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HOLES CREEK, WATER RESOURCES DEVELOPMENT, VOLUME I, MAIN REPORT--ETC(U)
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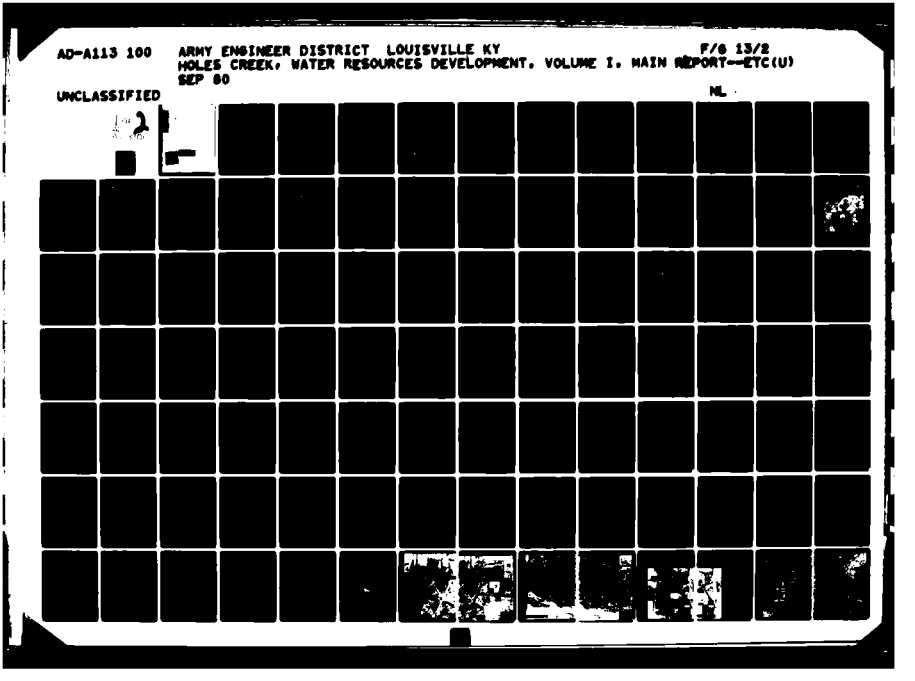

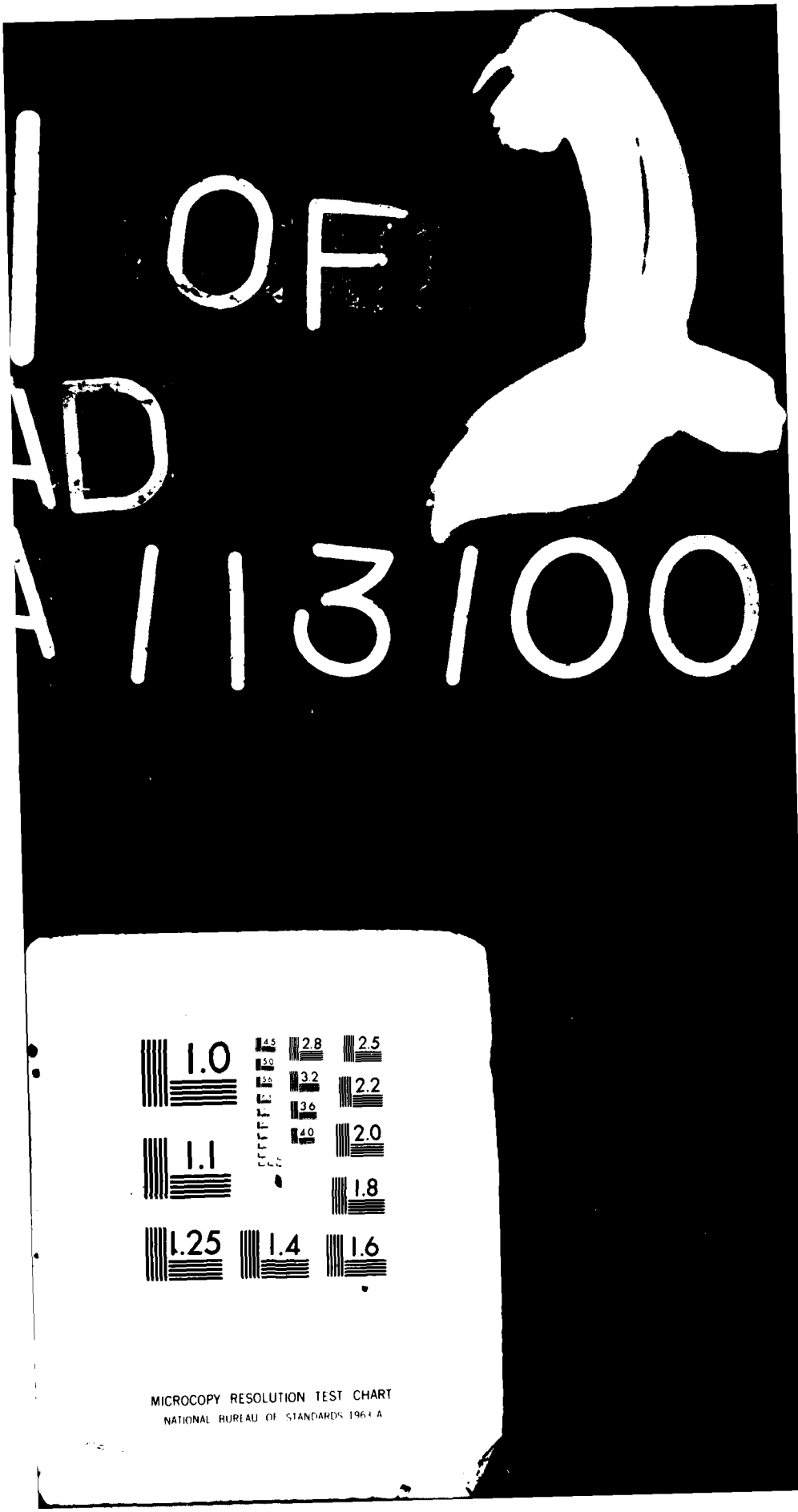
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The significant unresolved water and related land resources problems in the study area are the direct result of flooding.

The tentatively selected plan consists of 7,550 feet of channel improvement the replacements of one railroad bridge and other appurtenances. The plan includes environmentally oriented design concepts to reduce advance impacts to fish and wildlife habitat.

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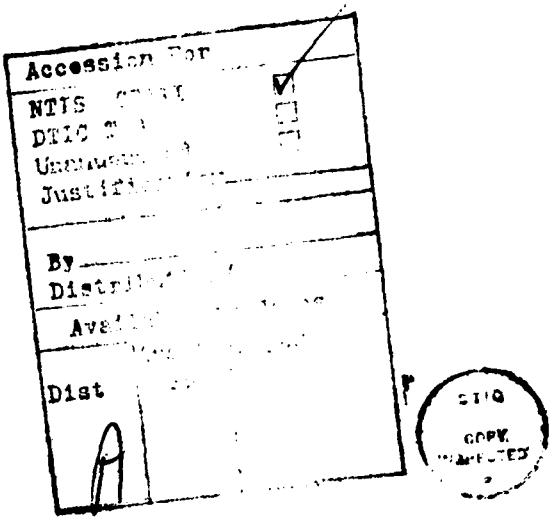
The plan would reduce average annual equivallent damages for the Holes Creek study area by 90 percent.

The selected plan includes recreation development with emphasis on an 1.7 mile paved trail. Limited picnicking and outdoor game facilities are also provided.



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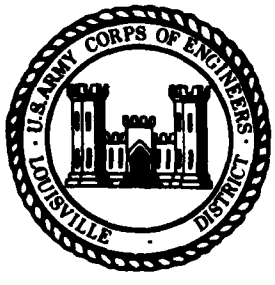
INTERIM REPORT FOR WATER RESOURCES DEVELOPMENT
MIAMI RIVER, LITTLE MIAMI RIVER, AND MILL CREEK BASINS,
SOUTHWEST OHIO

A STUDY TO DETERMINE THE FEASIBILITY OF PROVIDING FLOOD CONTROL AND RELATED WATER RESOURCES IMPROVEMENTS IN THE HOLES CREEK BASIN, OHIO



SEPTEMBER 1980

Syllabus

The purpose of this interim report is to present the findings of a study concerning water resource development in the vicinity of West Carrollton, Ohio. The study was undertaken as a part of the Miami River, Little Miami River, and Mill Creen Basins, Ohio Survey Investigation. Other water resource studies concerning Southwest Ohio will be reported on in subsequent interim and final reports.

The study area is located on the left bank of the Miami River, south of Dayton and in Montgomery County, Ohio. The study area includes the City of West Carrollton and portions of the City of Moraine, Miami Township and Washington Township. Two triburary streams, Owl Creek and Holes Creek, flow through the study area and enter the Miami River in the vicinity of West Carrollton.

The significant unresolved water and related land resources problems in the study area are the direct result of flooding. The most serious problems are caused by headwater flooding on the lower reaches of Owl and Holes Creeks, especially Holes Creek. The larger floods on the Miami River also cause problems on the lower reaches of both creeks. The Miami Conservancy District has constructed levees along the Miami River to prevent overbank flooding by the Miami River.

After considering and evaluating a large range of alternative plans, including several nonstructural measures, levees, channel improvements, upstream impoundments and diversions, the report concluded that a 500-year channel improvement plan best met the water resource needs of the lower Holes Creek area. No viable plans were formulated for the Owl Creek Basin. The tentatively selected plan consists of 7,550 feet of channel improvements, the replacement of one railroad bridge and other appurtenances. The plan includes

environmentally oriented design concepts to reduce adverse impacts to fish and wildlife habitat. These concepts include the construction of a low flow channel, installation of pools and riffles, preservation of a small woodlot, and in certain areas restricting construction to one bank only. The remaining detrimental impacts are considered to be more than offset by the economic and social well-being attributes resulting from the flood protection provided by the plan.

The channel improvement would substantially lower all floods and provide a high degree of protection to all affected properties now subject to frequent and severe flooding. The plan would reduce average annual equivalent damages for the Holes Creek study area by 90 percent.

The selected plan includes recreation development with emphasis on an 1.7 mile paved trail. Limited picnicking and outdoor game facilities are also provided. The recreational development would cost about $600,000 and provide 64,700 annual visitor days of usage.

The selected plan has an estimated first cost of $7,030,000. Average annual costs including operation and maintenance are estimated at $580,000, and total average annual equivalent benefits are estimated at $754,000. Benefit categories include damage reductions for present and future flows, advance replacement of a railroad bridge, savings to the national flood insurance program, affluence benefits for residential contents, benefits to future development that would be located at the 100-year flood level or higher, and benefits attributed to the recreation development. Location benefits are not appropriate. With a benefit to cost ratio of 1.3 and net benefits of $174,000, the plan is clearly economically feasible.

HOLES CREEK
INTERIM REPORT NO. 2
MIAMI RIVER, LITTLE MIAMI RIVER, AND MILL CREEK BASIN, SOUTHWEST OHIO

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Introduction

This document reports on the feasibility studies for water and related land resources in the vicinity of West Carrollton, Ohio. The studies were conducted consistent with the planning requirements of the Water Resource Council Principles and Standards (P&S), the National Environmental Policy Act of 1969 (NEPA), and related policies. The major sections of the report following the Introduction are Problem Identification, Formulation of Plans, Assessment and Evaluation of Plans, and Comparison of Plans.

The Introduction material is furnished to provide the background information for the study. This includes the authority and scope, study participants, related studies, and the format and process for completing this report.

Study Authority

During the late fifties and early sixties, considerable public concern was expressed over water resource problems in the Miami River, Little Miami River, and Mill Creek Basins, Ohio. Subsequently, the U.S. Senators and Congressmen from Ohio requested a resolution by Congress for an investigation into flood control and allied improvements. The authority for this study is contained in two resolutions, including U.S. Senate Resolution of 31 May 1967 and U.S. House of Representatives Resolution of 19 October 1967.

The resolutions directed a review of prior reports with a view to determining whether improvements for flood control and allied purposes are advisable at the present time in the Miami River, Little Miami River, and Mill Creek Basins in Southwestern Ohio.

Scope of the Study

This is an interim report concerned only with water resources in the vicinity of West Carrollton, Ohio. A report considering the parent study, Miami River, Little Miami River, and Mill Creek Basins, will be submitted at a later date. A previous interim report, Mill Creek in Southwestern Ohio for Flood Damage Reduction and Recreation, studied and reported on the Mill Creek Basin. The report recommended a local protection project which has been subsequently authorized. The General map (Plate 1) shows the relationships between the parent study and the interim studies.

This study discusses the present and projected water-related problems and needs of the two tributary basins (Holes and Owl Creeks) in the study area (see Figure 1), considers alternatives for appropriate solutions, and presents plans of improvement determined to be the most practical, acceptable, and feasible. The study was directed toward investigation of flood problems of the area. The Miami River, Holes Creek, and Owl Creek all contribute to the flood problems at West Carrollton. Navigation, power, and other water resource uses are not pertinent as the water resources of these basins are very limited. Water supply and water quality problems may exist in the study area, but are not considered in detail in this report. Potential problems with these uses are being studied by others, and their potential solutions are not related to flood control development in Holes or Owl Creeks.

Study Participants and Coordination

The early stage public meeting held in the area (Dayton) was one of the three initial meetings for the parent study. The State, the Miami Conservancy District (MCD), Fish and Wildlife Service, and local officials have been kept

informed of efforts for this interim study. Meetings with representatives of MCD, Ohio, and West Carrollton were held in June 1975, November 1977, and September 1978. Their concerns and views have been incorporated into the study. Appropriate letters from the above participants and reports from the U.S. Fish and Wildlife Service are included in the Appendix. The Formulation Stage Public Meeting was held at West Carrollton on 14 December 1978. Of the 65 to 70 persons in attendance, five or six local property owners objected to any type of flood control improvements and a similar number supported the study. Local officials, represented primarily by the Miami Conservancy District (MCD), supported the study and indicated their preference for a channel improvement alternative.

The Final Public Meeting was held in West Carrollton on 24 June 1980 with approximately 100 persons in attendance. Comments received varied from objections to any type of flood improvements on Holes Creek to full support of the selected plan. All comments received from local officials supported the need for flood control measures and the selected plan.

Prior Studies and Reports

The only prior study pertaining to flood problems along Holes and Owl Creeks in the West Carrollton study resulted in a brief reconnaissance report prepared by the Miami Conservancy District in 1961. The report considered channel improvement plans for Holes Creek and Owl Creek and tributaries, and levee plans along Holes Creek and at Allen Plat. From this study, channel improvements were accomplished for a portion of Owl Creek and one tributary. A second study, concerning Miami River flooding, by the Miami Conservancy District resulted in a local protection project at West Carrollton for reduction of flood damages from the Miami River (see Figure 1).

Several recent studies, generally for county-wide or larger areal coverage, have been completed that include data on water supply, water quality, land use, demographic topics, soils, and developmental aspects.

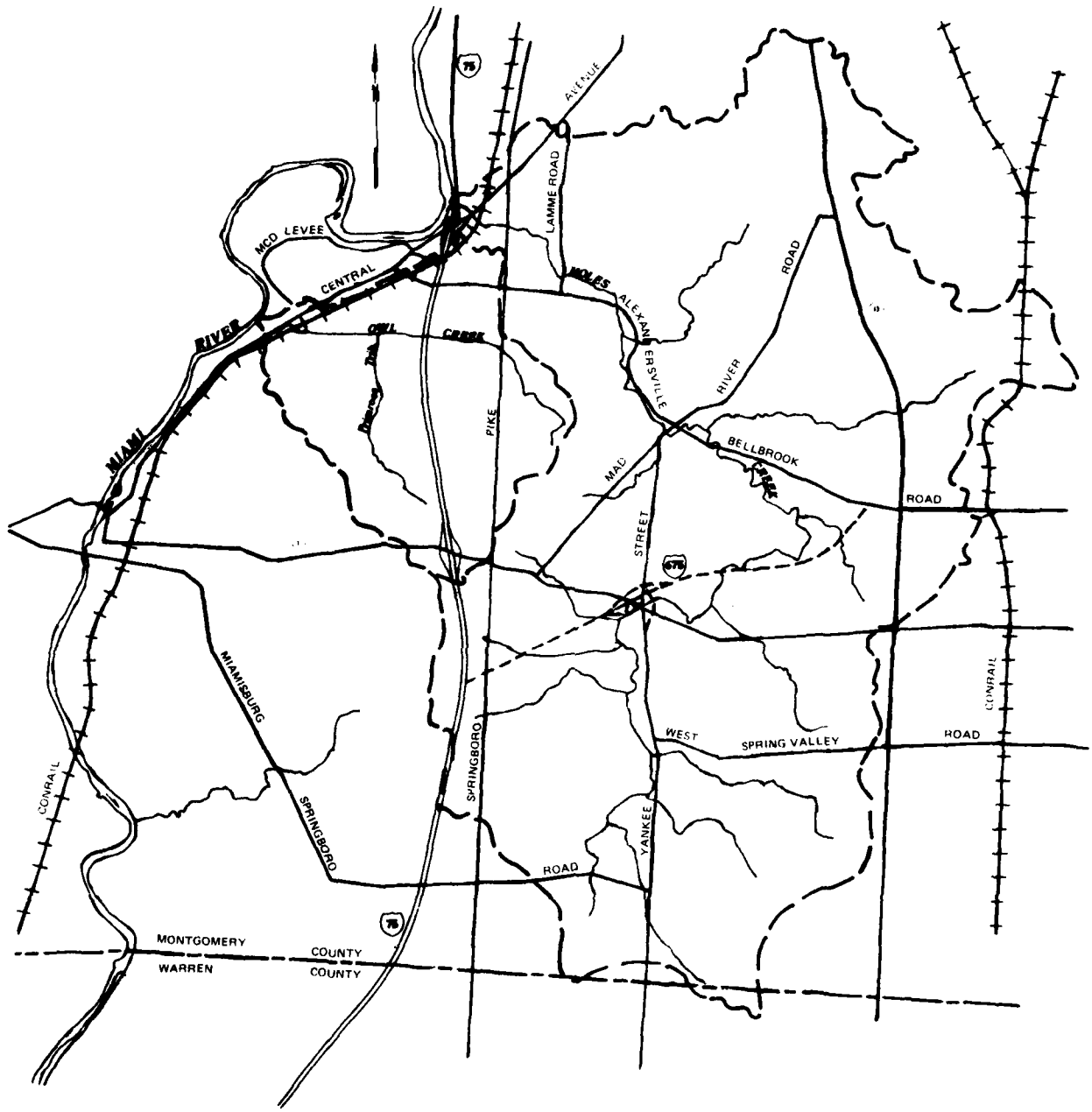


FIGURE 1: STUDY AREA

A partial listing of the agencies preparing these reports include: U.S. Environmental Protection Agency, U.S. Department of Agriculture, State of Ohio, and the Miami Valley Regional Planning Commission. Also, a flood insurance study is underway for the City of West Carrollton by the Office of Federal Insurance and Hazard Mitigation.

All of the prior studies and reports have been reviewed and appropriate information from several was used in preparation of this report.

The Report and Study Process

Documentation of studies conducted for the West Carrollton area is provided by the Main Report, which includes the Environmental Impact Statement, and the Appendices. The Main Report is a nontechnical presentation that presents the results of the survey study. The appendices provide greater details on the studies accomplished and documents the views and comments of others.

This report documents the final stage (3) of the survey investigation, and its completion finishes the preauthorization studies for the area. The report provides the documentation for further review and action by Federal and State decision makers. More specifically, the report will be transmitted to and reviewed by the following: Corps of Engineers--Ohio River Division, Board of Engineers for Rivers and Harbors, and Chief of Engineers; Secretary of the Army; Office of Management and Budget; and Congress. The above process includes additional steps to obtain further inputs from the general public and local, State, and Federal agencies. Upon completing this review, the Division Engineer will issue a public notice to all persons known to be interested in the study. The notice sets forth the findings of the study and invites those, who wish to do so, to furnish their views and comments to the Board of Engineers for Rivers and Harbors. Depending upon the views and comments received and upon controversial matters, the Board may hold a public meeting during its review of the report. The Chief of Engineers forwards copies of the report to the Governor of Ohio and to other interested Federal agencies

for formal review and comments. After receipt and consideration of all comments, including the review by the Office of Management and Budget, the Secretary of the Army transmits the report to Congress for action.

Problem Identification

This section includes identification of national objectives, water resource problems in the area, and planning objectives established for this study. The national objectives are established by law and apply to all water resource studies. The planning objectives are established after the water resource problems and needs are identified. This is accomplished by identifying water resource management problems and public concerns, analyzing them to determine the physical area involved, and surveying existing and projected resource conditions for the area. Consideration of this information along with planning constraints will result in the establishment of specific planning objectives.

National Objectives

Two national objectives have been established for all water resource developments. They are enhancement of National Economic Development (NED) and Environmental Quality (EQ). NED can be enhanced by improving national economic efficiency and increasing the value of the Nation's output of goods and services. In respect to water resource projects, contributions to NED are made through actions that result in net economic benefits. EQ can be enhanced by management, conservation, preservation, creation, restoration, or improvement of the quality of natural resources and ecological systems. In order to identify the results of efforts to meet these objectives, an alternative will be formulated which optimizes the NED objective, and an alternative will be selected that optimizes the EQ objectives.

Existing Condition

ENVIRONMENTAL SETTING AND NATURAL RESOURCES.

The study area is located in the south-central part of Montgomery County, with two small areas in the upper reaches of Holes Creek extending southward into Warren County (Figure 1). The drainage areas of the two streams cover 32.6 square miles with Holes Creek draining 28.2 square miles and Owl Creek draining 4.4 square miles. Both streams are tributaries of the Miami River. Holes Creek has its confluence with the Miami at Mile 72.65 and Owl Creek enters the Miami downstream from Holes Creek at Mile 68.7. The Miami River flows from north to south toward the Ohio River.

The flood plain of the study area is highly urbanized with relatively few open spaces and greenbelt strips along the two creeks. In pursuit of open land for housing, industry, and commercial activity, developers have utilized much of the suitable land. As a suburb of Dayton, the area has experienced rapid growth during the last decade, and complete urbanization of the study area is projected by the year 2000.

Topography of the stream basins is characterized by the flat, alluvial plain terraces of the Miami River and the dissected plateaus of the uplands. Elevation levels in the Owl Creek Basin range from 690 feet [National Geodetic Vertical Datum (NGVD)] at the streamsides of Owl Creek-Miami River confluence to 1,025 feet NGVD along Interstate Highway 75 in the south. Elevation levels in the Holes Creek Basin range from 710 feet NGVD at the streamsides of Holes Creek-Miami River confluence to 1,052 feet NGVD east of Interstate Highway 75. Most of the relief in the flood plain is accounted for by the abrupt descent from the uplands onto the Miami River flood plain.

Holes Creek flows over a streambed composed primarily of gravel and sand with a number of gravel bars present. Just upstream of the Conrail Railroad Bridge, a sewerline crossing has been covered with poured concrete to protect it from erosion and damage. This structure acts as a low head dam that raises

the water level about 3 feet and forms a shallow pool extending to Springboro Pike.

The water quality of Holes Creek appears to be reasonably good based upon the type of aquatic life supported by the stream. Benthic organisms observed during a site inspection in August 1978 included mayfly larvae, blackfly larvae, damselfly nymphs, aquatic beetles, isopods, and snails. However, benthic fauna were not abundant. Crayfish were present. Fishes which occur in the stream include green sunfish, creek chub, darters, and stone rollers and various other minnows. Bass, bluegills and catfish were reported to be present in some of the upstream pools above Mad River Road.

A typical assemblage of riparian tree species grows along the banks of the creek. The portion of the stream from Springboro Pike to near Ormand Drive, in particular, has a goood tree canopy. The old field communities, located between Springboro Pike and I-75 ramp, contain scattered trees and support grasses and weeds such as cocklebur, smartweed, sunflower, and black-eyed Susan. The wooded tract supports flood plain tree species.

Most of the length of Owl Creek passes through residential and industrial areas. Woods and old field areas border the stream in a few places. Riparian vegetation occurs along the streambanks except where streets and yards intervene. The portion of Owl Creek below Alexandersville Road and the lower reach of Primrose Tributary have previously been channelized. The following observations were made during the fall of 1978. The streambed is primarily gravel and sand. Water quality on lower Owl Creek appears to be seriously degraded from the point of effluent discharge at a paper company to the mouth of the creek. The discharge is a milky white and leaves a deposit in the streambed. No life forms were visible in the affected portion of the creek. Above the discharge point, the flow was light to nonexistent. No fish were observed in the creek, probably due to the intermittent nature of the water flow. Few invertebrates were observed.

A review of the archeological site files maintained by the Laboratory of Anthropology, Wright State University, Dayton, Ohio, indicates that a total of

six prehistoric or historic archeological sites have been recorded in the lower reaches of the two creeks. Two of these sites lie in the lower Owl Creek area. Four archeological sites have been recorded in the vicinity of lower Holes Creek, of which three are located on the grounds of the Siebenthaler Nursery. As a result of extensive industrial and suburban landscape alterations, the infield findings of an archaeological reconnaissance were completely negative.

The National Register of Historic Places was consulted and there are no recorded register properties in the lower reaches of either creek.

The climate of the study area is continental which is marked by large annual and daily changes in temperatures. Such a climate is characteristic of the eastern interior of the United States. Due to the location of Holes Creek-Owl Creek Basins in the east central portion of the Continent, which is a major path for high and low atmospheric pressure systems, the climate is quite variable. During January, the coldest month, the average temperature is 28.1°F, and in July, the warmest month, the average temperature is 74.6°F. Thunderstorms with high intensities of rainfall are common during the spring and the summer. Average annual percipitation in nearby Dayton is 38 inches.

HUMAN RESOURCES

Montgomery County had a 1975 population of 587,507. Approximately 35 percent of this population, or 206,000, lived in Dayton just north of the study area. The 1975 data indicated that 103,097 persons, or 17.5 percent of the population, resided in the communities of West Carrollton (13,292); Miamisburg (15,122); Kettering (69,949); and Moraine (4,734) which serve the study area. Figure 2 shows the corporate limits within the study area. A comparison of 1970 and 1975 data indicates that the County lost approximately 20,000 people. In contrast to the net County loss, surburban areas such as West Carrollton showed substantial increases during the same period. This was largely due to internal migration from Dayton to the suburbs. This trend is expected to continue until desirable subdivision land is exhausted.

