has been used for recreation by the public since at least the late 1940's. Based on the period from 1965 through 1986, the average annual visitation to the project has been about 670,000. By most standards, the facilities that have been available to support use of this magnitude are meager. It is speculated that the project's popularity for recreation is, therefore, derived from its close proximity to population centers including the eastern suburbs of Pittsburgh.

In general, Crooked Creek Lake has facilities available for boating including water skiing, swimming, picnicking and other day-use sports, camping, sightseeing, hiking, winter sports, fishing, and hunting. Their locations are shown on Plate 6. The recreation facilities termed "existing" in this Master Plan are those that were provided by the Corps in the Spillway Recreation Area, below the dam, to some extent at the Environmental Learning Center, and along Cherry Run many years ago, are those available in the former state park, or are those that the Corps has been able to provide since 1981. They are shown on Plates 11 and 12. Plans to provide new sanitary facilities at the Beach and safer facilities at the Boat Launching Area are included herein, but, since these efforts are not yet complete, they are termed "initial." They have, nevertheless, fairly immediate importance to the project.

The Main Recreation Area contains the Main Day-Use Area which includes most of the project land bounded by L.R. 03108 to the north, the lake to the east and south, the Beach peninsula to the east and the Government property line to the west. Only the Campground and the Administration Building also occupy small parts in the southwest and northwest of this large area. The Main Day-Use Area has about 175 picnic sites, parking areas, an overlook shelter, two waterborne rest rooms, drinking fountains, a ball field, an amphitheater, and trails for fishermen and sightseers.

The Campground has 50 campsites, each of which consists of a generally grassy area set off by stake number markers, a picnic table, and a fire ring. A waterborne rest room serves this area. It is remarkable that, without developed spurs, the campsites have apparently suffered little environmental damage. However, the sites are small with no buffers between sites. Although it would be desirable to halve the number of sites in the existing Campground to provide a more desirable recreation experience, such action would ultimately constitute a disservice to nearly one-half of the campers who now use the Campground unless the smaller number of sites was augmented elsewhere. The Campground is nearly always busy on summer weekends; however, it is rarely completely full, possibly because it can be filled only with difficulty due to the high density of users.

On a narrow peninsula and accessible only by road, the 1 1/2-acre Beach is served by parking areas for 350 cars, a mobile concession from which paddle boats, fishing boats, and canoes are rented and food and drink items are sold, two rest rooms with leaking vaults, and two change shelters. No provisions are made for lifeguards at the beach; nevertheless, the beach remains popular. The water adjacent to the beach has two buoy lines. The inner line denotes the area with a maximum water depth of five feet while the second, which extends approximately half of the way to the opposite shore in the spillway's vicinity is intended for more competent swimmers.

The Boat Launch Day-Use Area is located on a high slope adjacent to the Boat Launching Area. It functions as a picnicking site for boaters and as an overflow area for day users. Although there are only a few picnic sites in the area, parking is available for nearly 100 cars. The only other facilities that are existing in the Boat Launch Day-Use Area area are a new vault-type rest room and a picnic shelter.

The Boat Launching Area has a concrete boat launching ramp with a turnaround that doubles as the entrance to the former Group Campground access road. There are three bays of parking stepped in terraces up the hillside to the west of the launching ramp. These bays are all undersized for use by car-trailers and, unlike the access road, are unpaved.

The former Group Campground consists of an unpaved access road, the most informal of turnarounds and a large open, grassy hilltop area. This site will require patrolling by vehicle because it is so close to other developed areas.

The unpaved continuation of the Boat Launching Area access road (beyond where the paved surface turns to the southeast) ends after a distance of about 200 feet in a small unpaved parking area. This site is the head of a trail developed several years ago by a local Boy Scouting organization.

The existing project Sanitary Station for Camping Trailers is along L.R. 03108 midway between the western Government property line and the Main Recreation Area entrance road. Although this facility would more logically be located in the vicinity of the Campground, the requirements of the

Pennsylvania Department of Environmental Resources regarding sanitary holding tanks together with the absence of a sewage treatment facility at the project capable of handling camping trailer wastes combined to preclude a new station at a more desirable site. The existing station is served by a newly replaced holding tank.

At the interesection of L.R. 03108 and the Main Recreation Area access road is the new Administration Building that will soon replace the old, totally inadequate one. Across L.R. 03108 is the site of the new Maintenance Building which will include some storage space. This new structure will replace the old, potentially unsafe building that was used for maintenance.

Off T-670 is the Environmental Learning Center which provides a small classroom and living facility. Consisting of three small interconnected wood frame buildings, the center is served by a paved access road and several parking spaces.

Across L.R. 03108 from the Sanitary Station for Camping Trailers is a wood frame one-story dwelling. This was the former state park manager's dwelling, and it is currently Federally owned and occupied by a Corps employee.

A steep, paved road just east of the former state dwelling leads to the Fishing Access Area below the dam. This area's fishing potential was recently improved considerably by the excavation and construction by local interests of a fishing embayment. The Crooked Creek Watershed Association aided by the Soil Conservation Service, several U.S. Army Reserve engineer units, Manor Township, the Fort Armstrong Horsemen's Association, and the Darmac Coal Company contributed to the development of the embayment and an accessway to the outlet works that is adjacent to the embayment. Otherwise, the Fishing Access Area is served by a paved parking area for 50 cars, a prefabricated vault rest room, and a few picnic sites. A new set of steps on the right bank downstream of the outlet works provides safe access to Crooked Creek for fishermen and a new railing atop the outlet works training walls allows fishing in the stilling basin. Lighting is provided in the area for safety purposes.

Adjacent to the dam's right abutment is the Spillway Day-Use Area which has an old but serviceable waterborne rest room and a visitor center that has yet to be furnished with displays. A paved access road and parking areas are available. Two picnic shelters and a number of other picnic tables are augmented by several pieces of playground equipment, a ball field, and an all-purpose paved court. Between the dam and these facilities are a physical fitness trail and a trail for fishermen leading to Crooked Creek's right bank below the dam.

Across L.R. 03108 from the Spillway Day-Use Area are two two-story brick Government dwellings and a small brick storage garage. These were developed at the time that the dam was constructed and are occupied by project personnel.

North of the spillway is the Manor Recreation Area. Existing development work at this site has consisted of the filling of two very badly eroded gullies and the construction of a water diversion to assure that the previous erosion does not reoccur. This work was accomplished by those who were responsible for construction of the fishing embayment below the dam. The Fort Armstrong Horsemen's Association with aid by the Darmac Coal Company has developed access roads and two equestrian rings in the Manor Recreation Area.

The Cherry Run Upstream Fishing Access Area consists only of a 10-car crushed stone parking area adjacent to T-518. It provides access for users of this trout stream.

#### 3-6 SURROUNDING LAND USE

The area surrounding the Crooked Creek Lake project is mostly rural in character. Land immediately adjacent to the project fee property line is, in most areas, wooded, under cultivation, or in pasture. There are relatively few residences on private land contiguous to project land, although there are clusters of both permanent and seasonal homes surrounding some northernmost parts of the project. They are located along L.R. 03108, both east and west of the project, along T-460 and T-670 and along a private road near the boat launching area. Residential development in the upstream part of the project vicinity is generally sparse, even around the locations of former settlements that were razed at the time of project construction.

Another major use of adjoining land is strip mining which is practiced immediately adjacent to the project boundary in several locations south and east of Pennsylvania Route 359. Mining on some of these properties has been completed. Surface reclamation has been somewhat haphazard or nonexistent.

#### SECTION 4 - PUBLIC INVOLVEMENT AND COORDINATION

# 4-1 GENERAL

In accordance with regulations current at the time, a public involvement program in connection with the updating of this Master Plan was developed. Including both traditional coordination with state and local agencies and contact with various local entities, this program eventually involved at least 19 local governments, local agencies and organizations, and over 400 persons representing diverse interests. Despite the heterogeneity of the participants, several common attitudes emerged. These are discussed below.

The public involvement program included both early and late stage components. The early stage consisted of 21 meetings and workshops in the project area with the 19 agencies, local governments, and local organizations mentioned above. A public meeting to which previous participants as well as the public at large were invited made up the late stage of the program.

#### 4-2 PUBLIC EXPRESSIONS

Common concerns and attitudes as expressed by participants in the public involvement process were numerous. Each of these areas of concern was addressed by more than one individual; most were addressed by more than one agency, governmental entity, or organization.

Perhaps the most surprising attitude expressed concerned the flood control capacity of the project. Repeatedly, a desire to maintain the lake's storage capacity and to discontinue consideration of a hydrologically feasible summer recreation pool raise of 20 feet in elevation was expressed. There was some sentiment in favor of the potential pool raise, but it soon became clear that no local governmental entity could help to mitigate the loss of the existing beach which would accompany a pool raise. Therefore, a pool raise was found to be politically unacceptable.

Concern was expressed over water quality in the lake and the status of the Carl A. White Mine Water Reclamation Plant which was built by the Pennsylvania Department of Environmental Resources and operated by them from 1978 to 1980. Water quality in the lake and in Crooked Creek upstream of the lake improved dramatically when the state initiated operation of the treatment plant several miles upstream of the project. When the plant was permanently closed two years later, however, the rapid degradation to the former level of water quality did not occur as anticipated.

There was publicity about excessing of unneeded Federal land in the media at the time of the early stage public involvement workshops. As a result,

two local governmental entities and the Pennsylvania Game Commission expressed concern about excessing of project lands. Manor Township's interest in excessing eventually led to positive action which resulted in outgranting of the Manor Recreation Area to the township.

Protection of the project's visual corridor is important to many of the public involvement program participants. Development in this corridor upstream of the Main Recreation Area except for minor improvements that would not change its overall character was discouraged. These people also favored continued provision of recreation facilities essentially where they are now located.

There was concern expressed that areas other than Armstrong County which contribute visitors to the project should also help to support the project by participating in its development or, more particularly, in its operation and maintenance. Study of the market area and origin of visitors tends to support this view. There is some indication that only one-third or fewer of all project visitors originate from Armstrong County.

Interest in concessionaire operation of both existing and new recreation facilities was expressed, although no one followed up on these expressions. A subsequent search for a concessionaire to operate and maintain the Campground, although not exhaustive, yielded no seriously interested parties. A market analysis to determine the feasibility of concessionaire operation of existing or proposed recreation facilities will be prepared as a Master Plan supplement prior to initiation of any such leasing actions.

Development of facilities for the handicapped was favored by several public involvement participants. A number of local entities jointly participated in construction of the fishing embayment below the dam. The intent of developing this facility was partly to benefit the handicapped and elderly.

Concerns specific to the various activities for which opportunities are offered at Crooked Creek Lake were expressed in both the early and late stages of the public involvement program. Probably the most controversial, though not particularly heated, issue which stimulated public comment was whether a 10 horsepower limit on boat motors should be instituted at the lake. One active local organization's membership was divided to the extent that they never were able to decide on a group consensus concerning the issue. The Pennsylvania Fish Commission's desire to maintain boating and water skiing on the lake without a 10 horsepower limit prevailed. The water zoning presented in Section 6 of this Master Plan reflects the Commission's desires in this regard.

Another boating-related comment that was voiced frequently was the need for access and parking for boaters and fishermen in the "no wake" zone downstream of the area where unlimited speed boating and water skiing are

permitted. Those requesting such a facility cited the difficulty and danger associated with passing through the unlimited speed zone to reach the "no wake" zone around the beach from the Boat Launching Area as the reason for their concern.

The most frequently heard comment was the request that the beach remain available for use at its present site without a pool raise. Most were fervent in their desire to have use of the beach remain free. One group indicated overwhelming preference for use of the beach without lifeguards or user fees as opposed to the provision of lifeguard service and the collection of user fees.

A few people expressed demand for long distance swimming opportunities at the lake. The prohibition of swimming in the unlimited speed zone for boaters was not favored by these individuals, but their desires were partly responsible for establishing the outer deep water buoyed area adjacent to the beach.

Additional picnic shelters were desired by numerous local users of the project. Only two shelters in the Spillway Day-Use Area have been available to users in the past. The recently developed picnic shelters as well as those proposed in this Master Plan should help meet the expressed demand.

Boat-in camping facilities were suggested as a way to make available some parts of the project that now lack public access. A number of organizations also requested that the Group Campground be kept open.

Demands for almost all kinds of trails were expressed by the public involvement participants. Hiking, bicycling, and cross country skiing were the most often cited types of trails desired, although snowmobile and equestrian trails were also mentioned frequently. Action to make available only an equestrian trail which may also be used for hiking has been undertaken by a local organization, the Fort Armstrong Horsemen's Association.

There was sentiment expressed in favor of continued availability of the Environmental Learning Center and the programs conducted there that are open to the public. Several organizations that conduct their own programs at the center also indicated their desire for continued use of the center.

Several people suggested that advantage be taken of the wildlife management opportunities extant in the Meyer's Field and Robb's Bridge Flat areas. Development of potholes was recommended for these sites as a means to attract waterfowl.

Many suggestions and ideas for improvement of the project were offered by a single source. Those with potential merit are discussed below.

It was recommended that only those project lands above the full pool, elevation 920.0 NGVD, be subject to excessing. Also suggested for various areas throughout the project that are not under development or active management was tree and shrub planting.

A courtesy dock for the Boat Launching Area was requested. This is a facility that is normally furnished at District boat launching ramps and one will be installed at Crooked Creek Lake when the Boat Launching Area is redeveoped.

More playground equipment in both day-use areas and the Campground was requested. On the subject of the Campground, its expansion and improvement of its sanitary facilities were suggested. Concerning group camping facilities, needs for both developed and undeveloped areas were cited.

The Fishing Access Area below the dam stimulated several comments. A handrail on the outlet works' left wingwall, which was recently installed, was suggested in place of the existing high chain link fence to permit fishing. Deflectors and other devices or measures to improve fishing and canoe access below the dam were recommended. Finally, it was suggested that access to the berm separating the fishing embayment from the main channel of Crooked Creek be provided by a footbridge.

# 4-3 PUBLIC MEETING

The late stage of the public involvement program carried out as part of the Crooked Creek Lake Master Plan updating effort consisted of a public meeting. This meeting was held on 28 September 1983 at Ford City which is near the project. Those participating in the early stage of the program, all others who were known to have an interest in the project, and the public at large were invited to participate in the public meeting.

The plan presented at the public meeting is that which was submitted in the "First Increment" of this Master Plan. It is also essentially that which is proposed herein, except that the possibility of a sewage system with a central treatment plan has, because of cost considerations, been abandoned in favor of sand mounds, a conventional septic system, and in two areas, vault rest rooms.

Public reaction to the plan was generally favorable. Some of the issues and comments discussed above resurfaced or were mentioned for the first time during the public meeting. General consensus was expressed in favor of light development of the project upstream of the existing developed recreation areas. The present level of project development and operation for recreation was thought by most to be desirable, although most participants did not want to pay for use of the project through either fees or higher taxes.

Questions on cost sharing were asked, but, because the Corps' recreation cost-sharing program had been temporarily discontinued, answers were difficult to provide. Since that time, the low priority assigned recreation has negated for the present cost-sharing opportunities for development at Crooked Creek Lake.

There was concern indicated regarding closure of the entrance to the Main Recreation Area at the intersection of T-460, T-840, and the Boat Launching Area access road. The proposed closure to provide for the integrity of an expanded Campground would force traffic bound for the Boat Launching and surrounding areas to use T-460 and T-840 for access. Currently, these roads are not in sufficient condition to safely handle such a volume of traffic. The participants were told that the Corps of Engineers has no authority to unilaterally or bilaterally help with the upgrading or maintenance of these local public roads.

# 4-4 PUBLIC INVOLVEMENT PROGRAM PARTICIPANTS

Those governmental entities, agencies, and organizations that participated in the Master Plan public involvement program are listed below. Coordination efforts that are more traditional to Corps master planning were undertaken with the participants indicated by asterisks.

Pennsylvania Fish Commission\*
Pennsylvania Game Commission\*
Armstrong County (including
Commissioners, Economic and
Community Development and
Recreation Departments)\*
Manor Township\*
Bethel Township\*
Burrell Township
Armstrong County Borough Association
Armstrong County Chamber of Commerce

Vandergrift Chamber of Commerce
Allegheny River Coalition
Crooked Creek Watershed Association\*
Fort Armstrong Horsemen's Association\*
Kiski Astronomers\*
Armstrong County Conservation League
Armstrong County 4-H
Moraine Trail Council, Boy Scouts
Ford Manor Council, Girl Scouts
Kittanning Rotary Club
Kittanning Kiwanis Club

# 4-5 COORDINATION

The term "coordination" as used herein refers to the interaction between the District and other entities whereby information and attitudes are solicited and, additionally, development and/or management objectives such as a cost-sharing program or outgranting are sought. Coordination took place to some extent with all governmental public involvement program participants; however, it was considerably more intense with the Pennsylvania fish and wildlife agencies and with Armstrong County than it was with the other participants, except for Manor Township. Later, coordination with the Pennsylvania Department of Environmental Resources was necessary to establish the acceptability of sewage treatment methods other than a

central project treatment plant. The coordination carried out in connection with this Master Plan updating with each agency, local government, and organization is discussed below.

a. Pennsylvania Fish Commission. When the turnback of the state park was imminent, the Fish Commission expressed interest in possibly operating and in helping to improve the Boat Launching Area. In a subsequent clarification of their position, it was indicated that the Fish Commission would be willing to manage the 400 acres of pool area presently under license plus a 25-foot wide strip of land around the pool for recreation (except at the beach) and the Boat Launching Area. On the land areas that the commission would manage, they were unwilling to accept responsibility for maintenance. They particularly wished to avoid maintenance responsibilities for sanitary facilities. Willingness to aid in development or redevelopment is apparently limited to boat launching facility mitigation requirements associated with a 20-foot summer pool raise which has been eliminated from further consideration.

Any kind of additional participation in the management of the Crooked Creek Lake project by the Fish Commission would require other than a standard Corps of Engineers lease or license agreement. Such an agreement should be explored further with the commission as well as any change in their attitude toward reconstruction of the existing boat launching facilities as mandated by higher authority in comments on the First Increment of this Master Plan.

An indefinite future possibility of cost sharing also exists at the project. The Fish Commission's willingness to trade maintenance responsibilities for improved boat launching and fishing access facilities should be determined.

In addition to the usual coordination in connection with cost sharing and outgranting, intensive efforts with the Fish Commission were undertaken to make their regulations and the zoning of the project water areas set forth herein consistent and acceptable to both agencies. Construction of the fishing embayment below the dam was also coordinated with the commission.

The Fish Commission has not yet commented on the draft of this Master Plan, but requested that opportunities for their involvement in the project be made to remain available.

b. Pennsylvania Game Commission. Prior to the turnback of Crooked Creek State Park, the Game Commission indicated that they were not interested in an outgrant of all undeveloped project lands for wildlife management purposes. They were later asked to consider whether they would be interested in managing three large project areas with wildlife management potential (Meyer's Field, Robb's Bridge Flat, and the spillway area

which is now called the Manor Recreation Area) under an outgrant. While the commission has lauded the wildlife management activities that have been pursued by project personnel, they indicated that the areas in question are too small for their efficient management.

The Game Commission was also asked to comment on the fishing embayment below Crooked Creek Dam. Their favorable comments helped to expedite embayment construction.

c. Pennsylvania Department of Environmental Resources. The original recreation areas plan developed for this updated Master Plan anticipated the need for a central sewage collection and treatment system as had been required by the Pennsylvania Department of Environmental Resources at other District projects. Because of its expense, higher authorities would not approve that plan which was presented in the First Increment of this Master Plan. A subsequent request to the department concerning minimum acceptable treatment methods and standards was honored only after a considerable delay.

At a meeting between District and department personnel it was indicated that "on-lot" treatment would be acceptable if sufficient sites could be located. Later, Department of Environmental Resources personnel visited the project to observe test pit evaluations and percolation tests. Recently, the department gave its approval for the issuance of permits for the one standard and three sand mound septic systems that are part of the redevelopment presented herein.

Project personnel have been coordinating the sealing of old coal mine shafts that open onto project land with the Department, who is expected to initiate work on the five shafts in Coal Bank Hollow by the end of Fiscal Year 1987.

