REVISED DRAFT

ENVIRONMENTAL STATEMENT

NONCONNAH CREEK
TENNESSEE AND MISSISSIPPI

Prepared Jointly By

Department of Army
Memphis District, Corps of Engineers
Memphis, Tennessee

Department of Agriculture
Nashville, Tennessee

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Summary

Revised Draft - Subject to Revision

NONCONNAH CREEK
TENNESSEE AND MISSISSIPPI

Prepared in Accordance with Sec. 102(2)(C) of P.L. 91-190

(X) Draft Environmental Statement ( ) Final Environmental Statement

Responsible Office: U. S. Army Engineer District, Memphis, Tennessee

and

U. S. Department of Agriculture

1. Name of Action: ( ) Adm. (X) Legislative

2. Description of Action: A flood prevention, watershed protection and recreational project to be carried out jointly by the United States Department of Agriculture and the U. S. Army Corps of Engineers in cooperation with local sponsoring organizations. The USDA-Soil Conservation Service with the Chickasaw Basin Authority will have responsibility for installation of three floodwater-retarding structures on the Johns Creek tributary. USDA with the three soil conservation districts (Shelby County, Tennessee, DeSoto County and Marshall County, Mississippi) will have responsibility for a basin-wide program of land treatment for erosion and sediment control on 35,010 acres. The Corps of Engineers with the Chickasaw Basin Authority will have responsibility for construction of a 1900-acre reservoir on Nonconnah Creek to provide flood control and recreation; 7 miles of channel cleanout and 12 miles of channel enlargement within the City of Memphis; and the establishment of a 600-foot wide greenway-floodway extending 20 miles from the mouth of Nonconnah Creek to the recreation reservoir. The project covers the 117,200-acre drainage area of Nonconnah Creek including portions of Shelby and Fayette Counties in southwest Tennessee, and extends into Marshall and DeSoto Counties in northwest Mississippi.

3. a. Environmental Impacts: Directly benefit 9,000 acres by substantially reducing flood hazards; reduce projected average annual damages from $4,931,300; to $43,700; create an estimated 1,450,000 annual man-days recreation potential; preserve and enhance beauty and esthetics associated with woods and natural areas adjacent to reservoir and greenway; reduce long-term erosion and sediment; result in net improvement of water quality; increase rate of urbanization.

b. Adverse Environmental Effects: Loss of 6 miles of existing channel and 2,300 acres of land containing 900 acres of bottomland hardwood habitat, and 18 archeological sites to permanent inundation and 4 archeological sites subject to damage from wave action; increased stream turbidity and sedimentation during construction; permanent loss of agricultural production within area of reservoir conservation pool; permanent alteration of existing traffic patterns on inundated roads; relocation of 22 families; loss or reduction in stream benthos and increased bank erosion during and for a relatively short time following channel disturbance.

4. Alternatives: No action; preventative measures (zoning, development policies, flood insurance); flood proofing; land treatment; urban redevelopment; levees; various combinations of floodwater-retarding structures; channel pavement; evacuation.

5. Comments Received:

Environmental Protection Agency
U. S. Department of the Interior
Office of Economic Opportunity
Tennessee Office of Urban and Federal Affairs
MATCOG (Mississippi- Arkansas- Tennessee Council of Governments)
Chickasaw Basin Authority
Memphis and Shelby County Planning Commission
City of Memphis
Shelby County Quarterly Court
Bureau of Sport Fisheries and Wildlife, USDI
Bureau of Outdoor Recreation, USDI
Geological Survey, USDI
National Park Service, USDI
Volunteer Group, Sierra Club
The Wildlife Society
Nonconnah Improvement Association
Professor Arlo Smith

6. Draft statement to CEQ______________.

Revised Draft statement to CEQ____________.

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1. Project Description. The Nonconnah Creek Basin includes portions of Shelby and Fayette Counties in southwest Tennessee and extends into DeSoto and Marshall Counties in northwest Mississippi. About one-half of the city of Memphis, Tennessee, is located in the basin, and Nonconnah Creek itself is tributary to the Mississippi River. A general map is shown on Plate 1.