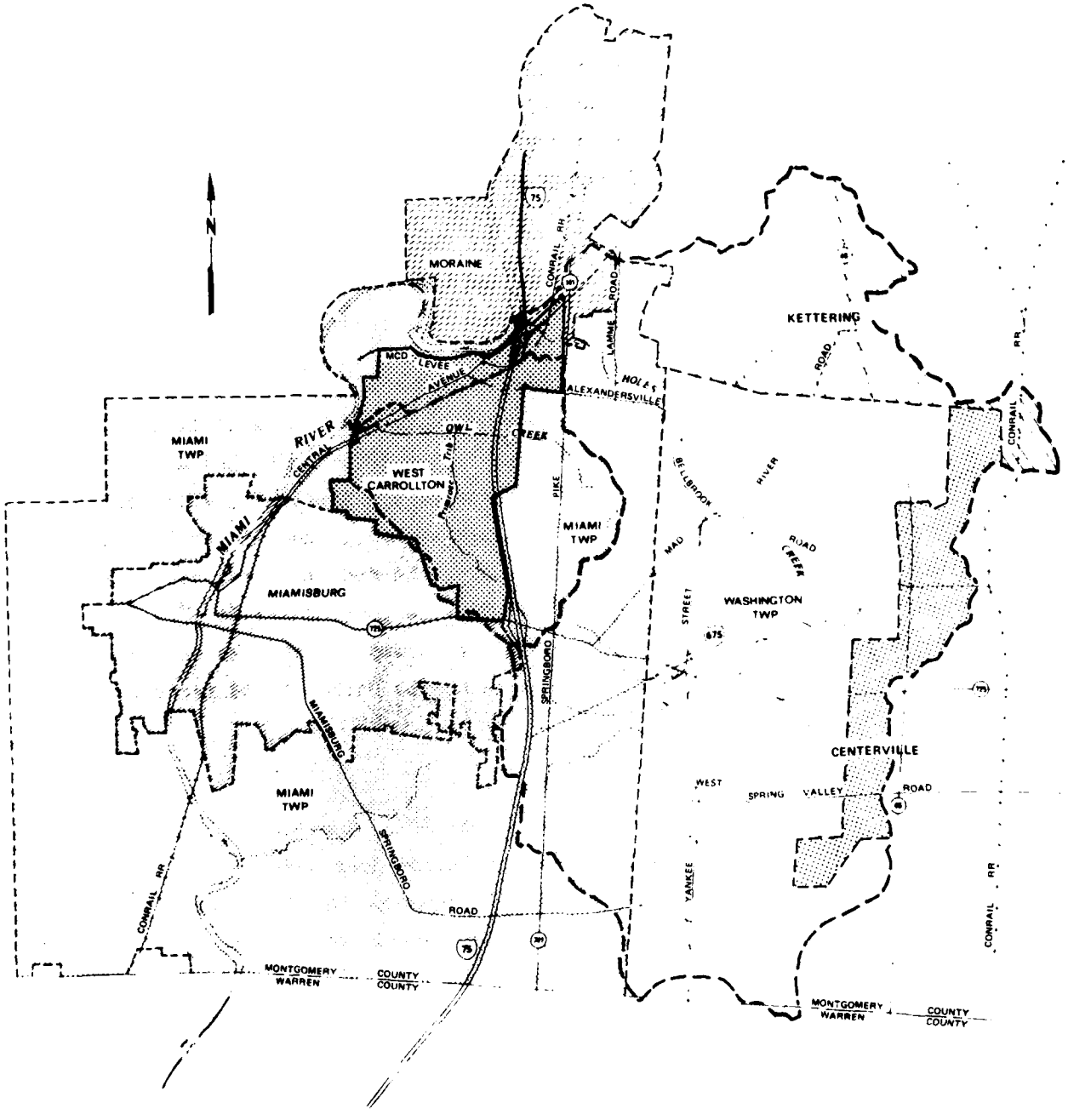


FIGURE 2: CORPORATE LIMITS

DEVELOPMENT AND ECONOMY

The economy of the study area is characterized by a strong activity in manufacturing and a moderate shift from production of goods to services. The study area and Montgomery County produce durable goods above the national average and nondurable goods below the national average. However, recent industrial activity indicates that the production of nondurable goods is gaining momentum, while the production of durable goods is not declining except in the percentage of total production. Meanwhile, services in general and finance, insurance, and real estate, in particular, have achieved phenomenal growth.

The major skills and occupations of the labor force are diverse due to a diversity of industrial and commercial activities. There is a concentration of heavy industries produce paper and allied products, rubber and plastic products, and primary metal products. The area is especially convenient for heavy industries because it is served by the Conrail Railroad, is close to Interstate Highways 75 and 70, and is within easy reach of both labor markets and desirable residential areas. Agriculture contributes to the economy, but is not a major employer and its value to the economy is expected to decrease as farmland is converted to residential and commercial complexes. Montgomery County will continue to be the hub of industrial and commercial development in the Dayton SMSA.

For Montgomery County, the estimated per capita income for 1974 was $4,902 and ranged around the study area from a high of $5,977 in Kettering to a low of $4,091 in Dayton. The averages from the State and the nation were $4,560 and $4,570, respectively.

The Miami Valley Regional Planning Commission (MVRPC) has recently published information which projects land use in Montgomery County and the communities surrounding the study area to the year 2000. The data indicate the existence of a strong urbanization trend characterized by a rapid increase in the ue of land for residential, commercial, industrial, institutional and open space purposes, and a corresponding decrease in vacant and agricultural land.

Without Project Condition

The future development (see Figure 3 - Land Use) of the study area under without project conditions would be approximately the same as with project conditions. This is due to four main reasons. One; planned commercial and industrial land use generally avoids flood damage susceptibility by means of allowing numerous commercial and industrial sites in high areas and the ability of developers to build over elevated foundations in the low areas. Two; the location of the area within convenient proximity to major highway, railroad, and air avenues of transport would continue to attract new labor-intensive commercial and industrial activities. Three; the readily available skilled and semi-skilled labor supply of the Dayton SMSA would respond sufficiently to prospective development needs. Four; population growth which would come as a result of the expanding labor market and the traditional migration from the big city would be met by existing residential land use planning which reduces flood damage susceptibility by requiring residential building in the low areas to be elevated above the 100-year flood level.

Generally, industrial and commercial development is not dependent upon the capability of flood plain land to support economic stability and growth. The "without" demographic and economic conditions in the study area and the sparsity of developable land manifest a new residential construction trend. Onsite inspection and conversation with local planners, realtors, and property owners and developers revealed a trend towards the construction of upper income single family units and moderate income multifamily units. New construction of moderate and low income single family units and low income multifamily units would be scarce due to the relatively high price of land suitable for residential development and the high cost of construction. The study area would therefore have a housing shortage for moderate and low income families especially in view of an anticipated strong population growth. This shortage could prompt commuting activites from nearby areas where lower and moderate incoming housing units are available. Available sources of Montgomery County employment, income, and population projections to the year 2000 vary too widely to maintain consistency. This is due to the unpredictability of industrial location movements, population shifts, and

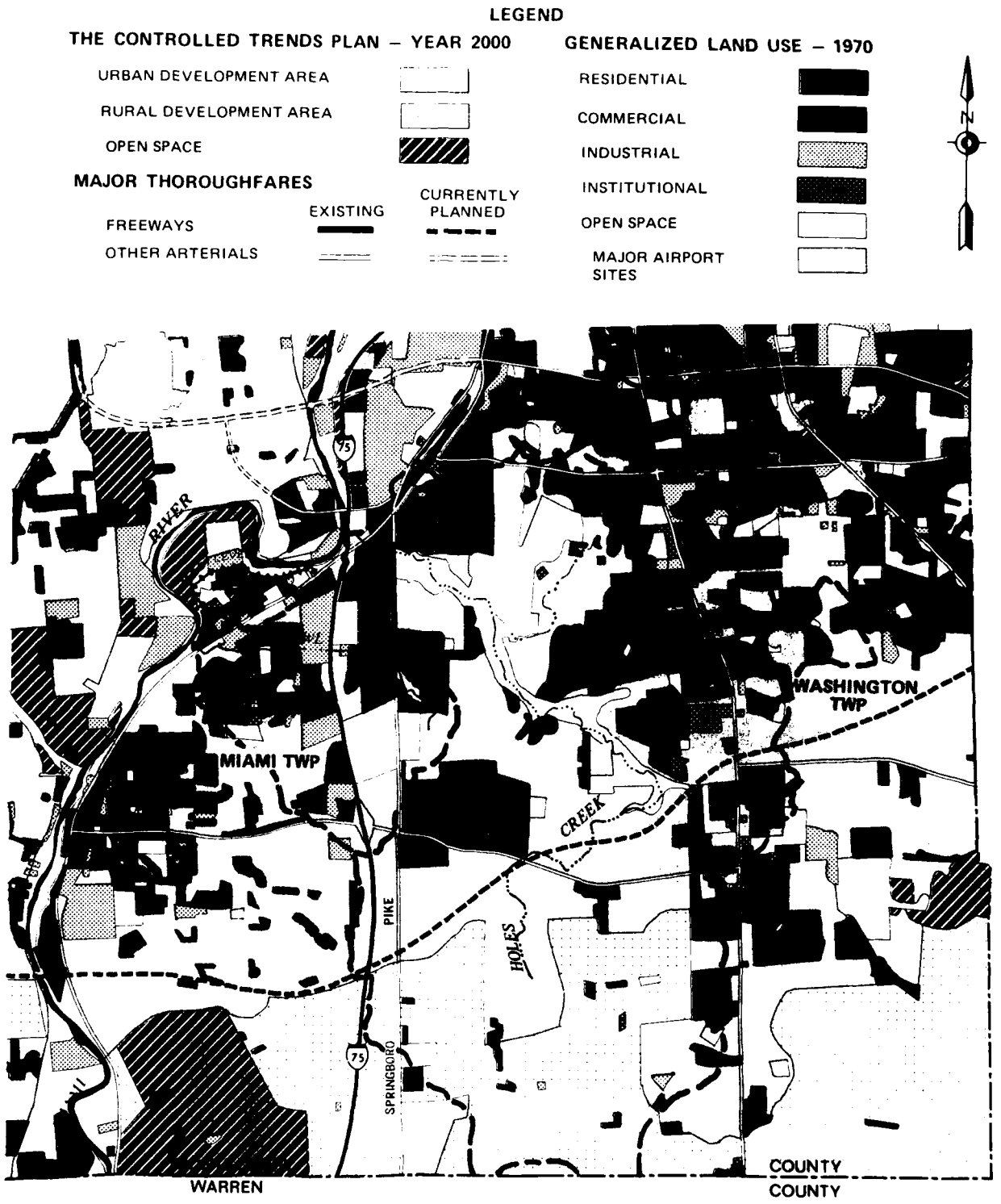


FIGURE 3: LAND USE

inflation level. Based on established trends, the immediate study area of the Miami and Washington Townships will experience a strong population growth by the year 2000 as indicated by data in Table 1.

TABLE 1

STUDY AREA POPULATION PROJECTIONS
(1970-2000)

Population	1970	1975	1980	1985	1990	1995	2000
Miami Township Includes Carlisle part, Miamisburg, West Carrollton, and Miami Township part.	43,020	46,250	50,103	54,098	58,092	62,711	67,331
Washington Township Includes Centerville and Washington Township part	27,730	29,590	32,483	35,286	38,089	41,389	44,689

Source: Miami Valley Regional Planning Commission

The traditional decline in vacant and agricultural land is expected to continue as a result of anticipated industrial, commercial, and residential development. Meanwhile, the immediate area will develop both economically and demographically somewhat faster than Montgomery County and State averages.

Economic development will be characterized by a moderate increase in manufacturing, a higher increase in wholesale and retail trade activities, and especially in services, with expected increases in employment and income. Average increases in income will be slightly above the rate of inflation. A transition is expected to occur whereby the economy will move from a manufacturing centered type to a service-oriented type although manufacturing will continue to maintain the largest single share in providing jobs and income.

Flood plain zoning and the flood insurance program are expected to be in effect in the near future. These measures will reduce the future increase in flood damages and provide some financial relief to the area. It is expected that the flood insurance program will cause some relocation of structures out of the flood plain over a period of many years. Some structures will probably be raised and remain in the flooded area. The nursery lands and other overbank vacant lands are expected to be developed.

Problems, Needs, and Opportunities

The purpose of this section is to define and discuss the water resource problems, needs and opportunities in the study area. Investigations indicate that the major water resource problem is confined to flood damages. As is true in most urbanized areas, there are general needs for additional outdoor recreation opportunities and enhancement and preservation of the existing natural environment. Opportunities for solving these needs are intrinsic to measures for alleviating the flood problem.

Water quality in Holes Creek is generally good with no known point source pollutant discharges. Owl Creek above the Elm Street Bridge has intermittent

flow and appears to have no pollutant discharges. However, a paper company next to the Conrail Railroad discharges appears to be polluted due to its milky coloration and apparent absence of aquatic life. Further treatment at the source appears to be the practical solution. Water supply for the area is provided by wells. The "Southwest Ohio Water Plan", Ohio Department of Natural Resources, indicates that the present system will be sufficient until the late ninties. Two potential courses of action are available to meet needs at that time. New well fields can be developed or the area can be served by a Dayton regional system. This latter course of action is recommended in the above-mentioned report. No significant irrigation or drainage problems are known to exist in the study area. The development of hydroelectric power in either Holes Creek or Owl Creek would not be practical due to their hydrologic size.

The primary desire of local interests in the study area is relief from flooding. Increased urbanization will result in increased flooding and flood damages. The interest of local officials is expressed in Exhibits to Appendix C. This interest in the flood problems along Owl and Holes Creeks was first expressed in the early 1960's after the area had been subjected to severe floods in 1959 and 1961 (see Figure 4).

FLOOD DAMAGES

The Miami Conservancy District and West Carrollton officials have reported flood problems along both Holes Creek and Owl Creek. The extent of these problems has been identified by developing hydrologic data which considered such aspects as storm characteristics, stream characteristics, extent and character of the basins and flood plains, and projected future characteristics. These hydrologic data were used in developing estimated present and future flood damages.

The area has not suffered from severe flooding in recent years. The most recent major floods occurred in 1959 and 1961, and caused substantial damages in the area. Historic data for flood conditions are lacking as no

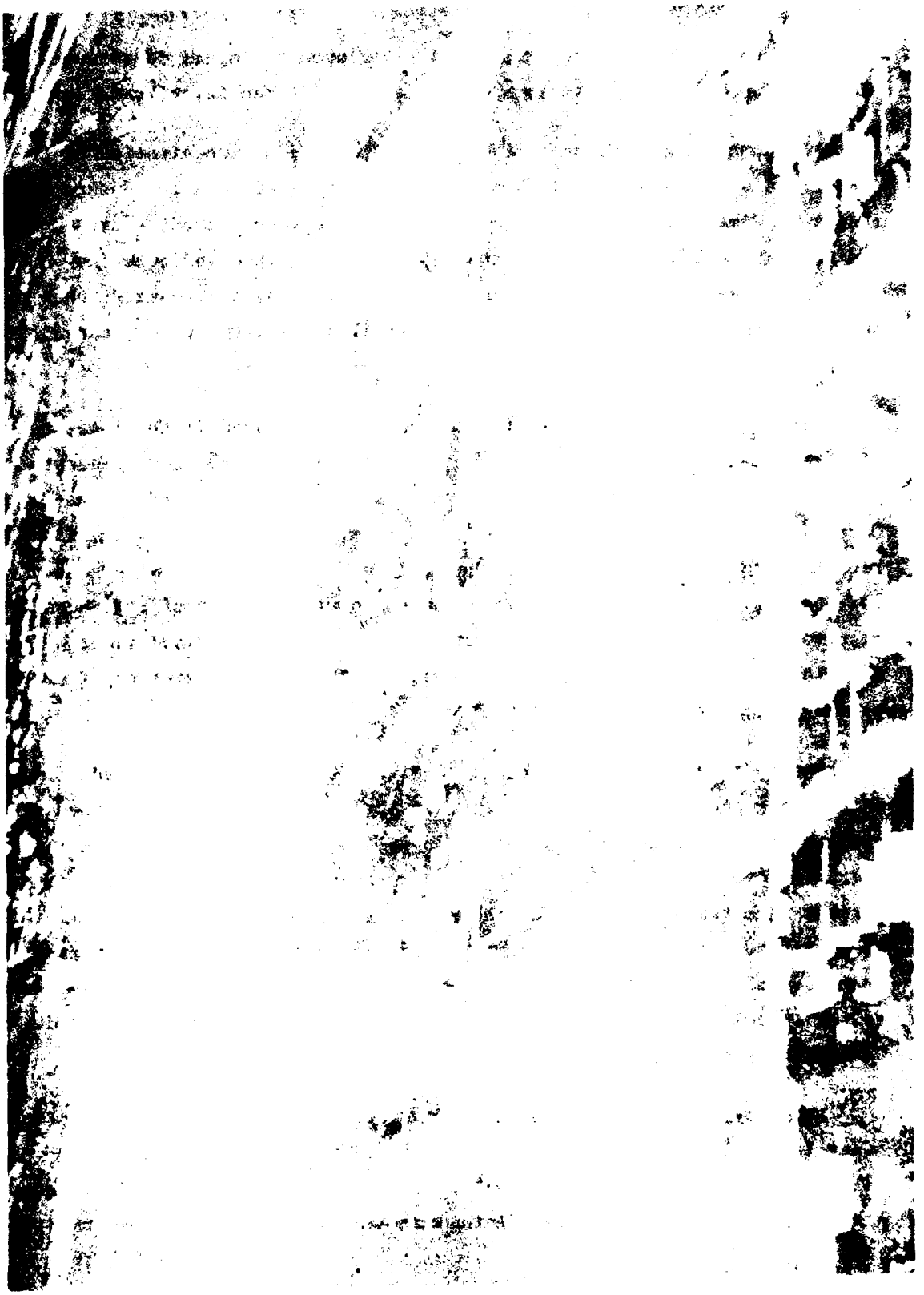


FIGURE 4: 1961 FLOOD CONDITIONS (HOLES CREEK)
VIEW SW FROM EAST DIXIE DR. SHOWING SPRINGBORO
PIKE FROM LOWER RIGHT TO UPPER LEFT

stream gages existed in the area until 1961, when the Miami Conservancy District installed a stream gage on Holes Creek at Mad River Road.

Although unsubstantiated, the recent increase in urbanization of the study area will cause more frequent and severe flooding in the future as a result of diminished infiltration and locally improved runoff conveyances. The elements which will cause increases in the magnitude of peak flow and reductions in the time to peak, include storm sewers, realigned ditches and small tributaries, and replacement of natural areas with houses, asphalt, and concrete.

Backwater from the Miami River causes flood damages in the lower reaches of both creeks; however, runoff from the study area causes the greatest damages. The Miami Conservancy District (MCD) has constructed a levee at West Carrollton to prevent flooding along the Miami River and four large flood retarding reservoirs upstream of the study area on the Miami River and tributaries. These structures in conjunction with a Corps of Engineers reservoir, C. J. Brown, have substantially reduced major flood events along the Miami River. Also, MCD has improved the flow characteristics of Owl Creek by channel clearing and straightening.

Due to topography of the drainage areas, the significant flood problems exist along the lower mile or two of the streams. The headwater areas of the streams are generally about 300 feet above the Miami River flood plain and are characterized by narrow flood plains and rather steep gradient where they descend from the upland area to the Miami River flood plain. Typically, the Miami River flood plain is relatively wide and flat. As the stream gradient changes with the topography, the relative flat gradient and undersized bridges reduce velocities and causes overbank flooding which can be extensive due to the flatness of the area.

Property, subject to flood damages by a 1,000-year flood, located in the lower 1.26 miles of Owl Creek and a 3-mile stretch in lower Holes Creek is valued at $29,058,100 and $29,430,500 (October 1979 values), respectively. Also, a low area (ponding area) lying between Holes and Owl Creeks that is

subject to flooding by both Creeks and the Miami River has corresponding property values of $27,219,000. Although accounting for a relatively small percentage of the development, industrial, commercial, and public development accounts for approximately 35 percent of the total developmental value.

The susceptibleness of the above property to flood damages is shown by the estimate that $13,000,000 in damages would result from an occurence of a standard project flood. Flood damage estimates are based on data which was gathered by flood damage surveys conducted in late 1977 and early 1978. Flood damage estimates, using October 1977 prices, were made for present and future runoff conditions, and subsequently updated to October 1979 prices. Based on these procedures, present (1979 conditions and values) average annual damages for the Owl Creek reach, Holes Creek reach, and the ponding area, described above, are estimated to be $138,100, $365,200, and $28,400, respectively. Total average annual damages, which include inputs for future flow conditions, future development above 100-year level, and affluence average annual equivalent (AAE) for the same reaches are $232,800, $632,900, and $48,500, respectively. These estimates do not include any damages for future development below the 100-year flood level. A display depicting the concentration of average annual damages is shown on Figure 5.

RECREATION AND ENVIRONMENTAL NEEDS

The "Southwest Ohio Water Plan, Ohio Department of Natural Resources - 1976," indicates a need for nearly all types of recreational facilities in Montgomery County. However, the needs were computed only from demand and supply within Montgomery County and may reflect higher needs than what exist due to the population concentration of this County. Nevertheless, a need does exist for additional recreation opportunities. The report presented a plan, the Dayton strip and node corridor, that would involve the purchase of land along the Miami River through Montgomery County for development of camping, hiking, picnicking, fishing, and boating facilities. This plan would help meet the needs of the area and is presently being implemented within Dayton.

The need to enhance and preserve the natural environment is of national concern and any opportunity to do so will be given consideration.

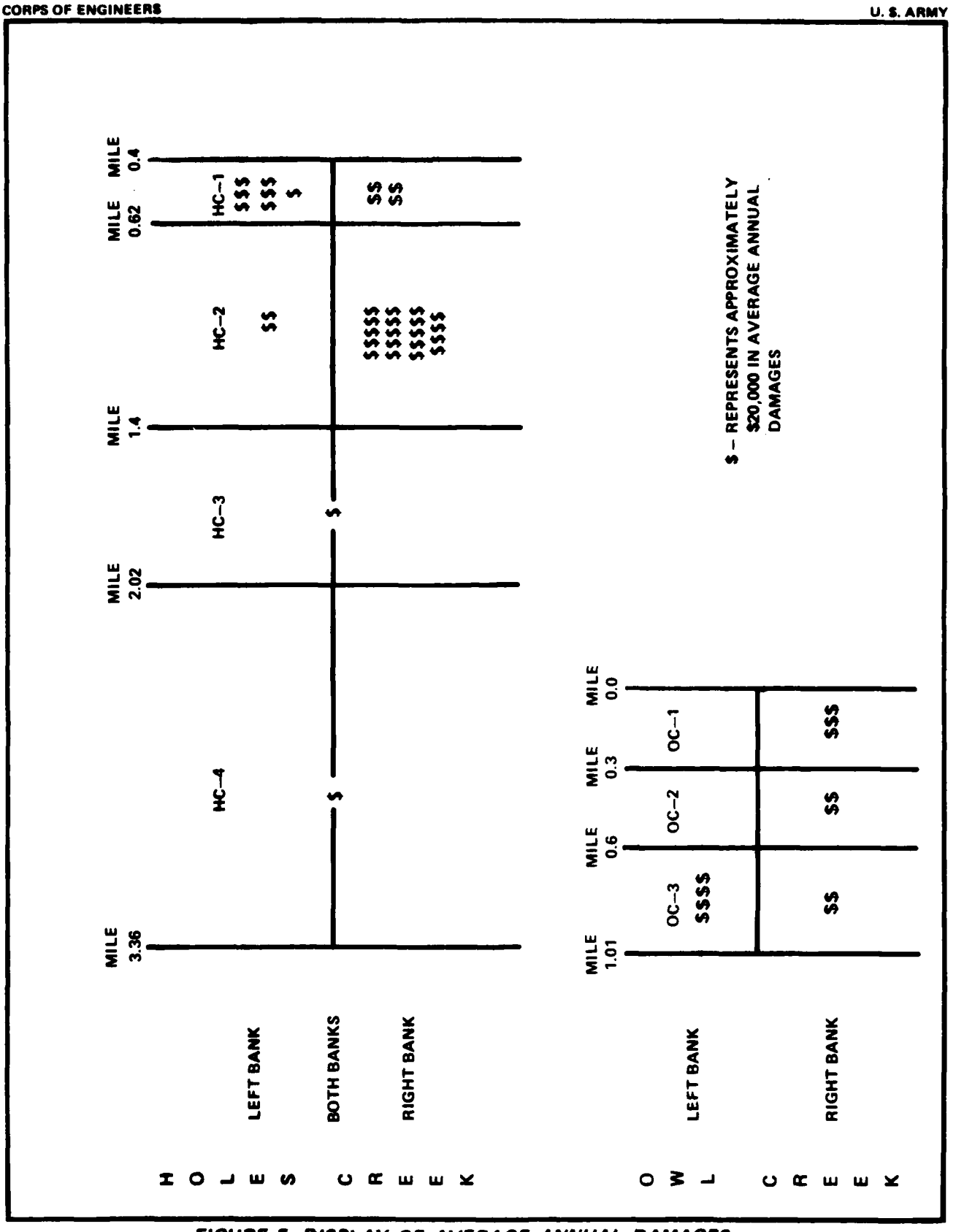


FIGURE 5: DISPLAY OF AVERAGE ANNUAL DAMAGES

Planning Constraints

The planning process must consider all constraints in the formulation of alternatives. The 1936 Flood Control Act provided two constraints to the planning process in respect to Federal participation. These constraints require that for any flood control project, the benefits must exceed the costs and that the residual conditions would not adversely affect the lives and security of the people. The latter statement has been interpreted to mean that a high degree of protection is desirable, and mandatory if a catastrophe would be likely with a low degree of protection. As the area is presently being studied by the Office of Federal Insurance and Hazard Mitigation, a constraint concerning construction in the floodway in respect to increases in the 100-year flood elevation can be expected.

Planning Objectives

The general objectives of this study are to identify the water resource problems in the study area and to develop a range of alternatives to solve or alleviate the problems. The planning objectives are to substantially reduce flood damages on the lower 1.3 miles of Owl Creek and the lower 3.3 miles of Holes Creek, and to reduce the adverse impacts of flood waters to the health and safety of the residents. As the flood problem occurs in an urban area, a level of protection equal to or greater than the one percent chance flood is desired.

Formulation of Preliminary Plans

The formulation of preliminary plans involve the identification of all realistic plans that would alleviate the flooding problems. These plans are then screened to identify the best plans. This section covers management measures, plan formulation rationale, and the analysis of preliminary plans.