- d. Armstrong County. The county considered the possibility of costsharing development or redevelopment as well as outgranting of recreation
  facilities. The county commissioners exhibited some interest in user fees
  since they indicated their belief that a substantive proportion of project
  users originate from outside of Armstrong County. They also expressed concern that the county would become responsible for a deteriorated or
  deteriorating situation (water quality in the lake and Crooked Creek after
  closure of the Carl A. White Mine Water Reclamation Plant), but were
  assured that there was no intention on the part of the Corps of Engineers
  to try to pass on such problems to the county. Nevertheless, the county
  commissioners would make no commitments concerning Crooked Creek Lake and
  recently declined to comment on a draft of this Master Plan and to become
  involved in the project.
- e. Sewage Enforcement Agency of Armstrong County. This agency is not a part of the county government, but a separate entity created for sewage

law enforcement by the municipalities in Armstrong County. They provided information concerning acceptability of various kinds of sewage treatment methods and observed and evaluated test pits and percolation tests. After review of the designs for facilities proposed by the District for collection, holding, and treatment of sewage, the Sewage Enforcement Agency coordinated with the Pennsylvania Department of Environmental Resources and issued the appropriate permits. Throughout the District's interaction with them, the agency's representatives were helpful and patient. They will again be involved in issuing a permit for the new proposed bathhouse.

f. Manor Township. The Manor Township Supervisors objected to potential excessing of the Manor Recreation Area which comprises most of the part of the project in their political subdivision. They originally proposed to lease the area and develop picnicking facilities. Later, the supervisors were approached by the Fort Armstrong Horsemen's Association who subsequently agreed to undertake a major equestrian development, some of which could be used by picnickers, at the site under a sublease from the township. A five-year lease which originally outgranted the Manor Recreation Area to the township was subsequently modified to provide a 25-year term. Development fostered by the Horsemen's Association has been initiated after repair of the two badly eroded gullies in the area and construction of a water diversion to prevent reforming of the same gullies. This earlier work was prosecuted in connection with the excavation of the fishing embayment below the dam.

Originally, the Manor Township Supervisors requested permission to develop a shooting range at the Manor Recreation Area. They were advised that their request for such a facility would be reconsidered after additional planning and design work on it is accomplished.

g. Bethel Township. The Bethel Township Supervisors were consulted, as required by the Pennsylvania Department of Environmental Resources' regulations, concerning the acceptability of sewage treatment proposals for the project. They agreed with the treatment systems that now serve new sanitary facilities at the project.

An earlier board of commissioners asserted the township's right of ownership to the road on project land that runs from the intersection of T-460 and T-840 past the Campground and Main Day-Use Area to the vicinity of the contiguous Beach access road. They indicated that Bethel Township automatically acquired rights under state law to the road when the state abandoned this former legislative route and that their ownership would have to be considered when construction of the new proposed entrance road for the Main Recreation Area takes place. A Pennsylvania Department of Transportation representative who conducted a record search supported the supervisors' claim. The present board indicated, however, that the contested length of road on project land does not appear on the township's official road drawing.

h. Crooked Creek Watershed Association. This local organization proposed, had designed by the Soil Conservation Service, and subsequently had constructed by several U.S. Army Reserve engineer units, Manor Township, the Fort Armstrong Horsemen's Association, and the Darmac Coal Company the fishing embayment below the dam. They were also instrumental in repair of the eroded gullies and development of the diversion in the Manor Recreation Area. These joint efforts which were led by the association are considered a fine example of local interorganizational cooperation for the benefit of a Corps project.

The Association is now reported to be willing, with help from Ducks Unlimited, to develop and manage a subimpoundment in the Robb's Bridge Flat area. The U. S. Fish and Wildlife Service was also recently involved in coordination for this proposal and appears to favor it.

i. Fort Armstrong Horsemen's Association. This private organization characterizes itself as an "umbrella" association of other equestrian groups. Their leadership approached the District during the early stages of the updating of this Master Plan in search of an area that could be developed for equestrian use. They also proposed an equestrian trail around the entire project as well as one around the nearby Mahoning Creek Lake project with a connection via the Baker Trail, a hiking trail developed by the American Youth Hostels. The association was encouraged to coordinate development proposals and efforts for the Manor Recreation Area with the Manor Township Supervisors. They did so and are now developing the Manor Recreation Area under Manor Township's lease for the area and a subagreement with the township supervisors. Under a license, the Fort Armstrong Horsemen's Association has also developed more than one-half of the trail proposed to encircle the Crooked Creek Lake project.

# SECTION 5 - REGIONAL INFLUENCES AND PLANNING CONSIDERATIONS

#### 5-1 GENERAL

The influences and considerations discussed below are associated with human existence and needs in the project area together with some more or less miscellaneous, but nevertheless important, factors. All of these have ramifications for the project and most exert pressures on it or affect other factors that do so.

# 5-2 ACCESS

As shown on Plate 7, the Crooked Creek Lake project is surrounded and crossed by state and township roads. Legislative Route (L.R.) 03108 crosses the dam and provides access to the Main Recreation Area, the tailwater area, the Administraton Building and Maintenance Complex, the control tower, the Spillway Day-Use Area, the spillway, and the Manor Recreation Area. Access to the Main Recreation Area is also provided by T-460 and T-840.

In several parts of the project upstream of the Main Recreation Area on the left bank and the spillway on the right bank, there are no roads to provide access to project lands. Some upstream areas, however, are fairly well served by state and local roads. Robb's Bridge Flat falls into this latter category, while Meyer's Field and other areas have access which is fairly poor.

One state highway (Pennsylvania Route 359), a minor route, passes through the project at Cochran's Mills. Two other more major state highways provide the primary access to the project area from all directions. These highways are Pennsylvania Route 66 and Pennsylvania Alternate Route 66. The former leads to the Ford City/Kittanning area, the Allegheny River valley, and other areas to the east and west via U.S. Route 422. Alternate Route 66 offers quicker access to the project from the Kiskiminetas Valley and other points to the south and southwest than does Route 66.

From the Pittsburgh area, there are two combinations of roads that lead to Crooked Creek Lake. One includes Pennsylvania Route 28 from the North Side of Pittsburgh along the Allegheny River valley to West Kittanning, U.S. Route 422 crossing the Allegheny River to Kittanning, and Pennsylvania Route 66 south to the project area. The other route serves Pittsburgh's eastern suburbs and includes Interstate Route 376 to Monroeville, Pennsylvania Routes 286 and 380 to North Washington, and Pennsylvania Routes 66 and Alternate 66 to the project area.

The roads in the immediate project area typically have two lanes. Most are paved, although some are crushed stone. The project has a number of

one-lane bridges crossing Crooked Creek and its tributaries. Most of the project area roads are very rural in nature, and their condition generally varies from fair to poor. The inability of these local roads to carry large volumes of traffic or heavy vehicles contributed to the decisions to avoid mitigating the loss of the beach in connection with a pool raise and to permit only small scale, low intensity developments in the upstream parts of the project.

Generally in good to fair condition, the roads leading to the project area from the surrounding population centers vary from two to four lanes. The Allegheny River valley route from Pittsburgh to the project consists of all four-lane roads except for part of Pennsylvania Route 66, while the eastern suburb route is comprised of more two-lane roads than four-lane roads.

The nearest Interstate Highway to the project is the Pennsylvania Turnpike (I-76 and I-80S) which is about 35 road miles away. I-79 is about 48 miles from Crooked Creek Lake. Although a few visitors, particularly transient campers from distant locations, undoubtedly use one or more Interstate Highways to reach the project, these roads do not have a great deal of importance to project use.

#### 5-3 HYDROPOWER

The Crooked Creek Lake project has been studied three times in recent years in connection with the provision of hydroelectric power facilities for commercial power generation. Hydro Corporation of Pennsylvania was granted Preliminary Permit No. 3304 in February 1981, but requested termination of the permit in December 1982. They concluded that there was then little potential for hydropower development because of low stream flows and the high cost of modifying the outlet works. This permittee had earlier indicated concerning the possibility of a year-around 20-foot pool raise that they could not affort to mitigate the loss of the existing beach.

In July 1984, Bethel Associates was granted a preliminary permit, No. 7873, to study the hydropower potential of the project. They, too, concluded that the installation of facilities for this purpose would be infeasible and requested termination of their permit in April 1985.

Preliminary Permit No. 9233 was issued to Tina Jean Associates in November 1985. To date, no information concerning their feasibility determination has been made available to the District.

Any hydropower installation at Crooked Creek Dam would be required to maintain a run-of-river mode of operation. The facilities would not be permitted to cause a change in pool fluctuation or in storage-time release, and no ponding of the pool for peaking would be allowed. Of equal importance for the purposes of this Master Plan, a hydropower development may

not be detrimental to the project's recreation resources. In reality, any such development would probably affect access to the right bank of Crooked Creek and the outlet works for fishing. Deleterious effects of this nature would have to be mitigated, and this would probably be accomplished by the provision of alternative access facilities at the tailrace and on the right bank of Crooked Creek.

#### 5-4 MARKET AREA

There is no data known to be available that would permit accurate determination of Crooked Creek Lake's day-use market area. However, camper registration records are available, and from them, an overnight market area which contributes 80 percent of the project's overnight use was defined. Data from 1982 was used to develop the market area shown on Plate 1, and 1983 data was used to confirm its probable accuracy.

Typically, the day-use market area for any project is smaller than its corresponding overnight market area, although observation of use patterns at this and other nearby reservoir projects indicates that the two areas are unlikely to differ substantially. They are, therefore, treated herein as a single market area.

Crooked Creek Lake draws the majority of its visitors from a recreation market area that extends a variable 30 to 50 miles outward from the immediate project vicinity along major road networks. It is also skewed toward the population concentration of Pittsburgh as can be clearly seen on Plate 1.

Substantial parts of six Pennsylvania counties including Allegheny, Armstrong, Beaver, Butler, Indiana, and Westmoreland are in the project's market area. Armstrong is the only county that is entirely in it. Small parts of Clarion, Clearfield, Jefferson, Lawrence, and Washington Counties are located in the market area, but are considered insignificant to the project.

# 5-5 DEMOGRAPHICS

This subsection deals with the populations in the Crooked Creek Lake market area counties, the characteristics of these populations, and the changes in them that may be expected in the future. No attempt has been made to calculate an actual market area population, because the entire population of each county should be reasonably representative of the part of that county that is within the market area. Further, a market area population was not needed to derive the estimated future visitation.

a. Historical, Existing, and Future Populations. TABLE 5-1 shows the past, approximate present, and anticipated future populations of the six

counties with substantive areas in the project's market area. Historical data were derived from 1980 Census information while 1980 OBERS data were used to extrapolate estimates of future populations.

TABLE 5-1

CROOKED CREEK LAKE, PA.

POPULATIONS OF MARKET AREA COUNTIES

	POPULATION					
COUNTY	1960	1970	1980	1990	2000	2030
		•				
Allegheny	1,628,587	1,603,133	1,450,085	1,483,000	1,479,000	1,455,000
Armstrong	79,524	75,590	77,768	74,000	72,000	68,000
Beaver	206,948	208,418	204,441	202,000	200,000	207,000
Butler	114,639	127,941	147,912	159,000	175,000	224,000
Indiana	75,366	79,451	92,281	86,000	88,000	95,000
Westmoreland	352,629	376,935	392,294	401,000	422,000	485,000
TOTAL	2,457,693	2,471,468	2,364,781	2,405,000	2,436,000	2,534,000

TABLE 5-1 indicates that the market area counties' populations collectively decreased about four percent between 1960 and 1980. Between the last census and 2030, a period of 50 years, these populations, taken as a whole, are expected to slowly regain the four percent loss and continue to increase by about another three percent. For most purposes, the market area population can probably be considered to be rather stable.

While the market area population may remain relatively stable, significant shifts within it have occurred or are anticipated. Allegheny County, by far the most highly and densely populated county in the market area, lost almost 11 percent of its population between 1960 and 1980. Although its population is expected to rise slightly by 1990, by 2030 it is expected to stabilize again at less than one percent above the 1980 level.

Armstrong County, the least populous, but the county in which the project is entirely located, lost about five percent of its population between 1960 and 1970. By 1980, however, it had regained over one-half of the previous decade's loss. For some time, Armstrong County has had the highest unemployment rate for a Pennsylvania county. This fact has probably played a large part in the projection of continual loss of population (12-1/2%) through 2030.

The three counties that border Armstrong County and that have significant portions in the Crooked Creek Lake market area have all gained in population since 1960. It is further anticipated that this trend will continue until at least 2030. Two of these counties are the second and third most populous in the market area. Butler County gained 27 percent in population from 1960 to 1980 and is expected to gain another (somewhat phenomenal) 51 percent by 2030. Between 1960 and 1980, Indiana County's population increased by 22 percent and, after an approximate seven percent drop that is predicted by 1990, is expected to slowly rise to a level about three percent above that of 1980. The population of Westmoreland County grew approximately 11 percent during the two decades before 1980, and it is anticipated that this trend will continue at a slightly reduced rate as the county gains almost 24 percent in population by 2030.

The past and predicted population shifts in the project's market area have been the probable cause of the expected. While the project's home county's population has remained somewhat stable and the neighboring counties' populations have increased, the project visitation has increased. But, because the increasing populations are some distance from the project, the rate of population increase has not been equalled by the rate of visitation increase. The projections of populations tend to suggest that, with other factors remaining as they are, the visitation growth trend will continue into the future.

b. Population Characteristics. Several population characteristics have traditionally been associated with recreational use rates as indicators. These are median age, average income, average education level, and whether a population is primarily rural or urban.

As a rule, younger populations tend to participate more in active outdoor recreation activities. Compared to the entire Commonwealth of Pennsylvania (32.1 years), the weighted median age of the Crooked Creek Lake market area counties is 33.0. Four counties, Allegheny, Armstrong, Beaver, and Westmoreland, have median ages that are from 0.8 to 1.6 years higher than the entire state. Two, Butler and Indiana Counties, have relatively young populations with median ages 2.4 and 4.7 years, respectively, below the state's. Assuming that the weighted median age of all six constituent counties is representative of the market area, the 0.9-year difference between this median age and that of the state suggests that market area residents may collectively participate in outdoor recreation less than others. This trend may intensify, since the median age of the market area is expected to rise in the future.

In 1980, the average annual per capita income in Pennsylvania was \$7,077, while the six counties that comprise most of the project's market area had a weighted average only \$84 lower at \$6,993. This difference probably has little significance. Three counties, Allegheny, Beaver, and Westmoreland, had per capita incomes ranging from \$909 to \$27 higher than the state

average. The other three counties' per capita incomes varied from \$230 to \$990 below the state average, but these counties, Armstrong, Butler, and Indiana, are those with fewer people. Populations with lower incomes tend to recreate outdoors less than those fortunate enough to enjoy higher incomes. The market area as a whole probably now has a difference in per capita income when compared with the state that is proportionately greater than in 1980 because of the decline of heavy industry. However, this has not been reflected in project visitations, possibly because recreation patterns appear to lag well behind changes in per capita income. It may be that, by the time per capita income losses affect the rate of outdoor recreation participation, gains in income and other factors associated with the emerging "high tech" character of the region's economy will offset utilization rate changes. Otherwise, continually falling per capita income will probably eventually affect use of the project.

The educational level of a population has been cited in the past as a factor affecting outdoor recreation participation rates. In theory, a high educational level accompanies a high participation rate. In the Commonwealth of Pennsylvania, 64.7 percent of the population had completed at least 12 years of formal schooling as of 1980 and 13.6 percent had completed a minimum of 16 years.

The counties comprising the Crooked Creek Lake market area had a 1980 population only 62.1 percent of which had finished 12 years of formal educa-Only 11.3 percent of these counties' populations had completed 16 years. Armstrong County had the least number of residents with a minimum of both 12 years and 16 years of schooling. The percentages are 58.7 and 6.7, respectively. In 1980, 59.2 percent of the largest market area county's population had completed 12 or more years of school, while 11.5 percent of Allegheny County's had completed 16 or more years. Beaver and Indiana Counties' percentages of residents who had finished a minimum of 12 years of education were close to the state average at 64.8 and 64.5, respectively, but their percentages who had finished a minimum of 16 years were low at 9.4 and 11.2, respectively. The two remaining counties, Butler and Westmoreland, had very high numbers of their residents with 12 or more years of formal schooling. The applicable percentages of their total populations were 69.1 and 68.6, respectively. However, even these two counties with seemingly better educated residents had only 11.7 percent and 12.4 percent of their populations schooled for 16 or more years.

From the above figures, it could be concluded that people residing in the Crooked Creek Lake market area tend to recreate less than others in the state. This may, in fact, be the case, since the project's popularity seems more attributable to its close proximity to large populations than it does to high per capita use rates.

The last population characteristic of probable importance to recreational use of the project is the market area's degree of urbanization. It has

been found that rural residents tend traditionally to participate more often than others in outdoor recreational activities.

Statewide, 69.3 percent of the population in 1980 was urban with an average density throughout Pennsylvania of 264.3 persons per square mile. The market area counties as a whole were more urban than rural with an average of 79 percent of their populations living in urban settings and an average density more than twice that of the state at 543.8 persons per square mile of land area. Armstrong, Butler, and Indiana Counties were predominantly rural with only 15.5 percent, 28.1 percent, and 21.9 percent of their populations, respectively, living in urban areas. The corresponding densities of these counties were 120.3, 187.5, and 111.3 persons per square mile, respectively. At 1,994.9 persons per square mile, Allegheny County's population is over four times more dense than Beaver's at 468.9 and over five times more dense than Westmoreland's at 379.8. Nevertheless, with 95.6 percent, 75.9 percent, and 64.6 percent, respectively, of their populations living in urban areas, these three counties all had essentially urban populations in 1980, and this situation has not changed appreciably.

The urban character of most of the market area's population would normally indicate lower than average outdoor recreation per capita participation rates. It must be borne in mind, however, that much of the market area population which is characterized in the published data as urban is, in fact, suburban. Such a category is not included in the data, and this lack may help to explain the popularity of Crooked Creek Lake in the face of population characteristics that seem to indicate the opposite.

#### 5-6 ECONOMY

The project market area economy has traditionally been dominated by heavy and extractive industries. Allegheny and Beaver Counties, in particular, have been bastions of heavy industry, particularly steelmaking and related activities. All of the market area counties have, at one time, if not presently, had centers of deep coal mining activity. Strip or surface mining has also been widespread throughout the market area.

Over the past two or three decades, coal mining in the project market area has declined considerably for a variety of reasons, not the least of which are the volatility of energy markets and the greater acceptability of various alternative fuels. Heavy industry has declined throughout the market area during the same period with steel and related industries declining sharply in the past 10 years.

It has been predicted that the western Pennsylvania economy will slowly shift toward high technology and service industries. This shift has begun, but it is far too early to determine its effect on recreational use of Crooked Creek Lake. It would, in fact, seem that the recent economic

decline of the market area should have had a noticeable effect on project visitation, yet no such sustained effect has been recorded.

# 5-7 RECREATION DEMAND AND NEEDS

For an indication of future recreation demands that can be expected to exert influences on the project, the latest available publication is a draft of "Pennsylvania's Recreation Plan, 1986-1990," which draws heavily on the 1982 "National Recreation Survey" for data and trend predictions. Essentially, the findings presented are that most traditional activities such as swimming, picnicking, and sightseeing have increased slightly in recent years and this trend is expected to continue with light to moderate increases in participation rates. Gains for camping, bicycling, running/jogging, hiking (including backpacking), and some other activities (which are not important at Crooked Creek Lake) are, however, expected to be substantial.

The highest priority, according to the plan, concerns the finding that the "...recreational needs of Commonwealth residents have not been adequately satisfied due to limited sources of funding to finance public recreation investments." At the same time, it is predicted that more people will be participating at slightly higher rates than in the past.

In Region 10 (southwestern Pennsylvania including all of the market area counties), a 1984 survey by the Commonwealth revealed the 10 most needed area types or facilities. TABLE 5-2 below shows the kinds of areas/facilities, their rank, and the percentage of survey respondents that cited the need for them (only those areas/facilities that pertain to Crooked Creek Lake are included) in the state's survey.

TABLE 5-2

COMMONWEALTH OF PENNSYLVANIA REGION 10
RECREATION AREAS/FACILITIES NEEDING DEVELOPMENT OR ACQUISITION

AREAS/FACILITIES	RANK	% OF RESPONDENTS CITING NEED
Hiking Trails	1	78
Bicycle Paths	2	77
Picnic Areas	3	73
Fishing Areas	5	68
Sitting/Passive Areas	6	65
Cross Country Skiing	7	62
Canoe Launch Areas	10	56

For the first time, the state's 1984 survey addressed the need for rehabilitation of existing recreation facilities indicating that many areas and facilities are, like those at Crooked Creek Lake, in need of major replacements and renovation. TABLE 5-3 below shows the state's survey results concerning the kinds of areas/facilities that are appropriate for the project and that are perceived by Region 10 residents to be in need of rehabilitation. As in TABLE 5-2, TABLE 5-3 also shows the rank and the percentage of survey respondents who indicated a need for rehabilitation of each type of area or facility.