The joint study of this project by the Secretary of the Army and Secretary of Agriculture was authorized by a resolution of the Committee on Public Works of the United States Senate, adopted 29 September 1972 at the request of Senator Howard Baker of Tennessee. The study is also responsive to an earlier resolution adopted by the United States Senate on 28 October 1970 at the request of Senator Baker and former Senator Albert Gore of Tennessee, authorizing review by the Chief of Engineers of the report on the Mississippi River and Tributaries Project, published as House Document No. 308, Eighty-eighth Congress.

The project is being planned and will be carried out by the Corps of Engineers and the United States Department of Agriculture in cooperation with the following local sponsoring agencies:

The Chickasaw Basin Authority, Tennessee
Shelby County Soil Conservation District, Tennessee
DeSoto County Soil and Water Conservation District, Mississippi
Marshall County Soil and Water Conservation District, Mississippi

Purposes of the project are (1) reduction in erosion rates through establishment of soil and water conservation measures in the uplands, (2) prevention of damage from a 100-year flood and all lesser floods on a major portion of the flood plain, (3) development of outdoor recreation facilities to help meet recreational needs of the area, (4) enhancement of the overall environmental quality of the watershed, and (5) sound development and use of the flood plain for open space, and the development of industrial, commercial, and residential areas. Proposed development consists of a comprehensive watershed program to be implemented jointly by the Corps of Engineers, the Department of Agriculture, and the local sponsoring organizations. It includes measures for flood control, recreation, open space, protection and enhancement of fish, wildlife, and other renewable resources, beautification and esthetic considerations, control of silt, erosion and pollution, and other flood plain uses consonant with a quality human environment. The Soil Conservation Service will have the responsibility of developing three floodwater control structures on the Johns Creek tributary and along with the Forest Service, p... a basin-wide program of land treatment for erosion and sediment control + environmental ... on 35,010 acres. The Corps of Engineers will be responsible for construction of a floodwater impoundment on the main stem which will be designed and developed for recreation. In addition, the Corps will provide 7 miles of channel cleanout, 12 miles of channel enlargement within the City of Memphis, and development of recreation and preservation

and enhancement of natural environmental values within a 600-foot wide greenway-floodway extending 20 miles from the mouth of Nonconnah Creek to the flood impoundment structure.

The land treatment program proposed for implementation by the U.S. Department of Agriculture is needed to control erosion, reduce sediment, and generally improve the environment and support the overall flood control program. Its effectiveness will depend on an intensive conservation education and information program aimed at users of both urban and rural lands. Principal features of the program include measures applicable to cropland and grassland, urban land and land in transition, forest land and critically eroding land. Briefly, these measures consist of applied conservation practices on agricultural lands including conservation cropping systems, terraces, grassed waterways or pipe outlets, stripcropping, contour farming, minimum tillage, diversions, or combinations of these practices which will keep soil losses within tolerable rates. Urban land treatment will emphasize establishment of permanent vegetation on home sites, vacant lots, public property and all other open lands. It will include creation and maintenance of greenbelts for purposes such as sound screens, esthetic screens, recreational and park areas, water control, and sediment traps. Planned forest land treatment measures include 600 acres of critical-area tree planting, 3,200 acres of tree planting for watershed protection and enhancement, and 2,000 acres of timber stand improvement. An estimated 1,330 acres of critically eroding areas will be treated by establishing perennial grasses, legumes, and trees. Gully

problems will be controlled by shaping and seeding, creation of small brush dams, or installation of earth dams as needed.

Structures proposed for construction with assistance of the Soil Conservation Service consist of three floodwater dams on the headwaters of Johns Creek. They will store 6 inches of runoff from a 15-square mile drainage area. Flows through emergency spillways will occur only when the discharge of a 100-year frequency rainfall is exceeded. All three structures are designed to store sediment from a 100-year yield.