Applicable Water Resources Management Measures

A wide variety of technical and institutional measures exist for managing water and related land resources. A range of measures has been considered to determine those which could address the planning objectives for this study. The measures which have been considered for this study, and discussed in Appendix B, are as follows:

Zoning
Flood Insurance
Building Code Regulations
Temporary Flood Plain Evacuation
Permanent Flood Plain Evacuation
Flood Proofing and Raise in Place
Tax Reform
Channel Improvement
Floodwall and Levee
Reservoir
Floodwater Diversion

Summary of Applicable Water Resources Management Measures

Of the measures considered, some are clearly more responsive than others in alleviating the water resource problems and meeting the planning objectives for this study. To avoid development of less viable alternative plans and to keep those alternative plans evaluated in detail at a manageable number, those management measures considered to be less responsive to the planning objectives were eliminated from further consideration. The measures eliminated were building code regulations, temporary flood plain evacuation, permanent flood plain evacuation, and tax reform. In addition, no attempt was made to incorporate zoning or flood insurance in any alternative plans because

these two measures were assumed to be a part of the "without" conditions. Thus, the measures of raise in place, flood proofing, channel improvements, floodwalls and levees, reservoirs, and floodwater diversions remained for consideration in development of alternative plans.

Plan Formulation Rationale

The process of plan formulation is conducted with the goal of developing plans that meet the stated objectives. However, in order to formulate plans that can be implemented, the formulation process considers certain criteria. Identification of the major criteria follows:

The plans must be acceptable to the public.

The plans must be able to function reliably and consistently in meeting the objectives.

The plans should furnish high degree of protection and not develop residual conditions which may cause adverse impacts to the health and lives of the affected public.

The plan should be equitable in the distribution of benefits and any disadvantages.

The plans must show that combined beneficial NED and EQ effects outweigh combined adverse NED and EQ effects

The plans must not seriously degrade nor destroy valuable environmental or cultural resources.

Analysis of Plans Considered in Preliminary Planning

This section provides a brief description of the six remaining alternatives and plans developed for the alternatives, a comparative assessment and evaluation of the plans, and concludes with identification of those plans to be studied further. Alternatives discussed are shown on Figure 6.

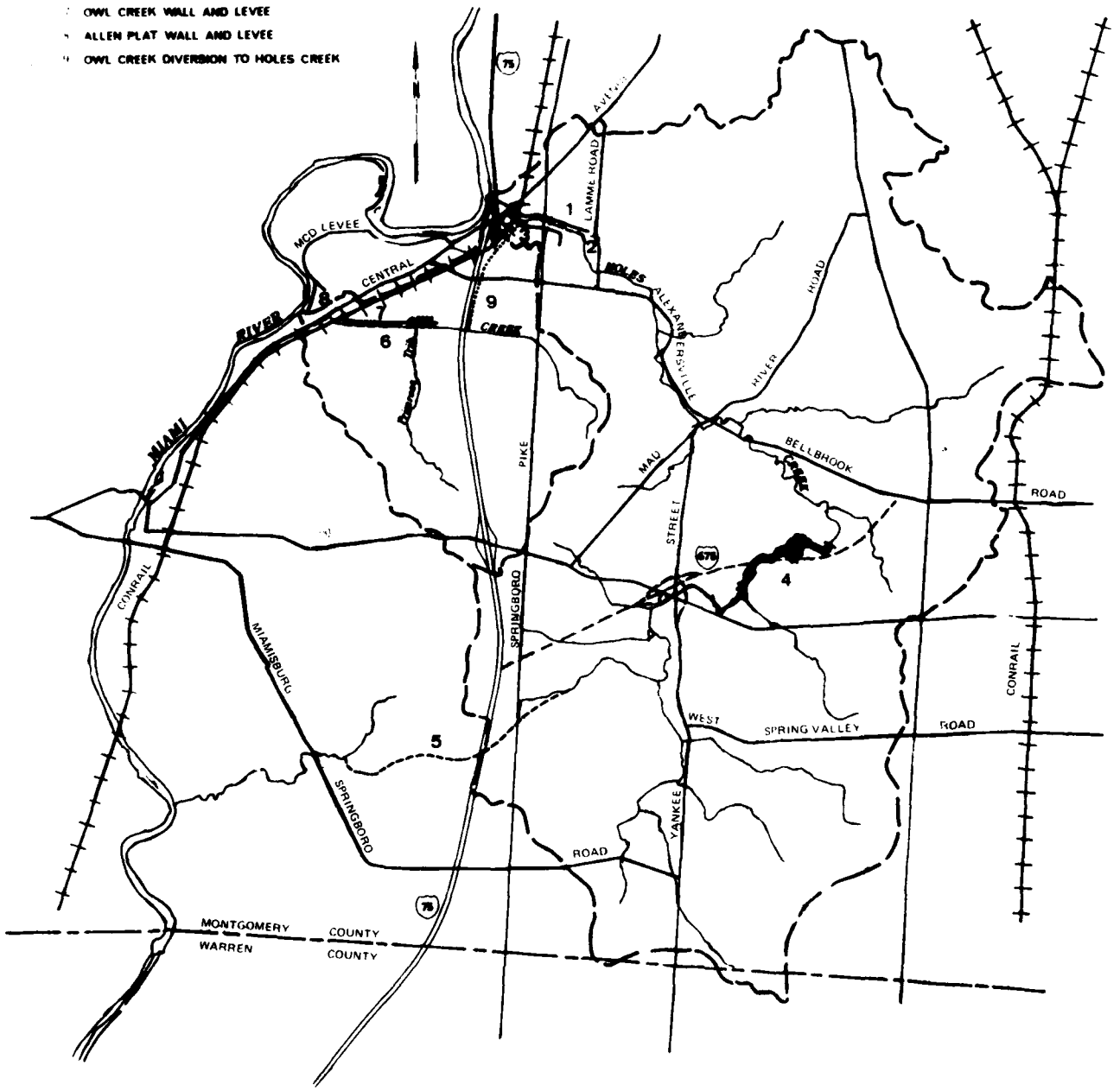


FIGURE 6: CONSIDERED PLANS

DESCRIPTION OF PRELIMINARY PLANS

Raise in Place. This alternative would physically raise the first floor of houses to provide 100-year flood protection. It was assumed that only affected single level houses with basements could be raised. For Holes and Owl Creeks, the residential units affected by the plans are 29 of 305 total and 44 of 220 total, respectively. Although flooding, including the 100-year frequency flood, causes extensive damages and affects, a relatively large area, the depth of flooding is not substantial. This characteristic applies to both creeks and the average height required for first floor protection is about 2 feet. As detailed investigation for each house would be required to determine whether it could structurally be raised, a liberal approach was taken to determine initial economic feasibility.

Flood Proofing. This alternative would prevent water from entering basements and first floors to a 100-year level of protection. It was assumed that all houses could withstand the induced hydrostatic pressure and be protected, except those with basement garages. For Holes and Owl Creeks, the alternative would protect 272 of 305 total houses and 173 of 220 total houses, respectively. Permanent measures would be required, where possible, due to the quick rise of flood waters.

Reservoir. The drainage basins of both creeks were studied for potential reservoir sites. Due to urbanization and the absence of major tributaries, effective reservoir sites could not be located on either stream. A site on Holes Creek near Grant Park was considered initially, but due to relatively high cost, over $9,500,000, and a recent planned development in the area, the site was no longer a practical solution.

Levees. Several levees and floodwall plans were studied for both streams. A brief description of each plan is provided:

Right Bank Holes Creek Levee. For Holes Creek, a right bank levee plan was considered from Lamme Road, east of Stream Mile 1.0, to the Interstate 75 ramp embankment. The plan includes 3,480 feet of earth levee, 860 feet of concrete wall, one pumping plant, and other appurtenances. In order to avoid

the relocation of several families and expensive land acquisition, about 1,500 feet of Holes Creek is realigned to provide adequate space for levee construction. The levee was designed to protect against the standard project flood, which would provide virtually complete protection to the residential and commercial development on the right bank between Lamme Road and Interstate 75.

Left Bank Holes Creek Levee. The left bank levee extends from high ground east of Springboro Pike to the Interstate 75 ramp embankment. The plan includes 3,010 feet of earth levee, 600 feet of concrete wall, one pumping plant, and other appurtenances. The levee was designed to protect again the standard project flood, which would provide virtually complete protection for all development on the left bank from Springboro Pike to the Interstate Ramp.

Right Bank Owl Creek Floodwall. Due to extensive development along Owl Creek from just upstream of Conrail Railroad to Alex Road, the construction of levees was deemed unpractical. A concrete wall along Gibbons Road was considered during screening studies. The wall would protect the residential and commercial development on the right bank from Alexandersville Road to Conrail Railroad Bridge. The wall would average about 7 feet high and would have a length of 4,500 feet.

Allen Plat Levee and Wall. This plan would protect the area, Allen Plat, lying between Central Avenue and the Miami River on the right bank of Owl Creek. As the area is subject to flooding from the Miami River and Owl Creek, an earth levee would extend from the MCD levee for West Carrollton downstream along the Miami River to Owl Creek and then along the right bank of Owl Creek to Central Avenue. A concrete wall would then follow along the north side of Central Avenue to high ground. The total plan would consist of 1,300 feet of earth levee, 1,500 feet of concrete wall, one pumping plant, and other appurtenances.

Channel Improvement. Plans were considered for both Owl and Holes Creek through the lower reaches. A brief description of each plan is presented.

Owl Creek Channel Improvement. The plan would improve the channel from Alexandersville Road to the Conrail Railroad Bridge. The improvement was considered for 25-year and 10-year levels of protection. For both levels of protection, the plan consists of 4,500 feet of channel enlargement with concrete slopes.

Holes Creek Channel Improvement. The plans for Holes Creek would improve the channel from the vicinity of Lamme Road to Interstate 75. The improvements were considered for various levels of protection ranging from 25-year to 500-year. For all levels of protection, the alignment is similar and design features include sections of grass, riprap and concrete channel enlargements, and the replacement of the Conrail Railroad Bridge. The larger options would also require the alteration of Springboro Pike Bridge.

Interbasin Diversions. Diversion of flood flows from each drainage basin into adjacent drainage systems were given consideration in the preliminary planning stages. Opportunities were limited for this alternative due to urbanization of the drainage basins and to the terrain of the basins. Preliminary plans were considered for Holes and Owl creeks and are described below.

Owl Creek Interbasin Diversion Plan. A diversion plan to convey water from the natural ponding area on the right overbank of Owl Creek upstream of Interstate 75 to Holes Creek just upstream of Conrail Railroad was considered. A preliminary hydraulic analysis indicated that the plan would have little impact on flood conditions on lower Owl Creek floods. The area would still be subject to flooding (although less frequently) from Holes Creek and the Miami River. The plan consists of about 6,000 feet of open earth channel.

Holes Creek Interbasin Diversion Plan. The best opportunity for diverting flood waters from Holes Creek to another drainage system is in the upper Holes Creek watershed. The diversion channel would extend from Holes Creek just upstream of State Road 741 southwesterly along unnamed tributaries to the Miami River. The diversion would control about one-third of the drainage basin and would consist of about 3.5 miles of excavated channel, two pipeline modifications, four highway drainage structures, and a maximum cut of 55 feet.

COMPARATIVE ASSESSMENT AND EVALUATION OF PRELIMINARY PLANS

The previous paragraphs presented a brief review of each plan considered in the preliminary planning stage. These plans were then compared and evaluated in order to screen out the unproductive plans. The criteria used in the screening process generally relate to meeting the planning objective. Values used for comparability and evaluation purposes included: benefit-cost ratio, flood damage reduction, residual damages, public acceptability, and pertinent remarks. Table 2 presents a summary of the results of the comparative assessment and evaluation of plans. It provides the basis for selecting those plans which best meet the planning objectives. Figure 6 illustrates the general location and alignment of the considered plans.

CONCLUSIONS OF ANALYSIS OF PRELIMINARY PLANS

The data in Table 2 provide sufficient justification for eliminating several of the preliminary plans. For Owl Creek, the only economically feasible plan is the flood proofing plan. However, as the local sponsor has shown no support for this plan (Exhibit 4 of Appendix C), the plan was given no further consideration. A review of Table 2 for Holes Creek shows three alternatives warranting further studies. The alternatives are the channel improvement, right bank levee, and nonstructural. However, a variety of channel sizes providing protection against flood levels ranging from a 25-year flood to a 500-year flood were considered for the channel improvement alternative. Economic evaluation (see Appendix E) of this range of channel designs resulted in the plan providing 25-year degree of protection having the greatest net benefits and the plan providing the 500-year degree of protection furnishing the best protection while remaining economically viable. These two channel improvement plans are included in the detailed analysis of plans. Although the nonstructural plan is not supported by local interests, the flood proofing plan is considered further as an alternative to the viable structural plans in conformance with the President's water policy contained in his Message to Congress on 6 June 1978.

TABLE 2

EVALUATION OF PRELIMINARY PLANS

Alternative-Plans (Total Est. First Cost)	Economic Feasibility	Damage Reduction	Remaining Damages	Public Views and/or Remarks
Holes Creek Reservoir ($9,500,000)	Unfeasible - Not quantified, but cost exceeds potential benefits	Not quantified; Appears 50% or less	Not quantified; Appears 50% or greater	Extensive development in considered pool area
Right Bank Holes Creek Levee ($4,400,000)	Feasible - 1.3 B/C	67%	$225,000	Public prefer ch. Imp.
Left Bank Holes Creek Levee ($2,230,000)	Unfeasible - 0.8 B/C	25%	492,000	
Right Bank Owl Creek Wall ($2,150,000)	Unfeasible - 0.5 B/C	40%	141,000	
Allen Plat Levee and Wall ($1,650,000)	Unfeasible - 0.4 B/C	27%	170,000	
Holes Creek Channel Imp.				
25-Year Plan ($3,760,000)	Feasible - 2.0 B/C	84%	108,000	Public prefer higher degree of protection
100-Year Plan ($6,050,000)	Feasible - 1.3 B/C	88%	81,000	Acceptable
500-Year Plan ($6,430,000)	Feasible - 1.3 B/C	90%	70,000	Acceptable
Owl Creek Channel Imp.				
10-Year Plan ($2,500,000)	Unfeasible - 0.5 B/C	42%	135,000	
25-Year ($2,810,000)	Unfeasible - 0.5 B/C	44%	130,000	
Holes Creek Interbasin Diversion ($9,000,000)	Unfeasible - Not quantified, but cost exceeds potential benefits	Not quantified; Appears less than 50%	Not quantified; Appears greater than 50%	High cost due to length and required structures
Owl Creek Interbasin Diversion ($540,000)	Unfeasible - Not quantified, but cost exceeds potential benefits	Not quantified	Not quantified	

TABLE 2 (Continued)

Alternative-Plans (Total Est. First Cost)	Economic Feasibility	Damage Reduction	Remaining Damages	Public Views and/or Remarks
Raise-in-Place - Holes Creek ($480,000)	Feasible - 1.2 B/C	7%	$609,000	Not effective; Not acceptable to local sponsor
Raise-in-Place - Owl Creek ($304,000)	Unfeasible - 0.9 B/C	9%	212,000	Not effective; Not acceptable to local sponsor
Flood Proofing - Holes Creek ($1,640,000)	Feasible - 3.2 B/C	55%	304,000	Not acceptable to local sponsor
Flood Proofing - Owl Creek ($1,090,000)	Feasible - 1.7 B/C	58%	97,000	Not acceptable to local sponsor

Assessment and Evaluation of Detailed Plans

The previous section identified the plans warranting detailed studies. This section will furnish the description, impact assessment, and evaluation for each of the four plans studied in detail. For clarity during further discussion of these plans, the flood proofing plan, levee plan, 25-year channel improvement plan, and the 500-year channel improvement plan have been designated Plans A, B, C and D, respectively.

Plan A

PLAN DESCRIPTION.

The flood proofing alternative for Holes Creek is designed to prevent flood waters from entering structures up to the 100-year flood level. This can be accomplished by installation of permanent and/or semi-permanent closures for various openings, installation of a sewer gate valve and waterproofing the exterior either by special coating or by construction of a new exterior cutoff wall (masonry) in the case of frame structures. Indications are that flood proofing should be limited to a maximum height of 3 feet to prevent induced structural damage from excessive hydrostatic pressures. Flood proofing was evaluated as being applicable to all categories of flooding such as basement only, structure only, and combination basement-structure flooding. The principal exception would be that flood proofing techniques are not seen as applicable to basement garage door openings due to the hydrostatic pressure on such an expanse and size, strength, cost and installation time factors for such a flood proofing closure. Assuming one-third of those units suffering basement flooding at the 100-year level would not be candidates for flood proofing, 272 out of 305 total units could be flood proofed. Also, Plan A was expanded to include environmental enhancement element (see Appendix B, Plate B-2), which consists of acquisition of about 24 acres along Holes Creek. The acquisition configuration resembles a strip-node concept in that the stream bed and bank are acquired as well as any

adjacent valuable wildlife habitat areas. This land is to be preserved in its natural state to insure that the existing fish and wildlife habitat is not destroyed or degraded in the future.

IMPACT ASSESSMENT.

The principal impacts of this plan would be to reduce flood damages and to enhance the environment. Damages to basements only, structures only, or combination basements and structures can be prevented adopting the available flood proofing techniques to individual structural types. A secondary beneficial impact would be that flood proofing would not significantly alter the visual and aesthetic character of the neighborhood. Also, flood proofing can be adopted to almost any structure in good condition.

Negative impacts associated with the alternative reside in the fact that the structures are situated in the flood plain and active protection measures, requiring the property owner's presence for installation or placement, are necessary in coping with the less frequent, more severe flood events. The relatively short time of concentration of flood waters requires the presence of the owner for placement of all moveable closures. A secondary negative impact would be that a flood proofed structure may be isolated at the peak of flooding which would pose a particular threat in case of an additional emergency. The tax base would be affected by the transfer of 24 acres to public control.

The flood proofing element would not significantly affect the environmental, natural resources, nor cultural resources. Construction activities should cause no major impacts. Some social problems may result, as many of the protected houses would be isolated during flood periods. The acquisition of the environmental enhancement land does not include any houses nor improvements. The major impact would be the enhancement of fish and wildlife resources of the area by preservation of the remaining valuable habitat areas. An impact assessment summary for the detailed plans is displayed in Table 7.

EVALUATION AND TRADE-OFF ANALYSIS.

This plan providing 100-year flood protection to 272 residences would provide a 55% reduction in average annual damages (AAD). The flood proofing element by itself has a benefit to cost ratio of 3.2. The total first cost for acquisition of the enhancement lands is estimated to be $500,000. When this cost is added to the flood proofing element, the resulting benefit to cost ratio for Plan A is 2.5. Although the plan is economically sound and enhances the environment, it does not fully meet all criteria. Residual damages and associated health and safety problems with the plan in effect would be significant. Local support for the plan and actual implementation are questionable. An evaluation summary for the detailed plans is presented in Table 8.

IMPLEMENTATION RESPONSIBILITIES.

The Flood Control Act of 1936, as amended, establishes the present basis for Federal and non-Federal sharing of responsibilities in the construction, operation, and maintenance of Federal water resource projects. However, the President's water policy statement, contained in his Message to Congress on 6 June 1978, proposes changes to existing cost sharing policy. The discussion in the following paragraphs will provide data for the present policy and for the President's proposal.

Cost Apportionment. Sharing of costs between Federal and non-Federal interests for the flood proofing plan based on the present policy for "local protection" improvements is shown in Table 3. The existing policy requires cost sharing for the flood proofing element at the rate of 80% total cost Federal and 20% non-Federal, and for the environmental enhancement element at the rate of 75% Federal and 25% non-Federal. Under the President's proposal, the first cost would be shared between Federal (75%), local (20%), and State (5%). The costs for any operation and maintenance are 100 percent non-Federal for both cost sharing methods. Table 3 shows the apportionment of the first costs and annual costs between Federal and non-Federal interests for Plan A.

TABLE 3

COST APPORTIONMENT ($1,000)
PLAN A

	Flood Proofing Plan	
	Present Policy	President's Policy
First Cost		
Federal	1,690	1,600
State	0	110
Local	450	430
Total	2,140	2,140
Annual Cost (50 yrs @ 7-1/8%)		
Federal	124	118
State	0	8
Local	33	31
Total	157	157

Federal Responsibilities. The Federal Government will design and prepare detailed plans and specifications, let construction contracts, and supervise and administer the construction of the project. The completed project would be annually inspected by Federal inspectors to assure that it remains effective.

Non-Federal Responsibilities. The non-Federal interests would operate, maintain, and provide any necessary replacements for the project. The above and following requirements are applicable for either cost sharing method:

Hold and save the United States free from damages due to the construction works, excluding damages due to the fault or negligence of the United States or its contractors.

At least annually inform affected interests regarding the limitation of the protection afforded.

Prescribe and enforce regulations to prevent obstructions or encroachment on channels which would reduce their flood carrying capabilities.

Comply with applicable provisions of (1) the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), and (2) Section 601, Title VI, of the Civil Rights Act of 1964 (Public Law 83-352).

Also, for the present policy and possibly the President's proposal (where this requirement would be in lieu of a cash contribution), the acquisition of lands, easements, and rights-of-way necessary for the construction of the project will be a local responsibility.

PUBLIC VIEWS

Views of Federal Agencies. Comments received from other Federal agencies generally requested to be kept advised of study progress and to be provided the opportunity for comments at a later date. The Fish and Wildlife Service has participated in the study by furnishing information concerning the base condition and the analysis for impacts of alternatives on Fish and Wildlife resources. Pertinent correspondence is included in Appendix C.

Views of Non-Federal Agencies and Others. The views of non-Federal agencies have been obtained by several meetings with local officials and Miami Conservancy District (MCD) representatives. Also, their views as well as other non-Federal agencies and the general public were solicited at the Plan Formulation Public Meeting held in West Carrollton on 14 December 1978. The main views of local officials concern the elimination of flooding along lower Owl and Holes Creeks. The views presented at the public meeting, which was attended by 65 to 70 persons, range from objections to any improvements to support for continuation of effort to determine the best plan. Specific comments came from the local sponsor, MCD, and consisted of general opposition to nonstructural plans due to their potential for degrading the affected area, likely social problems, and the ineffectiveness in reducing flood damages (see Exhibit 4 of Appendix C).

Plan B

PLAN DESCRIPTION.

The Plan B levee would start at high ground just east of Lamme Road and extend westward along an existing drainage ditch to Holes Creek where it would follow the right bank of Holes Creek to its terminus at the Interstate I-75 ramp embankment. The plan would provide Standard Project Flood protection to the right overbank from Lamme Road to the Interstate I-75 ramp. The main features of the plan consist of 3,480 feet of earth levee, 860 feet of concrete wall, one pumping plant to handle interior drainage, 1,500 feet of channel realignment, and a sand bag closure on Lamme Road. The channel realignment is necessary in order to provide adequate space between the channel and existing homes for levee construction. Plan B is shown on Plate B-3 of Appendix B.

IMPACT ASSESSMENT

The primary effect of this plan would be the enhancement of social well-being and the economy through the reduction of the flood problem. For the protected area, flood damages, potential health hazards, isolation, and possible loss of lives would be averted by implementation of the plan.

The community tax base would be adversely effected by the removal of about 12.5 acres of land for project purposes. However, this loss would be offset somewhat by increased property values due to protection from flooding. The local economy would be impacted favorably during the construction period by the temporary employment of construction workers.

The use of concrete wall in lieu of earth levee and the realignment of Holes Creek are measure taken to prevent the necessity of taking several homes. Plan B requires no relocation of residents or businesses.

Major impacts to the physical environment would occur where the natural features of the right bank are replaced by a man-made earth levee or concrete wall. Also, the 1,500 feet of channel realignment with filling of the old channel would significantly change the physical environment for this reach. The levee and wall would have an adverse aesthetic impact on the area. The existing vegetation ranging from lawns to wooded streambanks will be removed in the construction area. The above alterations would effect the variety and density of wildlife presently using the area. In accordance with the Fish and Wildlife Service recommendation (see Exhibit 12, Appendix C), the preservation of about one acre of wildlife habitat adjacent to the levee and Conrail Railroad is included in the plan.

No archeological or historical sites have been identified on lands needed for construction of the levee.

Construction activities would also result in short-term increases in erosion and sedimentation, traffic, dust and noise levels. The movement of heavy equipment and materials could cause temporary inconvenience to nearby residents.

Selective measures would be employed during construction to reduce the adverse impacts. These measures would include erosion control, dust control, and seeding of disturbed areas confining the work area and landscaping. These measures would reduce the magnitude and duration of adverse impacts.

For the protected area the plan would have beneficial impacts on aesthetics reducing silt deposits, and trash and debris accumulations associated with flooding, and neighborhood improvements could be expected when the threat of frequent flooding is eliminated. The unprotected left bank would still be subjected to flooding and its adverse impacts.

EVALUATION AND TRADE-OFF ANALYSIS.

Plan B would provide a high degree of protection (up to the Standard Project Flood) for the developments on the right bank of Holes Creek. The major economic benefits that would result from the plan are reduction of

flood damages. Approximately 265 residences, nine business establishments and associated municipal and utility facilities would be protected. Flood damages would be virtually eliminated for the protected area. For the total four-reach study area, flood damages are reduced by 67 percent.

The main residual damages would be concentrated in the residential development on the left bank between Conrail Railroad and Springboro Pike. Damages in other reaches are rather small (see Table E-15), but do contribute to the total residual damages. A summary of the evaluation of Plan B is shown in Table 8.

IMPLEMENTATION RESPONSIBILITIES.

The Flood Control Act of 1936, as amended, establishes the present basis for Federal and non-Federal sharing of responsibilities in the construction, operation and maintenance of Federal water resource projects. However, the President's water policy statement, contained in his Message to Congress on 6 June 1978, proposes changes to existing cost sharing policy. The discussion in the following paragraphs will provide data for the present policy and for the President's proposal.

Cost Apportionment. Sharing of costs between Federal and non-Federal interests for the right bank levee based on the present policy for "local protection" improvements is shown in Table 4. Under this policy, non-Federal interests would be required to furnish all lands and rights-of-way, including relocation assistance and the modification to all utilities and roads. Under the President's proposal, the first cost would be shared between Federal (75%), local (20%), and State (5%). For both methods the local sponsor would be required to cost share on the land compensation feature at the same ratio as the remainder of project costs. The costs for operation and maintenance are 100 percent non-Federal for both cost sharing methods. Table 4 shows the apportionment of the first costs and annual costs between Federal and non-Federal interests for Plan B.

TABLE 4

COST APPORTIONMENT (1,000)
PLAN B

	Right Bank Levee Plan	
	Present Policy	President's Policy
First Cost		
Federal	$2,770	$3,300
State	0	220
Local	1,630	880
Total	$4,400	$4,400
Annual Cost		
Federal	$198	$ 236
State	0	16
Local	162	108
Total	$360	$ 360

Federal Responsibilities. The Federal Government will design and prepare detailed plans and specifications, let construction contracts, and supervise and administer the construction of any project. The completed project would be annually inspected by Federal inspectors to assure that it remains effective.