TABLE 5-3

COMMONWEALTH OF PENNSYLVANIA REGION 10
RECREATION AREAS/FACILITIES NEEDING REHABILITATION

AREAS/FACILITIES	RANK	% OF RESPONDENTS CITING NEED
Picnic Areas	1	85
Hiking Trails	2	78
Fishing Areas	5	69
Campgrounds	6	67
Bicycle Paths	7	66
Sitting/Passive Areas	8	64

# 5-8 COMPETING RECREATION RESOURCES

In the relatively small Crooked Creek Lake market area shown on Plate 1, there are three other Corps of Engineers flood control reservoirs, Mahoning Creek Lake, Conemaugh River Lake, and Loyalhanna Lake. Except for Loyalhanna Lake, visitation to which has, in recent years, been of the same magnitude as that to Crooked Creek Lake, these projects serve far fewer visitors than does Crooked Creek Lake. Also offering water-related recreation opportunities in the market area and partially under the jurisdiction of the Corps of Engineers are the Ohio, Allegheny, and Monongahela Rivers.

There are only three Pennsylvania state parks in the market area and two on its borders. Point State Park in Pittsburgh's "Golden Triangle" is water related (to all three rivers mentioned above), but is not at all comparable to Crooked Creek Lake. Keystone State Park in Westmoreland County has a small (78 acres) lake, and the swimming and other day-use activities conducted there could be considered comparable to the project. The same could be said for Moraine State Park, except that its Lake Arthur is much larger than Crooked Creek Lake, no public camping facilities are available, and boats used on the lake may have a motor with a maximum of 10 horsepower.

At Yellow Creek State Park on the eastern edge of the project's market area is a 720-acre lake. This state park is generally comparable to the Crooked

Creek project, except that, like Moraine State Park, a 10 horsepower restriction on the size of boat motors on the lake is in effect and no camping facilities are provided. On the northwestern edge of the market area near Moraine State Park is McConnell's Mills State Park. This park has an old restored grist mill and day-use facilities and is not comparable to Crooked Creek Lake.

Allegheny County's North and South Parks are large regional day-use parks close to suburban populations. Although North Park has a small lake that is used for fishing and boating (without motors), it and South Park are otherwise not similar to Crooked Creek Lake. Several other county parks in the market area provide day-use opportunities without water resources that would cause these parks to compete more directly with the project.

Several lakes located in the market area, at least one of them quite large, were constructed and are operated for municipal water supply. Most of them, including the large one, Beaver Run Reservoir, are not open to public recreational use. Thus, these reservoirs do not compete with Crooked Creek Lake.

# 5-9 VISITATION

In consideration of the information found to be available and developed during this Master Plan updating, the similar reservoir method of estimating future project visitation cannot be easily adapted for use with Crooked Creek Lake. The principal weaknesses of that method, aside from the original intent that it be used for new reservoir projects, are the lack of similar projects for which data is available and the age of the data.

In lieu of the similar project method, the future visitation level has partly been extrapolated from an examination of historical visitation records beginning in 1965. Partly, too, it has been predicted on the basis of the project's anticipated maximum practical use level without extensive development of new recreation areas.

TABLE 5-4 below shows the annual visitation experienced at Crooked Creek Lake for the 21-year period from 1966 through 1986.

TABLE 5-4

CROOKED CREEK LAKE, PA.

HISTORICAL ANNUAL VISITATIONS FOR RECREATION

YEAR	VISITATION	YEAR	VISITATION	YEAR	VISITATION
1966 1967 1968 1969 1970	414,900 422,100 538,500 524,500 644,000 726,980	1973 1974 1975 1976 1977	621,890 554,530 609,710 680,540 849,550 685,463	1980 1981 1982 1983 1984 1985	761,870 710,264 970,700 776,375 727,549 696,291
1971 1972	726,980 464,400	1978 1979	685,463 708,514	1985 1986	696,2 988,1

The average visitation for the 21-year period, is approximately 670,000 recreation days annually. In reality, however, the annual use of the project has been above this average level since 1976. This and the considerations discussed in previous subsections indicate a trend of gradually and continually increasing visitation to the project.

The current level of project visitation on a trend curve is about 780,000 recreation days annually. By 2030, this annual visitation can be expected to grow to about 800,000 recreation days. It should be noted, however, that there have been visitations above this level twice (1982 and 1986) and that there is space at the project to expand only camping facilities, unless the recreation development is to remain heavily unbalanced. The additional average 20,000 recreation days that would be added to project use in the future would, then, be attributable to additional camping facilities and would also include a small amount of additional day use in which the greater number of campers could be expected to participate. Sustained growth in demand beyond the average 800,000 recreation day level could not be accommodated at Crooked Creek Lake without development beyond that proposed in this Master Plan.

TABLE 5-5 shows for each activity available at the project for which records have been kept the approximate proportion of visitors that engage in that activity and the corresponding annual visitation for that activity. The values given in this table are expected to remain relatively stable in the future.

TABLE 5-5

# CROOKED CREEK LAKE, PA. ACTIVITY PARTICIPATION RATES

ACTIVITY	PROPORTION OF VISITORS PARTICIPATING IN ACTIVITY (Percentage)	ANNUAL VISITATION FOR EACH ACTIVITY (Recreation Days)
Boating	5.4	42,000
Waterskiing	0.8	6,000
Swimming	22.6	176,000
Picnicking	26.7	208,000
Sightseeing	53.2	415,000
Camping	0.9	7,000
Fishing	12.2	95,000
Hunting	2.8	22,000
Hiking	2.4	19,000
Winter Sports	9.0	70,000
TOTAL	136.0*	1,060,000*

<sup>\*</sup>Totals do not equal 100 percent and 780,000 recreation days because some visitors engage in more than one activity during a visit.

# 5-10 FACILITY REQUIREMENTS

The facilities shown on Plates 12 through 15 and the cost tables accompanying this updated Master Plan indicate the facilities that are and will be required in the future to accommodate the current and expected levels of use. Only 57 campsites proposed for construction and Group Campground improvements in the future will enlarge the capacity of the project. All other initial and future facilities would represent major replacements and, in a few cases, improvements to existing opportunities.

# 5-11 DESIGN STANDARDS

The following standards should be applied to the initial and proposed developments at Crooked Creek Lake. If these are followed to a practicable extent for new and remedial work as it becomes necessary, the result will generally be better constructed facilities than are now in existence at the project. EM 1110-2-410 and draft EM 1110-1-400 and future successors to these manuals should be considered to be controlling in the design of facilities.

a. Roads and Parking Areas. Roads in the Main Day-Use Area and in the proposed upstream access sites should be designed according to the parameters in the following table.

TABLE 5-6 CROOKED CREEK LAKE, PA. ROAD DESIGN PARAMETERS

Road Type	Road Width	Shoulder Width	Maximum Gradient (%)	Design Speed	Maximum Radius
Two-Way Circulation					•
Main Access	20	4	10	35	150
Internal	18	4	10	35	150
One-Way Circulation	12	4	10	20	50
Fishing Access	18	4	12	10	50
Service	- 10	4	12	10	50

Underdrains should be installed where needed for proper drainage.

All circulation roads and parking areas in the major project recreation areas should, to the extent consistent with policy and funding, be bituminous paved and parking areas should have concrete wheel stops. The road or parking area section should consist of a compacted subgrade, a five-inch asphaltic concrete base and a two-inch asphaltic concrete finish course as shown on Plate 8.

Roads and parking areas for fishing access in the more remote parts of the project should be constructed of a layer of coarse aggregate choked with a fine aggregate. The depth of the coarse aggregate layer should be determined by the soil conditions at each site.

b. Day-Use Areas. Facilities to accommodate the various day-use activities at Crooked Creek Lake have already been consolidated and intensified. A typical picnic unit consists of one table and one grill and a trash receptacle shared with another unit, although dumpsters are used at Crooked Creek Lake in place of trash cans. Day-use areas should be furnished, where possible, with potable drinking water. If feasible, waterborne rest rooms are preferable, but if necessary, vault-type or other types of rest rooms using more recent technology may be used, as appropriate. Rest rooms should be spaced evenly throughout day-use areas and no picnic site should be farther than 600 feet from a rest room.

In parts of the day-use areas at Crooked Creek Lake, shade is at a premium. For this reason, picnic shelters that can be developed in accordance with current policy should be provided. Six picnic shelters in addition to that proposed for initial installation are proposed for the future.

c. Boat Launching Areas. While all of the pavement in a boat launching area above the ramp may be of the bituminous type as discussed in subsection a. above, the ramp itself should be constructed of reinforced concrete with each lane 12 or more feet wide and an optimum slope of 14 percent. Slopes of 12 percent to 16 percent are acceptable as shown on Plate 8. Of considerable importance is the alignment of the ramp and its approach. The alignment should force a driver to take definite action to be able to follow the approach and ramp into the lake and, thereby, to act as a warning to prevent an accident. While higher authority has recommended pull-through type parking for this Crooked Creek Boat Launching Area, its topography and the available space will not permit provision of such facilities.

At minor fishing access and small boat or raft launching areas, an appropriate area along the shoreline or streambank should be stabilized to provide a place for launching and retrieval activities. Stabilization could be by masonry wall, wooden bulkheading, or other suitable measures.

- d. Swimming Area. The only future development at the beach is the extension of the underwater sand area about 50 feet east or toward the end of the peninsula. This should be accomplished in the same manner and at the same grade as the existing underwater sand area.
- e. Campgound. Although ideally located 100 feet apart, as shown on Plate 8, the available space at Crooked Creek Lake will permit a reasonable number of campsites to be spaced only an average of 75 feet apart. Dense landscape plantings, providing both canopy and understory vegetation should be provided and encouraged to reestablish itself naturally where possible to provide each group of campers with a sense of privacy. A few campsites, however, should have multiple spurs and central cooking and eating areas to accommodate large families or groups.

Circulation roads in campgrounds should be one way where possible. Spurs should be designed for both pull-through and back-in use to increase diversity and make optimum use of available space. Tables, fire rings, and impact areas should be opposite camping trailer doors which are generally located on the right side of the trailer.

Back-in spurs should be angled 30 to 60 degrees from the road. If 90 degree angle spurs are necessitated by the terrain, spur entrances should be flared to provide adequate width for maneuvering.

Standard spur-type campsites, the first of two types of camping facilities, should be provided with a crushed stone parking space or spur, an enclosed impact area of approximately 20 feet x 20 feet, a picnic table, and a fire ring. The spur should be as level as possible, but enough slope should be provided for proper drainage. Potable water should be available at centralized supply facilities.

Walk-in campsites, the second type of camping facility, should consist of a 15-foot x 18-foot tent pad with a contained stabilized surface, a picnic table, and a fire ring. For both kinds of camping facility, centralized and effectively screened trash collection facilities should be provided at convenient collection points.

If at all possible, the camping area should be provided with waterborne sanitary facilities. All campsites should ideally be located within 300 feet of a washhouse or rest room, although 600 feet may be considered as a maximum. Rest rooms should include waterborne toilets, urinals, and lavatories, while washhouses should contain all of the same facilities plus showers.

A sanitary station for camping trailers should be provided in conjunction with the camping area for the discharge of recreational vehicle holding tanks.

- f. Group Campgound. An area should be provided for use by organized groups such as Boy or Girl Scouts, various social groups, church groups, etc. Facilities in the group area should include a centralized parking area, a rest room, a central water supply, and a centralized trash collection facility. Group camping is a future activity, but, because of the reconstruction of the boat launching area as directed by higher authority, the road to the existing group camping area will need to be relocated. This relocation will be required prior to reestablishment of the group camping area in order to provide access for patrolling of the area.
- g. Trails. There is actual or apparent demand for three kinds of trails at Crooked Creek Lake: walking/hiking, equestrian, and bicycle. Bicycle trails are relatively expensive and would have to be provided entirely by a non-Federal entity, although the probable demand for them is exhibited by the number of bicycles that are brought to the camping area (146 in 1982). If interest in bicycling is sustained or grows, local interests should be encouraged to provide appropriate facilities at their expense in areas that could be provided through a lease or license.
- (1) Walking/hiking. These kinds of trails should be constructed of compacted or otherwise stabilized soil to a width of 42 inches. They should generally be primitive in character, although adequate drainage ditches and pipes should be provided to assure a dry surface as frequently as possible. When slopes become excessive, steps of treated wood timbers should be used.

Handicapped walks and trails are essentially subdivisions of walking and hiking trails, but with considerably more stringent requirements. In most cases, at least bituminous pavement should be provided to a minimum width of four feet or optimally five feet. Running slopes should not exceed five

percent and cross slopes should not exceed two percent. A level rest area should be provided every 200 feet. Curbs should be provided at all dropoffs and should be augmented by railings where a dropoff will be more than 30 inches.

- (2) Equestrian. Where possible, the equestrian trails will use the existing Baker Trail with the permission of the American Youth Hostels, Inc. All equestrian trails shall have underbrush cleared to a width of six feet with an overhead clearance of eight feet. Proper drainage and other measures to prevent erosion and/or to promote harmless collection of silt should be provided. Generally, the equestrian trails at the project will be constructed according to "A Guide to Construction, Tahoe Rim Trail" by the U.S. Forest Service and the "Adopt-a-Trail Handbook" by the New Mexico Natural Resources Department, which set forth established and accepted standards and practices for such trails.
- h. Water Supply. The water supply made available by the Manor Township Joint Municipal Authority along L.R. 03108 will be adequate for all future additions to the existing project facilities. All additions to the distribution system internal to the project should be designed to the same standard as the existing improvements that were recently installed.
- i. Sewage Treatment. There is no existing or planned central sewage treatment system for Crooked Creek Lake. Therefore, sewage treatment will have to continue to be provided on an on-lot basis for future developments. Standard septic systems are the preferred method of treatment, but sand mounds should be used where insufficient depth of suitable soil is encountered. Where neither of these two kinds of systems will work effectively, other available technologies that may be employed effectively should be investigated. Where no on-lot treatment is feasible, vault or composting rest rooms should be used. Consideration should be given to aeration of rest room vaults.
- j. Signs. Insofar as possible, all signage throughout the project should be consistent and uniform. Where feasible, Federal recreation and international symbols should be used. The sizes, configurations, and placement of signs should conform to the latest approved version of ORDP 1130-2-4, the Ohio River Division Sign Handbook.

# 5-12 ARCHITECTURAL CHARACTER

The architectural character and design of future project buildings should be in accordance with the following criteria:

a. All buildings should be designed and sited to blend with the natural surroundings.

- b. The design and materials, as well as the architectural details of future structures, should be standardized throughout the recreational areas. Waterborne rest rooms, campers' washhouses, and the bathhouse in the swimming area, all of which are shown on Plate 9, and the campers' control station should all be constructed using textured concrete blocks ("Shadowstone") similar to those being used in current or recent construction at the project. Initially provided and future picnic shelters should match the existing shelters.
- c. All buildings should be designed to withstand public usage, vandalism, and where applicable, (such as the swimming area) flooding.
- d. The design of all buildings should allow use by handicapped persons insofar as this is possible.

#### SECTION 6 - PLAN OF DEVELOPMENT

#### 6-1 GENERAL

The plan of development set forth in this section has been synthesized from the information, data, and projections discussed in the previous sections. First, the resource use objectives enumerated in the following section were formulated. They were then, in turn, translated into physical plans which have two components: zoning plans for the project's lands and waters and facilities development plans.

Associated with implementation of this latter component would be environmental impacts. Because the developments proposed would, for the most part, occupy areas that have been used in the past, the environmental impacts would be minimal. Nevertheless, they are assessed in this section.

Under current recreation development policies, implementation of much of the facilities development plan may have to be carried out by local interests unilaterally or by concessionaires. Despite the anticipated inability of local governments to unilaterally support project development, limited opportunities for cost sharing may exist in the future should funding become available. Additionally, some development may occur with SRUF funds. These possibilities are discussed in this section.

Normally, an updated Master Plan would contain a development schedule. In this case, however, the uncertainty concerning implementation of the facilities development plans preclude meaningful scheduling.

# 6-2 RESOURCE USE OBJECTIVES

Resource use objectives are the stated philosphies and reasons behind the features of the development and management plans contained in this updated Master Plan. Some of these are obvious and hardly need to be stated, while others have grown out of conditions existing at the project. Still others were derived from demand statements set forth by project users during public involvement sessions. They are included here because their documentation here is mandated by regulation and to help future planners and managers to understand the rationale for the various recommendations of this Master Plan.

a. Provide recreation opportunities for approximately as many annual project users as have historically visited the project. About 700,000 recreation days have historically been spent annually at Crooked Creek Lake. Existing facilities at the project are capable of accommodating this level of use and, as long as sufficient funds are available to operate the existing facilities, they should be operated at the current level.

After more than five years, there would be little to be gained by further reducing service to the public in recognition of the turnback by the Commonwealth of Pennsylvania Department of Natural Resources. On the other hand, the project's potential for further, extensive recreation development should not be exploited, based on the overwhelming preponderance of opinion expressed by users of the project and residents of the Crooked Creek Lake vicinity who value the undeveloped character of the upstream parts of the project. Future demand is not, in any event, expected to stimulate a need for a great number of additional facilities.

b. Eliminate hazards to the public, project personnel, and the environment. At the outset of this updating effort, several hazards or hazardous areas were identified. These included inadequate or barely adequate potable water supply systems, rest rooms with badly leaking vaults that were in gross violation of Federal and state standards, and the right bank cliffs just downstream of the outlet works. Subsequently identified hazards are the alignment of the access road and ramp at the boat launching area and open coal mine shafts on project land.

Potable water and sanitary problems have been largely resolved by the Corpssponsored development that is now existing. It includes the provision of potable water through a utility service contract with the Manor Township Joint Municipal Authority and the construction of an internal project water distribution system, new waterborne rest rooms with sand mound septic systems and new vault rest rooms.

Access via cliffs to the right bank of Crooked Creek just below the outlet works has largely been obviated by several actions. Construction by local interests (the Crooked Creek Watershed Association, two Army Reserve units, Manor Township, the Fort Armstrong Horsemen's Association, and the Darmac Coal Company) of the fishing embayment below the dam provided an additional fishing area with easy access. Step construction on the right bank downstream of the cliffs by the Pennsylvania Conservation Corps provided safe access to the area exposed below the cliffs where fishing occurs during low water discharges. Step construction by project personnel for operational access and an operational access road constructed by the Darmac Coal Company as an adjunct to the fishing embayment provided considerably easier access to fishing waters just below the outlet works on the left bank. Finally, installation atop the outlet works end and wing walls of railings in lieu of the previous chain link fence by project personnel has permitted fishing where many fishermen most wish to fish.

The boat launching area has been redesigned to make it much more difficult for a motorist to mistakenly follow the access road and ramp into the lake. This improvement will be constructed as part of the initial level of development as soon as funds become available.

The coal mine southwest of the boat launching area reportedly once was worked to provide fuel for a natural gas compressor station that was located in what is now the boat launching area embayment. At some time in the past, earth was pushed up in front of the mine entrance, but this pile of earth has eroded and settled to the point where entry to the mine is relatively easy, as evidenced by the trash and litter that has been discarded into the mine. During wet parts of the year, the mine contributes what appears to be a significant amount of acid mine drainage to an adjacent stream and, thence, to Crooked Creek Lake. In the absence of action by another responsible agency and for the safety of project visitors, particularly children, it is proposed to at least fence the coal Following this remedial action, a geotechnical study focused mine mouth. on permanently sealing the mine and stopping the flow of acid mine drainage without damaging surrounding property or alternatively neutralizing the drainage should be performed and implemented as initial project improvements. The open mine shafts in the Coal Bank Hollow area will soon be sealed by the Pennsylvania Department of Environmental Resources. Their aid through continued coordination should also be sought to resolve or help to resolve the problem of the open mine shaft near the Boat Launching Area.

c. Encourage and make opportunities available for local efforts to improve the project. At the outset of the Master Plan updating effort, the likelihood of successfully securing a cost-sharing local sponsor, even under previous policies, was recognized as nearly nil. Because the Commonwealth of Pennsylvania had already turned back the state park and Armstrong County appeared to be involved to the limit of their ability in a cost-sharing program for Mahoning Creek Lake, the public involvement program that augmented this updating effort was aimed toward finding and encouraging lesser local efforts than are usually associated with a formal cost-sharing program.

Some of the results hardly represent less effort than a formal cost-sharing program, at least on the parts of the local individuals, organizations, and government involved. The embayment construction below the dam which is described as to its participants in subsection b. above is, so far, the prime effort which is worthy of recognition as an outstanding local action that has been of benefit to the project. Following closely behind, however, are the efforts of Manor Township and the Fort Armstrong Horsemen's Association in developing the Manor Recreation Area and the equestrian trail around the project (involving the Association only).