The Corps of Engineers will construct a multiple purpose structure for flood control which will be developed for recreation in cooperation with the Chickasaw Basin Authority. The dam will be located approximately 20 miles upstream from the mouth of Nonconnah Creek. The reservoir will contain sediment storage for 100-year accumulation, a total of 6,195 acre-feet. Recreation storage of 6,905 acre-feet will be included to provide maximum surface area with the most desirable shoreline. The conservation-recreation pool will consist of 1,900 surface acres. Floodwater storage of 18,000 acre-feet will be included to reduce discharge from 25,000 cfs to 2,100 cfs for the 100-year frequency flood. (Refer to Table 1).

Mainstem channel improvement will be accomplished by the Corps of Engineers. The reservoir will effectively control flooding from the dam site at mile 19.8 downstream to the mouth of Johns Creek tributary at mile 11.8. In this reach, channel improvement will be limited to removal of existing debris and silt accumulation, with no

enlargement. From mile 11.8 downstream to mile 0.7 it will be necessary to enlarge the existing channel to prevent damage to existing development from the 100-year frequency flood. The channel bottom width will be increased to 90 feet from mile 11.8 downstream to mile 9.3 and to 110 feet from mile 9.3 downstream to mile 0.7. The channel will have side slopes of 1 on 4 except where existing banks are flatter and will be designed and constructed to be compatible with establishment of a greenway. The greenway will consist of a 600-foot wide floodway which is necessary to accommodate overbank flow in combination with the improved channel. No development will be permitted within the greenway zone to restrict overbank flows which will occur on the average of once every 10 years.

The greenway will extend from the mouth of Nonconnah Creek to the reservoir at mile 19.8. Wherever possible, existing vegetation within this area will be left in place to preserve a natural setting. A system of hiking and bicycle trails will be developed extending the full length of the greenway. Horse riding trails will extend for 10 miles. In areas which have been denuded or lands which have been used as borrow for landfill operations, banks will be reshaped and replanted with domestic or wild plant species as appropriate to the site. At selected points, the greenway may be enlarged to include picnic areas, game fields, and rest areas.

TABLE 1- STRUCTURAL DATA

STRUCTURES WITH PLANNED STORAGE CAPACITY

Nonconnah Creek Watershed, Tennessee and Mississippi

Item	Unit	Nonconnah Lake	Johns Creek Structures 11	Johns Creek Structures 15	Johns Creek Structures 17	Total
Class of Structure			C	C	C	
Drainage Area	Sq.Mi.	53.24	5.43	1.59	7.90	68.16
Curve No. (1 day)(AMC II)			80	80	80	-
Tc	Hrs.	5	1.16	0.63	1.27	-
Elevation Top of Dam	Ft.	339.0	337.6	349.0	331.0	-
Elevation Crest Emergency Spillway	Ft.	326.0	328.9	342.3	322.3	-
Elev. Crest High Stage Inlet	Ft.	-	-	338.90	-	-
Elev. Crest Low Stage Inlet	Ft.	-	321.5	335.0	315.0	-
Maximum Height of Dam	Ft.	37	35	28	32	-
Volume of Fill	Cu.Yds.	1,400,000	153,000	86,000	190,500	1,829,500
Total Capacity	Ac.Ft.	31,100	2,143	739	3,004	36,986
Sediment Submerged 100 Yrs.	Ac.Ft.	5,550	611	188	735	7,084
Sediment Aerated	Ac.Ft.	645	85	26	21	777
Beneficial Use (Recreation)	Ac.Ft.	6,905	-	-	-	-
Retarding	Ac.Ft.	18,000	1,447	525	2,248	22,220
Between High and Low Stage	Ac.Ft.	-	-	242	-	242
Surface Area						
Sediment Pool	Acres	1,200	150	47	200	1,597
Beneficial Use Pool (Rec.)	Acres	1,900	-	-	-	-
Retarding Pool	Acres	3,280	247	98	430	4,055
Principal Spillway						
Rainfall Vol. (Areal)(1 Day)	In.	7.9	7.9	7.9	7.9	-
Rainfall Vol. (Areal)(10 Day)	In.	-	14.5	14.5	14.5	-
Runoff Volume (10 Day)	In.	-	9.57	9.57	9.57	-
Capacity of Low Stage (Max.)	Cfs	-	267	42	326	-
Capacity of High Stage (Max.)	Cfs	-	-	92	-	-
Frequency Operation-Emerg. Spillway	% Chance	1	1	1	1	-