Non-Federal Responsibilities. The non-Federal interests would operate, maintain, and provide any necessary replacements for the project. The above and following requirements are applicable for either cost sharing method:

Hold and save the United States free from damages due to the construction works, excluding damages due to the fault or negligence of the United States or its contractors.

At least annually inform affected interests regarding the limitation of the protection afforded.

Prescribe and enforce regulations to prevent obstructions or encroachment on levees and ponding areas which would reduce their flood control purposes or hinder their operation and maintenance.

Comply with applicable provisions of (1) the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), and (2) Section 601, Title VI, of the Civil Rights Act of 1964 (Public Law 83-352).

For the present policy and possibly the President's proposal, the acquisition of lands, easements, and rights-of-way necessary for the construction of the project will be a local responsibility.

PUBLIC VIEWS.

Views of Federal Agencies. Comments received from other Federal agencies generally requested to be kept advised of study progress and to be provided the opportunity for comments at a later date. The Fish and Wildlife Service has participated in the study by furnishing information concerning the base condition and the analysis for impacts of alternatives on Fish and Wildlife resources. Pertinent correspondence is included in Appendix C.

Views of Non-Federal Agencies and Others. The views of non-Federal agencies have been obtained by several meetings with local officials and Miami Conservancy District (MCD) representatives. Also, their views as well as other non-Federal agencies and the general public were solicited at the Plan Formulation Public Meeting held in West Carrollton on 14 December 1978. The main views of local officials concern the elimination of flooding along lower Owl and Holes Creek. The views presented at the public meeting, which was attended by 65 to 70 persons, range from objections to any improvements to support for continuation of effort to determine the best plan. The local sponsor, Miami Conservancy District, offered opposition to the levee plan due to potential increase of damages on the left bank and the incomplete protection provided for the area. Pertinent correspondence is included in Appendix C.

Plan C

PLAN DESCRIPTION.

The Plan C channel improvement would start at Lamme Road Bridge and continue downstream to its terminus just downstream of the Interstate 75 ramp bridge. The new channel follows the existing alignment except for two stretches between Lamme Road and Springboro Pike (see Appendix B, Plate B-4) and stretch by Conrail Railroad where existing stream meanders are modified. The plan would provide 25-year degree of protection for the extent of the project, which includes the major damage centers for Holes Creek. The main features of the plan consist of about 2,600 feet of trapezoidal channel with 6:1 grass side slopes, about 1,900 feet of trapezoidal channel with 3:1 riprap side slopes, the replacement of the Conrail Railroad Bridge, and shaping one slope only for about 1,200 feet.

IMPACT ASSESSMENT.

The primary beneficial impact of Plan C would be the enhancement of social well-being and the economy through the reduction of the flood problem. Flood damages, potential health hazards, isolation, and possibility of loss of lives would be reduced by the plan as the more frequent floods (up to 25-year frequency) would be prevented and impacts from the higher or infrequent floods would be reduced.

The community tax base would be adversely effected by the removal of about 25 acres of land for project purposes. However, this loss would be offset somewhat by increased property values due to protection provided. The local economy would be impacted favorably during the construction period by the temporary employment of construction workers.

Plan C requires no relocation of residents. However, three small commercial structures would have to be relocated.

Major impacts to the physical environment would consist of destruction of streambank vegetation for about 9,000 linear feet, and major alterations to the existing aquatic habitat for approximately 4,500 feet and minor alterations for another 1,200 feet. The disposal of excavated materials is expected to have rather minor impacts. The present natural stream conditions would be replaced by a "manicured" channel. In general accordance with the Fish and Wildlife Service recommendations (see Exhibit 13, Appendix C), the preservation of a woodlot (about 4 acres) located on the left bank downstream of Springboro Pike, furnishing valuable wildlife habitat, is included in the plan.

No archeological or historical sites have been identified on lands needed for construction of the new channel.

Construction activities would also result in short-term increases in erosion and sedimentation, traffic, dust and noise levels. The movement of heavy equipment and materials could cause temporary inconvenience to nearby residents.

Selective measures would be employed during construction to reduce the adverse impacts. These measures would include erosion and dust control measures, seeding of disturbed areas, confining the work area, and landscaping. These measures would reduce the magnitude and duration of adverse impacts.

Flood protection would also have beneficial impacts on aesthetics of the area by reducting silt deposits, trash and debris accumulations associated with flooding.

EVALUATION AND TRADE-OFF ANALYSIS

Plan C would provide some flood protection to all development downstream of Lamme Road. The plan would eliminate flooding up to a 25-year frequency flood and reduce the stages of all larger floods. The major economic benefits that would result from the plan are reduction of flood damages. For the four-reach study area, flood damages are reduced by 84 percent.

Although no unique environmental areas are effected, the existing stream and its banks are significantly altered. This detrimental loss of habitat and vegetation has to be compared to the beneficial economic gains and social well being aspects resulting from the flood protection provided. An evaluation summary for the detailed plans is presented in Table 8.

IMPLEMENTATION RESPONSIBILITIES.

The implementation responsibilities for Plan C are the same as for Plan B previously described.

Cost Apportionment. The apportionment of costs for this plan is by the same procedures as described for Plan B and is shown below in Table 5.

TABLE 5

COST APPORTIONMENT (1,000)
PLAN C

	Present Policy	President's Policy
First Cost		
Federal	$2,520	$2,820
State	0	188
Local	1,240	752
Total	$3,760	$3,760
Annual Cost		
Federal	$186	$ 208
State	0	14
Local	126	90
Total	$312	$ 312

Federal and Non-Federal Responsibilities. The division of responsibilities between Federal and non-Federal is the same as previously described for Plan B.

PUBLIC VIEWS.

The Fish and Wildlife Service recommended that pools and riffles be established in the new channel, a low flow channel be constructed, and one bank be left in its natural state. The Fish and Wildlife letter reports are contained in Appendix C.

Views of non-Federal Agencies and Others. General views concerning the study and plans by local agencies and the public are the same as presented for Plan B, except for comments by MCD. By letter (see Appendix C), MCD offered specific support for the channel improvement alternative, but emphasized that a high degree of protection was desired.

Plan D

PLAN DESCRIPTION.

Plan D is very similar to Plan C, except that it provides a much higher degree of protection (500-year) and it includes complementary measures for reducing adverse environmental impacts. To provide the higher degree of protection, the channel width is considerably larger than Plan C, additional modifications are required at the Conrail Railroad and Springboro Pike bridges, and the channel is extended about 1,000 feet upstream of the Lamme Road bridge and downstream to the Interstate 75 bridge. The total length of the plan is 7,550 feet. The trapezoidal design of Plan C has been modified for Plan D to include leaving one bank, where possible, in its natural condition, providing a low flow channel, and constructing riffles and pools. See Plates 2, 3 and 4 for the design features of Plan D.

IMPACT ASSESSMENT.

Since the plan has the same alignment and major features of Plan C, the impacts would be similar. However, the magnitude of these impacts would be affected adversely by the larger channel size, and beneficially by the compensation measures and higher degree of protection provided. The impacts of this plan are displayed in Table 7.

EVALUATION AND TRADE-OFF ANALYSIS.

Evaluation and trade-off analysis would be similar to Plan C, with the major exceptions of higher flood protection provided and reduced environmental impacts. Plan D would eliminate flooding up to a 500-year frequency flood,

and reduce the stages of any larger floods. The plan would reduce the total average annual damages for the study area by about 90 percent. The complementary design measures would reduce adverse impacts to the aquatic and streambank environments. Leaving one bank in its natural state or reestablishing similar conditions where necessary would maintain much of the existing natural habitat and aesthetics. The establishment of a low flow channel, and pools and riffles should allow for quick recovery of the aquatic life in the stream. Table 8 presents a summary of the evaluation and trade-off analysis.

IMPLEMENTATION RESPONSIBILITIES.

The implementation responsibilities for Plan D are the same as previously described for Plans B and C.

Cost Apportionment. The apportionment of cost for this plan is by the same procedure as described for Plans B and C, and is shown below in Table 6.

TABLE 6

COST APPORTIONMENT (1,000)
PLAN D

	Present Policy	President's Proposal
First Cost		
Federal	$4,600	$4,820
State	0	320
Local	1,830	1,290
Total	$6,430	$6,430
Annual Cost		
Federal	$339	$355
State	0	24
Local	170	130
Total	$509	$509

Federal and Non-Federal Responsibilities. The division of responsibilities between Federal and non-Federal is the same as previously described in Plans B and C.

PUBLIC VIEWS

Views of Federal Agencies. The views of Federal Agencies are exhibited in Section B of Appendix C and the views in response to review of the draft report and EIS are exhibited in Section C of Appendix C. Corps of Engineers responses to the comments and views by other agencies are located in Section C of Appendix C. The exception is the U. S. Fish and Wildlife Service's final report (see Section B, Appendix C) which was furnished pursuant to the Fish and Wildlife Coordination Act. As previously discussed, Plan D has incorporated several features, generally in conformance with Fish and Wildlife Service's draft report (see Section B, Appendix C), to lessen adverse impacts to the existing fish and wildlife of the area. Some modifications to Plan D have occurred as a result of receipt of more refined data, public views and concerns, and comments from other agencies. The Fish and Wildlife Service, considering these modifications and possibly other factors, have included additional recommendations in their final report. In summary, their recommendations are: (1) include three areas of natural channel, bypassed by Plan D, and an area west and adjacent to Conrail Railroad in wildlife conservation easements and determine the feasibility of managing at least one of the areas for aquatic resources; (2) seeding and planting disturbed areas in species valuable to wildlife; (3) reducing the width of the low flow channel to 10 feet or less and including pools under bridges; (4) placing of clean gravel in the new channel; and (5) designing the project to allow uninhibited movement of fish species. Items (2) and (5) are felt to be adequately addressed by Plan D, although specificity must be delayed until detailed design studies are completed. For items (3) and (4), although the present low flow channel design of 30 feet with 10-foot ripple areas and use of existing subsrate appears to better approximate natural conditions, further consideration of these recommendations can be accomplished during post authorization studies. It is expected that at least a portion of all four

areas in item (1) will be acquired by the selected plan. All three of the natural channel areas have been assumed to be filled and made available for recreational use, and, as such, can include plantings for wildlife. A large portion of the fourth area will be required for construction and the small remaining area will most likely be acquired as severance lands. Again, specificity on the actual status of the areas must be delayed until detailed post authorization studies are completed.

Views of Non-Federal Agencies and Others. The same views and comments, as a result of the Plan Formulation Public Meeting, previously presented for Plan C applies to Plan D. At the Final Public Meeting, Plan D was supported by local officials. From the general public some opposition to any type of improvements was received. Appendix C contains responses received as a result of the public meeting and review of the draft report.

TABLE 7

IMPACT ASSESSMENT SUMMARY
OF DETAILED PLANS

Impact and Evaluation Factors	Most Probable Future "Without Conditions"	PLANS PLAN A (Nonstructural Plan) Flood Proofing Providing 100-Year level of Protection and F&W Enhancement Lands	PLAN B SPF Right Bank Levee Plan	PLAN C 25-Year Channel Improvement Plan	PLAN D 500-Year Channel Improvement Plan
Planning Objective (Reduction of Flood Damages)	AAD = $445,000 in 1985; increases to $641,000 by 2000 - Total AAD $681,000	55 Percent	67 Percent	84 Percent	90 Percent
IMPACT ASSESSMENT					
National Economic Development					
Project First Costs 1/ ($1,000)		2,140	4,400	3,760	6,430
Federal	---	1,690	2,770	2,520	4,600
Non-Federal	---	450	1,630	1,240	1,830
Project Annual Costs 1/ ($1,000)		157	360	312	509
Federal	---	124	198	186	339
Non-Federal	---	33	162	126	170
Residual AAD ($1,000)		304	225	108	70
Benefits AAE ($1,000)	---	385	462	615	670
Benefit-Cost Ratio	---	2.5	1.3	2.0	1.3
Net Benefits ($1,000)	---	228	102	303	161
Environmental Quality					
Riparian Vegetation (Streambanks)	Stream canopy; good songbird and small mammals habitat along 3-mile reach; 80% of which is wooded	Preservation of about 24 acres of fish and wildlife habitat	Eliminates about 10% of wooded streambanks in 3-mile reach. Preservation of about 1 acre of wildlife habitat	Eliminates about 30 of wooded streambanks in 3-mile reach. Preservation of about 4 acres of wildlife habitat	Eliminates about 30 of wooded streambanks in 3-mile reach. Preservation of about 4 acres of wildlife habitat

TABLE 7 - (CONTINUED)

Impact and Evaluation Factors	Most Probable Future "Without Conditions"	PLANS PLAN A (Nonstructural Plan) Flood Proofing Providing 100-Year level of Protection and P&WL Enhancement Lands	PLAN B SPF Right Bank Levee Plan	PLAN C 25-Year Channel Improvement Plan	PLAN D 500-Year Channel Improvement Plan
Aquatic Habitat	Shallow pools and riffles supports viable community of fishes	Preservation of 4,300 feet of Holes Creek	Alteration of 1,500 feet	Alteration of 4,500 feet of aquatic habitat	Alteration of [illegible] feet of aquatic habitat
Social Well Being					
Number of Residential Properties Affected (Protected under Plans) and Degree of Protection	305 in 100-year flood plain	272 houses protected to 100-year level	265 units receive SPF level of protection	300 units receive minimum 25-year degree of protection	More than 300 units receive minimum 500-year degree of protection
Community Cohesion	As flooding increases in future years, neighborhoods may deteriorate and residence may move - depends on severity of flooding.	Cohesion could be affected	Right bank enhanced	STABILITY OF COMMUNITY ENHANCED	
Health and Safety	Transportation water and utility services subject to interruption, outages, etc.	No significant impact	BENEFITS COMMENSURATE WITH LEVEL OF PROTECTION PROVIDED		
Regional Development					
Local Cost	Cost of flood insurance for structures; damage not covered by insurance	Flood insurance premiums greatly reduced for 272 residents	Flood insurance premiums eliminated for 196 protected units; reduction of damages not covered by insurance; and added local cost for implementing plan	Flood insurance premiums reduced for 300 units partially protected; reduction of damages not covered by insurance; and added cost for implementing plan	Flood insurance premiums reduced by 100% for 300 units; reduction of damages not covered by insurance; and added cost for implementing plan
Employment	No induced	5 new jobs for about 1-1/2 years	10 new jobs for about 1-1/2 years	9 new jobs for about 1-1/2 years	17 new jobs for about 1-1/2 years

1/ Cost sharing data based on existing policy.

	NO ACTION PLAN (WITHOUT CONDITION) LOCATION OF IMPACTS		WORST PLA LOCATI
	Region	Remainder of Nation	Region
1. National Economic Development (NED)			
a. Beneficial Impacts			
(1) Value of Increased Output of Goods and Services			
Flood Damage Reduction	Gradual reduction in damages 3/ 6/ 9/	Growth in damages reduced 3/ 6/ 9/	$377,[illegible] 2/ 6/ 9/
Advance Replacement of R. R. Bridge	None	None	None
Savings to Flood Insurance Administration	None	None	$[illegible],000 2/ 6/ 10/
(2) Total NED Benefits	Minor positive impact	Minor positive impact	$385,[illegible]
b. Adverse Impacts			
(1) Plan Costs	Cost of flood insurance premiums 2/ 6/ 9/	Cost to subsidize flood insurance 2/ 6/ 9/	$2,140,[illegible]
(2) Total NED Costs	Not quantified	Not quantified	$2,140,000
c. Net NED Impact	Not quantified	Not quantified	$928,000
d. Benefit/Cost Ratio	Indeterminate	Indeterminate	2.5
2. Environmental Quality (EQ)			
a. Beneficial Impacts			
(1) Natural Resources*	Minor savings in repair materials 2/ 5/ 10/	Minor savings in repair materials 2/ 5/ 10/	Savings of materials fo repair and replacement damaged property 2/ 4/
(2) Preservation of Habitat	Floodway subject to alterations, unidentified at this time 2/ 5/ 10/	Indeterminate	Positive contribution by preservation of 24 acre stream and adjacent habi 1/ 6/ 9/
b. Adverse Impacts			
(1) Water*, Air*, and Noise* Quality	Minor short-term sediment pollution 3/ 4/ 10/	Insignificant	None
(2) Natural Resources*	Eventful elimination of material in present development 3/ 6/ 10/	Eventful elimination of material in present development 3/ 6/ 10/	Commitment of construct materials and minor fue 1/ 5/ 9/
(3) Ecological Systems	Minor impacts due to relocation 3/ 6/ 10/	Insignificant	Insignificant

TABLE 8

EVALUATION SUMMARY OF DETAILED PLANS

PLAN A NONSTRUCTURAL PLAN FLOOD PROOFING LOCATION OF IMPACTS		PLAN B RIGHT BANK LEVEE PLAN SPF LEVEL OF PROTECTION LOCATION OF IMPACTS		PLAN 25-YEAR CHANNEL 5,700' OF IM LOCATION OF
Region	Remainder of Nation	Region	Remainder of Nation	Region
$377,000 2/ 6/ 9/	Indeterminate	$456,000 2/ 6/ 9/	Indeterminate	$573,000 2/ 6/ 9/
None	None	None	None	$35,000 2/ 5/ 9/
8,000 2/ 6/ 10/	Indeterminate	6,000 2/ 6/ 10/	Indeterminate	$7,000 2/ 6/ 10/
$385,000	Indeterminate	$462,000	Indeterminate	$615,000
$2,140,000	Indeterminate	$4,400,000	Indeterminate	$3,760,000 2/ 6/ 9/
$2,140,000	Indeterminate	$4,400,000	Indeterminate	$3,760,000
$228,000	Indeterminate	$102,000	Indeterminate	$303,000
2.5	Indeterminate	1.3	Indeterminate	2.0
Savings of materials for repair and replacement of damaged property 2/ 4/ 9/	Savings of materials for repair and replacement of damaged property 2/ 4/ 9/	Savings of material for repair and replacement of damaged property 2/ 4/ 9/	Savings of material for repair and replacement of damaged property 2/ 6/ 9/	Savings of materials for repair and replacement of damaged property 2/ 6/ 9/
Positive contribution by preservation of 24 acres of stream and adjacent habitat 1/ 6/ 9/	None	Positive contribution by preservation of about 1 acre of wildlife habitat 1/ 6/ 9/	None	Positive contribution by preservation of about 4 acres of woodland 1/6/9/
None	None	Short-term major increase in stream sediment, dust, and noise levels 1/ 6/ 9/	Short-term increase in turbidity on Miami River 1/ 6/ 9/	Short-term increase in turbidity on Miami River
Commitment of construction materials and minor fuel 1/ 5/ 9/	Commitment of construction materials and minor fuel 1/ 5/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/
Insignificant	None	Minor alteration of aquatic habitat and major alteration to right streambank habitat 1/ 6/ 9/	None	Major alteration of aquatic and streambank habitat 1/ 6/ 9/

B LEVEE PLAN PROTECTION IMPACTS Remainder of Nation	PLAN C 25-YEAR CHANNEL IMPROVEMENT 5,700' OF IMPROVEMENT LOCATION OF IMPACTS Region	Remainder of Nation	PLAN D 500-YEAR CHANNEL IMPROVEMENT 7,550' OF IMPROVEMENT LOCATION OF IMPACTS Region	Remainder of Nation
Indeterminate	$573,000 2/ 6/ 9/	Indeterminate	$612,000 2/6/9/	Indeterminate
None	$35,000 2/ 5/ 9/	Indeterminate	$49,000 2/5/9/	Indeterminate
Indeterminate	$7,000 2/ 6/ 10/	Indeterminate	$9,000 2/6/10/	Indeterminate
Indeterminate	$615,000	Indeterminate	$670,000	Indeterminate
Indeterminate	$3,760,000 2/ 6/ 9/	Indeterminate	$6,430,000 2/6/9/	Indeterminate
Indeterminate	$3,760,000	Indeterminate	$6,430,000	Indeterminate
Indeterminate	$303,000	Indeterminate	$161,000	Indeterminate
Indeterminate	2.0	Indeterminate	1.3	Indeterminate
Savings of material for repair and replacement of damaged property 2/ 6/ 9/	Savings of materials for repair and replacement of damaged property 2/ 6/ 9/	Savings of material for repair and replacement of damaged property 2/ 6/ 9/	Savings of material for repair and replacement of damaged property 2/ 6/ 9/	Savings of material for repair of replacement of damaged property 2/ 6/ 9/
None	Positive contribution by preservation of about 4 acres of woodland 1/6/9/	None	Positive contribution as one natural bank/overbank zones under public control and about 4 acres of woodland is preserved 1/6/9/	None
Short-term increase in turbidity on Miami River 1/ 6/ 9/	Short-term increase in turbidity on Miami River	Short-term increase in turbidity in Miami River	Short-term increase in turbidity in Miami River	Short-term increase in turbidity in Miami River
Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/	Commitment of fuel and construction materials 1/ 6/ 9/
None	Major alteration of aquatic and streambank habitat 1/ 6/ 9/	None	Major alteration of aquatic and streambank habitat 1/ 2/ 3/	None

	NO ACTION PLAN (WITHOUT CONDITION) LOCATION OF IMPACTS		
	Region	Remainder of Nation	Region
3. Social Well-Being			
a. Beneficial Impacts			
(1) Health, Safety, and Community Well-Being	Gradually reduces susceptibility of area to flood impacts 3/ 6/ 10/	Insignificant	Insignificant
(2) Aesthetic Values*	Gradually conversion to open space 3/ 5/ 10/	None	None
(3) Community Cohesion*	None	None	Insignificant
b. Adverse Impacts			
(1) Health, Safety, and Community Well-Being	Unless entirely relocated, residents subject to flood impacts 2/ 5/ 9/	Insignificant	Area will contin subjected to flo 2/ 6/ 9/
(2) Aesthetic Values*	Potential for unsightly condition 3/ 4/ 10/	None	Potential for un neighborhood 2/
(3) Community Cohesion*	Major disruption of community 3/ 4/ 10/	None	Potential minor due to some relo
4.. Regional Development			
a. Beneficial Impacts			
(1) Increased Income	Positive, difference between flood insurance premiums and flood damages 1/ 6/ 9/	None	Reduction of ins premiums 2/ 6/ 9/
(2) Increased Employment*	Insignificant	None	S construction years 1/ 5/ 9/
b. Adverse Impacts			
Decreased Income	Damages not covered by insurance 2/ 6/ 9/	None	Damages not prev and local cost o

Index of Footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation).

Uncertainty 1/

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less than 10%.

Exclusivity

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because necessary additional actions are lacking.

Section 122

*Items specifically required in Section 122 and App B in ER 1105-2-240.

1/ Easily reversible measures are desirable in cases where uncertainty of impact is high.

TABLE 8 - (CONTINUED)

	PLAN A NONSTRUCTURAL PLAN FLOOD PROOFING LOCATION OF IMPACTS		PLAN B RIGHT BANK LEVEE PLAN SPF LEVEL OF PROTECTION LOCATION OF IMPACTS		PLAN C 25-YEAR CHANNEL IMPRO 5,700' OF IMPROVEM LOCATION OF IMPACT	
on	Region	Remainder of Nation	Region	Remainder of Nation	Regio	Remai
	Insignificant	None	Major reduction to susceptibility of flood impacts for right bank area 2/ 6/ 9/	Insignificant	Major reduction to susceptibility of flood impacts for study area 2/ 6/ 9/	Insign
	None	None	Reduces flood debris and flood related constraints to improvements 2/ 6/ 9/	None	Reduces flood debris and flood related constraints to improvements 2/ 6/ 9/	None
	Insignificant	None	Protected area can remain intact 2/ 6/ 9/	None	Protected area can remain intact 2/ 6/ 9/	None
	Area will continue to be subjected to flood problems 2/ 6/ 9/	Indeterminate	None	None	None	None
	Potential for unsightly neighborhood 2/ 5/ 9/	None	"Manicured" levee replaces natural area 2/ 6/ 9/	None	Partial "manicured" look of new channel 2/ 6/ 9/	None
	Potential minor disruption due to some relocation 1/ 4/ 9/	None	Inequity of protection could split community (short-term) 2/ 4/ 9/	None	None	None
	Reduction of insurance premiums 2/ 6/ 9/	None	Reduction of premiums and damages not covered by insurance 2/ 6/ 9/	None	Reduction of premiums and damages not covered by insurance 1/ 5/ 9/	None
	5 construction jobs for 1-1/2 years 1/ 5/ 9/	None	10 construction jobs for 1-1/2 years 1/ 5/ 9/	None	9 construction jobs for 1-1/2 years 1/ 5/ 9/	None
	Damages not prevented by plan and local cost of plan 2/ 6/ 9/	None	Added cost as net between premiums and local cost - not quantified 2/ 6/ 9/	None	Added cost as net between premiums and local cost - not quantified 2/ 6/ 9/	None

tion.

INUED)

PLAN B RIGHT B - LEVEE PLAN SPF LEVEL OF PROTECTION LOCATION OF IMPACTS		PLAN C 25-YEAR CHANNEL IMPROVEMENT 5,700' OF IMPROVEMENT LOCATION OF IMPACTS		PLAN D 500-YEAR CHANNEL IMPROVEMENT 7,550' OF IMPROVEMENT LOCATION OF IMPACTS	
	Remainder of Nation	Region	Remainder of Nation	Region	Remainder of Nation
susceptibility of impacts for 2/ 6/ 9/	Insignificant	Major reduction to susceptibility of flood impacts for study area 2/ 6/ 9/	Insignificant	Major reduction to susceptibility of flood impacts for study area 2/ 6/ 9/	Insignificant
ris and flood s to improve-	None	Reduces flood debris and flood related constraints to improvements 2/ 6/ 9/	None	Reduces flood debris and flood related constraints to improvements 2/ 6/ 9/	None
remain	None	Protected area can remain intact 2/ 6/ 9/	None	Protected area can remain intact 2/ 6/ 9/	None
	None	None	None	None	None
replaces 9/	None	Partial "manicured" look of new channel 2/ 6/ 9/	None	Partial "manicured" look of new channel 2/ 6/ 9/	None
tion could short-term)	None	None	None	None	None
ums and d by	None	Reduction of premiums and damages not covered by insurance 1/ 5/ 9/	None	Reduction of premiums and damages not covered by insurance 1/ 5/ 9/	None
bs for 1-1/2	None	9 construction jobs for 1-1/2 years 1/ 5/ 9/	None	17 construction jobs for 1-1/2 years 1/ 5/ 9/	None
between cost - 6/ 9/	None	Added cost as net between premiums and local cost - not quantified 2/ 6/ 9/	None	Added cost as net between premiums and local cost - not quantified 2/ 6/ 9/	None

Comparison of Detailed Plans

The comparison of plans will be based on data developed for the previous sections on Assessment and Evaluation of Detailed Plans. The significant impacts of each plan are compared with the remaining plans in order to select the best plans for meeting NED and EQ objectives, as well as tentatively selecting the best plan for meeting all objectives and criteria. The plans were compared using their significant impacts to NED, EQ, and social factors. Regional development impacts were not considered to be significant as the impacts are relatively minor and the public has not expressed a strong concern regarding regional income and employment effects. Table 9 summarizes the major impacts and ranks the plans for each major decision factor.