While past and ongoing local actions in support and betterment of the project should rightly be a source of great pride for the contributors, additional opportunities for other local actions exist and are set forth in this Master Plan. These chiefly involve provision of safer, additional, or improved boating, rafting, canoeing, or fishing access in the lake or

upstream along Crooked Creek. Local sponsors could range from the Pennsylvania Fish Commission to Burrell Township or their volunteer fire department. Waterfowl habitat could be created in the Robb's Bridge Flat area through the local development and operation and maintenance of a subimpoundment. Another opportunity for a local entrepreneur exists at the campground which could be operated and expanded as a concession.

Reforestation by volunteer labor and with donated materials has occurred several times in the past at the project. Such actions should be encouraged in view of the nearly overwhelming need for revegetation in parts of the Main Recreation Area.

d. Provide the opportunity to control the Main Recreation Area. Currently there are two entrances to the Main Recreation Area which includes the Main Day-Use Area, the Campground, and the Beach. One point of ingress and egress is the main entrance road from L.R. 03108, while the other entrance is across the Main Recreation Area to the southwest at the intersection of T-460, T-840, and the Boat Launching Area access road. As a result of the park roads' usually better condition than T-460 and T-840, permanent and summer residents in the vicinity of the Boat Launching Area have a tendency to use park roads for access. Worse, others passing through the area use the park roads as through highways and sometimes use the park's dumpsters for personal garbage disposal. Security for project recreationists is also threatened by the current lack of control.

In this Master Plan, it is proposed in the future to provide a new main access road from the vicinity of the new administration building to the fishing access along the south side of the Main Recreation Area. All development east of this new road would be for day use while the entire area to the west would be for camping. At the T-460/T-840/Boat Launching Area access road intersection, the entrance to the Main Recreation Area would be closed to the public; but without the new segment of access road, this closure would be considerably less reasonable. If the District cannot unilaterally provide the proposed new access road, opportunities to construct it at least partially through donated local efforts should be sought and encouraged.

e. Provide the opportunity to better separate day and overnight use. Currently, the existing Campground and the adjacent day-use areas are separated in fact. It is a poor separation in effect, however, because the development and use of the Campground is so dense and its sites are so close to its own boundaries. The consolidation of day-use facilities will help to achieve the needed separation and the construction in the future of the new main access road would provide a physical barrier providing separation.

- f. Consolidate day-use activities into smaller areas. Currently, day-use facilities are located in the Main Recreation Area, the Boat Launch Day-Use Area, and the Spillway Recreation Area. After the turnback of the state park, the number of picnic tables at the project was cut from about 450 to approximately 250 and a small degree of consolidation was achieved. Day-use facilities are still spread out too liberally in the Main Recreation Area and are too few in the Boat Launch Day-Use Area. With implementation of this updated Master Plan's recommendations, picnicking facilities should be relocated from future camping areas to the consolidated Main Day-Use Area (east of the proposed new entrance road) and to the Boat Launch Day-Use Area which currently is usually underutilized.
- g. Assure that the Beach remains open without charge. This resource use objective was expressed frequently during the public involvement workshops conducted in connection with this updating effort. It is the only such facility available to the public in the project vicinity and should remain, with or without lifeguards, according to those commenting on this issue.
- h. Provide a safe circulation pattern at the Boat Launching Area. As a result of concern by the Corps of Engineers about the safety of its boat launching facilities nationwide, it was determined by the Office of the Chief of Engineers that the existing Crooked Creek Lake access road, turnaround area, and ramp present no obstacle at all to a motorist mistakenly driving directly into the lake. Also recommended was pull-through parking for the convenience of boaters. The access and circulation system in the Boat Launching Area has been redesigned so that a motorist must take definite action in order to run into the lake. However, the topography and available space in the Boat Launching Area will not permit pull-through parking. Reconstruction of the Boat Launching Area has a high priority and could be sponsored at least in part by local interests.
- i. Continue to provide opportunities for a variety of types of boats. Despite its small size, the Crooked Creek Lake pool has historically been and continues to be popular for power boating, water skiing, canoeing, and fishing from a boat. Rational and meritorious arguments for maintaining the status quo and for limiting the horsepower of boats on the lake and, thereby, decreasing congestion were advanced during the public involvement process. An approximately equal number of public involvement participants favored each alternative. The Pennsylvania Fish Commission endorsed the continued provision of opportunities for as many kinds of boaters as possible, and it has been determined by the Pittsburgh District that, as long as it is possible to do so with a reasonable degree of safety, diversity should be maintained. This conclusion is reflected in the water zoning plan presented in this Master Plan and in the Pennsylvania Fish Commission's current rules and regulations for Crooked Creek Lake which have been closely coordinated.

- j. Provide a more secure and efficient area for docking of Corps boats. Because of the potential need to gain access, at any time, to the Corps boats assigned to the project, they have been docked near the Beach. At this location, they are often difficult to keep under surveillance and to secure from theft and vandalism. The site behind the Government residences which is discussed in the previous subsection would be a superior site for docking of Government boats. Access is provided by an abandoned legislative route that is capable of providing all weather access. Both surveillance and security would be easier to provide at this site.
- k. Provide more and better camping facilities. Considering the popularity of the existing 50 pay and five free campsites, despite their high density and lack of amenities, it is anticipated that Crooked Creek Lake could attract many more campers. To do so, the existing campsites should be spread out and augmented with additional sites. Expansion of camping opportunities would contribute to a desirable balance of available project recreation activities and would further enhance the efficiency of the Campground's operation.
- 1. Maintain the Group Campground with improved access. As undeveloped as is the existing area that was previously used for group camping, it, nonetheless, has been popular with groups and organizations. With the reconstruction of the Boat Launching Area, the access road to the Group Campground which was always subject to frequent flooding because of its location, should be relocated. Vehicular access to the former Group Campground area should be maintained because it is easily accessible by foot and regular patrolling will be required. At the same time, project personnel have reported that a significant amount of silt, which must periodically be removed from the launching ramp, originates from the stream that an access road to the Group Campground area must cross. If further investigation indicates that this siltation problem is sufficiently severe, the access road embankment could be designed to establish a siltation basin.

Since access should be maintained to the Group Campground area and no other facilities were ever provided in the area, it would require only a few mowings per year of a smaller area than in the past to keep the area open to the public. Sanitary facilities would no longer be so near as the old vault rest room at the Boat Launching Area; therefore, users of the Group Campground would be required to provide portable sanitary facilities acceptable to the project Resource Manager, at least until potential future rest room facilities could be provided through local efforts or cost sharing.

m. Continue to provide the availability of the Environmental Learning Center (ELC) and the programs offered there. The ELC has by now become an integral part of the community. To eliminate this special recreation facility or substantially change the mode of its operation would

be viewed by the regional populace as an unreasonable taking by the Federal Government, and it would surely be disputed. In addition, it should be noted that the ELC is used intensively and extensively throughout the year for meetings and training sessions for field personnel, thereby saving for the Government some per diem and other costs associated with holding these sessions in the District Office or rented facilities.

Recently, Crooked Creek Lake was nominated for and chosen to represent the Corps of Engineers in the projects category in the Take Pride in America award program. It was the only project selected nationwide. material submitted concerning the ELC played a large part in the project's success thus far in this competition. Among the activities cited in the nomination that are held at or enhanced by the ELC are the Environmental Awareness Youth Camp (sponsored by the Armstrong County Conservation District and the Penn Glade Lions Club), Camp Sunshine (sponsored by the Pennsylania Association of Retarded Citizens), National Wildlife Week (sponsored by the National Wildlife Federation), the District's Survival Day, Kent State University workshops, the Corps' volunteer program, the District's water safety program, Project Wild and Project Learning Tree workshops, Eco-meets final competitions, Pennsylvania Conservation Corps projects, and training sessions by the Pennsylvania Fish and Game Commissions, the Ohio Department of Natural Resources, the Corps, and other local law enforcement agencies. The Armstrong County Conservation League, local Boy and Girl Scout troops and an Explorer Scout post, a local organization for hemophiliacs, several youth groups, youth shelters, school and church groups, and various special populations also use the facility regularly. In essence, the provision of the ELC by the Corps may nearly be viewed as the reciprocal of the local volunteer spirit that has so greatly benefitted Crooked Creek Lake.

The ELC additionally represents one of many Corps of Engineers efforts that have resulted in a leadership role in environmental matters, as opposed to the former "enemy of the environment" perception of the Corps. Even though the subject of the environment no longer commands the popularity that it did in the 1960's and 1970's, the ELC is helping to carry on the environmental awareness that became prevalent during those decades. The agency that now regards itself as one of the foremost environmental organizations should strive to continue the ELC programs and, in order to do so, the operation of the ELC should be continued as long as sufficient funding is available. The levying of reasonable charges for its use is entirely proper, however, and the recent fee schedule should be continued and kept updated in the future.

- n. Provide equestrian facilities. When the public involvement program was initiated, the Fort Armstrong Horsemen's Association, Inc. responded to the District's suggestion that an area suitable for equestrian use might be available at the Crooked Creek Lake project. The area north of the spillway, after remedial repair of two badly eroded gullies and installation of a water diversion to forestall future erosion was found to be well suited for equestrian use. It was further determined that the equestrian trail surrounding the project which the association wished to establish could, with proper construction and monitoring, be a desirable addition to the project and could be of aid in patrolling parts of the project that were previously nearly inaccessible. The equestrian facilities that are under construction are appropriately being provided entirely by local interests.
- o. Maintain the undeveloped character of upstream parts of the project. Although nearly the entire project was leased to the Commonwealth of Pennsylvania as a state park, significant development never occurred on the right bank or upstream of the Boat Launching Area on the left bank of the reservoir. During the public involvement process, a preference for the undeveloped character of these areas was expressed frequently and strongly by those who use it. Only one comment favoring development of a small part of the upstream project area was received. Honoring this local preference is sensible in light of the road network providing access to the area which is capable of safely carrying only limited amounts of traffic. Therefore, the development of recreation facilities in the upstream parts of the Crooked Creek Lake project should be limited to those access proposals contained in this Master Plan which will merely help to accommodate existing activities.
- p. Provide more intense forest management. In the past, forest management at the project was limited to necessary care for trees that are part of the planted landscape in addition to activities such as removal of old or dead trees that became a hazard. At times, forest management was a by-product of wildlife management actions. Public Law 86-717 appears to require a somewhat more intense management effort, although not one so intense as to include measures such as clear cutting, for example. Selective cutting, on the other hand, may be appropriate in parts of the project, while in others it would be out of place. The Operational Management Plan should address forest management to a greater degree than does the current Forest, Fish and Wildlife Management Plan.
- q. Continue to manage fish and wildlife in accordance with the guidelines contained in the Forest, Fish and Wildlife Management Plan. The Pennsylvania Fish Commission has a license with the Department of the Army giving them primary responsibility for managing the project's fishery. This does not prohibit, however, the Corps from undertaking activities which are compatible and fully coordinated with the Fish Commission. Since the Pennsylvania Game Commission has declined to manage

the project's wildlife resources, the Corps has primary responsibility for this activity. The Corps' wildlife management efforts should be guided by the Forest, Fish and Wildlife Management Plan, subject to current Corps policy and the availability of funds. The plans contained in the Forest, Fish and Wildlife Management Plan with any modifications necessitated by recent changes in the resource should be transferred to the Operational Management Plan.

r. Where significant hardships are not created, outgranted areas where activities unrelated to the project are conducted should be returned to Corps or other project related management. Because it is a "stand alone" facility, the area in the Robb's Bridge Flat vicinity granted to the Pennsylvania Department of Transportation should not have its license renewed upon expiration in 1989. The same could be said of the area adjacent to the spillway that is under the Department's control. However, the benefits of having this road maintenance facility at the project (better road and dam guardrail maintenance and earlier snow removal) militate for continuation of an outgrant and permitting of a salt storage structure. The Department is reported to be willing to purchase the site, but the required excessing cannot be recommended because of hydrologic and related potential liability reasons.

#### 6-3 ZONING

Based on an analysis of the information contained in this and the preceding three sections, a zoning map was developed defining the optimal uses for all of the project lands and waters. This plan, which is shown graphically on Plate 11, presents specific recommendations for the interim and ultimate uses to which all land and water areas are to be dedicated, limits on the densities and locations of development and use, the desired relationship of developments to natural and/or scenic protection zones, distribution and location of water access areas, and an integration of appropriate uses into a balanced plan for wise use of all project resources in the public interest.

# a. Land Use Classifications.

- (1) Project Operations. Lands acquired and allocated to provide for safe, efficient operation of the project for those authorized purposes other than recreation and fish and wildlife are included in this zone. In all cases this will include, but is not limited to, the land on which project operational structures are located. No interim or agricultural uses are permitted on these lands.
- (2) Recreation-Intensive Use. In this category are lands acquired for project operations and allocated for use as developed public use areas for intensive recreational activities by the visiting public, including areas for concession and quasi-public development. No agricultural or other interim uses are permitted on these lands.

- (3) Recreation-Low Density Use. Lands acquired for project operations and allocated for low density recreation activities by the visiting public are included in this classification. At Crooked Creek, such zones are the proposed sites for access to the lake and the stream upstream of the Open Boating (see subparagraph b.(2) below) zone. No interim or other agricultural uses will be permitted on these lands.
- (4) Wildlife Management. Lands acquired for project operations and allocated as habitat for fish and wildlife or for propagation of such species are designated as "Wildlife Management" lands. These lands will be continuously available for low density recreation activities. Agricultural use of wildlife management lands is permitted, provided that the benefits to wildlife and allied uses are approximately equivalent to those derived from the agricultural use. Such use may be on an interim or permanent basis.
- (5) Reserve Forest Land. These are lands acquired for project operations and allocated for vegetation control to support management objectives compatible with sustained yield. Timber will be harvested, however, only when required to achieve other management objectives such as wildlife habitat improvement or to sustain the value of the forest resource. Forest improvement measures on this land such as timber planting or vegetation manipulation for erosion control are permitted.
- b. Water Use Classifications. The water use plan presented below is designed to protect the recreating public, to minimize conflicts between water and land use activities and to protect sensitive environmental resources. Four hundred acres of water above the dam are outgranted by license to the Pennsylvania Fish Commission, and the water zoning plan generally reflects their preferences as a managing agency. The water zoning set forth herein, in fact, formalizes the actual zoning that has been enforced by the Fish Commission and project management personnel since the early 1980's. Although considered in the Master Plan updating process, a horsepower or speed limitation over the entire lake is not necessary at this time, although such a zoning action is not precluded in the future if conditions warrant.
- (1) No Boating. This category applies to water areas which are buoyed off, prohibiting watercraft beyond the designated point or line. These areas are located around operational structures such as the dam (the area between the dam and the trash boom is zoned as such) and the public swimming area. Because of Crooked Creek Lake's small size, no swimming is permitted except at the designated swimming area and above the "shoal" buoys that are located upstream of the boat launching ramp embayment.

- (2) Open Boating. Waters allocated to the "Open Boating" category are available for most boating and related activities. Because of the small size and narrow configuration of the lake, however, certain restrictions have been applied. These restrictions include a mandatory counterclockwise circulation pattern, a limit of one skier per boat, no inboard motors with over the transom or open exhausts, no airboats, and no floatable devices other than Coast Guard approved personal flotation devices and boats. With the exception of the water areas within 100 feet of each shore and the boat launching ramp embayment, all of the water between the "no wake" buoys above the beach and the "shoal" buoys above the boat launching area is zoned for open boating.
- (3) No Wake. Speeds of craft navigating waters allocated to this category are restricted to levels required for effective handling of the boat which will not create a damaging wake or waves, safety hazards, or undue disturbance. The Pennsylvania Fish Commission describes the rate of movement permissible in these zones as "slow, minimum height swell speed." The following types of waters are allocated to this category:
- (a) Waters proximate to the boat launching ramp or other facilities which might be physically damaged by wave action induced by high-speed boat use;
- (b) Water which, due to shallowness, narrowness, or submerged obstacles, would present dangers to users of boats traveling at high speeds;
- (c) Waters having as their highest use fishing, hunting, canoeing, conservation, provision of aquatic habitat, or other activities which would conflict with use by craft traveling at high speeds; and
- (d) Waters within 100 feet of the shoreline or items along the shoreline such as docks, tied up boats, or diving buoys.

# 6-4 FACILITIES DEVELOPMENT PLAN

The features of the facilities development plan's various elements are discussed in the following subsections. Shown on Plates 11 through 15, the plans are divided into initial and future components.

For each area, facility, or group of facilities, the initial component consists of those facilities that are expected to be constructed beginning in Fiscal Years 1987 or 1988. Generally, these are assigned the highest priority for development. Future facilities are those for which a date of construction initiation cannot be reasonably predicted. Some of these latter facilities will require local cooperation in order for construction to take place. Depending on the availability of funds, construction of some of these facilities could precede development of initial ones.

a. Water Supply. Water service to the project was initiated during the fall of 1986 under Utility Service Contract No. DACW59-85-C-0040 when the Manor Township Joint Municipal Authority's eight-inch water main, shown on Plate 11, was essentially completed. Connection work is also complete, so that water service is provided to recently completed sanitary and other facilities as well as to the project's older existing facilities. Specifically, these include the Environmental Learning Center, the three Government dwellings, the sanitary disposal station for camping trailers, the two new Main Day-Use Area rest rooms and one new Campground rest room, the Beach, the Boat Launch Day-Use Area, the new administration building and maintenance complex, the Spillway Day-Use Area, and the small storage garage on the right bank. Three fire hydrants, one near the Environmental Learning Center, one between the new administration building and the new maintenance complex, and one between the Spillway Day-Use Area rest room and the two Government dwellings on the right bank, are also supplied by the new water system. Components of the old system that are readily removable such as pumps, pumphouses, and the storage tank will be razed and/or disassembled. Those items that can be salvaged will be reused where a need arises.

The existing water system including the Manor Township Joint Municipal Authority's main and appropriate parts of the interior water distribution system will be adequate to support all future development needs. The initial and future water system additions proposed herein consist merely of extensions to the existing system. An additional Campground rest room developed with SRUF funds would be supplied by the existing system. Served in the future would be the expanded Campground including a rest room and two washhouses. Water service to the Group Campground (a fountain and handwash facility) would also be included in the future.

b. Sewage. At Crooked Creek Lake, the three Government dwellings, the Spillway Day-Use Area rest room, and the Environmental Learning Center are served by older septic tank/leach field treatment systems. These operating septic systems appear to be working adequately without problems and will be maintained in use as they are.

The three new waterborne rest rooms (two in the Main Day-Use Area and one in the Campground) require sand mound leach fields for adequate treatment. In two cases, the Main Day-Use Area rest room closest to the Beach and the Campground rest room, the sand mounds had to be located remotely from the rest rooms they serve.

The new administration building and maintenance complex are served by a single standard septic tank/leach field located northeast of the maintenance complex. Sewage will be piped by gravity from both facilities to the septic system. Although construction is not expected to be initiated until Fiscal Year 1988, the Beach will have constructed, as part of the initial phase of development, a new rest room in place of two existing vault structures. Like the existing structures, the new rest room at the Beach will be of the vault type because there is no site where its large anticipated volume of sewage can be treated. If possible with the amount of funds made available, the new structure may include change areas. The new rest room will be located at the site of the old one, the removal of which will be required.

An initial sanitary improvement will consist of a waterborne facility similar to that newly constructed in the Campground. This rest room will serve initial expansion of the Campground with SRUF funds. Future sanitary facilities will consist of another waterborne rest room and two washhouses in the expanded Campground.

On the ridge in the central part of the new Campground is a site in which a standard leach field can be constructed. It is anticipated that this site will be capable of treating sewage from the initial Campground rest room and the westernmost future washhouse. Where possible, existing treatment facilities will be expanded to serve the future rest rooms and washhouses. The standard septic system for the administration building and maintenance complex appears to be expandable, and the easternmost future Campground rest room and washhouse could possibly be served by such an expansion.

For the Group Campground, a vault-type rest room like that developed recently in the Boat Launch Day-Use Area would be provided when feasible in the future. Alternately, it is suggested that a composting or other "state of the art" type of rest room and/or treatment facility be constructed, partly on an experimental basis, provided that it can be economically justified.

c. Main Access Road. The existing access road to the Main Recreation Area from L.R. 03108 is generally in poor condition and is in need of rebuilding. Originally not designed for the volume of traffic it currently receives, this road also occupies a prime strip of land along the top of the slope in the Main Day-Use Area that would be better left to pedestrian use.