Table 1 - Structural Data (cont'd)
Structures With Planned Storage Capacity
Nonconnah Creek Watershed, Tennessee and Mississippi
(Continued)

Item	Unit	Nonconnah Lake	Johns Creek Structures 11	Johns Creek Structures 15	Johns Creek Structures 17	Total
			C	C	C	
Size of Conduit	Dia.	8'x10'	48"	30"	54"	-
Emergency Spillway						
Rainfall Volume (ESH) (Areal)	In.	17.20 (4 Day)	12	12	12	-
Runoff Volume (ESH)	In.	13.99	9.45	9.45	9.45	-
Type		Chute	Veg	Veg	Chute	-
Bottom Width	Ft.	500	300	150	300	-
Velocity of Flow (Ve)	Ft./Sec.	-	8.15	5.96	-	-
Slope of Exit Channel	Ft./Ft.	-	0.028	0.033	-	-
Maximum Water Surface Elev.	Ft.	335.0	331.5	344.0	324.7	-
Freeboard						
Rainfall Volume (FH)(Areal)	In.	30.50 (2 Day)	29.90	29.90	29.90	-
Runoff Volume (FH)	In.	28.35	26.93	26.93	26.93	-
Maximum Water Surface Elev.	Ft.	335.0	336.6	348.0	330.1	-
Capacity Equivalents						
Sediment Volume	In.	2.18	2.40	2.52	1.71	-
Retarding Volume	In.	6.34	5.00	6.19	5.33	-
Recreation Volume	In.	2.40	-	-	-	-

The 120-acre North Park will have a boat launching ramp, shoreline picnic tables, combination restroom-change shelters and attendant parking facilities. Also provided for are tennis, basketball and volleyball courts, as well as various trails and open playing fields. North Park will be utilized as an intense use, day-light hours facility.

The 1500-acre South Park will provide each type of facility planned for the North Park, but will also provide for overnight camping and equestrian trails and stables.

The Nonconnah Creek project is presently in the preauthorization study phase. The project location and extent of proposed developments are shown on Plate 2. The benefit-cost ratio of this project is presently 1.5 to 1, using an interest rate of 5-5/8% and a 100-year evaluation period.

2. Environmental Setting Without the Project. The Nonconnah Creek watershed is located in extreme southwest Tennessee and northwest Mississippi. The drainage area is elongated, being some 30 miles in length with a maximum width of about 8 miles. It originates in Marshall County, Mississippi, and flows northwesterly to its outlet into McKellar Lake, which is an old run of the Mississippi River. Total drainage area is 117,200 acres or 183 square miles, of which 94,900 acres are in Shelby County, Tennessee; 730 acres in Fayette County, Tennessee; 12,300 acres in DeSoto County, Mississippi; and 9,270 acres in Marshall County, Mississippi. Major tributaries are Johns Creek (drainage area

27.2 square miles), Collierville Creek (drainage area 10.6 square miles) and Days Creek (drainage area 10.1 square miles). There are numerous smaller tributaries of less than 10 square miles drainage area.

Better than 40 percent of the area of the watershed is urbanized, including about one-half of the city of Memphis, parts of Germantown and Collierville. Other land uses in the watershed are estimated to be about 34 percent cropland, 17 percent pasture and idle, and 4 percent miscellaneous. Approximately 5 percent is forest land, although a part of the pastureland, existing park lands, and other areas contain small wooded tracts. The watershed population was 260,000 in 1965 and is expected to grow to 528,000 in 1990. Present agricultural lands in Shelby County, Tennessee will be essentially totally converted to industrial and residential development sites by the year 2000.

The predominant source of income within the watershed is from employment in manufacturing and service industries. Farm employment and income account for only a small percentage of the total income of the watershed. A special census made of Shelby County in 1966 found the median family income per census tract ranging from a low of $2,098 to a high of $12,664. In 1970, incomes ranged from a low of $4,205 to a high of $22,736 median family income per census tract within the basin.