Designation of NED Plan

The NED plan should address the objectives in a way which maximizes net economic benefits. Net economic benefits are maximized when plan scale is optimized and the plan remains efficient. The plan must be based on sound design and includes measures for addressing all objectives. A review and analysis of Table 9 results in Plan C being designated the NED candidate plan. This plan has the highest net benefits. A further analysis (contained in Appendix E) to optimize the scale of the plan resulted in the determination that the 25-year plan was the most efficient.

Designation of EQ Plan

The EQ plan addresses the objectives in the way which emphasizes aesthetic, ecological, and cultural contributions. Beneficial EQ contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of the study area. Designating an EQ plan involves comparing the appropriate impacts in Table 9

for the plans and selecting the plan which contributes to or is most harmonious with environmental objectives. The construction activities required by Plan A would cause insignificant environmental impacts. With the preservation of about 24 acres of relatively valuable wildlife habitat, which includes about 4,300 feet of Holes Creek and adjacent lands, Plan A would enhance the environment during the life of the project. Without preservation action, much of the area would likely be destroyed or degraded in the near future. For these reasons, Plan A is designated the EQ plan.

TABLE 9

SUMMARY OF COMPARISON OF DETAILED PLANS

	Base Condition	Without Condition	PLAN A (EQ)	PLAN B	PLAN C (NED)	PLAN D
A. Plan Description	1979 Condition	Most probable future without additional flood control project	Flood proofing residential structures; 100-yr. level of of protection; and acquisition of 24 acres of environmental enhancement lands	3,480 feet of earth levee, 860 feet of concrete wall, one pump and 1,500 feet of channel change	5,700 feet of improvement with bottom widths varying from 60 to 110 feet	7,550 feet of improvement with bottom widths varying from 60 to 200 feet
B. Account Factors						
1. Economic						
(a) First Cost	--	--	$2,140,000	$4,400,000	$3,760,000	$6,430,000
(b) Annual Cost	--	--	$157,000	$360,000	$312,000	$509,000
(c) Flood Damages Prevented	None	Flood insurance program would gradually reduce damages	$377,000	$456,000	$573,000	$612,000
(d) Residual Flood Damages	Damages will continue to occur at an AAE rate of $498,200	Damages would gradually be reduced, but substantial damages would be expected to remain in 2020	$304,000	$225,000	$108,000	$70,000
(e) Benefit Cost Ratio	Not applicable	Not applicable	2.5	1.3	2.0	1.3
(f) Net Benefits	Not applicable	Not applicable	$228,000	$102,000	$303,000	$161,000
2. Planning Objectives for Holes Creek	Not applicable	Not applicable	Reduces flood damages on Lower Holes Creek by 55% and degree of protection is marginal	Reduces flood damages on Lower Holes Creek by 67% and degree of protection is high	Reduces flood damages on Lower Holes Creek by 84% and degree of protection is low	Reduces flood damages on Lower Holes Creek by 90% and degree of protection is adequate
3. Environmental						
(a) Noise, Air, and Water Quality	No effect	Minor short-term adverse impacts on noise, air, and water quality	Insignificant	Short-term adverse impact on noise, air, and water quality	Short-term adverse impact on noise, air, and water quality	Short-term adverse impact on noise, air, and water quality
(b) Ecological Systems	No effect	Minor adverse impacts due to some relocation of homes and infringement of development on the flood plain	Insignificant	Short-term adverse impact on aquatic habitat and major long-term impact on about 3,000' of overbank habitat	Major short-term adverse impact on aquatic habitat and major long-term adverse impact on about 9,000' of bank and overbank	Short-term adverse impact on aquatic habitat and major long-term adverse impact on about 9,000' of bank and overbank
(c) Preservation	No effect	Floodway subject to alteration to a degree by owners, not qualified	Preservation of about 24 acres	Levee and channel realignment area preserved in altered state, and the preservation of about one acre of habitat	Banks and channels preserved in altered state, and the preservation of about 4 acres of valuable wildlife habitat	One bank preserved for about 3,860 feet and about 4 acres of woodland preserved, and the other bank and channel preserved in altered state
4. Social						
(a) Community Cohesion	Stable	Potential disruption due to relocation	Potential disruption	Protected area preserved, but inequity of protection could cause disruption	Cohesion would be enhanced by protection	Cohesion would be enhanced by protection
(b) Aesthetics	Minor adverse after flooding	Minor adverse after flooding and potential	Minor effects on residential areas	"Manicured" levee replaces natural area	"Manicured" channel replaces natural stream	"Manicured" channel replaces natural stream
(c) Health, Safety and Well-being	Flood related problems will continue	Flood related problems will be reduced, but considerable flood problems likely to remain	Flood related problems will be reduced, but considerable flood problems likely to remain	Major reduction to flood problems on right bank	Major redution to flood problems for study area	Major reduction to flood problems for study area

TABLE 9. (Continued)

	Base Condition	Without Condition	PLAN A (EQ)	PLAN B	PLAN C (NED)	PLAN D
5. Regional Development						
(a) Employment	None	Insignificant	5 construction jobs for 1-1/2 years	10 construction jobs for 1-1/2 years	9 construction jobs for 1-1/2 years	17 construction jobs for 1-1/2 years
(b) Cost	Continued flood damages	Positive, as flood insurance premiums less than flood damages	Added cost, as project cost would exceed reduction in insurance premiums and reduction of damages not covered by insurance	Added cost, as project cost would exceed reduction in insurance premiums and reduction of damages not covered by insurance	Added cost, as project cost would exceed reduction in insurance premiums and reduction of damages not covered by insurance	Added cost, as project cost would exceed reduction in insurance premiums and reduction of damages not covered by insurance
C. Response to Criteria						
1. Acceptability			Opposition by local officials and sponsor	Some opposition	Generally acceptable	Acceptable
2. Certainty			Uncertain implementation	The certainty of the SA impacts is generally 90% or better	The certainty of the SA impacts is generally 90% or better	The certainty of the SA impacts is generally 90% or better
3. Completeness			Other measures may be necessary	Plan is complete	Plan is complete	Plan is complete
4. Effectiveness			55% reduction in AAD and measure not proven effective	67% reduction in AAD and measure not proven	84% reduction in AAD and technologically sound	90% reduction in AAD and technologically sound
5. Efficiency			B/C ratio of 2.5 and net benefits of $228,000	B/C ratio of 1.3 and net benefits of $102,000	B/C ratio of 2.0 and net benefits of $303,000	B/C ratio of 1.3 and net benefits of $161,000
6. Reversibility			Fuel and material consumed	11.5 acres of existing habitat permanently and fuel and materials consumed	20 acres of existing habitat permanently altered and fuel and materials consumed	33 acres of existing habitat permanently altered and fuel and materials consumed
7. Stability			Low	High	High	High
D. Rankings of Plan 1/ Contributions						
1. Net Benefits		5	2	3	1	3
2. Flood Damage Reduction		5	4	4	2	1
3. Ecological Systems		2	1	3	5	4
4. Preservation		2	1	4	4	3
5. Community Cohesion		5	4	3	2	1
6. Health, Safety and Well-being		5	4	3	2	1
E. Implementation Responsibility		Local Government agencies	Corps of Engineers and local Government agencies	Corps of Engineers and local Goverment agencies	Corps of Engineers and local Government agencies	Corps of Engineers and local Government agencies

1/ Low numbers are desirable

Recreation Element

General

The inclusion or exclusion of recreation does not influence the formulation of flood control plans. The flood control plan must be feasible without regard to recreation. Likewise, recreation must be feasible without regard to flood control. At local flood control projects recreation emphasis is on day-use type activities and all facilities must be provided within the lands acquired for the basic flood control project, except as may be required for access, parking, potable water, sanitation and related developments for health, safety and public access.

Description

Local interests have requested that recreation facilities be added to the selected plan (See Exhibits in Appendix C). To provide day-use type activities of walking, jogging, bicycling, outdoor games, and limited picnicking, recreation facilities consisting of about 9,000 feet of paved trails, picnic units, potable water and play equipment were added to the selected plan. The 8-foot paved trail consists of two segments; of which, one segment would extend along the left bank from Lamme Road to its intersection with the South Montgomery County Bikeway just west of Interstate 75. The second segment extends from the foot-bridge in the vicinity of Butler Street access site along the right bank eastward to Lamme Road. The plan includes the purchase of four small tracts (the largest consisting of about 1/2 acre) for access to the facilities. The facilities are to be used as a neighborhood type park with no parking facilities. See Plate 2 for a layout of the recreation plan.

Impact Assessment and Evaluation

As the recreation plan is to be developed essentially on project lands and the magnitude of work is minor when compared with the channel improvement work, the impacts of construction are insignificant. The major impacts, resulting from adding recreation, are improvements to the general well-being of the area's population by providing readily available facilities for recreating and relaxing.

Implementation Responsibilities

Legislative authority for recreation development and sharing of responsibilities between Federal and non-Federal is contained in Section 4 of the 1944 Flood Control Act, Section 207 of the 1962 Flood Control Act, and Section 1 of the Federal Water Project Water Recreation Act of 1965. The proposed President's policy previously discussed under Assessment and Evaluation of Detailed Plans does not change the present policy concerning recreation as established from the above reference legislative acts.

COST APPORTIONMENT

Sharing of costs between Federal and non-Federal interests for the recreation development based on present policy is shown in Table 10. Under this policy, non-Federal interests would be required to pay or contribute in-kind 50 percent of the total first cost of the recreation development, and pay all costs for operation, maintenance, and replacements.

TABLE 10

COST APPORTIONMENT
RECREATION ELEMENT

First Cost	
Federal	$300,000
Local	300,000
Total	$600,000
Annual Cost	
Federal	$ 22,100
Local	48,900
Total	$ 71,000

FEDERAL RESPONSIBILITIES

The Federal Government will design and prepare detailed plans and specifications, let construction contracts, and supervise and administer the construction of any recreation facilities.

NON-FEDERAL RESPONSIBILITIES

The non-Federal entity must participate in development of outdoor recreation and has the following responsibilities:

Acquire in its name and dedicate to public outdoor recreation use for the economic life of the basic flood control improvement all lands required for the recreation development.

Where the appraised value of the land so provided amounts to less than 50 percent of the total first cost of recreation development, make additional contribution sufficient to raise the non-Federal share to at least the 50 percent level.

Operate, maintain and replace, without expense to the Federal Government, the recreation areas and all facilities installed pursuant to the agreement.

Selected Plan

Flood Control Plan

Plan selection is the designation of the alter ive plan considered to be the most desirable. The plan should best meet the needs and desires of the public, while adequately addressing the objectives, constraints and criteria. To obtain the needs and desires of the public several meetings have been held with local officials and two well publicized public meetings were held in West Carrollton (See Appendix C). Based on the results of the studies accomplished for this report and public views obtained, Plan D (500-year channel improvement plan) appears to best meet all selection factors. This plan provides a high degree of protection, has compensation measures for reducing adverse environmental impacts, has net beneficial contributions, and is supported by the local sponsor.

The selected plan (Plan D) would consist of increasing the hydraulic carrying capacity of Holes Creek by channel widening and straightening. The new channel would carry the 500-year frequency flood, and extend from about 1,000 feet upstream of Lamme Road to its downstream terminus at the northbound Interstate 75 Bridge as shown on Plate 2. The total length of the improved channel is about 7,550 feet. The channel consists of four segments with transitions as necessary for each segment. The upstream terminus of the plan is about 1,000 feet upstream of the Lamme Road bridge. The first 500 feet of improvement consists of shaping banks to 3 horizontal to 1 vertical and riprapping. The next 500 feet consists of channel widening from 80' to 100' and using gabions on the left bank while carrying the 3:1 riprap slope for the right bank. The segment from Lamme Road to Springboro Pike consists of widening on the left side only, use of 6 horizontal to 1 vertical side slope on the left bank, and a bottom width varying from 75 feet to 165 feet. Riprap will be placed on side slopes at channel bends and other necessary locations. The next segment extending through the Springboro Pike Bridge and downstream for about 120 feet and consists of a concrete channel with a base width of about 145 feet. This segment was required to minimize bridge alterations and to reduce land requirements immediately downstream of the

bridge to avoid a commercial establishment on the right bank. The last segment extends from the concrete channel to the downstream terminus. This segment consists of widening the channel and shaping slopes to 3 horizontal to 1 vertical. The slopes are riprap and the bottom width varies from 100 feet to 200 feet. The railroad bridge is replaced with a larger structure, and slopes under all bridges are either riprap or concrete. A rectangular low-flow channel with pool/riffle structures will be constructed through the area where the existing channel is widened. The low-flow channel would be 30 feet wide and about 1 foot deep, except at riffles where it would be 10 feet wide. The low flow channel would extend from a point about 500 feet upstream of Lamme Road to the Interstate 75 bridge. A woodlot of about 4 acres on the left bank downstream of Springboro Pike will be acquired in fee to preserve the area as a fish and wildlife compensation measure. These measures are included to reduce adverse impacts to the aquatic environment. Typical cross sections of Plan D are shown on Plates 3 and 4. Additional design data are shown on the plates for Appendix B.

A small portion of the excavated material from the proposed channel improvement would be used to fill the old channel, and to form or reinforce a small embankment on the right bank upstream of Springboro Pike. A small embankment presently spans a low bank area at this site, and is included in the rights-of-way for Plan D. The remainder would be disposed of on a spoil area. The exact location of a spoil area has not been determined at this time, but the gravel pits on the right bank of Miami River across from West Carrollton were assumed to be the site for cost estimating purposes.

The plan would require the alteration of a trunk sewerline, water lines and other miscellaneous utilities. Three structures would be taken by the project; a business located in a former residence on the left bank at Springboro Pike, and two structures (appearing to be maintenance or storage buildings) on the left bank nursery land below Lamme Road. The plan would require the purchase of about 38 acres in fee and about 15 acres of temporary easements for spoil disposal.

Recreation Element

As local interests have requested that recreation facilities be included with the selected plan, the recreation element previously described has been added to Plan D. Facilities are provided for day-use activities consisting of walking, jogging, bicycling, outdoor games, and picnicking. The main facility provided by the plan would be the paved 8-foot multiuse trail which extends for about 1.7 miles. All recreation facilities would be located on land required for the flood control plan, except for limited facilities on the land purchased for access.

Economics

Each element of the selected plan must be feasible. Economically, Plan D has a benefit to cost ratio of 1.3 and the recreation element has a benefit to cost ratio of 1.2 (See Appendix E). Table 11 shows an economic summary of the selected plan.

TABLE 11

ECONOMIC SUMMARY
SELECTED PLAN

Purpose	First Cost	Average Annual Cost	Average Annual Benefits	Net Benefits	Benefit to Cost Ratio
Flood Control (Total)	$6,430,000	$509,000	$670,000	$161,000	1.3
Federal	$4,820,000	$355,000			
Non-Federal	$1,610,000	$154,000			
Recreation (Total)	$600,000	$71,000	$84,000	$13,000	1.2
Federal	$300,000	$22,100			
Non-Federal	$300,000	$48,900			
Selected Plan	$7,030,000	$580,000	$754,000	$174,000	1.3

Conclusions

General

A wide variety of structural and nonstructural measures were evaluated for alleviation of flooding in the vicinity of West Carrollton, Ohio. Four alternative measures were determined to be economically feasible for alleviating flooding along Holes Creek. This final array of plans included flood proofing (Plan A), a levee on the right bank of Holes Creek (Plan B), a 25-year channel improvement plan (Plan C), and 500-year channel improvement plan (Plan D). After consideration of views and comments received from other agencies and the general public, and consideration of environmental, social, technical and economic factors, Plan D was selected as the best plan. At the request of the local sponsor recreation facilities were added to the plan.

The flood control measure (Plan D) of the selected plan would enlarge about 7,550 feet of existing channel in order to carry a 500-year frequency flood. The estimated first and annual costs for flood control purposes are $6,430,000 and $509,000, respectively. With average annual benefits of $670,000, the flood control measure has a benefit to cost ratio of 1.3. The recreation development consists of a 1.7 mile paved trail, and picnic and outdoor games facilities. The estimated first and annual costs for the recreation purpose are $600,000 and $71,000, respectively. With average annual benefits of $84,000, the recreation development has a benefit to cost ratio of 1.2. These elements combined for the selected plan result in a first cost of $7,030,000, annual cost of $580,000, annual benefits of $754,000, and a benefit to cost ratio of 1.3.

The local sponsor, the Miami Conservancy District, is legally and financially capable of sponsoring the plan. The sponsor has furnished a letter of intent outlining their understanding of the requirements for local cooperation and a letter indicating their preference for a channel improvement plan.

Major Considerations

A summary of the major considerations for the selected plan in respect to environmental, social well-being, technical, economical, Executive Order 11988, and Section 404(r) of Public Law 92-500, as amended, aspects is provided below.

ENVIRONMENTAL CONSIDERATIONS.

A primary concern of the study was to provide a level of flood protection desired by local interests while maintaining or enhancing the environment of the area. The most significant adverse impacts on the environment would be the removal of vegetation on the streambank, and the disruption of the aquatic habitat. The plan does include measures that would reduce these impacts. A pool/riffle system and a low-flow channel were included in the plan to reduce the adverse impacts on the aquatic habitat. Also, where possible, construction is being limited to one side of the channel which leaves intact much of the existing vegetation on the opposite bank. The plan includes the fee acquistion of a woodlot of about 4 acres for preservation of wildlife habitat. This feature was recommended by the Fish and Wildlife Service.

SOCIAL WELL-BEING CONSIDERATIONS.

By providing a relatively high degree of flood protection, the plan would provide beneficial impacts on the social well-being of the area. By greatly reducing the threat of flooding, anxieties of flood plain residents would be lessened. Also, the threat of health problems associated with flooding would be reduced and the physical appearance of the area should improve. The recreation development would improve the general well-being of residents by providing readily accessible recreation facilities. Negative short-term impacts would be associated with the construction works and would include increased dust and noise levels.

TECHNICAL CONSIDERATIONS.

Past experience has proven that channel improvement alternatives are effective measures for reducing flood conditions. The one problem generally associated with this measure is increased flood heights downstream of the improvement. However, the downstream terminus (Mile 0.06, Holes Creek) of the selected plan is in the Miami River flood plain and due to the extent and capacity of this area, no significant increase in flood stages would occur. The risks involved, in respect to the hydrology developed and the design of the plan, are not critical in respect to endangering lives or significant changes in desired reduction of damages. As the hydrology and design are based on future conditions, when the entire drainage basin will be essentially urbanized, a high degree of protection is assured.

ECONOMIC CONSIDERATIONS.

By reducing flood damages, the selected plan would result in economic savings to the region and the nation. The plan would reduce average annual equivalent damages by 90 percent. The selected plan is economically feasible with a benefit to cost ratio of 1.3 and net benefits (average annual equivalent) of $174,000. A potential for loss of tax revenue results from the taking of land for project purposes; however, this loss may be offset by increased property values. Sensitivity analyses for future changes that could affect the economics of the plan were considered in Appendix E. Increasing interest rates (presently restricted to 1/4 percent per year for Federal projects) would increase the annual cost while decreasing the benefits. The interest rate analysis (see Appendix E) determined that the proposal would remain economically feasible until the interest rate exceeded 9-3/4 percent. The proposal should be completed long before this rate is applicable to Federal projects.

CONSIDERATION OF EXECUTIVE ORDER 11988.

The objective of the Executive Order (EO) has been considered in the formulation of plans for this study. The following determinations have been made in response to requirements of EO 11988.

a. In order to achieve the desired objective of providing flood protection to existing structures in the base flood plain, the proposed channel improvement must be located in the flood plain. No practical nonflood plain alternative existed.

b. The protection of existing structures in the flood plain required some action in the flood plain. Various alternatives, both structural and nonstructural, were considered for accomplishing the objective. After consideration of economic, environmental and social factors, and the desire of local interests, the 500-year channel improvement plan was selected as the best flood control plan.

c. The proposed action does not conflict with applicable State or local standards concerning flood plain protection.

d. The proposed action will affect the natural and beneficial values of the flood plain. Some streambank and adjacent vegetation will be permanently lost and the aquatic habitat will be at least temporily altered.

e. In order to minimize the adverse environmental impacts of the proposed action, several modifications were made to the normal trapezoidal design. These include the following:

(1) For certain reaches, limiting construction to the streambed and one bank only while leaving the other bank in its natural condition.

(2) Disturbed areas will be seeded or planted as soon as possible after construction.

(3) During construction, measures will be implemented to reduce erosion and dust.

(4) The improved channel will have structures to provide pools and riffles for maintaining/restoring the aquatic life of the stream.

(5) A low-flow channel will be included in the design to prevent adverse impacts associated with dry periods.

f. The plan also includes as a compensation feature the preservation of a woodlot of about 4 acres for wildlife and environmental quality.

g. The plan includes recreation facilities for day-use activities.

h. This study and the formulation of the proposed action have been coordinated with appropriate Federal, State, and local agencies and interested groups and individuals. A general listing of those involved in the study is contained in the Environmental Impact Statement. Public meetings were held in West Carrollton on 14 December 1978 and 24 June 1980 concerning the study, alternatives considered, and plan selection.

CONSIDERATION OF SECTION 404(r), PUBLIC LAW 92-500, AS AMENDED.

The section of this law, as amended, involves the discharge of dredged or fill material into waters of the United States. The Environmental Protection Agency 404(b) Guidelines (40 CFR 230) have been applied to those aspects of the project involving the placement of fill material into waters of Holes Creek. The eight objectives established by EPA to minimize effects on water quality and the aquatic ecosystem have been evaluated as part of this report whereby effort can further be performed in accordance with these conditions. The Environmental Impact Statement contains the evaluation and results of placing materials with the channel in accordance with the Section 404 (b)(1) Guidelines. The determination and findings of the analysis are presented below:

Determination. A review of the considered actions in accordance with Section 404(b) Guidelines allows the following determinations:

a. An ecological evaluation has been made following the evaluation guidance in 40 CFR 230.4, in conjunction with the evaluation considerations in 40 CFR 230.5.

b. Appropriate measures have been identified and incorporated within the considerations to minimize adverse effects on the aquatic environment as a result of the discharges.

c. Consideration has been given to the need for the activities, the availability of alternative sites, and methods of disposal that are less damaging to the environment and such water quality standards as are appropriate and applicable by law.

d. The proposed discharges will not affect wetlands.

Findings. Considering the foregoing evaluation, and in view of the above determinations, it is found that the discharge sites for the Holes Creek project have been specified through application of the 404(b) Guidelines.

Recommendations

I recommend that the selected plan described in this report be authorized for construction as a Federal project for flood control, with such modifications as in the discretion of the Chief of Engineers may be advisable.

The President, in his June 1978 water policy message to Congress, proposed several changes in cost-sharing for water resources projects to allow States to participate more actively in project implementation decisions and to equalize cost-sharing between structural and nonstructural flood damage prevention projects. These changes include a cash contribution from benefiting States of 5 percent of the first costs of construction assigned to nonvendible project purposes and 10 percent of the first costs of construction assigned to vendible project purposes. Application of this policy to the West Carrollton project would require the State of Ohio to contribute as estimated $320,000 in cash (5 percent of $6,430,000 the total estimated project first cost of the construction assigned to nonvendible project purposes [flood control] based on October 1979 price levels).

The President also proposed that the present cost-sharing requirements for flood damage prevention projects be modified to require a cash or in-kind contribution from non-Federal interests equal to 20 percent of the project first costs assigned to flood damage prevention. (In the case of local protection type projects, this cash or in-kind contribution is in lieu of the existing requirement that local interests provide without costs to the United States all lands, easements, rights-of-way, and project.)

Application of this policy to the West Carrollton project would require that non-Federal interests make, in addition to the State contribution, a cash or in-kind contribution of an estimated $1,290,000 (20 percent of $6,430,000). Also, in conjunction with the recreation development the local sponsor must cost share with the Federal Government at a rate of 50-50. This requires the non-Federal interests to pay, contribute in-kind, or repay with interest no less than one-half of the separable first cost allocated to recreation, presently estimated at $300,000. As a result of the above, the local sponsor's total share for flood control and recreation would be $1,590,000. The combined non-Federal share is currently estimated to be $1,910,000. I recommend construction authorization for the West Carrollton project in accordance with the President's proposed cost-sharing policy.