When a major rebuilding of this main access road occurs in the future, it should be relocated to take advantage of its potential function as a separator of day-use and overnight areas. This latter function should qualify the proposed construction for SRUF funding. Such relocation will considerably shorten the length of main access road to be maintained. As shown on Plate 11, the new, 20 foot wide main access road would begin at and essentially follow the route of the existing access road for about 400 feet where it would then turn southwest and skirt a large draw instead

of passing through it as the present road does. It would then turn southeast around the head of the draw, cross a Main Day-Use Area circulation road and connect to the existing Beach access road in the vicinity of an existing fishing access trail.

d. Main Day-Use Area. Other than water supply and sanitary improvements, the only initial development proposed for the Main Day-Use Area is a single picnic shelter. The new ice skating rink is near the head of the large draw that separates the new administration area from the Main Day-Use Area. Although the ice skating facility is for day use, it is actually located in the Campground as shown on Plate 11. There should be no conflict between these uses, however, because they occur during different seasons.

Consolidation of picnic facilities in the Main Day-Use Area is being accomplished and is considered as part of the existing development. The existing picnic sites in the future Campground are being dismantled and the facilities are being redistributed to the Main Day-Use Area and the Boat Launch Day-Use Area. The Main Day-Use Area will then contain 154 picnic sites including the tables in the shelters.

The proposed initial octagonal picnic shelter is to be sited in the Main Day-Use Area as shown on Plate 11 for use in conjunction with the ice skating rink and is intended to have removable sides and a wood stove so that it could, at times, be used as a warming hut. Although it would be available for general public use, this picnic shelter would also be able to be reserved and used by groups for a fee. Such use of the project's existing picnic shelters has demonstrated the popularity of such operation. In the future, development in the Main Day-Use Area would involve construction of new roads and parking areas, reduction in size and reconstruction of the overlook parking area and the large parking areas between the old main access road and the Beach access road, and construction of five additional picnic shelters. Relocation of the existing ball field, the provision of additional playground equipment and the construction of a trail along the route of the old main access road would also be pursued in the future.

The large parking areas in the southeast part of the Main Day-Use Area should, in the future, be reduced in size to 54 spaces, while the overlook parking area should be redeveloped with a turnaround and 36 car parking spaces. Two new parking areas together would accommodate 64 cars.

Five additional picnic shelters would be similar to those that already exist at the project. The ball field relocation would be necessitated by construction of the new roads and a parking area.

e. Campground. All recent developments in the Campground related to water supply and sanitary facilities. Except for SRUF-financed initial development of 17 new campsites and a new rest room on the ridge in the former western part of the Main Day-Use Area, the improvement of basic camping facilities including amelioration of grossly overcrowded existing facilities and provision of additional facilities will occur sometime in the future.

The highest future development priority should be the reduction by approximately one-half of the campsites in the existing Campground. This action should not be taken, however, until at least some of the eliminated campsites have been replaced since an unmitigated reduction would constitute a disservice to some campers.

First, some of the 67 campsites in the vicinity of the ice skating rink (see Plate 11) should be constructed together with at least the rest room proposed for the area. Next, the 14 campsites proposed for the ridge to the west and the proposed new access road should be developed. Seven proposed future walk-in campsites to be located in the draw west of the ridge and the associated 20-car parking area above the south end of the draw should also be developed concurrently with the ridge development. These seven walk-in sites would be available for use without charge and would serve as the required free camping facilities. When this development occurs, the Beach access road should be closed except for service purposes at the intersection of T-460, T-840, and the Boat Launching Area access road.

Later, all or an increment of the remainder of the 67 potential future campsites east of the ridge and both proposed future washhouses could be developed. In connection with this development which would more than double the Campground's capacity, the proposed camper check station, and two 10-car parking areas (one for visitors to campers and one for excessive vehicles that would otherwise be parked at one campsite) should be developed. Throughout the development period, too, additional playground equipment should be provided.

All but the walk-in sites should have a crushed stone spur and a defined impact area in addition to a tent pad, a picnic table and a fire ring.

f. Beach. Most development or redevelopment of the Beach is existing or will be accomplished initially. In addition to provision of a drinking fountain, handwash and new vault-type rest room, the Beach access road, the parking area and aisles and parking bays have been repaved.

Future improvement of the Beach includes the addition of a larger sand area at the beach itself. Extending 50 feet eastward toward the end of the Beach peninsula, the expanded sand area would be located below elevation 846.0 NGVD only and would provide an adjacent swimming area for those who wish to pursue beach activities on the grass instead of sand.

- g. Boat Launch Day-Use Area. Beyond the new water supply and sanitary facilities and the picnic shelter, all of which are existing in the Boat Launch Day-Use Area and shown on Plate 11, consolidation of the project's day-use facilities is resulting in the installation of 40 picnic sites. Future development of the area would include reconstruction and paving of the access road and parking area (together with a reduction in size of the parking area from about 100 car spaces to 50 car spaces) and the construction of one additional picnic shelter.
- h. Boat Launching Area. This area is to be reconstructed initially as shown on Plate 12 to require a definite turn onto the two-lane concrete launching ramp. A courtesy dock near the ramp will also be provided. Near the ramp and courtesy dock a rebuilt set of steps would offer foot access to the new vault rest room in the adjacent day-use area from the Boat Launching Area. Another new set of steps in the vicinity of the parking areas would also be provided.

Although pull-through type parking spaces for car-trailers are generally recommended, the topography of the Boat Launching Area precludes such a parking arrangement at a reasonable cost. Fifty car-trailer spaces in two lots with a central aisle would, therefore, be provided. Unlike the existing three parking lots, these would be paved with bituminous material.

i. Group Campground. The Group Campground has been closed since local interests have not been willing or able to assume operation and maintenance responsibilities for it. Because of its proximity to the Boat Launching Area, however, vehicular access to the area should be maintained for patrolling purposes. The existing access road to the Group Campground is an extension of the existing boat launching ramp turnaround and may be modified initially to meet the new boat launching ramp turnaround. In the future, however, and particularly if the area is reopened, a new and less flood-prone access route to the area should be provided as shown on Plates 11 and 12.

It has been reported from observation by project personnel that much of the silt that is deposited annually on the boat launching ramp comes from the stream that empties into the Boat Launching Area embayment. Others believe that this silt settles on the ramp during periods of flood storage or afterward, when the pool elevation is being reestablished within the operational minimum range. Since there is a disparity of opinion on this technical question and a solution, if feasible, would reduce operation and

maintenance costs, a study should be conducted to determine the origin of the siltation problem. If it is found that reduction of silt from the stream will have a substantive effect on the problem, the fill required for the new proposed Group Campground access road to cross the stream could be designed as a dam which would form a siltation pond. Such a pond is shown on Plate 12 and, although it is considered a future development, it should have a high priority among future project improvements if it is determined that it will wholly or partly alleviate the boat launching ramp siltation problem.

Other than a new access road, the only other future developments proposed for the Group Campground are the provision of potable water to a drinking fountain and handwash facility and a vault-type rest room similar to that constructed initially in the Boat Launch Day-Use Area or, partly on an experimental basis, a composting rest room.

- j. Administration Building and Maintenance Complex. These facilities (shown on Plate 11) were reduced in size somewhat because of cost considerations compared with those proposed in the First Increment of this Master Plan. No further development in the future is proposed, although it should be recognized that there may, sooner or later, be a need to add the additional space that was included in the First Increment Report but was eliminated during the design process. Any such proposal should, however, be thoroughly scrutinized.
- k. Environmental Learning Center. This complex of three interconnected small buildings is functionally complete. The only future development proposed is a small observatory which would consist of a 10'x16' frame building with electric power and a roof or part of the roof that would be removable. Such a roof is commonly rolled out of the way on garage door rollers and tracks.

The proposed observatory would be developed by the Kiski Astronomers, a local organization. They would have use of the observatory for their own study purposes, but would also continue to provide a segment of some of the Environmental Learning Center programs as they have done in the past. An appropriate real estate instrument would formalize these arrangements.

1. Fishing Access Below Dam. This area was recently upgraded considerably through provision of a vault rest room, paving of its access road and parking areas, construction of the fishing embayment and a berm along part of the embayment providing access for maintenance purposes to the outlet works, construction of steps providing safe access to the left bank of Crooked Creek immediately below the outlet works, and other lesser improvements. Only the pier proposed for handicapped users has not yet been constructed. This is shown on Plate 11 and would consist of a wooden

pier suitable for wheelchair use and would be developed as part of the initial phase through cooperation with the Crooked Creek Watershed Association and such other volunteers as may wish to become involved.

- m. Spillway Day-Use Area. This area generally functions well, and no facilities in addition to those shown on Plate 11 are needed. Furnishing of the existing visitor center with displays and winterization of the existing waterborne rest room will be complementary to the existing opportunities provided in the area.
- n. Manor Recreation Area. The plan proposed for the 113 acre Manor Recreation Area is shown on Plate 13 and would be implemented over initial and future development phases by Manor Township under a 25-year lease and the Fort Armstrong Horsemen's Association under a subagreement with the township. Both general day-use and equestrian facilities would be provided in the area. Erosion damage repair and control measures including the water diversion shown on Plate 13 have already been accomplished by local interests including the township and association. Two access roads, a large parking area and two fenced equestrian rings are under construction and are considered essentially existing.

The proposed day-use facilities would be open to the general public on a regularly scheduled basis. They would initially include a small picnic area, a playground, temporary portable rest rooms, and, if water of sufficient quality can be obtained from a well, a hydrant for drinking water. Eventually, more permanent sanitary facilities commensurate with the township's and association's ability to provide them would be constructed.

The proposed initial equestrian facilities would be used for both informal and scheduled events and include a system of riding trails, a 24'x80' head-quarters building with a food, equipment, and supplies concession, a meeting room, and an announcer's booth, crushed stone roads and grass parking areas for cars or trucks with a trailer, an 80'x200' barn with temporary stalls that are portable so that the building can also be used as an indoor riding ring, and a water collection system using on-site springs to feed a watering trough. Crushed stone roads and parking areas would interconnect the buildings and riding rings. The area would be open to the general public for equestrian activities upon request. However, reservations for scheduled events would take precedence over the facilities' informal use.

In the future, the initial facilities would be augmented by a 100'x300' indoor riding arena, three more 80'x200' barns with permanent stalls, bleachers for the rings, an additional parking area, another picnic area and a campground capable of accommodating at least 45 campsites, two rest rooms and a playground. As in the initial development, crushed stone roads with adjacent parking facilities would accommodate 85 cars, 53 car-trailers

and 108 trailer trucks or similarly sized rigs. Eventually, too, the Fort Armstrong Horsemen's Association conceives of the likelihood that at least one barn would be leased to a concessionaire who would provide permanent rental stabling and an opportunity for public horse rental. Such an action would help support the area and would also benefit the area's security.

A rifle range, which was proposed by the Manor Township Supervisors, is considered to be generally incompatible with the day-use and equestrain activities intended for the site. It is not shown on Plate 13. However, if implementation and management plans that would assure maximum visitor safety are developed by Manor Township, this proposed use would be reconsidered for future development.

o. Equestrian Trail. An equestrian trail outside of the Manor Recreation area is under construction by the Fort Armstrong Horsemen's Association under a license agreement. The trail will, when complete, provide a cross-country route around the entire Crooked Creek Lake project, using the existing Baker Trail, local roads where required, and new trail that will be located on both Federal and privately owned lands. Trail development has occurred as much as possible on Federal lands where it will benefit project management as well as equestrian users. However, where the trail crosses privately owned lands, it will be the responsibility of the Fort Armstrong Horsemen's Association to obtain the necessary rights-of-way. Trail maintenance will be the responsibility of the licensee, who will also be required to have insurance coverage for liability in connection with equestrian use of the trail.

The license for the equestrian trail was recently finalized. Initially, only a five-year term should be offered, during which possible degradation to the project, maintenance by the lessee, and potential problems relating to the provision of public access where none previously existed can be evaluated.

Eventually, the Fort Armstrong Horsemen's Association hopes to have an equestrian trail system which includes trails surrounding both Crooked Creek and Mahoning Creek Lakes and a connecting trail between the two projects. The trail around Crooked Creek Lake which is over one-half completed will constitute the first phase of this approximately 100-mile trail system.

p. Meyer's Field Small Boat Access Area. Served by Burrell Township Road 460, this area which is shown on Plate 12 would provide convenient access to the upper reaches of the minimum pool for fishermen and others who wish to launch small boats, canoes, and rafts. Because of the situation in this part of the pool, larger power boats would not use the Meyer's Field Small Boat Access Area. It would also, however, when developed in the futurem be a take-out point for canoeists and rafters floating down from upstream.

Facilities provided would include a crushed stone access road, part of which would be reconstructed and part of which would be new. A parking area of crushed stone for 10 car-trailers would also support the proposed one-lane reinforced concrete boat launching ramp.

- q. Mouth of Cherry Run Fishing Access Area. Access to this area is provided by L.R. 03053 as shown on Plate 12 and, when developed in the future, it would offer a mid-project site for the launching of small boats, canoes, and rafts. Since the area would be located favorably in relation to Cherry Run, no actual launching facility would be required. Major facilities required at the site would consist of a crushed stone access road and a parking area of the same material for 15 cars.
- r. Rearick's Fording Canoe and Raft Access Area. Located along Burrell Township Road 510, this area would provide access for those who float down Crooked Creek in canoes and rafts, an existing activity which already occurs at the area shown on Plate 12. Facilities developed in the future would include a crushed stone access road, a crushed stone parking area for 15 cars and a six-foot wide concrete ramp leading from the parking area to Crooked Creek.
- s. Signs. On Plates 7, 11, and 12 are numbered locations of entrance and directional signs. The numbers correspond to the sign boards shown on Plate 15. This information together constitutes the sign plan for Crooked Creek Lake which is considered as part of the future phase of development.

Signs at the project should be kept consistent to the extent possible and should conform to the Ohio River Division or other prescribed sign handbook that is current at the time of sign placement. At this time, signs should be consistent with the existing ones throughout the project which are generally in conformance with the current Ohio River Division Sign Handbook of October 1978. The provision of a few of the proposed signs is not a part of any other future development. The cost of these is minimal and no estimate has, consequently, been included for them.

No attempt has been made to include traffic control signs in the sign plan. The need for and locations of such devices will be determined in the design phase of development.

## 6-5 ENVIRONMENTAL IMPACTS

Facilities development will involve localized construction impacts and result in a slight shift in the location of recreational activities at the project. The types and levels of recreation, however, are not expected to change significantly. This development was generally discussed in the June 1985 "Environmental Assessment for the Operation and Maintenance of Crooked Creek Lake, Armstrong County, Pennsylvania." Following the Environmental Protection Agency's review of this assessment under Section 309 of the Clean Air Act, the District Commander concluded in his Finding of No Significant Impact (July 3, 1985) that the continued operation and maintenance of this project, including facilities development, would not be a major Federal action significantly affecting the quality of the human environment. This development, as part of project operation and maintenance, is in compliance with the National Environmental Policy Act and the Clean Air Act. It has also been determined that the proposed development would not affect resources presently under the jurisdiction of the Endangered Species Act and the Wild and Scenic Rivers Act. However, the status of resources under the two acts can change over time and should be reconsidered as each development is undertaken. Individual components of the development may fall under the jurisdiction of the Fish and Wildlife Coordination Act, Section 404 of the Clean Water Act, and the Archeology and Historic Preservation Act. These will be addressed on an individual basis as applicable.

# 6-6 IMPLEMENTATION

The means by which any development scheme will be accomplished shares equal importance with the plan itself. Because of current national priorities, development and renovation potentials are more restricted than they were in the past and there is considerably greater emphasis on provision of recreation opportunities solely by local interests. At the same time, recreation visitation to projects like Crooked Creek Lake seems no longer to be increasing annually at a frenetic pace as occurred in the 1960's and 1970's. Although somewhat stabilized, the trend of annual visitation is still a rising one. Nevertheless, a need for the proposals contained in this Master Plan is extant and is expected to become greater as time passes.

It should also be recognized that the current national priorities may not retain their current importance over the useful life of this Master Plan. Problems that are presently perceived as serious may be partially or even wholly solved in the future or new, more serious problems may arise. Changed priorities could drastically affect the manner and speed of implementation. The aim of this Master Plan, however, is to have continued utility despite changes in the implementability of its proposals.

There are five basic implementation methods currently available for development of Crooked Creek Lake. They are cost sharing, development solely by local interests under an outgrant, use of special recreation user fee (SRUF) revenues, use of regular O&M, General funds, and development by concessionaire.

Funding for cost sharing may well be more difficult to secure than in the past. In addition to providing at least 50 percent of the development costs of a proposal up front, the cooperating local governmental entity must also agree to operate, maintain, and provide major replacements for the new development.

As in the past, local governmental entities with all or part of a project in their jurisdiction may obtain use, under a lease or license, of an area at the project and in their jurisdiction for approved recreational development. In such cases, all development costs are the sole responsibility of the local sponsor and operation, maintenance, and major replacements costs must be borne by them, too.

Special recreation user fee (SRUF) revenues which are rebated to the District will be available to accomplish a fairly wide variety of actions at Crooked Creek Lake. Essentially, these funds may be used to decrease project operation and maintenance costs and/or to increase user fee revenues, but only in existing recreation areas. Means of achieving these goals may generally include renovation, consolidation, separation of day-use and overnight areas, addition of facilities or features thereof, and payment of operation and maintenance costs including those for fee collection and other improvements on a case by case basis. According to October 1984 guidance on the use of SRUF funds, they may also be applied to the provision of barrier-free access for the handicapped. Under this implementation method, operation, maintenance, and major replacement responsibilities would remain with the Corps of Engineers or, with changed local conditions, could conceivably be assumed by an outgrantee.

Another development method is the use of regular 0&M, General funds. This method would be restricted to use where facilities are in need of total renovation, reconstruction, or replacement and the necessary work, even if involving a change in facilities or upgrading, could be accomplished at the same or less development and operation and maintenance cost than replacement or rebuilding of the original facilities.

The last potential development method that could be utilized at Crooked Creek Lake would involve implementation of some of the plans proposed in this Master Plan by a concessionaire. Although this method can have the added benefit to the Government of providing income at little cost, only activities for which there is a viable commercial market are susceptible to

concessionaire interest. For developments that are undertaken in this manner, operation, maintenance, and major replacements are also provided by the concessionaire.

TABLE 6-1 below shows, for each recreation area, which of the five implementation methods could apply to its future development. This matrix is not necessarily exhaustive and is subject to change in the future as new legislative mandates or policies take effect.

TABLE 6-1 CROOKED CREEK LAKE, PA.
FUTURE DEVELOPMENT IMPLEMENTATION METHODS

	Implementation Methods					
Area/Facilities	l. Cost Sharing	2.  Development by Local Interests	3. Special Recreation User Fee (SRUF) Revenues	4. Regular O&M, General Funds	5.  Development by Concessionaire	Remarks
Main Access Road	X	X	x	x <u>1</u> /		Method 3 could be applied on the basis of separation of day-use and overnight facilities in support of day-use area consolidation.
Main Day-Use Area	Х	x	x	x <u>1</u> /		Method 3 could be applied to picnic shelters which would increase user fee revenues and to some parking areas to provide for one-way access.  Method 4 could apply to some or all roads and parking areas.
Campground	X	X	x	х <u>1</u> /	х	Method 3 could be applied on the basis of increased revenues and higher use fee classification.
						Method 4 could apply to new entrance road and patking area for walk-in campsites.
Beach	X	X		x <u>2</u> /	x	
Boat Launch Day-Use Area	x	<b>x</b>	<b>x</b>	х <u>1</u> /		Method 3 could be applied to picnic shelters which would increase user fee revenues and possibly to access road and parking area hard surfacing and one-way circulation. Method 4 could apply to access road and parking area.
Group Campground	x	х	X .	xĹ/	X	Method 3 could be used for the access road fill if it is to act as a siltation pond dam since O&M costs would be decreased. Method 4 could then be applied to the access road.
Manor Recreation Are	a	х			x	
Meyer's Field Small Boat Access Area	X	х				
Mouth of Cherry Run Fishing Access Area	Х	x				
Rearick's Fording Ca and Raft Access Area		X				

 $<sup>\</sup>frac{1}{2}$ / Method 4 could be applied only if existing facilities are in need of total renovation, reconstruction, or replacement. Method 4 could be applied only to improve safety.

#### SECTION 7 - COST ESTIMATES

## 7-1 DEVELOPMENT COSTS

The costs shown in TABLES I, II, and III attached to this updated Master Plan are based on prices as of April 1987. TABLE I is a summary of both initial and future development costs for Crooked Creek Lake.