The watershed lies almost entirely within the Memphis-North Mississippi urban development area. Small farms and pastureland occupy the basin at the upper reaches of the creek. Memphis was the seventeenth

largest city in the nation in 1970, with a population of 623,500. The population of Shelby County at that time was 722,100. The greater Memphis trade area, which includes Shelby County, Tennessee; DeSoto County, Mississippi; and Crittenden County, Arkansas, had a population of 806,000. Since 1900, the growth rate of the Memphis area has exceeded that of the nation with an average rate of 28.5 percent per decade compared to an average national rate of 13.5 percent per decade.

The Nonconnah Creek watershed has experienced even higher increases in population and urban development. This is due in part to its location with respect to major highways, airports, and industrial developments. After World War II, the rapid expansion of the city put new demands upon the overflow areas. In 1963, the southern loop of the perimeter expressway was completed along the northern edge of the Nonconnah Creek floodplain opening up this area to a major transportation artery. Memphis International Airport is located just south of the Nonconnah Creek floodplain with the north-south runway extending into the overflow area. Several major railroads cross Nonconnah Creek and numerous spur tracks parallel the floodplain. This network of transportation facilities created pressure to develop the floodplain area for industry and private housing. Road and street improvements planned or underway will soon provide access and accompanying urbanization in all parts of the watershed.

Average yearly rainfall in the watershed is about 50 inches. According to the National Weather Service normal monthly rainfall varies from an average of 3 inches in October to more than 5 inches in March. Thunderstorms during spring and summer are often of high intensity resulting in heavy runoff and rapid rise in the elevation of the flow in the creek and its tributaries. Mean annual temperature of the basin is about 62 degrees Fahrenheit. January is the coldest month, averaging about 41 degrees Fahrenheit. July is the hottest month with an average temperature of 81 degrees.

Topography varies from gently rolling hills and ridges in upland areas to moderately wide valleys. Elevations range from 215 feet above mean sea level in floodplain areas to 390 feet above mean sea level in hill areas. The Nonconnah basin lies within the Gulf Coastal Plain physiographic area. This plain has been dissected to a variable degree. The valleys in the basin are well incised. Tributary streams have moderately wide valley floors. Hilltops and ridgetops are rounded with moderately sloping valley walls. Uplands are considered rolling to undulating. The watershed has a dendritic drainage pattern. Exposed on or near the surface are sedimentary and windblown geologic formations ranging in age from Upper Eocene to Recent. The following geologic column represents the sequences of these formations:

System	Series	Subdivision
Quaternary	Recent	Alluvium
	Pleistocene	Loess
Tertiary	Pliocene	Terrace Gravel
	Upper Eocene	Jackson Formation
	Upper Eocene	Grenada Formation

A description of the above subdivisions is as follows:

a. Alluvium is found in the flood plains of all drainages. The alluvium is comprised primarily of silt derived from the upland loess. This alluvium is up to 30 feet thick and a large portion has been deposited in modern times. Several tributaries on the southwest section of the watershed have large scale gravel and sand quarries. These areas are contributing coarse grain deposits to the flood plain. A geologic profile as shown on Plate 3 is representative of subsurface materials near the location of the proposed lake on the main channel of Nonconnah Creek.

b. Loess is an Aeolian (wind-lain) silt or clayey silt which mantles the entire watershed outside of the flood plain. Total thickness of the loess decreases from about 100 feet along the western edge to less than 10 feet in the eastern edge of the watershed. The loess is unconsolidated and is weathered to a considerable depth. When unweathered, it is calcareous and gray in color. Weathered loess is generally buff colored. Texture varies only slightly from the surface to the base of the deposit.

c. Terrace Gravel underlies loess deposit except where removed by erosion before the loess deposition. This deposit was laid down as alluvium and is comprised of well-rounded chert gravel and cobbles

with a matrix of clayey sand or sand clay. It is unconsolidated. Maximum thickness is about 60 feet but this is variable.