The implementation of the recommended plan would be contingent upon the local sponsor meeting other provisions as required by Section 3 of the Federal Control Act of 1936, as amended, and other appropriate laws. The local sponsor must meet the following requirements:

a. Operate, maintain and provide any necessary replacements for the completed project, including recreation facilities, without cost to the United States;

b. Hold and save the United States free from damages due to the construction works, excluding damages due to the fault or negligence of the United States or its contractors:

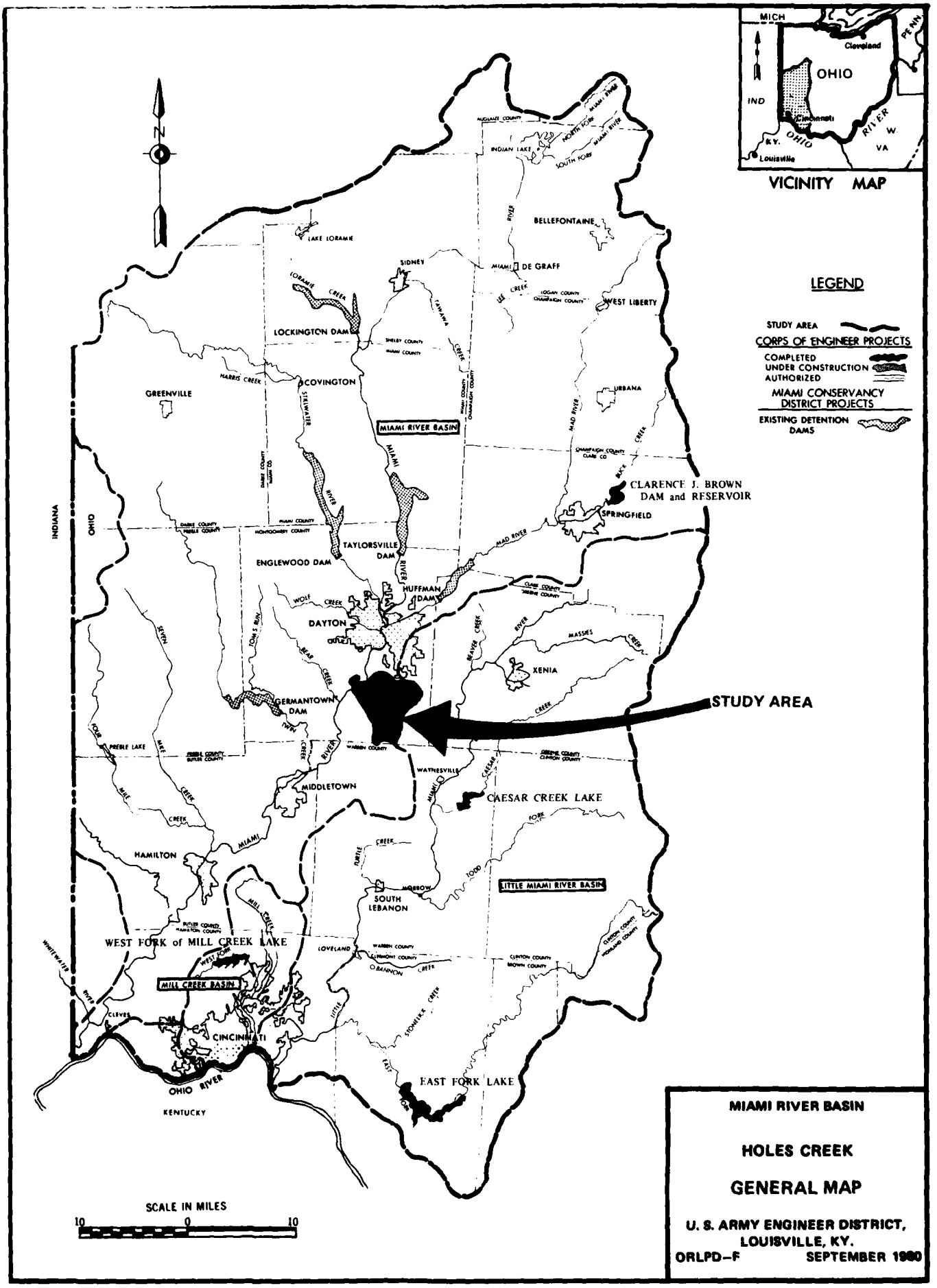
c. Prescribe and enforce regulations to prevent obstructions or encroachments on channels and ponding areas which would reduce their flood control purposes or hinder their operation and maintenance;

d. At least annually, inform affected interests regarding the limitation of the protection afforded;

e. Comply with applicable provisions of (1) the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), and (2) Section 601, Title VI, of the Civil Rights Act of 1964 (Public Law 93-352);

f. Acquire lands, easements, and rights-of-way for the recommended plan with cost incurred for this requirement contributing toward the 20 percent cost share requirement and reimbursement by the Federal Government if the costs exceed 20 percent of the total first cost of the project.

C. E. EASTBURN
Colonel, Corps of Engineers
District Engineer



MIAMI RIVER BASIN

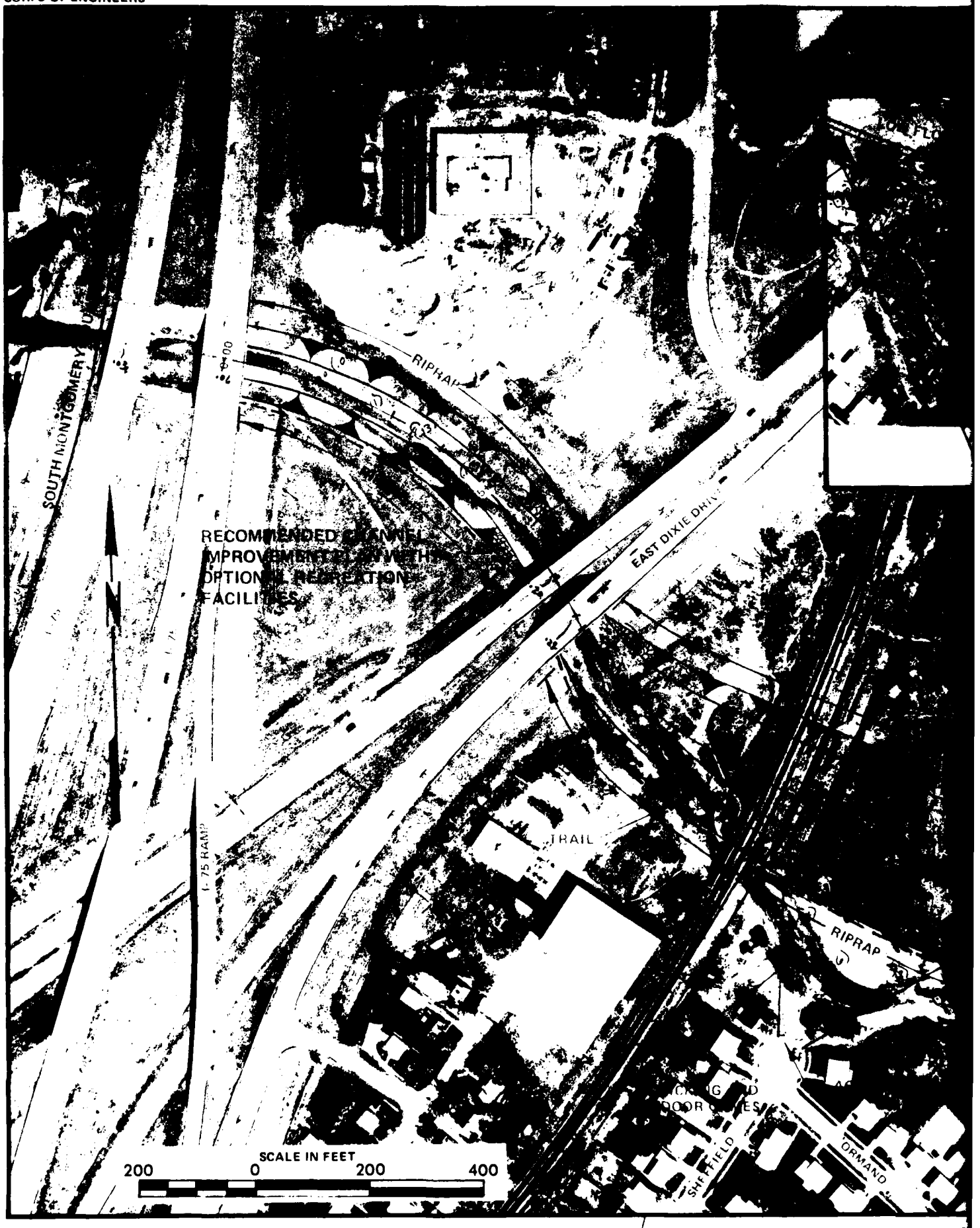
HOLES CREEK

GENERAL MAP

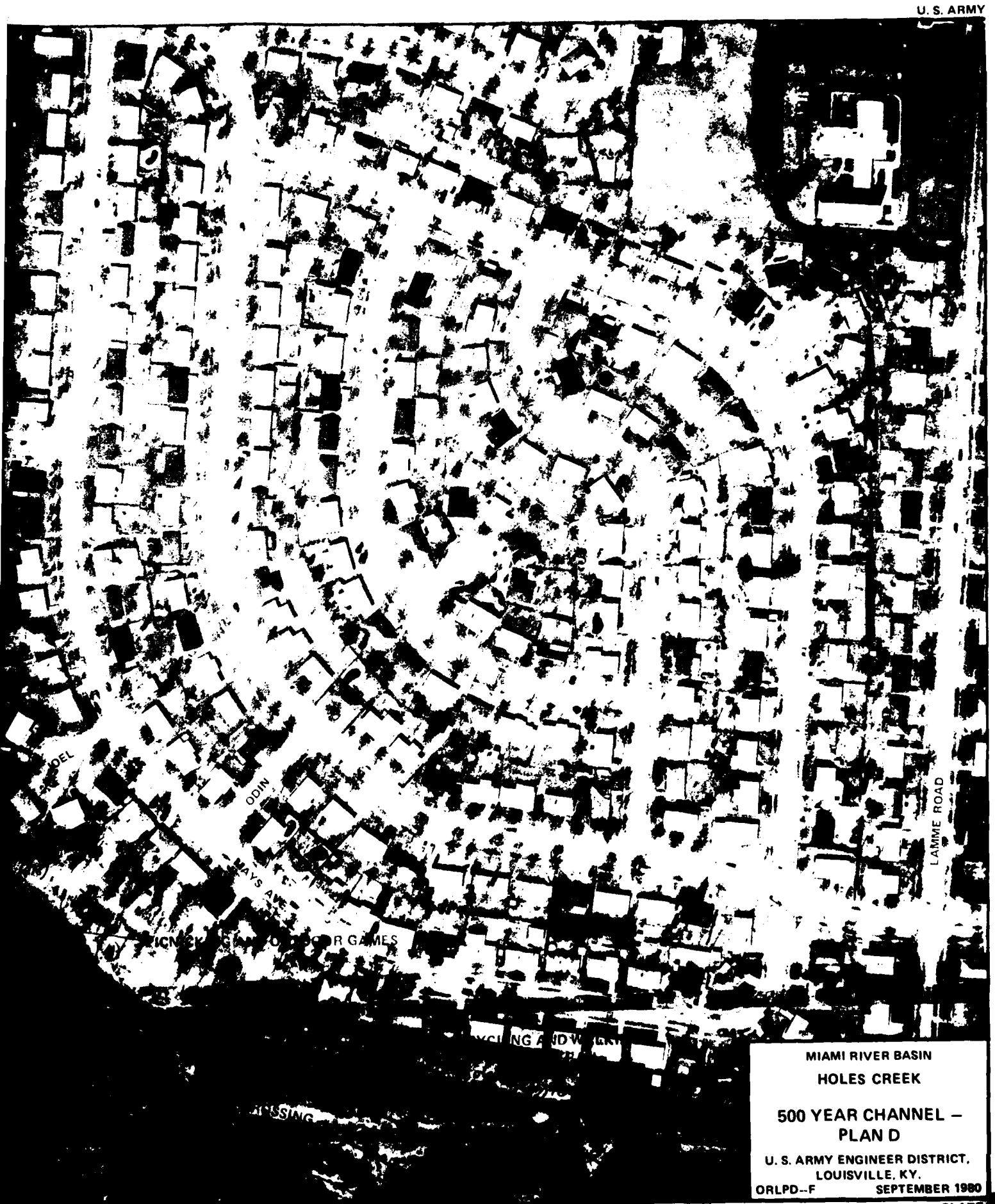
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE, KY.

ORLPD–F SEPTEMBER 1980

PLATE 1


SOUTH MONTGOMERY
RIPRAP
EAST DIXIE DRIVE
RECOMMENDED CHANNEL
IMPROVEMENTS WITH
OPTIONAL RECREATION
FACILITIES
I-75 RAMP
TRAIL
RIPRAP
SHEFFIELD
ORMAND
SCALE IN FEET
200 0 200 400

CORPS OF ENGINEERS



MIAMI RIVER BASIN

HOLES CREEK

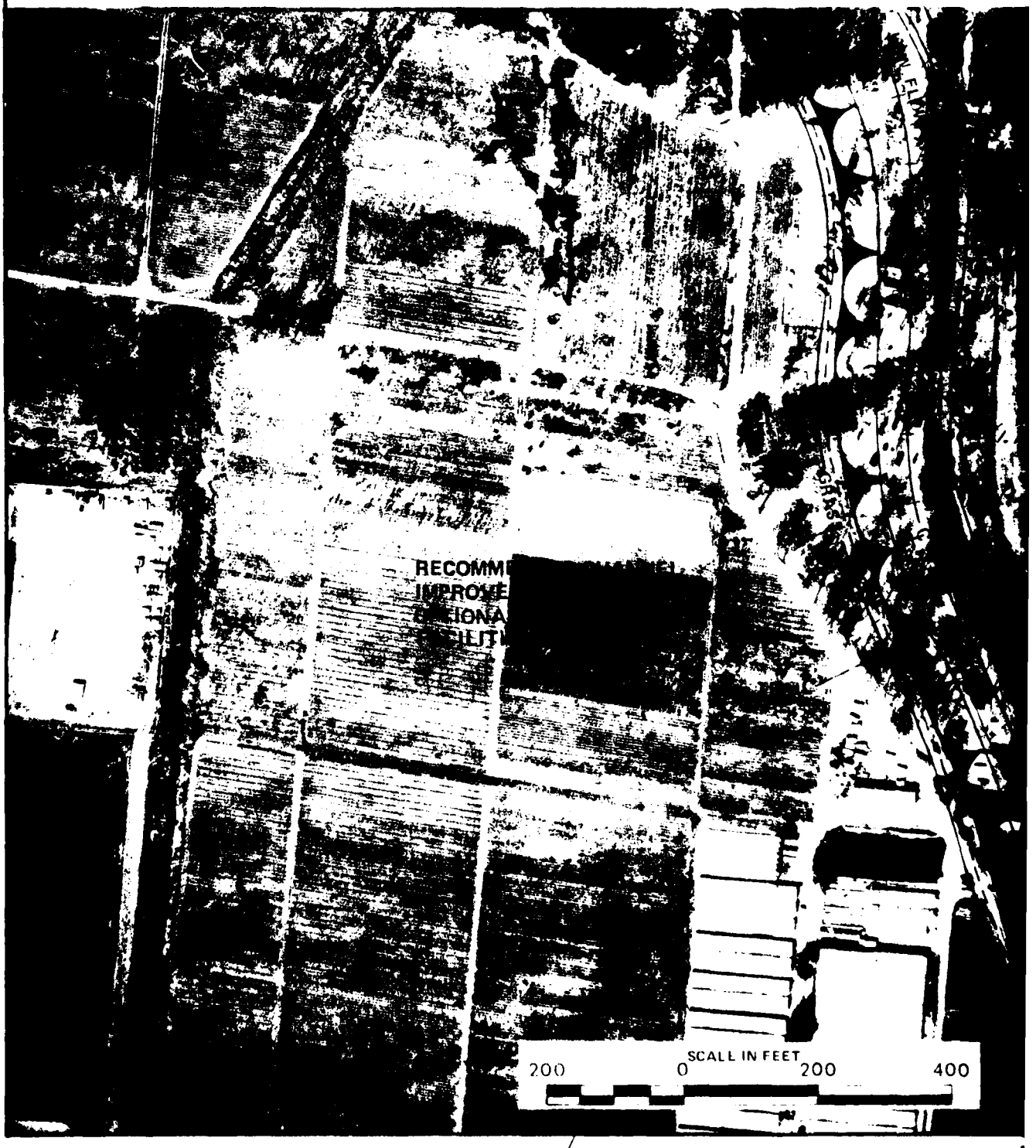
500 YEAR CHANNEL – PLAN D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE, KY.

ORLPD--F SEPTEMBER 1980

SHEET 2 OF 4 PLATE

MATCH LINE B



U.S. ARMY

N

MATCH LINE C

SCALE IN FEET
0 200 400

MIAMI RIVER BASIN

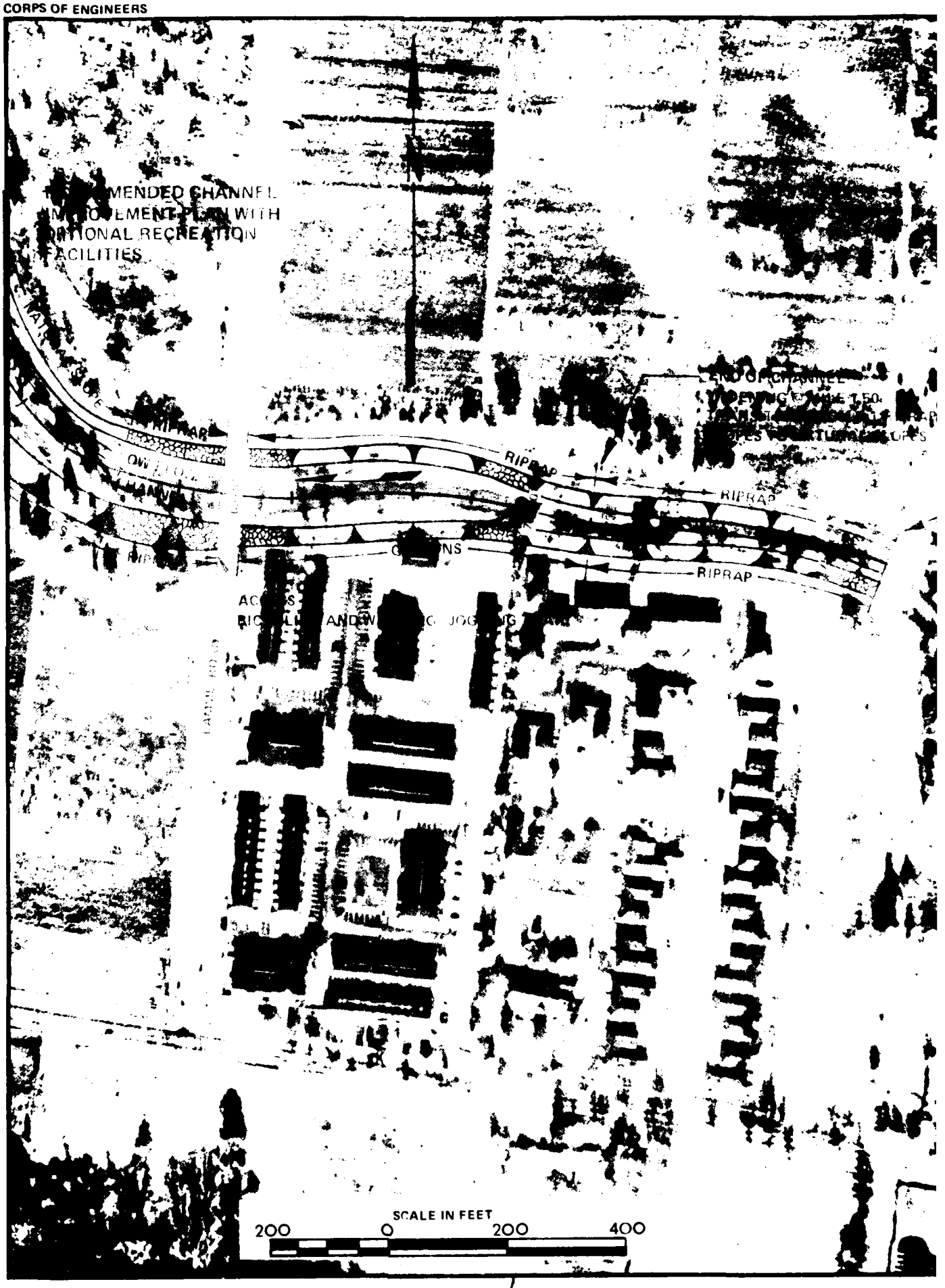
HOLES CREEK

500 YEAR CHANNEL – PLAN D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE, KY.
ORLPD–F SEPTEMBER 1980

SHEET 3 OF 4 PLATE 2

CORPS OF ENGINEERS



MATCH LINE C

MIAMI RIVER BASIN

HOLES CREEK

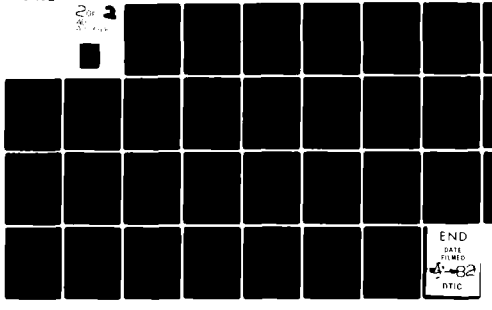
500 YEAR CHANNEL PLAN D

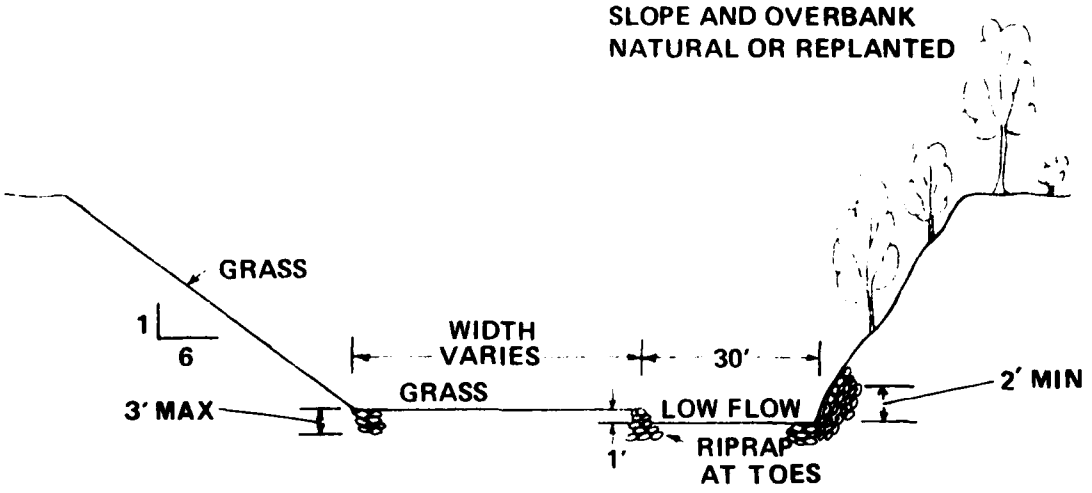
U.S. ARMY ENGINEER
LOUISVILLE KENTUCKY
ORLPD

AD-A113 100 ARMY ENGINEER DISTRICT LOUISVILLE KY F/G 13/2
HOLES CREEK, WATER RESOURCES DEVELOPMENT. VOLUME I. MAIN REPORT--ETC(U)
SEP 80

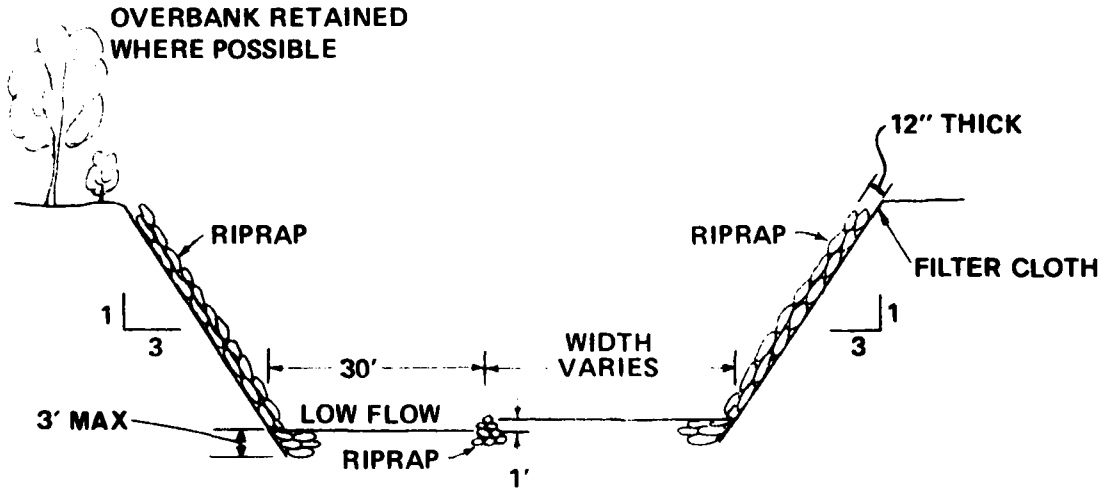
UNCLASSIFIED NL

2 OF 3





TYPICAL SECTION
DOWNSTREAM OF SPRINGBORO PIKE



TYPICAL SECTION
UPSTREAM OF SPRINGBORO PIKE

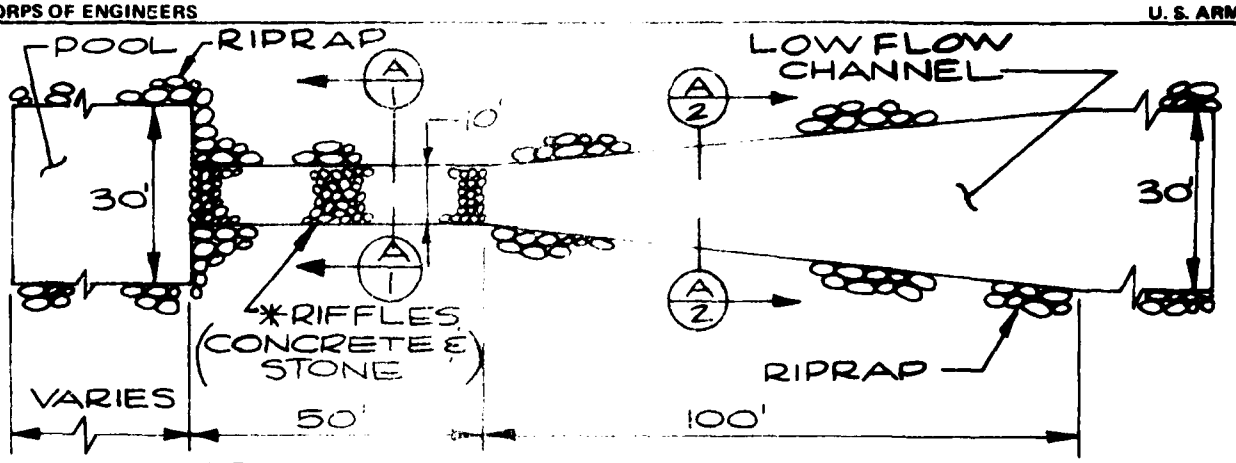
NOT TO SCALE

MIANI RIVER BASIN
PLAN D
TYPICAL DESIGN SECTIONS
OF
CHANNEL IMPROVEMENT PLANS

U. S. ARMY ENGINEER DISTRICT,
LOUISVILLE, KY.

ORLPD–F SEPTEMBER 1980

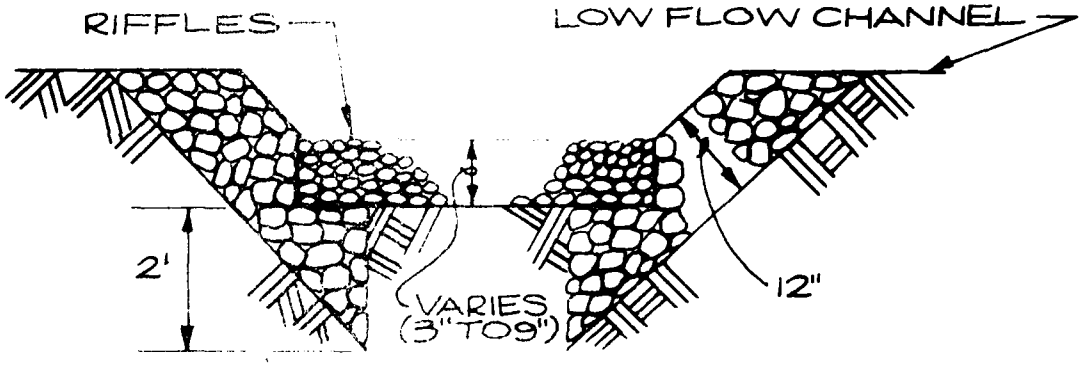
PLATE 3



*POSITIONING OF RIFFLES WILL VARY ACCORDING TO FISH AND WILDLIFE SERVICE.