For the Beach and the Boat Launching Area, the Main Day-Use Area, and the Campground, TABLE II shows the costs associated with replacement and reconstruction, respectively, of existing recreation facilities in the first two named areas initially. The last two named areas would have the facilities for which costs are shown in TABLE III developed with SRUF funds. The \$1,116,000 total cost is for the major remaining initial developments, implementation of which appears fairly certain.

TABLE III gives the current costs for development of new recreation areas and facilities at some unspecified time in the future. These costs are estimated to amount to a total of \$3,440,000 spread over nine areas or facilities.

#### 7-2 OPERATION AND MAINTENANCE COSTS

For an indication of project and recreation annual operation and maintenance costs, records from 1982 (when the Corps of Engineers assumed responsibility for the former state park) through 1984 for Crooked Creek Lake were examined. Records for 1985 and 1986 are available, but were not considered representative of a typical year since considerable amounts of sanitary funds (R-18) are included in the figures.

In the future, the average figures for operation and maintenance escalated to account for inflation, but disregarding unforeseen situations, should give a fairly reliable idea of the costs to be anticipated. Future developments accomplished with O&M funds would, of course, be in addition to such expected O&M costs.

From 1982 through 1984, overall project operation and maintenance costs averaged approximately \$1,210,000 annually. For recreational operation (Features 05 and 06) and maintenance (Feature 29), costs have averaged about \$400,000 for the same period. Both overall project and recreational 0&M costs decreased over the three-year period examined. This probably occurred at least partly because badly needed remedial work and measures were carried out as soon as possible after turnback of the state park, and the need for such expenditures decreased over time.

#### SECTION 8 - PROJECT RESOURCE MANAGEMENT PLAN

#### 8-1 GENERAL

Recent policy (ER 1130-2-400) prescribes that management plans for each Corps project are to be set forth in an Operational Management Plan. The project Master Plan is intended to present the basic principles and policies to be used as guides in the preparation of the Operational Management Plan. Formerly, project management plans were contained in five or six (depending upon whether a Lakeshore Management Plan is required) appendices to the Master Plan. Four of the five management plans required for Crooked Creek Lake were prepared and approved in the form of the single volume Appendices B and D, Forest, Fish and Wildlife Management Plan; Appendix C, Fire Protection Plan; and Appendix E, Safety Plan. Except for some very general descriptions of their contents, these appendices will not be repeated here, since they should be readily available separately. Rather, this Master Plan's recommendation is that the management plans contained in the appendices should generally be transferred with the modifications recommended below and such other changes as may be found to be justified or necessary to the appropriate part of the Operational Management Plan.

#### 8-2 PROJECT RESOURCE MANAGEMENT

The project Resource Management Plan for Crooked Creek Lake is the one Master Plan appendix that was not completed. All of the basic and factual information required to discuss this subject in the forthcoming Operational Management Plan is available at the project or in this Master Plan. It is recommended that the resource management plans presented in the Operational Management Plan essentially reflect the operational and maintenance actions as they are currently practiced at the project. Guidance relating to several resource management subjects that are to be addressed in the Operational Management Plan is listed below.

- a. The actual operational range of minimum pool elevations has been raised one foot during the recreation season. Previously, the nominal minimum pool elevation of 840 NGVD was operated between elevations 840 and 845 NGVD. This range has been modified so that the minimum pool is now operated between elevations 841 and 846 NGVD. This change was instituted to optimize the usefulness of the beach.
- b. It is anticipated that the present land ownership by the Federal Government for the project will be adequate for its remaining economic life. Any disposal of a significant amount of land would invalidate this guideline.

- c. It is anticipated that, with development of the future facilities recommended herein, adequate recreation opportunities for the remaining economic life of the project will be available at the project. However, significantly changed conditions in the project's market area such as an unexpected influx of population could increase recreation demands placed on the project.
- d. The Operational Management Plan should determine exactly what level of personnel is optimum and what minimum level can continue to operate and maintain the project. Potential future actions such as operation of the camping area by concessionaire should also be considered in these estimates.
- e. The visitor center structure in the Spillway Day-Use Area has been completed for several years, but no displays have been installed. A prospectus for treatment of the visitor center's interior has been completed and reviewed within the District. The Operational Management Plan should set forth plans for completion of the visitor center displays.
- f. Three vault rest rooms at the project are located below full pool, elevation 920.0 NGVD. One is the new structure at the Boat Launch Day-Use Area, the finished floor elevation of which is 894.0 NGVD. The floor elevation of the two existing rest rooms at the Beach is approximately 869.0 NGVD, and it is reasonable to expect that the new vault-type facility that is to replace them will have a similar finished floor elevation. Permits for these sanitary facilities have been and are expected to be issued on the basis that their vaults will be emptied when it can be reasonably anticipated that the reservoir pool elevation will exceed the rest rooms' floor elevations. The Operational Management Plan should indicate these elevations (including the actual finished floor elevations of the new bathhouse when it becomes available) and the requirement for pumping out the vaults' contents.
- g. A fee schedule including both a reservation fee of \$25.00 and user fees ranging from \$1.00 to \$4.00 per person per night depending on group size was recently instituted for the Environmental Learning Center. This schedule should be reviewed periodically and updated when required.

## 8-3 FORESTS

Forest management for Crooked Creek Lake is prescribed in the Forest, Fish and Wildlife Management Plan, Appendices B and D to the Master Plan. Essentially, the forestry portion of this plan recognizes ecological succession and limits management to a "hands off" policy where succession to equilibrium or a climax community is desired, reforestation designed to hasten succession toward the site's natural climax or a desired substitute community, monitoring possible sources of degradation, and attempting to

guide human behavior. While these management techniques and the goals they are intended to achieve are commendable, Public Law 86-717 also requires the Corps, at its projects, to "...assure fully adequate and dependable future resources of readily available timber." In the preparation of the Forest, Fish and Wildlife Management Plan, this part of the policy seems to have been underemphasized. Forest management appears to be related primarily to wildlife management while the value of the timber resource itself is largely ignored. During preparation of the Operational Management Plan, accepted forest management techniques aimed at sustaining or increasing the value of the project's timber resources should be considered and included, as appropriate, for the wooded vegetative communities discussed in the Forest, Fish and Wildlife Management Plan.

#### 8-4 FISH AND WILDLIFE

The fish and wildlife management plans for Crooked Creek Lake are contained in the Forest, Fish and Wildlife Management Plan, Appendices B and D to the Master Plan which was approved in 1977. This plan does not address current management responsibilities and Corps policy which governs implementation of the plan.

Although the Corps has the authority to manage its lands under PL 86-717, the responsibility of the state to manage its fish and wildlife resources in accordance with state law is also recognized. At Crooked Creek Lake, the Pennsylvania Fish Commission has assumed management responsibility for the fishery under license with the Department of the Army. The Pennsylvania Game Commission, however, has declined the offer to manage the project's wildlife resources, leaving primary responsibility with the Corps. After the state turnback of the project in 1981, Corps personnel initiated wildlife management activities following the guidelines in the Forest, Fish and Wildlife Management Plan.

The guidelines in the Forest, Fish and Wildlife Management Plan do not make a distinction between enhancement and management of the resource. The Congressional authorities for management and enhancement, however, are distinct, although their translation to Corps policy is made much less so by the lack of a clear definition for each activity. Fish and wildlife enchancement roughly corresponds to improvement and expansion of available resources including construction of facilities or modification of the resource. The use of the term "enhancement" in the Forest, Fish and Wildlife Management Plan does not necessarily correspond to this definition. Management, on the other hand, roughly corresponds to proper maintenance of the resources to perpetuate the existing habitat values.

Corps management (not enhancement) of fish and wildlife resources at Crooked Creek Lake is clearly authorized under PL 86-717, subject to the availability of funds. Enhancement is separately authorized through the

administrative application of PL 89-72's cost-sharing principles to completed projects. However, all current law and policy encourages non-Federal entities to accomplish enhancement entirely on their own under a lease requiring that they also operate, maintain, and replace the facilities. The activities given in the Forest, Fish and Wildlife Management Plan, therefore, must be applied in light of Corps policy.

At Crooked Creek Lake, much of the game management compartment habitat consists of old field, thicket, and young forest which was farmland prior to Federal acquisition. Under PL 86-717, the Corps could use funds to periodically mow or clear these areas to maintain these early successional stages if that is the objective, or these areas could be permitted to mature toward a climax forest stage. Both could be considered to be proper management of the resource. Enhancement would include constructing waterfowl impoundments, nesting boxes, or facilities such as observation platforms, as these would provide habitat or facilities which do not naturally occur at the project. Federal funds should not be spent to construct enhancement facilities without a non-Federal governmental sponsor who will agree to help develop, operate, maintain, and replace them. Any proposed cost-sharing agreement would be subject to approval by higher authority.

With the following modifications, the Forest, Fish and Wildlife Mangement Plan should be adopted for use in the Operational Management Plan.

- a. The Forest, Fish and Wildlife Management Plan does not recognize all of the project's perpetual flowage easements. Using this Master Plan as a guide, appropriate corrections should be made in the Operational Management Plan.
- b. The recommendation of the Forest, Fish and Wildlife Management Plan that a summer recreation pool be established at elevation 860.0 NGVD (19 feet above the current nominal minimum pool) should not, in accordance with the findings of this Master Plan, be perpetuated in the Operational Management Plan.
- c. Project water quality should continue to be monitored with a view particularly to identifying changes that may yet occur as a result of degradation of inflow from upstream of the project. Significant changes could seriously affect both the project's fisheries as well as the recreation opportunities it offers. Water quality near inflows of pollutants originating from project lands should also be monitored to determine their relative importance, whether abatement actions should be taken and, if so, those actions that would be appropriate.
- d. Work in all but three of the wildlife management compartments recommended in the Forest, Fish and Wildlife Management Plan has been initiated (all compartments are shown on Plate 10). Compartments 10 and 14

have woodcock habitat improvement possibilities and Compartment 13 is one of only three areas at the project that have pheasant and bob-white habitat improvement potential. As funding permits, management efforts should be extended to these three compartments. Unless reasons to the contrary are extant, the three compartments should have management actions initiated prior to intensification of efforts in other compartments.

e. Prior to the development of a subimpoundment in the Robb's Bridge Flat area through cost sharing with a non-Federal governmental entity or through a totally non-Federal effort, cultural resources in the area must be fully investigated with any required actions completed and thorough coordination in accordance with law and policy must be completed.

## 8-5 FIRE PROTECTION

The 1978 Fire Protection Plan, Appendix C to the Master Plan, is generally adequate, and, after updating, its contents should be transferred to the Operational Management Plan. Two potentially important changes have occurred since the Fire Protection Plan was prepared.

First, Burrell Township formed a fire department a few years ago. Most of the Crooked Creek Lake project, though undeveloped, is located in the township. The Operational Management Plan should recognize this addition to the project's fire protection potential.

Second, provisions have been made for the addition of three fire hydrants at the project. These are byproducts of the new availability of municipal water. One hydrant protects the Environmental Learning Center and the one-story Government dwelling, one protects the new administration building and maintenance complex, and one protects the visitor center, the Spillway Day-Use Area rest room and picnic shelters, and the two two-story Government dwellings. The availability of these hydrants should be recognized together with their fire protection ramifications in the Operational Management Plan.

# 8-6 SAFETY

In 1977 a Safety Plan, Appendix E to the Master Plan, was prepared for Crooked Creek Lake. While this plan will be generally satisfactory, with updating, for transferral to the Operational Management Plan, there are some situations that have come to light since its preparation that should be recognized and discussed in the Operational Management Plan.

The previous use of crevices and irregularities in the cliffs below the dam on the right bank of Crooked Creek for access by fishermen has been largely ameliorated by the provision of additional wing railing on the outlet works end wall and alternative, safer access facilities.

Nevertheless, the cliff area can still easily be reached from downstream. The Operational Management Plan should provide for monitoring the accessibility of this potentially hazardous area. Fencing has been installed at the top of the cliffs to eliminate the danger of falling.

The Baker Trail apparently was established at the project only by informal agreement between the American Youth Hostels (AYH) organization and the Government. While this Master Plan was being updated, permission from AYH to rebuild a two-cable (one above the other) bridge across Cherry Run was requested. The old bridge was destroyed when the tree to which the cables were anchored fell, forcing hikers to use a detour several miles long to cross Cherry Run. Like the old one, the rebuilt bridge would be crossed by placing the feet on one cable and the hands on the other. While the new bridge would be able to be crossed safely using the proper techniques and precautions, not all users can be expected to be familiar with these. In addition, there is the possibility that some users may play on the bridge in a hazardous manner for entertainment.

Before permission to rebuild the bridge is granted, a formal outgrant agreement for the Baker Trail should be executed by the AYH so that they will assume the liability risk for the bridge. In addition, interpretive devices clearly showing who should not use the bridge and, for those for which it is suitable, the proper and safe way to cross the bridge should be provided at both of its ends.

# SECTION 9 - CONCLUSIONS AND RECOMMENDATIONS

## 9-1 CONCLUSIONS

Based on analysis of the factors considered in this updated Master Plan, it is concluded that Crooked Creek Lake is a viable project that currently satisfies critical needs in the western Pennsylvania region. It is, additionally, imperative that it continue to do so, although not at a significantly increased scale.

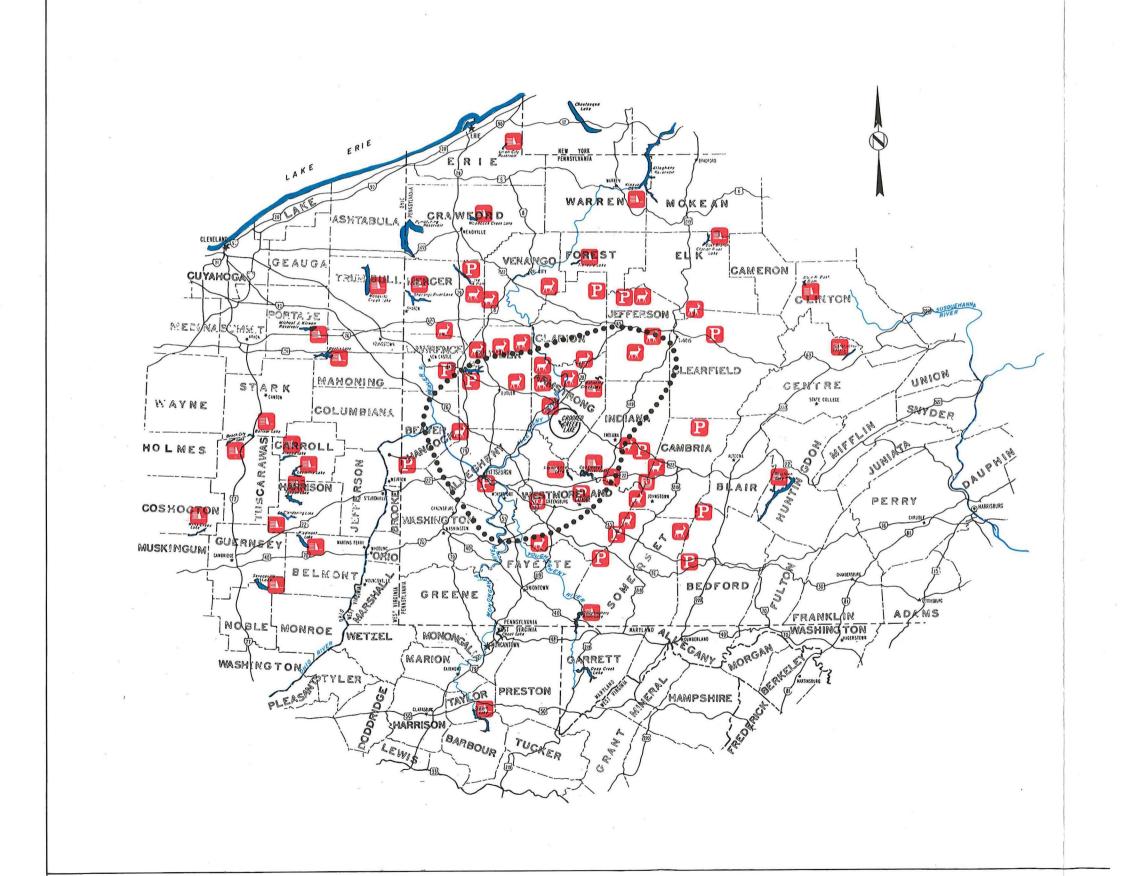
Further conclusions are that a larger summer recreation pool at the project is impractical and that development of the project's admittedly insubstantial hydropower potential would have little effect on its capacity to serve the general public. Finally, it is concluded that the currently undeveloped parts of the project should be developed lightly or not at all, but that, at the same time, every possible effort should be made to improve the existing recreation areas and facilities in accordance with the plans presented herein.

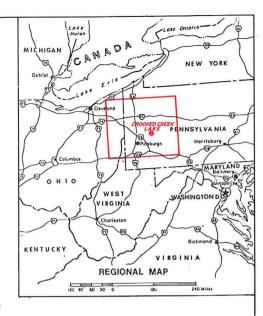
#### 9-2 RECOMMENDATIONS

It is recommended that this Master Plan be approved as the overall guide for development and management of Crooked Creek Lake and as the authorization vehicle for the various plans presented herein.