TYPICAL PLAN OF LOW FLOW CHANNEL

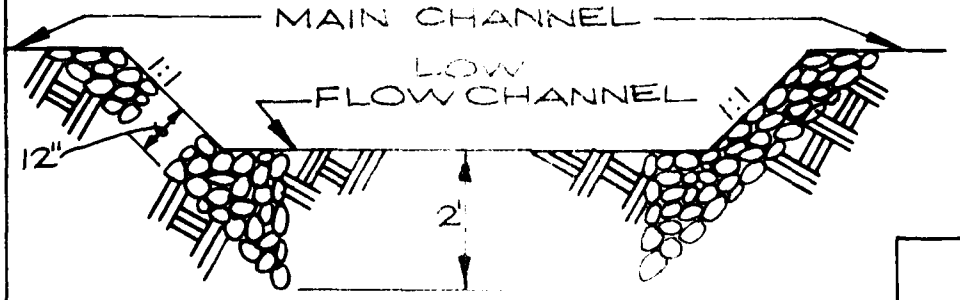
30 0 30 60
SCALE IN FEET



SECTION A 1

RIFFLES

SCALE: NONE



SECTION A 2

LOW FLOW

SCALE: NONE

MIAMI RIVER BASIN

HOLES CREEK

LOW FLOW CHANNEL

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE, KY.
ORLPD-F SEPTEMBER 1980

PLATE 4

FINAL

ENVIRONMENTAL IMPACT STATEMENT

Holes Creek

Interim Report No. 2

Miami River, Little Miami River,

& Mill Creek Basins, Southwest Ohio

U.S. Army Engineer District, Louisville

Abstract: The Louisville District has investigated public concerns of the West Carrollton study area with respect to flood damages from Owl and Holes Creeks. No viable plans exist for alleviation of flood problems on lower Owl Creek. Four plans to alleviate flood problems on lower Holes Creek were selected for detailed study. These are: flood proofing for the Holes Creek flood plain, a levee on the right bank of Holes Creek, and two channel improvement plans for Holes Creek providing 25-year and 500-year frequency of occurrence flood protection. The 500-year channel improvement plan has been selected as the preferred plan based on its high degree of protection, provision of measures for reducing adverse environmental impacts, and net beneficial economic contributions.

SEND YOUR COMMENTS TO
THE DISTRICT ENGINEER BY _____

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NOTE: Information, displays, maps, etc. discussed in the Holes Creek, Ohio Main Report are incorporated by reference in the Environmental Impact Statement.

LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Impact Statement

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1. SUMMARY

Major Conclusions and Findings.

1.01 Four alternative plans have been considered to relieve flood problems along Holes Creek in the vicinity of West Carrollton, Ohio. These are: flood proofing, a levee on the right bank of Holes Creek, and two channel improvement plans providing 25-year and 500-year frequency of occurrence flood protection. (A 100-year frequency of occurrence flood, for example, is one that is expected to occur once in 100 years. But a 100-year flood is more a statistical term than a prediction of frequency. In fact, a 100-year flood may hit two or three times within any 100-year period.) The 25-year channel improvement plan has been selected as the National Economic Development Plan since it maximizes net economic benefits. The 500-year channel improvement plan appears to best meet all selection factors and has been designated the Selected Plan.

1.02 The levee plan and channel improvement plans would cause short-term impacts during construction from erosion, sedimentation, and increased stream turbidity. Clearing for construction would cause the loss of some vegetation and its associated wildlife habitat. Aquatic life would be adversely affected by alteration of the watercourse. There are no archeological or historical resources or threatened or endangered species which would be affected by the proposed plans. The nonstructural plan would have no significant adverse impacts. The four proposed plans would produce beneficial impacts through reduction of flood damages and decreased disruption of public facilities and services.

1.03 The following evaluations pursuant to the requirements of Executive Order 11988 on Flood Plain Management have been made:

a. In order to achieve the desired goal of reducing flood stages in West Carrollton, the proposed action must be located in the flood plain.

b. Various alternatives were considered, both structural and nonstructural. The selected plan provides for a reasonable level of protection in a manner considered acceptable and desirable by the local interests.

c. The proposed action does not conflict with applicable State or local standards concerning flood plain protection.

d. The proposed action would have a minor effect on the natural and beneficial values of the flood plain. Holes Creek flows through an urban area and much of the adjacent flood plain has been developed for residential and commercial use.

e. In order to minimize the impacts of the proposed action, various measures will be undertaken as part of the project's design and construction. These include the following:

(1) Retention of as much of the existing streambank vegetation as possible (restricting work to one side of the stream, where possible, for the 500-year channel improvement plan) and replanting the affected areas with grass, trees and shrubs.

(2) Disturbed areas will be seeded or planted as soon as possible after construction.

(3) Short and long-term erosion control measures will be implemented during construction.

(4) Reconstructed channel for the 500-year plan will be designed with a series of structures to simulate the pools and riffles that will be destroyed by construction.

(5) A low-flow channel will be designed in the 500-year channel improvement plan to help prevent extreme low flow conditions.

(6) An adjoining woodlot of about 4 acres will be purchased to help compensate for lost wildlife habitat.

f. Development of this project has been coordinated with appropriate Federal, State, and local agencies and interested groups. Public meetings on the project were held in West Carrollton on 14 December 1978 and 24 June 1980.

1.04 Those items of project construction which involve the discharge of dredged or fill material into navigable waters of the United States have been evaluated using guidelines promulgated by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army pursuant to Section 404(b) of the Clean Water Act. The Section 404 evaluation is presented in Appendix F. Based on that evaluation, the following determination and findings were made:

a. An ecological evaluation has been made following the evaluation guidance in 40 CFR 230.4, in conjunction with the evaluation considerations in 40 CFR 230.5.

b. Appropriate measures have been identified and incorporated in the proposed plans to minimize adverse effects on the aquatic environment as a result of the discharges.

c. Consideration has been given to the need for the proposed activities, the availability of alternate sites, and methods of disposal that are less damaging to the environment, and such water quality standards as are appropriate and applicable by law.

d. The proposed discharges will not affect wetlands.

1.05 Since there are no wetlands located in the project area, no action is required by Executive Order 11990, Protection of Wetlands.

1.06 In accordance with the Endangered Species Act of 1973 as amended by the Endangered Species Act Amendments of 1978, coordination with the Fish and Wildlife Service concerning the potential presence of species listed or proposed for listing as endangered has been conducted. The Fish and Wildlife Service has concluded that the project is not likely to jeopardize the continued existence of listed species.

1.07 Pursuant to the Fish and Wildlife Coordination Act, coordination has been maintained with the Fish and Wildlife Service. The preliminary, draft, and final fish and wildlife reports are included in Appendix C.

1.08 In general, none of the considered actions will pose any hindrance to land use and water resources planning in the area. All alternatives are compatible with the Southwest Ohio Water Development Plan, Dayton Strip and Node Corridor, and Germantown Primitive Corridor Plans which recommend that new recreational facilities be developed for Montgomery County. The completion of a new bicycle trail along the Miami River which will cross over the mouth of Holes Creek, will not be influenced by the actions considered. Transportation, with regard to the proposed I-675 interchange system south of the study area, will not be affected.

1.09 Local officials are proposing to restore the Old Miami River Dam at West Carrollton. The dam, as desired, will function for recreation and ground water recharge purposes. The only other prospect known for the general West Carrollton vicinity concerns the Western Regional Wastewater Treatment Facility which is nearing completion. Neither will be affected by the considered Holes Creek alternative actions.

Areas of Controversy.

1.10 Some objections to flood protection measures of any kind were expressed at the public meetings. No significant points of disagreement regarding specific items of the proposed plans have been raised.

Unresolved Issues.

1.11 No unresolved major disagreements with study area interests exist.

Relationship to Environmental Requirements.

1.12 The following table displays the relationship of the alternative plans to the principal environmental laws, executive orders, policies, and land use and water resources plans.

RELATIONSHIP OF PLANS TO ENVIRONMENTAL REQUIREMENTS PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

	Flood Proofing	Right Bank Levee	25-Year Channel Improvement	500-Year Channel Improvement
Federal Policies				
National Environmental Policy Act		All plans in full compliance.		
Fish and Wildlife Coordination Act		All plans in full compliance.		
Clean Water Act		All plans in full compliance.		
Endangered Species Act of 1973		All plans in full compliance.		
National Historic Preservation Act of 1966		All plans in full compliance.		
Clean Air Act		All plans in full compliance.		
Federal Water Project Recreation Act		All plans in full compliance.		
Land and Water Conservation Fund Act		All plans in full compliance.		
Wild and Scenic Rivers Act		All plans in full compliance.		
Flood Plain Management (E.O. 11988)		All plans in full compliance.		
Protection of Watlands (E.O. 11990)		All plans in full compliance.		
Analysis of Impacts on Prime and Unique Farmland in EIS, CEQ Memorandum, 30 August 1976		All plans in full compliance.		
State and Local Policies		All plans are compatible.		
Land Use Plans		All plans are compatible.		

2. NEED FOR AND OBJECTIVES OF ACTION

Study Authority.

2.01 The authority for the study is contained in U.S. Senate Resolution of 31 May 1967 and U.S. House of Representatives Resolution of 19 October 1967. The resolutions directed a review of prior reports with a view to determining whether improvements for flood control and allied purposes are advisable in the Miami River, Little Miami River, and Mill Creek Basins in Southwestern Ohio.

Public Concerns.

2.02 During the late fifties and early sixties, considerable public concern was expressed over water resource problems in the Miami River Basin. In 1961, West Carrollton was identified within a brief reconnaissance report, prepared by the Miami Conservancy District, as having local flood problems. The primary desire of local interests in the study area is relief from current levels of and future increases in flooding and flood damages which will result from increased urbanization.

Planning Objectives.

2.03 The general objectives are to identify the water resource problems in the study area and to develop a range of alternatives to solve or alleviate the problems. The planning objectives are to substantially reduce flood damages and other flood related problems on the lower 1.3 miles of Owl Creek and the lower 3.3 miles of Holes Creek.

3. ALTERNATIVES

Plans Eliminated from Further Study.

3.01 Nonstructural Plans. A number of plans which do not involve major structures to control flood waters were considered in preliminary planning.

a. Flood plain zoning would reduce the flood damage potential in accordance with a planned program of development and land use. It was assumed that flood plain regulation ordinances would be enacted as part of the flood insurance program and would supplement any recommended course of action.

b. Local governmental agencies could adopt building code regulations that would assist in reducing future flood damages. However, some damages are unavoidable, and for other structures, or for the less affluent members of the flood plain community, the cost of compliance with building code regulations could be prohibitive.

c. The existing tax structure could be adjusted in such a manner as to make tax rates for flood plain property higher than corresponding rates for properties located off the flood plain. Such action would make new development on the flood plain less attractive, and it would tend to encourage persons currently using flood plain property to relocate. Since this measure would not solve the present problem, it received no further consideration.

d. Federally subsidized flood insurance for individual properties is now implemented in the study area. Flood insurance will not reduce or eliminate flooding, but serves only to reimburse individual property owners for losses.

e. Temporary evacuation of persons or personal property from flood prone areas when a flood threat exists was considered. This measure would not be applicable to the study area since the rapid rise of floodwaters would not allow for adequate warning.

f. Permanent evacuation of flood plain areas could be used to reduce flood damage potential. Such a measure would involve land purchase, physical removal of buildings and improvements, and relocation of population. This alternative was not satisfactory because it would be difficult, costly, and time-consuming.

g. Raising structures (first floor and higher) above a particular flood level to eliminate all or a great part of potential flood damages was considered. This approach was found to be ineffective in significantly reducing damages.

3.02 Structural Plans. The following structural plans were considered in preliminary planning.

a. The drainage basins of Owl Creek and Holes Creek were studied for potential reservoir sites. Due to urbanization and the absence of major tributaries, effective reservoir sites could not be located on either stream.

b. A levee on the left bank of Holes Creek extending from high ground east of Springboro Pike to the Interstate 75 ramp embankment was considered. The plan would provide virtually complete protection for all development on the left bank from Lamme Road to the Miami River, but was found to be economically unfeasible.

c. A concrete wall on the right bank of Owl Creek along Gibbons Road was investigated. A combination levee and wall plan was considered for an area, Allen Plat, lying between lower Owl Creek and the Miami River. Both of these plans were rejected because costs exceeded potential benefits.

d. Channel improvement plans for Owl Creek which would furnish 25-year and 10-year levels of protection were eliminated due to unfavorable economics.

e. A diversion plan to convey water from the natural ponding area on the right overbank of Owl Creek upstream of Interstate 75 to Holes Creek just upstream of Conrail Railroad was considered. Preliminary analysis indicated that the plan would have little impact on flood conditions on lower Owl Creek and would provide protection to the ponding area only for Owl Creek floods. The plan is not economically feasible.

f. The best opportunity for diverting flood waters from Holes Creek to another drainage system is in the upper Holes Creek watershed. The diversion channel studied would extend from Holes Creek just upstream of State Road 725 southwesterly along unnamed tributaries to the Miami River. It would consist of about 3.5 miles of excavated channel, two pipeline modifications, four highway drainage structures, and a maximum cut of 55 feet. The plan would reduce damages significantly, but was economically unfeasible due to high costs resulting from length and required structures.

Without Conditions (No Action).

3.03 Urbanization of the study area will cause more frequent and severe flooding in the future as a result of diminished infiltration and locally improved runoff conveyances. The surrounding area of Miami and Washington Townships will experience a strong population growth by year 2000. The traditional decline in vacant and agricultural land is expected to continue as a result of anticipated industrial, commercial, and residential development.

3.04 Flood plain zoning and the flood insurance program are expected to be in full effect in the near future. These measures will reduce the expected future increase in flood damages and provide some financial relief to the area. It is expected that the flood insurance program will cause some relocation of structures out of the flood plain over a period of many years.

Some structures will probably be raised and remain in the flooded area. No major changes to the present stream and bank environment are expected. Land now used for a nursery and other overbank vacant land are expected to be developed.

Plans Considered in Detail.

3.05 Nonstructural Plan (Flood Proofing). The flood proofing alternative for Holes Creek is designed to prevent flood waters from entering structures up to the 100-year flood level. This can be accomplished by installation of permanent and/or semipermanent closures for various openings, installation of sewer gate valves, and waterproofing the exterior either by special coating or by construction of a new exterior cutoff wall (masonry) in the case of frame structures. Flood proofing would be limited to a maximum height of 3 feet to prevent induced structural damage from excessive hydrostatic pressures. This plan includes the purchase of about 24 acres of land along Holes Creek for environmental enhancement.

3.06 Under a proposal in the President's Message to Congress on 6 June 1978, the costs will be shared between Federal (75%), local (20%), and State (5%).

3.07 Holes Creek Channel Improvement. Two channel improvement plans were studied for providing different levels of protection. The plans are identified by the levels of protection provided: 25-year and 500-year. The 25-year channel improvement would start at Lamme Road bridge and continue downstream to its terminus just downstream of the Interstate 75 ramp bridge. The channel would have a trapezoidal shape with both banks modified and would be 5,700 feet long. The 500-year channel would begin 1,000 feet upstream of Lamme Road and extend 7,550 feet down to the Interstate 75 bridge. The plans differ in bottom width of the new channels and the alterations required by varying the widths. The design does change with stream reaches and is provided in Appendix B. See Plates 2, 3 and 4 of this report, and Plates in Appendix B for illustrations and cross sections of the plans.

3.08 Under current policy, non-Federal interests are required to furnish all lands and rights-of-way, relocation assistance, and modifications to all utilities and roads. The Federal Government is responsible for project construction costs. Under the President's proposal, the first cost would be shared between Federal (75%), local (20%), and State (5%). The costs for operation and maintenance are 100 percent non-Federal for both cost sharing methods.

3.09 Several features to compensate for fish and wildlife losses are included in the 500-year plan. These features include leaving one bank, where possible, in its natural condition, providing a low flow channel, constructing riffles and pools, and purchase of a 4-acre woodlot. The 25-year plan also provides for purchase of the 4-acre woodlot. The U.S. Fish and Wildlife Service Draft Report recommends most of these features; it also recommends conservation easements on four tracts with dense vegetative growth.

3.10 The 500-year plan includes recreation facilities for day-use activities such as walking, jogging, bicycling, outdoor games, and limited picnicking. The facilities consist of about 9,000 feet of paved trails, picnic units, potable water, and play equipment. The 8-foot wide paved trail consists of two segments, one of which extends along the left bank from Lamme Road to its intersection with the South Montgomery County Bikeway just west of Interstate 75. The second segment extends from the foot-bridge in the vicinity of Butler Street access site along the right bank eastward to Lamme Road. The plan includes the purchase of four small tracts (the largest consisting of about one-half acre) for access to the facilities. The facilities are to be used as a neighborhood type park with no parking facilities.

3.11 Holes Creek Right Bank Levee Plan. The levee would extend from Lamme Road on the east to the Interstate 75 ramp embankment on the west--generally following the right bank of Holes Creek (see Plate B-3). The plan would provide Standard Project Flood protection (the Standard Project Flood is an estimated or hypothetical flood that might be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geological region involved, excluding extraordinarily rare conditions) for the right overbank area. Elements of the plan include 3,480 feet of earth levee, 860 feet of concrete wall, one pumping plant, 1,500 feet of channel realignment, and other appurtenances. The channel realignment is necessary to provide adequate space for levee construction between the channel bank and existing houses.

3.12 No special compensation features have been included in the present design of the plan; however, a one acre tract of streambank vegetation recommended by the U.S. Fish and Wildlife Service would be purchased.

3.13 The implementation responsibilities and cost sharing for this plan are the same as for the channel improvement plans.

3.14 National Economic Development (NED) Plan. The NED plan addresses the objectives in the way which maximizes net economic benefits. It must be based on sound design and must include measures for addressing all objectives. The 25-year channel improvement plan has been designated the NED candidate plan. It has the highest net benefits and addresses all objectives.

3.15 Environmental Quality (EQ) Plan. The EQ plan addresses the objectives in the way which emphasizes aesthetic, ecological, and cultural contributions. Beneficial EQ contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of the study area. The plan most in harmony with environmental objectives is the flood proofing plan.

3.16 Selected Plan. The 500-year channel improvement plan appears to best meet all selection factors. The plan provides a high degree of protection, has compensation measures for reducing adverse environmental impacts, and has net beneficial economic contributions.

Comparative Impacts of Alternatives.

3.17 The following table displays the impacts on significant resources of the plans considered in detail and outlines plan economic characteristics. Additional comparative information on the alternative's impacts can be found in the Main Report, Tables 7 and 8.

COMPARATIVE IMPACTS OF ALTERNATIVES

Base Conditions and Alternatives	Soils, Erosion, and Streambank Effects	Air Quality	Noise Levels	Water Quality	Vegetation
Base Condition	**Erosion and scouring of the flood plain due to flooding**	**Substandard**	**Typical of suburban areas**	**Reasonably good**	**Riparian and flood plain tree species and understory vegetation, old field communities**
Without Condition (No Action)	Increased erosion and scouring due to increased flooding	Decrease in air quality in the absence of effective control measures	Slight increase	Some decrease in water quality in the absence of effective control measures	Some decrease in vegetation as result of construction activity in flood plain
Nonstructural	No impact	No impact	Insignificant impact	No impact	No impact
Right Bank Levee	Short-term erosion during construction, reduced erosion and scouring of flood plain	Minor, short-term decrease in air quality during construction	Short-term increase during construction, slight long-term impact from occasional noise from ponding area pumphouse	Short-term impact from increased turbidity	Clearing for construction
25-Year Channel Imp.	Short-term erosion during construction, reduced erosion and scouring of flood plain	Minor, short-term decrease in air quality during construction	Short-term increase during construction	Short-term impact from increased turbidity, long-term impacts from alteration of creek bed	Clearing for construction
500-Year Channel Imp.	Short-term erosion during construction, reduced erosion and scouring of flood plain	Minor, short-term decrease in air quality during construction	Short-term increase during construction	Short-term impact from increased turbidity, long-term impacts from alteration of creek bed	Clearing for construction

Base Condition and Alternatives	Wildlife	Aquatic Biota	Threatened or Endangered Species	Land Use	Employment and Economic Development
Base Conditions	A variety of songbirds, small mammals, reptiles, and amphibians present	Diverse fish fauna and healthy aquatic community	No threatened or endangered species known to exist in the area	Green space immediately along stream, residential and commercial development beyond	Employment has been above national average and concentrated mainly in manufacturing
Without Condition (No Action)	Some decrease in wildlife due to encroaching development	Possible adverse impacts if there is significant water quality degradation	Area will remain unconducive to threatened or endangered species	Continued urbanization	Economic growth is expected to continue
Nonstructural	Beneficial impact from land acquired for preservation	No impact	No impact	Some additional stream bank land would remain undeveloped	Minor effect on employment for installation of flood proofing measures
Right Bank Levee	Adverse impacts from elimination of habitat	Adverse impacts from construction and alterations within reach considered for channel realignment	No impact	Slight impact to protected right bank which is presently mostly developed	Temporary increase in employment during construction; long-term increase from increase in development in previously flood prone areas
25-Year Channel Imp.	Adverse impacts from elimination of habitat	Adverse impacts from alteration of the watercourse	No impact	Slightly increased utilization of limited opportunity for development	Temporary increase in employment during construction; long-term increase from increase in development in previously flood prone areas
500-Year Channel Imp.	Adverse impacts from elimination of habitat	Adverse impacts from alteration of the watercourse; most impacts would be short-term due to design features	No impact	Increased development as for 25-year plan but somewhat greater impacts due to greater level of protection	Temporary increase in employment during construction; long-term increase from increase in development in previously flood prone areas

Base Condition and Alterations	Transportation	Aesthetics	Cultural Resources	Recreation	Economics
Base Conditions	Interstate Hwy 75, several State and Federal highways, Penn Central Railroad	The area is generally aesthetically pleasing	Four archeological sites recorded, no significant remnants remain; no National or Historic Places sites	Use of the stream and environs for fishing and nature appreciation	Not applicable
Without Condition (No Action)	Increased intra-area travel	Degradation possible with increased population and development pressures	No change expected	Additional pressures from increased recreational demands	Not applicable
Nonstructural	No impact	Minimal impact	No impact	Minimal impact	Costs: $2,140,000 B/C ratio: 2.5 Net Annual Benefits: $228,000
Right Bank Levee	Short-term adverse impacts during construction, long-term beneficial impacts from less disruption from flooding	Adverse effects from change to artifically developed environment, beneficial effects from reduced flooding	No impact	Adverse impacts from elimination of vegetation and alteration of the watercourse	Costs: $4,400,000 B/C ratio: 1.3 Net Annual Benefits: $102,000
25-Year Channel Imp.	Short-term adverse impacts during construction, long-term beneficial impacts from less disruption from flooding	Adverse effects from change to artifically developed environment, beneficial effects from reduced flooding	No impact	Adverse impacts from elimination of vegetation and alteration of the watercourse	Costs: $3,760,000 B/C ratio: 2.0 Net Annual Benefits: $303,000
500-Year Channel Imp.	Short-term adverse impacts during construction, long-term beneficial impacts from less disruption from flooding	Adverse effects from change to artifically developed environment, beneficial effects from reduced flooding	No impact	Adverse impacts from elimination of vegetation and alteration of the watercourse ameliorated by the provision of recreation facilities	Costs: $7,030,000 B/C ratio: 1.3 Net Annual Benefits: $174,000

NOTES:
1. Base Condition Year - 1979
2. Period of Analysis - 100 Years

4. AFFECTED ENVIRONMENT

Environmental Conditions.

4.01 The study area is a highly urbanized flood plain with relatively small open space and greenbelt strips along Owl and Holes Creeks. Much of the streambank of Holes Creek has good tree cover and understory vegetation. The water quality is reasonably good, and the stream supports a viable aquatic community. The local economy has generally been strong with employment concentrated in manufacturing. The study area sustains damages from periodic flooding.

Significant Resources.

4.02 Soils. The soils in the region of the Holes Creek Basin have been formed from glacial materials which originated from the shale and limestone bedrock of the area. The Fox-Ockly and the Ross-Medway Associations are the principal soils in the Miami River terraces and flood plain. The Fox-Ockley soils are predominant within the corporate limits of West Carrollton, including the lower reaches of Holes Creek. The Ross-Medway soils are primarily the association of the Miami River itself and are found near the confluence of the Miami River and Holes Creek. Other common soil associations in the middle and upper reaches of Holes Creek include Miamian-Celina, Xenia-Russell, Milton-Ritchey-Hillsdale, Brookston-Fincastle, and Brookston-Crosby Associations. The soils in the study area, which tend to be erodible on slopes, present few, if any, obstacles to construction. Additional soils information is provided in Appendix A and in the Soil Survey of Montgomery County, Ohio, USDA Soil Conservation Service.

4.03 Air Quality. Air Quality monitoring stations are operated throughout Montgomery County by the Regional Air Pollution Control Agency (RAPCA). The monitoring site nearest to the study area is located within the City of Moraine. At this site suspended particulates are monitoried using a

conventional high-volume sampler procedure. Air quality near the study site during 1977 violated both State and Federal annual particulate standards, and was nearly in compliance with the primary Federal standard. Montgomery County is designated nonattainment status for photochemical oxidants and carbon monoxide; meaning that the levels of these pollutants within the County generally exceed the National Ambient Air Quality Standards. Overall air quality for this area is substandard.

4.04 Noise Levels. Noise levels, caused primarily by local traffic, are typically suburban. Other major sources of noise are: the Moraine (South Dayton) airport, from which light aircraft operate; the Conrail Railroad; and Interstate 75, all of which are located near the mouth of Holes Creek.

4.05 Water Quality. Holes Creek supports a healthy, diverse population of forage fish and a limited population of sport fish. While some upstream water quality samples have shown relatively high levels of bacteria and suspended solids, Holes Creek water quality is generally good. Dissolved oxygen levels are high; biochemical oxygen demand is low, which indicates that the creek is not heavily polluted.

4.06 Vegetation. Specific biotic communities in the immediate study area include: isolated woodlots; cultivated, old, and abandoned fields; and what uncultivated (flood plain) land borders the stream. Isolated woodlots are undeveloped or uncultivated areas as represented by the approximately 5-acre woodlot on the left streambank between Springboro Pike and Conrail Bridge.

4.07 The creek bank supports typical riparian and flood plain tree species (e.g., willow, sycamore, cottonwood, hackberry, boxelder, silver maple, etc.), as well as a thick and diverse understory vegetation which provides food and good habitat for wildlife. The riparian and woodlot communities are susceptible to alteration as a result of continued residential development in the flood plain. Encroachment into these areas is quite evident.

4.08 Idle or old field plant communities, typified by those in the lower stream area on the right bank between the railroad bridge and Interstate 75, are generally in one stage or another of secondary succession.

4.09 Wildlife. Vegetation in woodlots, old and cultivated fields, and flood plain communities, and available water provide satisfactory habitat for a diversity of wildlife. Recent surveys specific to the Holes Creek vicinity have noted usual reptile/amphibian populations, but only limited species identification has been made. The stream hardwood forests and brushy areas provide good habitat for such small mammals as squirrel, raccoon, chipmunk, mice and rats which consume nuts, acorns, fruits and seeds. Herbivorous woodchuck and cottontail rabbits prefer open areas or forest strips near open areas, as do the omnivorous red and gray foxes. Muskrat together with snake, frog and turtle species which have been sighted in this area are common to stream edges. Although bank vegetation does not provide good den habitat for large predator animals, it does attract a variety of small songbirds.

4.10 Aquatic Biota. Holes Creek, primarily in the upper reaches, supports aquatic plants such as pondweed, arrowhead, bulrush and cattail; however, aquatic vegetation in the project reach is sparse to absent. The stream also harbors a diverse community of microscopic plants and animals. Other invertebrate species include insects, annelids, flatworms, crustaceans, and mollusks. However, benthic fauna is not particularly abundant. Additional information on the benthic fauna of Holes Creek is available in the Environmental Impact Statement for Interstate Route 675, U. S. Department of Transportation, Federal Highway Administration and Ohio Department of Transportation, Columbus, Ohio. The stream substrate in the study area varies from silty sand to gravel. Several pool-riffle complexes exist in the reach from the Conrail Railroad to Lamme Road. Fish species collected in the study reach of the stream include green sunfish, bluegill, creek chubsucker, blacknose dace, sand shiner, spotfin shiner, creek chub, stoneroller, bluntnose minnow, common shiner, carp, white sucker, hog sucker, Johnny darter, and fantail dater. Smallmouth bass was collected upstream of the project area. The U. S. Fish and Wildlife Service has estimated 200 man-days

per year fisherman use in the project area. Most of the fishing is done by local youngsters with creek chub probably being the commonly caught fish.

4.11 Threatened or Endangered Species. In accordance with the Endangered Species Act of 1973 and the Endangered Species Act Amendments of 1978, the Louisville District requested the views of the U.S. Fish and Wildlife Service concerning the potential presence of species listed or proposed for listing as endangered. After an examination of the project area, the Fish and Wildlife Service concluded that the project is not likely to jeopardize the continued existence of listed species. Additionally, no threatened or endangered species listed by the State of Ohio are known to exist in the study area.

4.12 Land Use. The predominant land uses within the Holes Creek Drainage Basin are for agriculture, open space and residential purposes. Along the lower reaches, within the 3-mile study area, Holes Creek flows through areas of residential and commercial development and idle land. From Lamme Road to Springboro Pike, along the right bank of the creek, land for housing is being developed at an increasing rate. On the left bank within this reach, an extensive nursery borders the creek. The nursery land is classified as prime farmland by the U. S. Soil Conservation Service. The undeveloped flood plain bordering the right bank from Springboro Pike to Dixie Drive supports an old field vegetation community, except for what commercial development has been made to the north along Springboro Pike. The left bank is bounded by approximately 5 acres of woodlot plus some residential and commercial development. Between Dixie Drive and the Holes Creek/Miami River confluence, land to the right of the creek is occupied by the Moraine Sewage Treatment Plant; land to the left is used for the I-75 interchange system. The study site lies within a developing area typical of many suburban areas throughout the State. This development includes not only housing, but commercial and industrial growth as well. The remaining undeveloped flood plain land is under much development pressure at this time.

4.13 Employment and Level of Economic Development. Employment in Montgomery County has been considerably above the national average and somewhat above the

State average. The labor force, which comprises 41 percent of the population, is 61.8 percent male and 38.2 percent female. There is strong economic activity in manufacturing and a moderate shift from production of goods to services. Services, along with finance, insurance, and real estate have grown greatly. Manufacturing used to provide the majority of jobs and wages, but services and wholesale/ retail trade now provides the majority of jobs. Farm employment has declined because there are fewer, larger, and more mechanized farms. Various skills and occupations characterize the labor force due to the diversity of industrial and commercial activities. Heavy industries operate in the communities surrounding the study area. These industries produce paper and allied products, rubber and plastic products, and primary metal products. The area is attractive to heavy industry because it is close to the Conrail Railroad, Interstate Highway 75 and 70, a good labor market, and desirable residential areas.

4.14 Miami and Washington Townships expect rapid economic growth within the next few decades, growth which should accelerate upon completion of the proposed I-675 circumferential highway that will connect Interstate Highway 70 in northern Montgomery County to the southern parts of the Dayton metropolitan area.

4.15 Transportation. Several major highways and railroads serve the area surrounding the study site. Interstate Highway 75 is the major north-south artery. In addition, several State and Federal highways cross the area. Conrail Railroad runs through the area in a northeasterly-southwesterly direction. Within the study area, Springboro Pike, Dixie Drive, I-75 and the Conrail Railway cross Holes Creek. A public transportation service operates within the Holes Creek Basin; others operate or are being planned within the County. However, the principal mode of travel for individuals is by privately-owned vehicle.

4.16 Aesthetics. No public dumping of trash is apparent in the vicinity (except that from the nursery within their own property limits), nor is there any severe health impairment problem presented by industrial pollution to the

stream. The water of Holes Creek, though clearer in the headwater than in the lower reaches, provides adequate habitat for typical flora and fauna. The stream is often suitable for fishing. Riparian tree species, in addition to those species found in the commercial nursery, enhance aesthetic quality.

4.17 Recreation. Recreational opportunities within the immediate study are characterized by limited land facilities and severely limited water-oriented outlets. Park districts and planning agencies in the general area are undertaking efforts to expand and develop recreational facilities. The Dayton Strip and Node Corridor plan would include purchasing land along the Miami River through Montgomery County, for the development of camping, hiking, picnicking, fishing and boating facilities. The overall plan includes the reach of the Miami River within the West Carrollton area. Local officials have also expressed a desire for restoring an old dam on the Miami River at West Carrollton for recreation and ground water recharge purposes.

4.18 Recreation facilities in the immediate area include Grant Park, Yankee Park and Cox Aboretum. Holes Creek and the land along its shores are used for fishing, hiking and nature appreciation. Motorbike trails crisscross the 5-acre woodlot on the left bank of the Creek.

4.19 Cultural Resources. Four archeological sites have been recorded in the vicinity of lower Holes Creek of which three are located on the grounds of the Siebenthaler Nursery. Sites 33MY151, an Archaic and/or Woodland habitation, and 33MY152, a habitation site of undetermined cultural affiliation, are situated on the right bank of Holes Creek and east of Lamme Road. Site 33MY153, a habitation site of undetermined cultural affiliation, is located on the left bank of Holes Creek, west of Lamme Road and north of Bellbrook Road. Site 33MY306, the Joseph Dryden Mill, probably dates from the early 19th Century. This mill formerly stood on the left bank of Holes Creek near the Conrail Railroad. As a result of extensive industrial and suburban landscape alterations, the infield findings of the archeological reconnaissance were completely negative. However, on the basis of available area literature, it is considered advisable that the project area be monitored

by a professional archeologist during any future construction activities in the area.

4.20 The National Register of Historic Places was consulted and there are no recorded register properties in the lower reaches of Holes Creek.

4.21 Coordination with the State Historic Preservation Officer was accomplished through personal communication with his regional representative. Coordination will be maintained during subsequent studies.

5. ENVIRONMENTAL EFFECTS

Soils, Erosion and Streambank Effects.

5.01 The right bank levee and floodwall plan for flood alleviation along Holes Creek will have adverse and beneficial impacts on soils, erosion, and the streambank. Adverse impacts will include short-term erosion during construction due to exposure and disturbance of 11.5 acres of soil. Erosion will cause sediment accumulations in the creek. These accumulations will continue until vegetation is reestablished and soils are stabilized. Levee construction will require approximately 13 acres of borrow (from a nearby nursery) which will be subject to erosion. This will produce an unavoidable change in site topography.

5.02 Upon completion of the project, graded side slopes of the new channel and levee will be seeded or riprapped to minimize streambank erosion and reduce sediment accumulations. The 4-acre ponding area associated with this plan will provide a permanent undeveloped area for collecting drainage water behind the levee.

5.03 Adverse impacts of the channel improvement plans include short-term erosion during construction from exposure and disturbance of soil. Erosion will cause sediment accumulations in the creek--erosion which will continue until vegetation is reestablished and soils are stabilized.

5.04 However, reduced flooding will reduce erosion and scouring of the flood plain. There will be less destruction of streambanks and adjoining lands. Upon completion of the project, graded side slopes of the new channel will be seeded or riprapped to minimize future erosion and reduce sediment accumulations.

5.05 The nonstructural plan would have no impact.

Air Quality.

5.06 Implementation of either the levee alternative or channel improvement will increase the suspended particulate level as fugitive dust from construction and wind erosion of disturbed soil. The condition will persist as a short-term effect only during construction; it will have no long-term impact on air quality. There will be minor emissions of gaseous pollutants (hydrocarbons, carbon monoxide, nitrogen dioxide, and sulfur dioxide) from construction-related vehicle operation. Again, these emissions will be generated only for a short time.

5.07 Flood proofing would have no impact.

Noise Levels.

5.08 Short-term increase in noise levels in the study area from levee or channel improvement construction activities will occur. This will cause temporary inconvenience to local residents. Long-term impact will result from noise associated with the levee project's ponding area pumphouse, though this is not expected to be significant.

5.09 The nonstructural plan would have neglible impact.

Water Quality.

5.10 Short-term erosion resulting from levee construction will increase the suspended sediment load of the creek. However, in time the revegetated soil will stabilize and this effect will diminish. Increases in stream velocity due to the 1,500 feet of channel realignment will also cause higher suspended solids levels. The temperature of the creek will be altered from changes in water velocity and removal of shade trees. Elimination of riffles within the streambed from channel realignment will decrease the dissolved oxygen concentration which is an important factor in determining the pollutant assimilative capacity of a stream. Though these changes will result from implementation of this alternative, the net effect is not expected to involve any significant long-term impact to water quality of Holes Creek or the Miami River.

5.11 Channel improvement construction will cause short- and long-term changes in water quality. These changes will occur from increased suspended sediment, water velocity, and affects to substrate. Increased turbidity as a short-term impact will result from higher suspended and dissolved solids within the stream. This is caused by soil disruption during construction and subsequent erosion. Impact of the increased sediment load to Holes Creek will extend into the Miami River for a distance downstream of the confluence point. Increased stream velocities are not expected to have any significant effect upon the Miami River since the Holes Creek channel is improved below I-75, there is little development in this area, and the Miami River is a much larger stream. Removal of shade trees as a result of the project will cause a long-term increase in water temperature. Channel improvement, resulting in removal of riffles from the creek bed, will cause a decrease in the dissolved oxygen concentration and corresponding pollutant assimilative capacity. Long-term impacts of the 500-year plan will be reduced by construction of pools and riffles.

Vegetation.

5.12 A significant adverse impact will occur from the preliminary land clearing and grubbing of vegetation for the levee alternative. An estimated 11.5 acres of riparian vegetation will be stripped. About 13 acres will be cleared for excavation of approximately 55,000 cubic yards of material needed to construct the 3,400-foot long earth levee. A portion of this material, though, will be obtained from the new channel segment excavation. Additionally, the plan proposes that 4 acres be used as a ponding area to collect surface and storm sewer runoff on the landward side of the levee. Altogether, these disturbed areas will require seeding and fertilizing to prevent erosion. Selective planting in each of these areas will produce changes in the existing environment by reducing species diversity. Other effects involve the disruption of vegetated areas upon relocation of utilities (e.g., water main and sanitary sewerlines, etc.) out of the considered project area. But this will cause only short-term impact.

5.13 A significant adverse impact from the considered channel improvement plan will occur from the clearing and grubbing of vegetation. This will infringe upon woodlots, old and cultivated fields, and riparian flood plain areas. This will involve removal of trees and associated plant communities. Upon construction completion, selective planting and riprapping of the streambanks will minimize potential short- and long-term erosion problems. Seeding and fertilizing of approximately 25 acres with the 25-year plan and 23 acres with the 500-year plan has been estimated. (The 500-year plan has a larger proportion of riprapping as opposed to seedings.) During implementation of this plan, approximately 60,000 or 154,000 (varies with plans) cubic yards of spoil material will require disposal or utilization. Disposal of this material could bury some existing plant communities. Other effects will involve the disruption of vegetated areas from relocation of utilities (e.g., water main and sanitary sewerlines, etc.). Both will cause short-term impacts.

5.14 The nonstructural alternative includes the purchase of 24 acres of vegetation for preservation.

Wildlife.

5.15 Alteration of terrestrial vegetation and animal habitat will inevitably affect wildlife. Levee construction and excavation activities causing noise, dust and/or other short-term effects will force wildlife from the immediate area. Habitat will be buried or otherwise eliminated. Selective planting of grass, shrubbery, etc., in disturbed areas will provide new habitat with less diversity.

5.16 Lesser adverse impacts of the levee plan involve utilities (e.g., water main and sanitary sewerlines) relocation out of the project area which will result in disruption of vegetative communities and potential wildlife habitats. These effects will be short-term.

5.17 Potential alteration of about 30 acres of vegetation and corresponding habitat for the 25-year channel improvement plan, and about 48 acres for the 500-year plan, will cause loss of terrestrial wildlife. During construction, noise, dust, etc., will stress most wildlife. Motile species such as birds and large mammals may leave the immediate area; however, they may be subjected to competition from other animals in the adjacent habitats. After construction, it is anticipated that this condition will reach equilibrium. Disturbed areas will be seeded which will alter species diversity. Disposal of generated spoil material will result in habitat burial and some wildlife displacement. Yet, if properly vegetated to curb runoff sediment and airborne dust problems, this material should provide new habitat for some small animal species. An additional adverse effect will result from water main and sanitary sewerline relocations out of the construction area. This will affect vegetative communities and wildlife habitats on a short-term basis.

5.18 There would be no adverse effects upon wildlife from implementation of the nonstructural alternative and potential beneficial effects from preservation of habitat.

Aquatic Biota.

5.19 Adverse impacts to aquatic life from the levee plan will occur within that reach of the stream considered for channel realignment. Realignment of this 1,500-foot segment will result in substrate alteration and a reduction in the variety and availability of stream habitats. It will also reduce the aquatic species diversity in this vicinity. Benthic organisms will be most affected. Removal of riffles will reduce pollutant assimilative capacity. Improvement of the stream channel can also influence any spring migratory patterns of fish species to headwaters of the creek. Levee construction and stream realignment will initially impart some degree of sedimentation from surface runoff. This will cause burial of benthic organisms. Use of the 4-acre ponding areas, as previously discussed, will be sporadic and occur only during brief periods of heavy rainfall. Revegetation of these areas will attract new flora and fauna.

5.20 Alteration of approximately 7,550 feet of channel for the channel improvement plans will adversely affect aquatic life within Holes Creek. Both flora and fauna will be disturbed by alteration of the present watercourse. However, riffles and pools will be reconstructed as practicable. If construction takes place in the spring, migration of certain species of fish could be disrupted. Benthic organisms and some aquatic flora will be affected by siltation. Removal of shade trees from along the stream will cause elevation of water temperature. Decreased dissolved oxygen concentration resulting from elimination of streambed characteristics (riffles, etc.) will reduce the creek's pollutant assimilative capacity. But under the design plan which will recreate these conditions, this will not be a long-term effect.

5.21 The nonstructural alternative would have no impact.

Threatened or Endangered Species.

5.22 The considered plans would have no impact since threatened or endangered species are not known to exist in the area.

Land Use.

5.23 Impacts of the levee plan on land use within the study area will involve 12.5 acres plus another 13 acres needed for excavation of the levee borrow material. This is principally idle (riparian) and agricultural (nursery) land. Property acquired for channel construction will be permanently unavailable for private development, but it could be considered for open land and various recreation activities.

5.24 The levee project will provide standard project flood protection for only the right bank of Holes Creek which is currently in residential and commercial use. Little change is expected from this form of land use. Property values will increase from project construction. For the primarily undeveloped left bank, no significant reduction of flood hazard will be provided and flood plain development will be subject to current hazards.

5.25 Impacts to land use within the study area will involve 25 acres for the 25-year channel improvement, and 38 acres for the 500-year plan. This is principally idle (riparian) and agricultural (nursery) land. Property acquired for channel construction will be permanently unavailable for private development, but it should be considered for open land and recreation. The nursery land classified as prime farmland is expected to be eventually converted to other uses regardless of whether the project is constructed.

5.26 The reduction of flood hazards in the area will make currently idle land more attractive to developers for use as residential or commercial property. However, only limited opportunities exist for extensive development.

5.27 The flood proofing plan would protect some green space from urban encroachment.

Employment and Economic Development.

5.28 Both the levee project and the channel improvement projects will benefit employment in the area. A temporary increase in employment will result from construction jobs associated with the project. A long-term increase in employment could result from increased commercial and industrial activity within the previously flood prone area on the right bank.

5.29 A number of economic impacts could result from this project. Tax revenues and property values, which to date have been depressed in the flood prone areas, will most likely increase. This will be somewhat offset by the loss of property tax revenues on land purchased for the project.

5.30 A long-term beneficial impact to public facilities and services in the area will result from the elimination of service interruptions and damages to power, water, sewer and transportation facilities. Fewer service interruptions and damages to local businesses and industries will result in fewer shutdowns and reduced financial losses. Less flood damage to private property will result in reduced financial losses to individuals and agencies.

5.31 Construction of the levee and floodwall or channel improvement is not expected to significantly disrupt any existing public facilities or services, nor will it displace any residences. However, power and sewerlines, and water mains paralleling or crossing the stream will require relocation.

5.32 The nonstructural alternative will have a minor effect on employment in the area through employment provided by installation of flood proofing measures.

Transportation.

5.33 Adverse impacts to transportation from construction activities associated with the channel improvement plan and the levee plan will be short-term. Long-term benefits resulting from less disruption of roads, bridges and

other transportation structures by flooding will enhance transportation. Physical damages to roads will be eliminated and costs will be reduced due to less traffic interruption and rerouting.

5.34 There would be no impact on transportation from the nonstructural alternative.

Aesthetics.

5.35 The channel improvement plan will change the existing natural setting to an artificial, man-made environment. However, flood prevention will alleviate the adverse effects upon aesthetics of the areawide sedimentation problem which now results from inundation. Similarly, the levee plan will change the existing natural setting to an artificially developed environment. Construction of an aesthetically unpleasing embankment on the right shore of the stream and not the left will eliminate the flooding problem for one side but not the other.

5.36 Flood proofing would have minimal effect on area aesthetics.

Recreation.

5.37 Clearing of vegetation for the levee and channel improvement plans will adversely affect recreational opportunities along Holes Creek. Loss of fish habitat from channel alterations would have an adverse impact upon stream fishing. Land-based recreational opportunities would be restored by the recreation facilities provided with the 500-year channel improvement plan.

Cultural Resources.

5.38 No significant archeological or historical sites remain in the area to be affected by the proposed alternatives.

6. PUBLIC INVOLVEMENT.

Public Involvement Program.

6.01 The only early public meeting held in the area was at Dayton, 26 March 1968, and was one of three initial meetings for the parent study, Miami River, Little Miami River and Mill Creek Basins, Ohio. However, the State, the Miami Conservancy District, the U.S. Fish and Wildlife Service, and local officials have been kept informed of efforts on studies for the project. Meetings with representatives of the Miami Conservancy District, State of Ohio, and West Carrollton were held in June 1975, November 1977, and September 1978. Representatives of the U.S. Fish and Wildlife Service, Montgomery County, and Miami Township also attended one or more of the above meetings. These concerns and views have been incorporated into this study.

6.02 The Formulation Stage Public Meeting was held at West Carrollton on 14 December 1978 and the Final Public Meeting on 24 June 1980.

6.03 By letter of 25 April 1979, comments were solicited to determine the scope and the significant issues to be addressed in the Environmental Impact Statement.

Required Coordination.

6.04 Following coordination of the Draft Environmental Impact Statement with appropriate agencies, groups and individuals, a late stage public meeting was held. Comments received on the Draft EIS and at the public meeting were utilized in the preparation of planning reports and the Final EIS which has been distributed to appropriate recipients. General coordination with appropriate agencies will be continued throughout the planning process.

Statement Recipients.

6.05 The following is a list of agencies, groups and individuals to whom the Draft Environmental Impact Statement was sent. The Final EIS is sent to those who initially were sent copies of the Draft EIS plus those who subsequently requested an EIS.

Federal Agencies

U.S. Department of Agriculture
- Soil Conservation Service
- Forest Service

U.S. Department of Commerce

U.S. Department of Health, Education and Welfare

U.S. Deparment of Housing and Urban Development

U.S. Department of the Interior
- Fish and Wildlife Service
- National Park Service
- Heritage Conservation and Recreation Service
- Environmental Project Review

U.S. Department of Labor
- Occupational Safety and Health

U.S. Department of Transportation
- Federal Highway Administration
- Federal Aviation Administration
- Federal Railroad Administration
- Coast Guard

U.S. Department of Energy
- Federal Energy Regulatory Commission

Environmental Protection Agency

Ohio River Basin Commission

Center for Disease Control

Council on Environmental Quality

U.S. Congressman from Ohio (Senators - 2; Representatives - 3)

State of Ohio

Office of the Governor (A-95 State Clearinghouse)

Department of Natural Resources

Department of Agriculture

Environmental Protection Agency

Department of Health

State Library of Ohio

Historic Preservation Officer

Department of Transportation

Local Officials

Mayor

- West Carrollton
- Centerville
- Englewood
- Kettering
- Miamisburg
- Moraine
- Oakwood
- Farmersville

Clerk/Trustees

- Jefferson Township
- Miami Township
- Washington Township

County Commissioner

- Montgomery County

Individuals

Dr. Sture Fredrick Anliot
Prof. Robert Bieri
Mr. Branley A. Branson
Dr. James W. Collinson
Dr. John Disinger
Dr. Richard R. Durrell
Dr. Charles H. Faulker
Dr. Arlene Foley
Dr. Richard W. Franeaviglia
Dr. H. Paul Friesema
Dr. D. Joseph Hagerty
Dr. Stanley Hedeer
Dr. Robert D. Miles
Mr. J. C. Randolph
Dr. John R. Ray
Prof. David A. Rock
Dr. Ronald G. Schmidt
Dr. D. Snarr
Dr. David Honor Stansbery
Dr. Carol B. Stein
Dr. Kent Vickery
Dr. Jonathan Wert
Dr. Andrew M. White
Mr. B. J. Winger
Mr. Alan C. Tonetti

A "Notice of Availability" has been sent to numerous organized groups, college and public libraries, news media, businesses and individual citizens as notification of this document.

Public Views and Responses.

6.06 Local interests consider flood problems to be the main concern among water resource needs. The views presented at the Formulation Stage Public Meeting ranged from objections to any improvements to support for continuation of efforts to determine the best plan. The local sponsor, the Miami Conservancy District, opposed the nonstructural plan primarily because it is less effective in reducing flood damages. The levee plan was not supported due to the potential increase in damages on the left bank and the incomplete protection provided for the area. Channel improvement with emphasis on a high degree of protection was supported.

6.07 Comments concerning significant issues which should be addressed in the Draft EIS were received from the Ohio Department of Natural Resources, the Miami Conservancy District, and the Miami Valley Regional Planning Commission. The Fish and Wildlife Service has submitted preliminary, draft and final reports on the project. Pertinent correspondence is included in Appendix C.

6.08 Since publication of the Draft EIS, the local sponsor, the Miami Conservancy District, has requested that recreation facilities be added to the selected plan. At the public meeting on 24 June 1980, concerns were voiced regarding overland flood flows at Lamme Road. Reassessment of this situation resulted in the 500-year channel being extended upstream an additional 1,000 feet. The Main Report and EIS have been revised to reflect these changes in the proposed plan.

6.09 The following is a list of those who provided comments on the Draft EIS.

U. S. Soil Conservation Service
U. S. Forest Service
U. S. Department of Commerce,
National Oceanic and Atmospheric Administration

U. S. Department of the Interior,
Office of the Secretary
U. S. Department of Transportation,
Federal Highway Administration
U. S. Environmental Protection Agency, Region V
Federal Energy Regulatory Commission
Ohio River Basin Commission
State Clearinghouse, Office of Budget & Management, Ohio
Ohio Department of Natural Resources
Ohio Historic Preservation Office

6.10 The comments received have been assessed and considered in the Final EIS. While some comments have prompted changes and refinements, none have resulted in major changes in the proposed action. A full text of comments and responses appears in Appendix C, Public Views and Responses.

INDEX, REFERENCES AND APPENDICES

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Plans Considered in Detail	p. 15 para. 3.05-3.15	p. 31-58	
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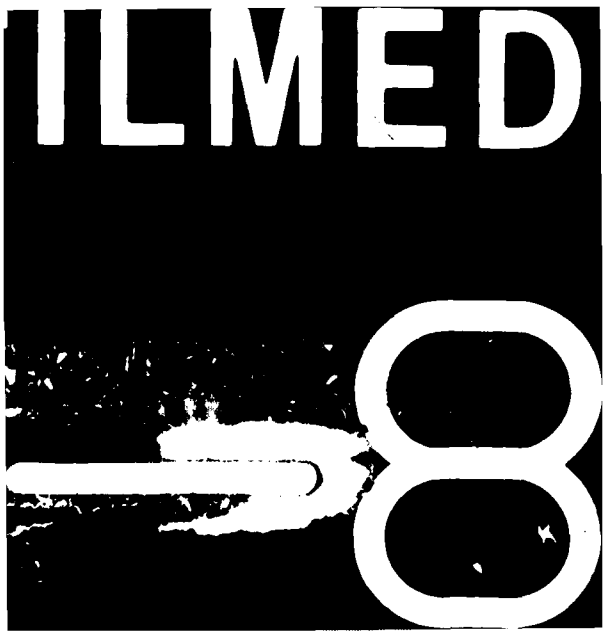
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