> RICHARD A. ROTHBLUM Colonel, CE

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# LEGEND



Corps Reservoir

P State Park

Public Hunting Area

State Natural Area or Historic Park

# CROOKED CREEK LAKE ALLEGHENY RIVER BASIN, PENNSYLVANIA

ALLEGHENY RIVER BASIN, PENNSYLVANIA MASTER PLAN

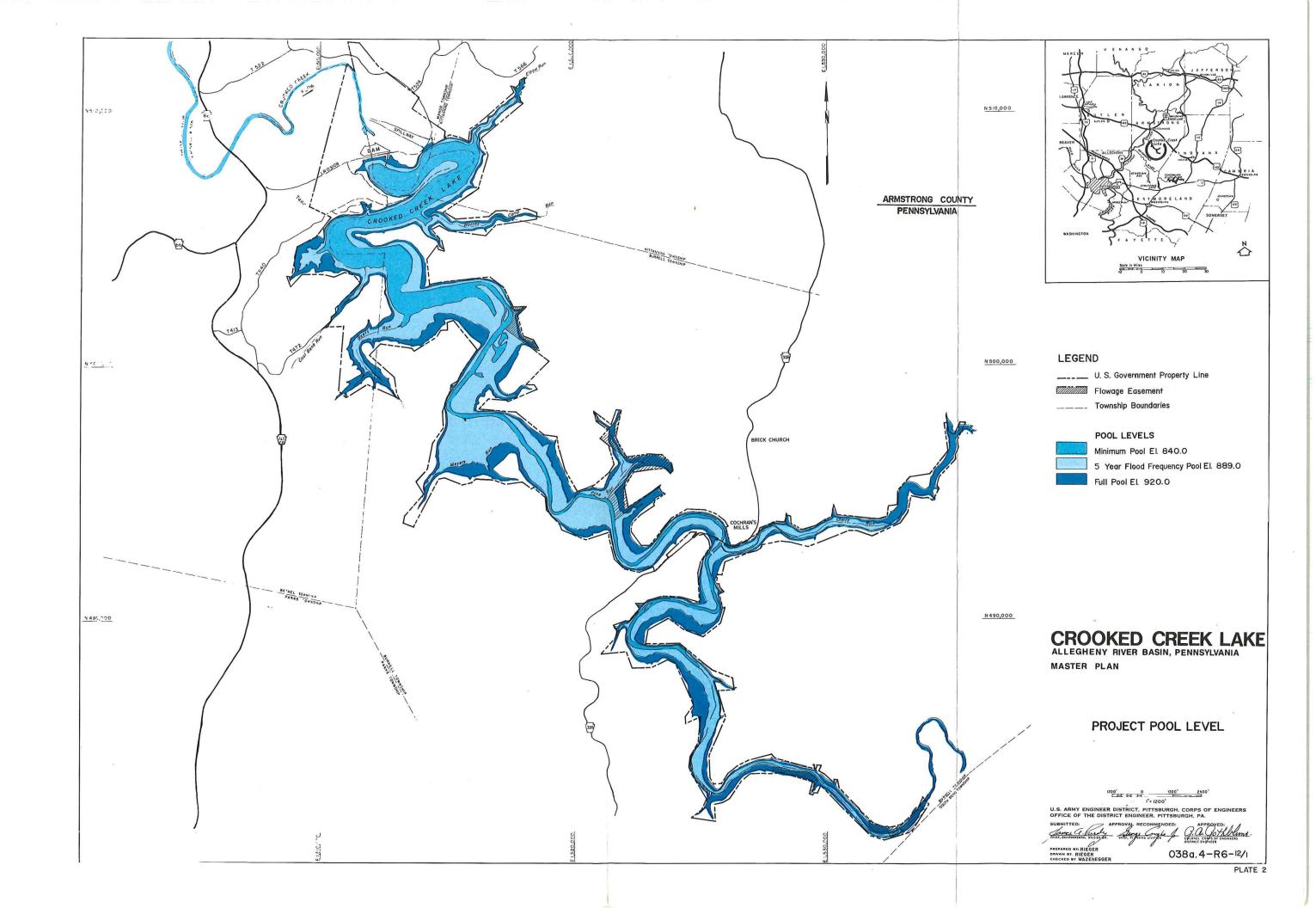
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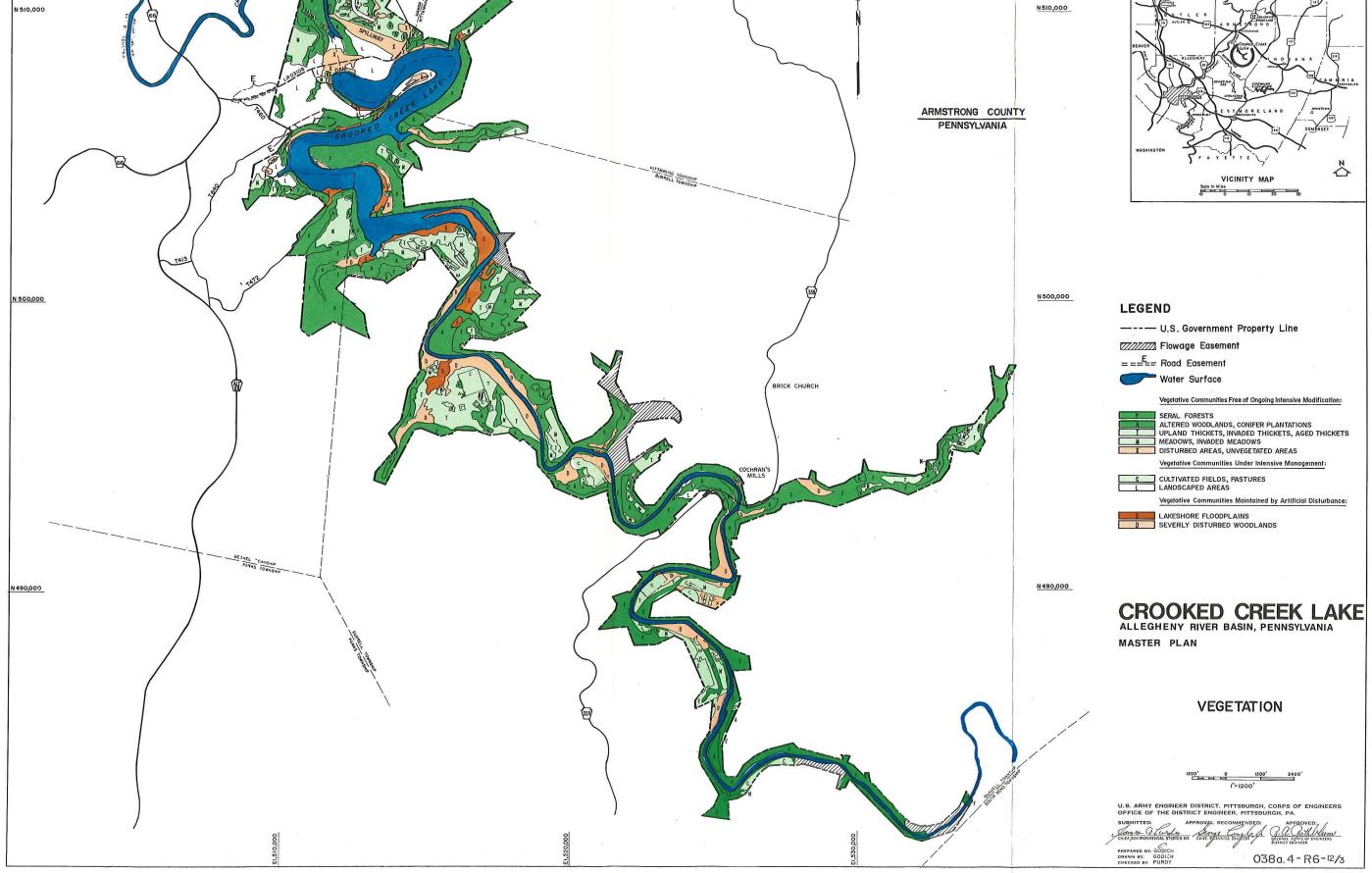
SCALE IN MILES

U.S. ARMY ENGINEER DISTRICT. PITTSBURGH. CORPS OF ENGINEER:
OFFICE OF THE DISTRICT ENGINEER, PITTSBURGH. PA.
SUBMITTED: APPROVAL RECOMMENDED: APPROVED.

PREPARED BY: GODICH
DRAWN BY: GODICH
CHECKED BY WAZENEGGER

038a.4-R6-3/1

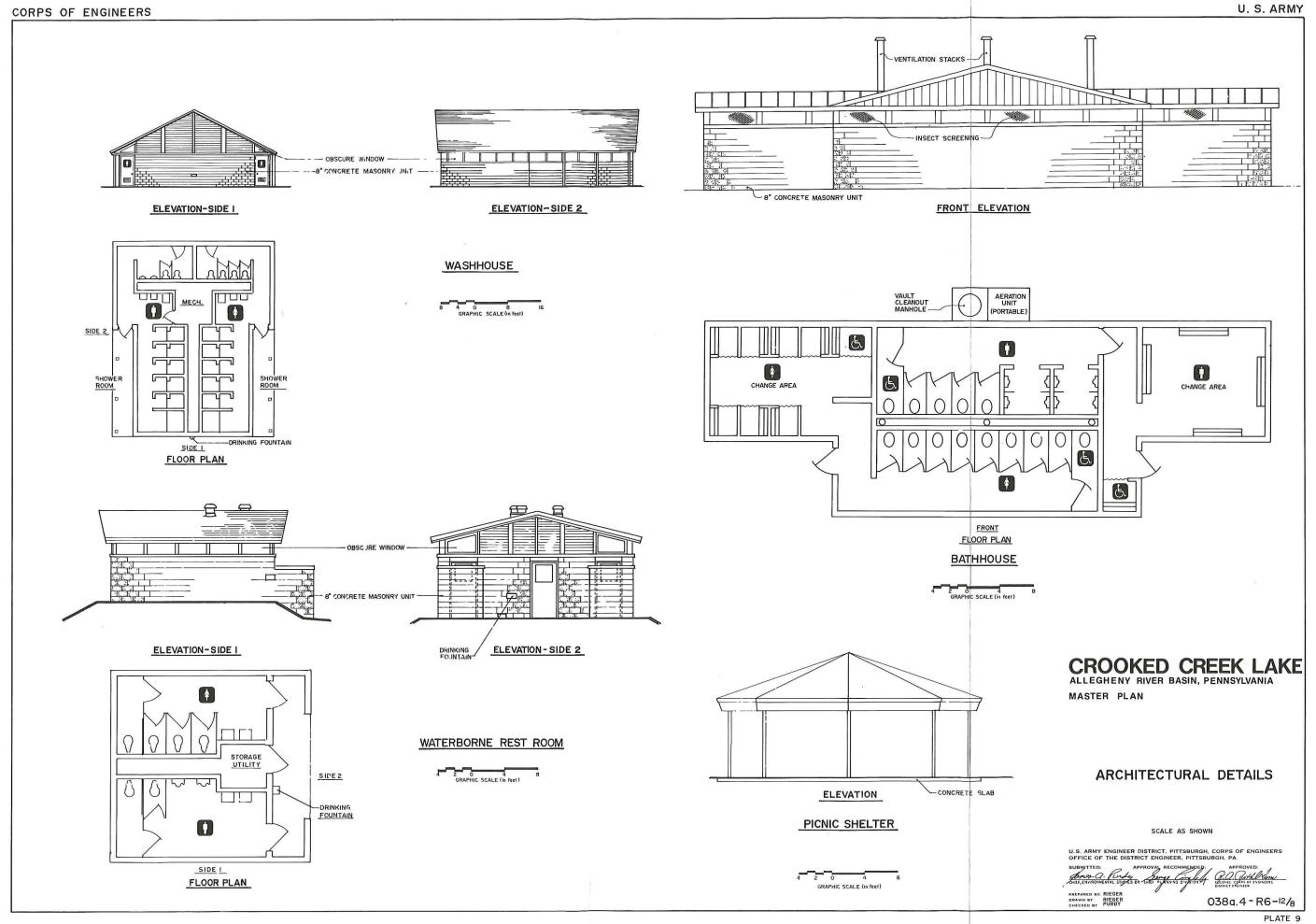


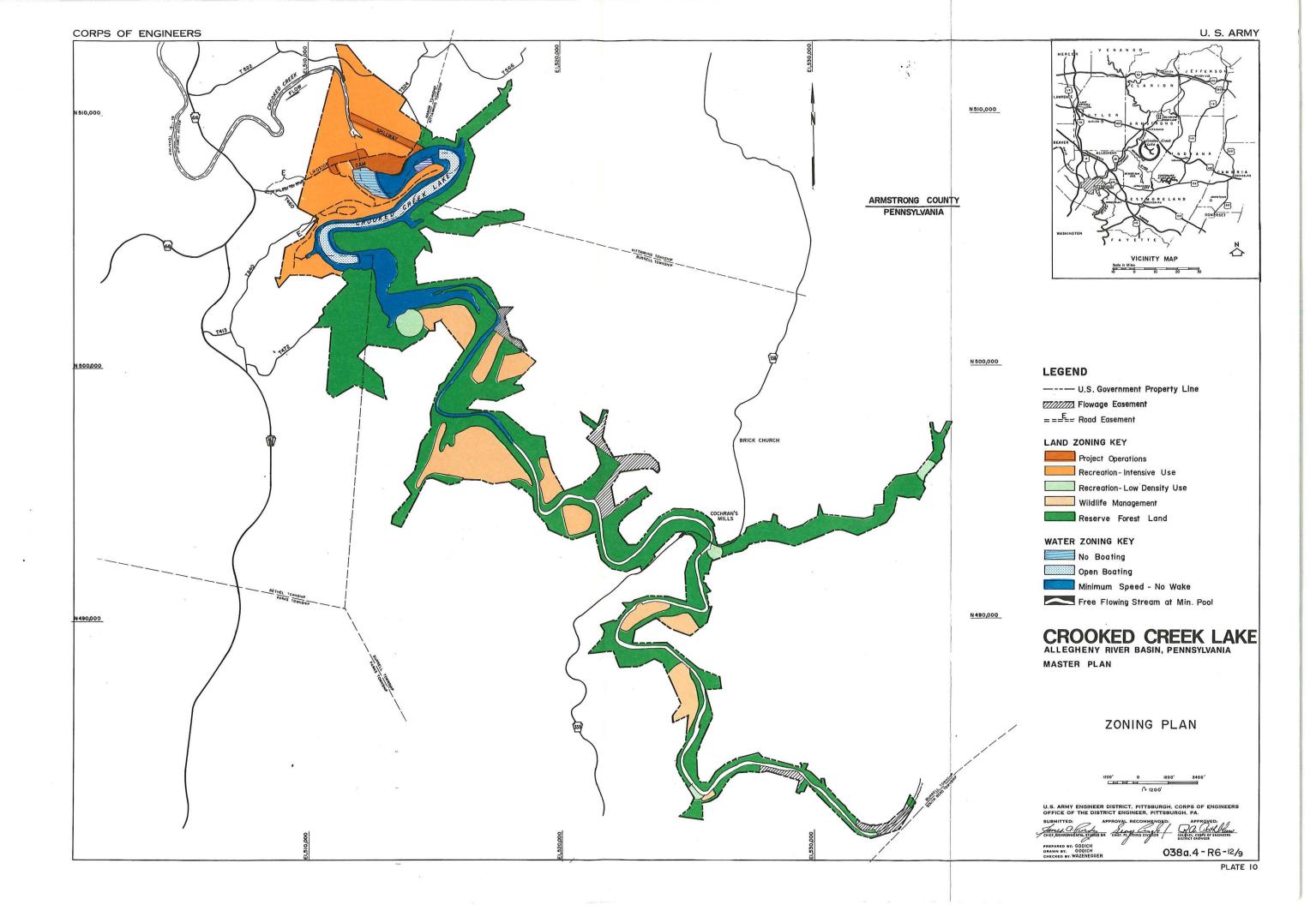


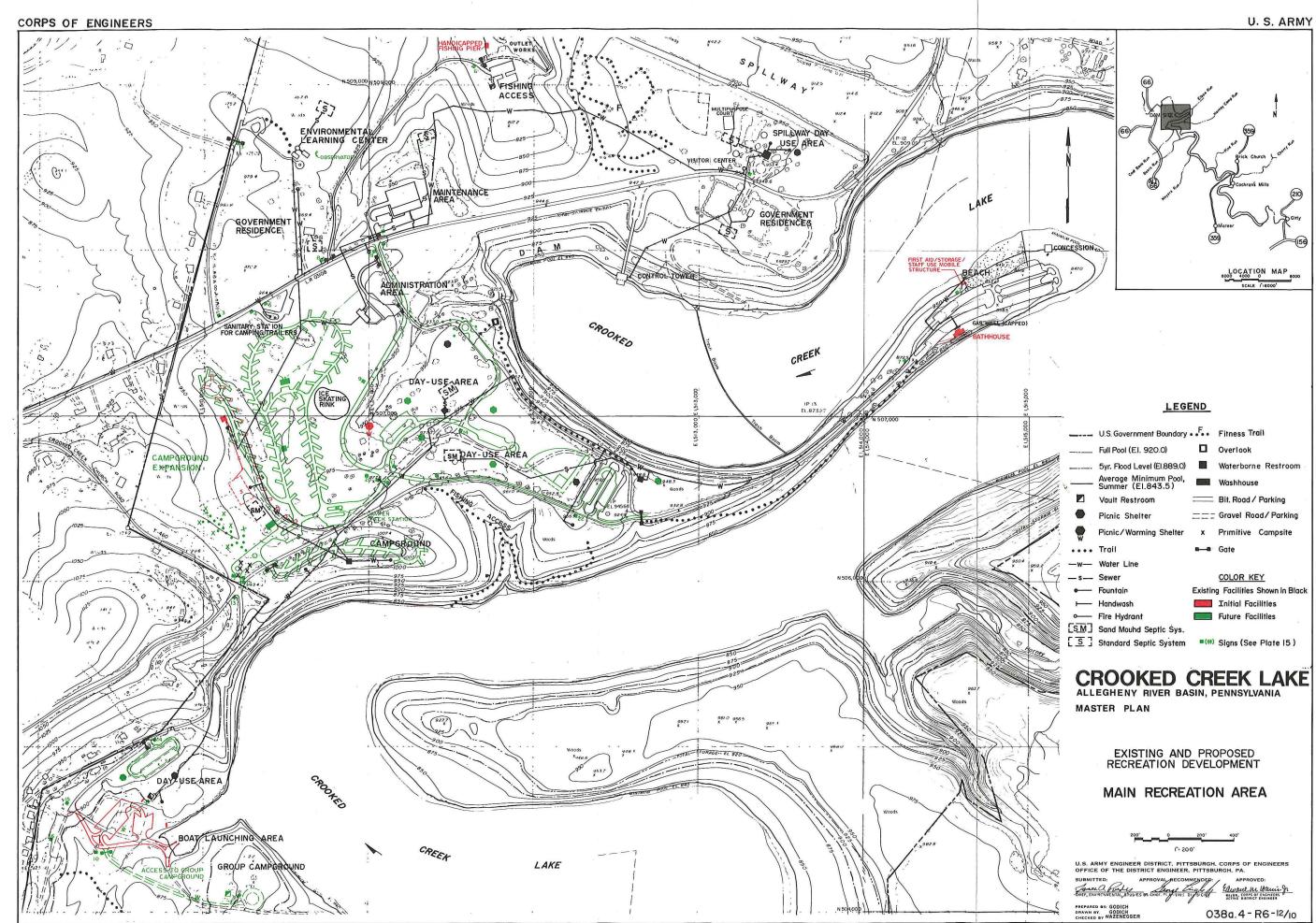
CORPS OF ENGINEERS

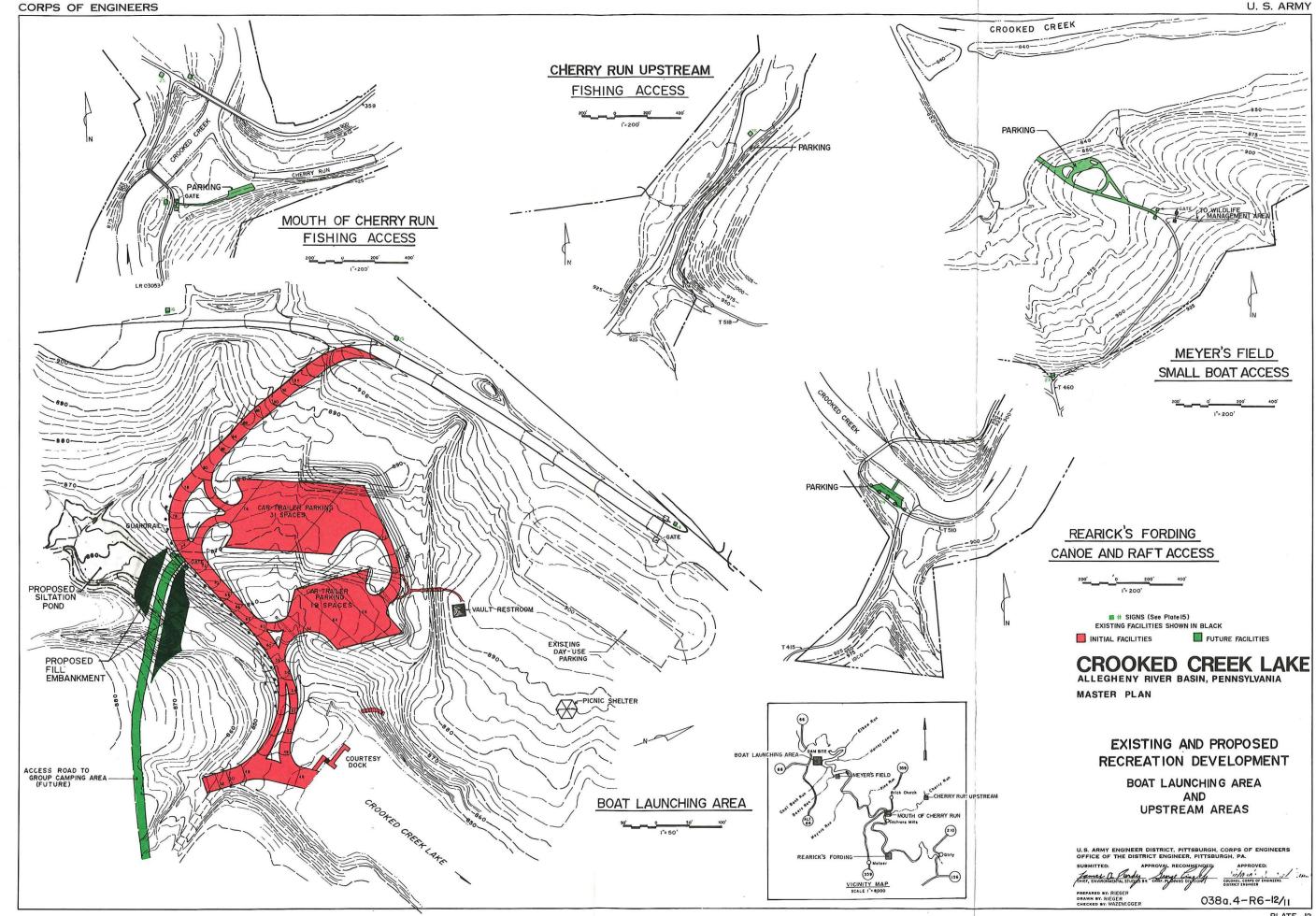
PLATE 6

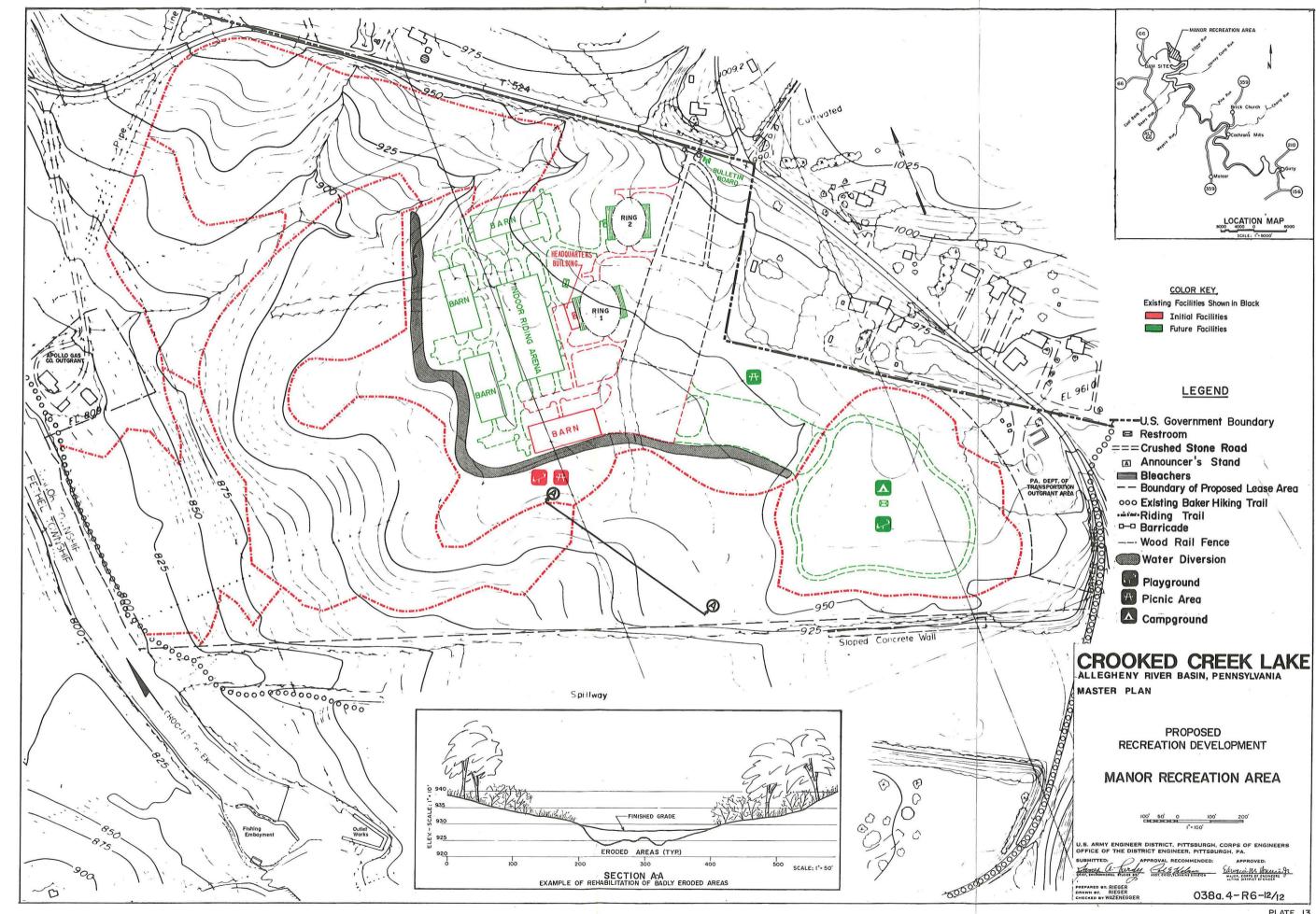
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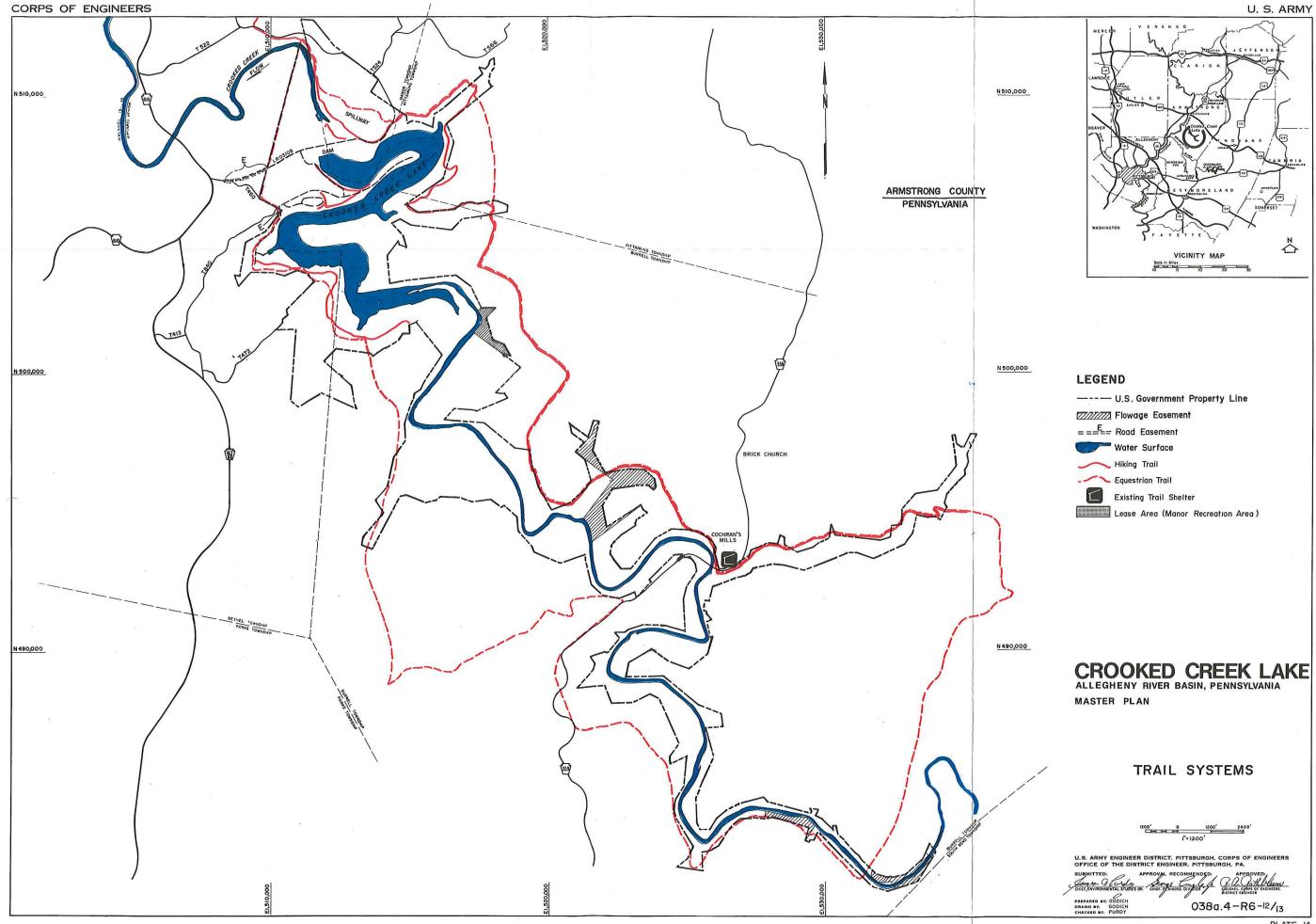


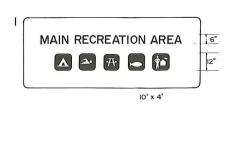


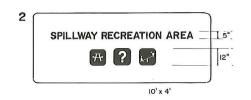














MEYER'S FIELD

8'-0" x 4'-0"

REARICK'S FORDING 15"

6'-6" x 4'-0"

CHERRY RUN 

6'-6" x 4'- 10"

6'-6" x 4'-10"

CHERRY RUN 15\* UPSTREAM 15"

D

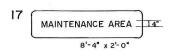
BOAT LAUNCH 15"

8'-0" x 4'-10"





\* \*\*









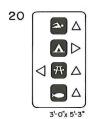




















 $\left[ \begin{array}{c} \Lambda \\ \Lambda \Lambda \end{array} \right]$ 









- I TWO ARROWS INDICATE THAT DIRECTION(S) DESIGNATED BY SIGN OR SIDE OF SIGN VARIES. SOME SIGNS WITH ARROWS SHOWN HERE WILL BE CONSTRUCTED WITHOUT THE ARROWS, AS APPROPRIATE.
- 2 SIGN LOCATIONS ARE SHOWN AS FOLLOWS:
- SIGNS I-22 SEE PLATE II (Existing and Proposed Recreation Development, Main Recreation Area).
- SIGNS 23-27 SEE PLATE I2 (Existing and Proposed Recreation Development, Boat Launching Area and Upstream Areas).
- SIGNS 23-27 SEE PLATE 7 (Access).
- 3 SUPPORTS AND MATERIALS SHALL BE CONSISTENT THROUGHOUT THE PROJECT AND SHALL COMPLY WITH ORDP 1130-2-4; OHIO RIVER DIVISION SIGN HANDBOOK (October 1978).

#### CROOKED CREEK LAKE ALLEGHENY RIVER BASIN, PENNSYLVANIA MASTER PLAN

SIGN PLAN

NO SCALE

038a.4-R6-12/14

#### TABLE I COST ESTIMATE CROOKED CREEK LAKE, PA SUMMARY (April 1987 Cost Level)

Category/Area	Construction Cost	Engineering and Design, 10%	Supervision and Admin., 10%	Total
Initial Recreation Facili		tation and Re	construction	
(Construction Costs fi	com Table 11)		4	
Beach	\$ 219,000	\$ 36,000*	\$ 21,900	\$ 277,000
Boat Launching Area	428,000	42,800	42,800	514,000
Main Day-Use Area	40,000	4,000	4,000	48,000
Campground	231,000	23,100	23,100	277,000
TOTAL	\$ 918,000	\$ 105,900	\$ 91,800	\$1,116,000
Future Development of Rec				
(Construction Costs f	om Table III)			
Main Access Road	\$ 192,000	\$ 19,200	\$ 19,200	\$ 230,000
Main Day-Use Area	571,000	57,100	57,100	685,000
Campground	1,550,000	155,000	155,000	1,860,000
Beach	8,000	800	800	10,000
Boat Launch Day-				
Use Area	126,000	12,600	12,600	151,000
Group Campground	285,000	28,500	28,500	342,000
Meyer's Field Small				
Boat Access Area	82,000	8,200	8,200	98,000
Mouth of Cherry Run				
Fishing Access				
Area	35,000	3,500	3,500	42,000
Rearick's Fording				
Canoe and Raft				
Access Area	18,000	1,800	1,800	22,000
TOTAL	\$2,867,000	\$ 286,700	\$ 286,700	\$3,440,000

<sup>\*</sup>Estimate of Actual E&D Cost.

## TABLE II COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED INITIAL DEVELOPMENT (April 1987 Cost Level)

ITEM	QUAN'	TITY	UNI	UNIT PRICE		TOTAL	
BEACH							
Bathhouse, Vault		L.S.		•	\$	120,000	
Mobile Emergency Medical Sta	tion	L.S.	•	-	,	34,000	
Electric Power		L.S.				20,000	
Seeding	•04	Ac.	\$	5,500		200	
Signs and Markers		L.S.	•	_		500	
Site Improvements		L.S.		_		500	
Subtotal					\$	175,200	
Contingencies (25%)						43,800	
TOTAL					\$	219,000	
BOAT LAUNCHING AREA							
Remove Existing Ramp		L.S.		-	\$	6,000	
Cut	8,000	CY	\$	10		80,000	
Grade Spoil	1,300	CY		3		3,900	
Inlets	4	Ea.		1,400		5,600	
15" CMP	150	LF		27		4,100	
36" CMP	25	LF		44		1,100	
Headwall	1	Ea•		900		900	
Erosion Control		L.S.		. <b>–</b>		1,000	
Road, 18', Bituminous	2,600	SY		20		52,000	
Car-Trailer Parking Area,	•					,	
Bituminous	4,000	SY		22		88,000	
Salvage Gravel Parking	4,500			1		4,500	
Turnaround, Bituminous	300			20		6,000	
2-Lane Launching Ramp,						•	
Concrete		L.S.		_		28,000	
Courtesy Dock		L.S.		_		5,000	
Stone Protection		L.S.				1,000	
Wooden Steps, 6' Wide	2	Ea.		2,000		4,000	
Signs and Markers		L.S.		-		3,500	
Guardrail	350	LF		11		3,900	
Seeding		Ac.		5,500		22,000	
Site Improvement		L.S.		· <del>-</del>		22,000	
Subtotal					\$	342,500	
Contingencies (25%)						85,600	
TOTAL (Rounded)					\$	428,000	

## TABLE II (cont) COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED INITIAL DEVELOPMENT (April 1987 Cost Level)

ITEM	QUAN'	TITY	UN	IT PRICE		TOTAL
MAIN DAY-USE AREA Picnic Shelter	1	Ea.	\$	32,000	\$	32,000
Subtotal Contingencies (25%)					\$ —	32,000 8,000
TOTAL					\$	40,000
CAMPGROUND Campsite, Crushed Stone Spur Rest Room, Waterborne Standard Septic Field Gravity Sewer Line Manhole Site Improvement	17 1 400 2	Ea. Ea. L.S. LF Ea. L.S.	\$	1,100 80,000 - 16 2,400	\$	18,700 80,000 70,000 6,400 4,800 5,000
Subtotal Contingencies (25%)					\$	184,900 46,200
TOTAL (Rounded)					\$	231,000

## TABLE III COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED FUTURE DEVELOPMENT (April 1987 Cost Level)

ITEM	QUAN	TITY	UN	IT PRICE		TOTAL
MAIN ACCESS ROAD						
Road, 20', Bituminous	0.32	Mi.	\$	235,000	\$	75,200
Road, 18', Bituminous	0.06		ī	210,000	1	12,600
Road, 18', Bituminous,				,		,
Reconstructed	0.27	Mi.		189,000		51,000
Road and Pavement Removal	0.15			35,600		5,300
Car Parking Area, Bituminous	7	Spaces		600		4,200
Signs and Markers		L.S.		-		500
Site Improvement		L.S.		- '		5,000
Subtotal					\$	153,800
Contingencies (25%)					,	38,500
TOTAL (Rounded)					\$	192,000
MAIN DAY-USE AREA						
Road, 18', Bituminous	0.26	Mi.	\$	210,000	\$	54,600
Road, 18', Bituminous,		•	•	,		.,,
Reconstructed	0.02	Mi.		189,000		3,800
Road, 12', Bituminous	0.08	Mi.		160,000		12,800
Car Parking Area, Bituminous		Spaces		600		38,400
Car Parking Area, Bituminous,		•				•
Reconstructed	90	Spaces		540		48,600
Road and Pavement Removal	0.70	-		35,600		24,900
Picnic Shelter	5	Ea.		32,000		160,000
Picnic Site	154	Ea.		200		30,800
Playground Equipment		L.S.				4,500
Ballfield Relocation		L.S.		_		13,000
Trails	0.80	Mi.		22,000		17,600
Electric Power		L.S.				8,500
Signs and Markers		L.S.		-		2,000
Site Improvement		L.S.		-		37,000
Subtotal					\$	456,500
Contingencies (25%)						114,100
TOTAL (Rounded)					\$	571,000

## TABLE III (cont) COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED FUTURE DEVELOPMENT (April 1987 Cost Level)

ITEM	QUANTIT	ry u	NIT PRICE	TOTAL
CAMPGROUND				
Road, 20', Bituminous	0.07 Mi	i. \$	235,000	\$ 16,500
Road, 18', Bituminous	0.55 Mi	•	210,000	115,500
Road, 12', Bituminous	0.96 Mi		160,000	153,600
Road and Pavement Removal	0.61 Mi		35,600	21,700
Car Parking Area, Bituminous	52 Sp		600	31,200
Campsite, Crushed Stone Spur	67 Ea		1,100	73,700
Campsite, Crushed Stone Spur,			-,-00	, , , , , ,
Reconstructed	38 Ea	1.	500	19,000
Campsite, Walk-in	7 Ea		800	5,600
Rest Room, Waterborne	l Ea		80,000	80,000
Washhouse	2 Ea		165,000	330,000
Water Line	450 LF	-	15	6,800
Drinking Fountain	2 Ea		1,600	3,200
Enlarge Existing Standard	~~		2,000	3,200
Septic System	Ī.,	.S.	_	40,000
Gravity Sewer Line	1,700 LF		16	27,200
Manhole	8 Ea		2,400	19,200
Ranger Check Station	l Ea		65,000	65,000
Gate	2 Ea		2,400	4,800
Playground Equipment		S.	-	7,000
Electric Power		S.		14,000
Telephone Service		S.	· .	4,200
Signs and Markers		S.	_	2,000
Site Improvement		S.	-	200,000
Subtotal				\$1,240,200
Contingencies (25%)				310,100
oone ingeneres (25%)			* *	310,100
TOTAL (Rounded)				\$1,550,000
ВЕАСН				
Sand Area below Min. Pool	560 SY	<b>!</b> \$	10	\$ 5,600
Site Improvement	L.	·	-	1,000
Subtotal (25%)			•	\$ 6,600
Contingencies (25%)				1,700
TOTAL (Rounded)				\$ 8,000

# TABLE III (cont) COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED FUTURE DEVELOPMENT (April 1987 Cost Level)

ITEM	QUAN	QUANTITY		IT PRICE	TOTAL	
BOAT LAUNCH DAY-USE AREA		, *				
Road, 18', Bituminous,						
Reconstructed	0.10	Mi.	\$	189,000	\$.	18,900
Car Parking area, Bituminous,	0.120		τ.	200,000	Τ.	20,700
Reconstructed	50	Spaces		540		27,000
Picnic Shelter		Ea .		32,000		32,000
Gate		Ea.		2,400		2,400
Signs and Markers		L.S.		_		500
Site Improvement		L.S.		-		20,000
Cult hash all					٨	100 000
Subtotal					\$	100,800
Contingencies (25%)						25,200
TOTAL					\$	126,000
GROUP CAMPGROUND						
Road, 12', Bituminous	0.12	Mi.	\$	160,000	\$	19,200
Road, 12', Bituminous,				•	·	•
Reconstructed	0.13	Mi.		144,000		18,700
Siltation Pond Dam		L.S.		_		60,000
Rest Room, Vault	1	Ea.		65,000		65,000
laterline	1,200	LF		. 15		18,000
Prinking Fountain and						
Handwash	1	Ea•		1,600		1,600
Gate	1	Ea•		2,400		2,400
Signs and Markers		L.S.		-		500
Site Improvement		L.S.		-	_	42,400
Subtotal					\$	227,800
Contingencies (25%)					'	57,000
5 ,			,			
TOTAL (Rounded)					\$	285,000

## TABLE III (cont) COST ESTIMATE CROOKED CREEK LAKE, PA PROPOSED FUTURE DEVELOPMENT (April 1987 Cost Level)

ITEM	QUAN	TITY	UN	T PRICE	TOTAL	
MEYER'S FIELD SMALL BOAT ACCESS	AREA					
Road, 12', Crushed Stone	0.14	Mi.	\$	73,000	\$	10,200
Road, 12', Crushed Stone				•		•
Reconstructed	0.40	Mi.		66,000		26,400
Car-Trailer Parking Area,						
Crushed Stone	10	Spaces		430		4,300
1-Lane launching Ramp, Concrete		L.S.		_		14,000
Gate	1	Ea.		2,400		2,400
Signs and Markers		L.S.		-		3,200
Site Improvement		L.S.		_		5,000
Subtotal					\$	6E E00
Contingencies (25%)					Ş	65,500
Contingencies (25%)						16,400
TOTAL (Rounded)					\$	82,000
101111 (Hounded)					٧	02,000
MOUTH OF CHERRY RUN FISHING ACC	ESS AR	EA				
Road, 18', Crushed Stone	0.07		\$	73,000	\$	5,100
Car Parking Area, Crushed Stone		Spaces	•	200	'	3,000
Signs and Markers		L.S.		_		15,000
Site Improvement		L.S.		_		5,000
•						
Subtotal					\$	28,100
Contingencies (25%)						7,000
TOTAL (Rounded)					\$	35,000
REARICK'S FORDING CANOE AND RAFT						
Road, 18', Crushed Stone	0.01		\$	73,000	\$	700
Car Parking Area, Crushed Stone		Spaces		200		3,000
Ramp, 6' Wide, Concrete	80	LF		30		2,400
Signs and Markers		L.S.		-		3,200
Site Improvement		L.S.		-		5,000
Subtotal					ė	14 200
					\$	14,300
Contingencies (25%)						3,600
TOTAL (Rounded)					\$	18,000
Total ( Mountaeu )					Ą	10,000