d. Jackson Formation consists of fine sand, silty sand, clayey sand and gray clay. These materials probably vary from unconsolidated to semiconsolidated. Lignite and organic matter are common. This formation is at least 100 feet thick but is exposed only in the bottom of some of the deeper channels in the western edge of the basin. The Jackson formation underlies the flood plain alluvium, the terrace gravels and the loess where the gravels are absent. The dip is about 15 feet/mile to the west.

e. Grenada Formation is the uppermost formation of Eocene age which comprises the Wilcox group. This formation consists primarily of sand with clay lenses and thin deposits of lignite.

Upland soils are of the Grenada-Loring-Memphis Association. This association is predominantly undulating to rolling. It consists of broad ridges that are gently sloping with strongly sloping side slopes, and many small drainageways. The soils of this association formed in silt deposits ranging from 5 to more than 20 feet thick. They range from well drained to poorly drained. Grenada soils, which are moderately well drained, predominate. They have a brown silty surface layer and a yellowish-brown silt loam subsoil. A compact (fragipan) layer begins 16 to 28 inches below the surface, which causes water to drain slowly through the subsoil and influences the use suitability and management requirements for crops. The Grenada soils are commonly

on nearly level wide ridgetops and sloping hillsides. The nearly well drained Loring soils have a brown, silty surface layer and a dark brown, silt loam subsoil with a compact (fragipan) layer starting at about 28 inches below the surface. The Loring soils are on the sloping ridgetops and the hillsides. Memphis soils, which are well drained, have a brown, silty surface layer. The subsoil is dark brown, silty clay loam. Memphis soils are on the broader ridgetops and steeper hillsides. Collins and Falaya soils are in the adjacent narrow bottoms.

Silty soils of recent alluvium are found on the floodplains. These are the Falaya-Waverly-Collins Association. These soils occupy the alluvial plain of Nonconnah Creek. All of these soils are susceptible to flooding. The soils are silty and fertile. They differ in natural drainage. The Collins soils, which occupy about 15 percent of the association, are best drained of the three, although not well drained. Ranking next are the Falaya soils, which occupy about 65 percent of this association. The Waverly soils, which occupy about 20 percent of the association, are the wettest. They are capable of growing corn and soybeans if moderate artifical drainage is provided.

Nonconnah Creek is relatively straight from the mouth to a point about 20 miles upstream. The stream gradient is approximately 6 feet

per mile. The existing channel section varies from a 90-foot bottom width and a 20-foot depth near the mouth, to 30 feet by 20 feet at mile 12, and 20 feet by 20 feet at mile 22.

The Nonconnah Creek channel and major tributaries within Shelby County are essentially man-made drainage ditches. A pilot channel was dug in 1938, eliminating many of the meandering bends, and work has continued on portions of the channel up to the present time. Many of the laterals have been paved or otherwise improved. These improvements and the subsequent area development have hastened the reduction/limitation of biotic diversity.

Until recently there has been a problem of intense pollution in Nonconnah Creek below Mt. Moriah Road increasing rapidly near the mouth. The creek received discharges of wastewater containing dyes, acids, bleaches, solvents, alcohols, and other materials. Waste discharges into the creek have been reduced by installation of sewers by the city of Memphis, and the water quality in Nonconnah Creek is improving significantly. The pollution of Nonconnah Creek is more intense than other major streams of the Chickasaw Basin because of its low normal flow. Wastewater from numerous sand and gravel operations creates a terrific turbidity problem in Nonconnah Creek below Johns Creek and some of its major tributaries.

Erosion within the watershed is a continuing problem. The Nonconnah Creek watershed has 55,575 acres of uplands that have erosion problems ranging from slight sheet erosion to severe gully erosion, with urban

construction greatly contributing to the problems. An estimated 894,200 tons of soil is eroded from this land annually with approximately 90,000 tons being delivered into McKellar Lake annually.

Poor quality of water in lower reaches and intermittent flows have placed severe restrictions on the variety of aquatic plants and animals. However, aquatic macrophytes are well represented in the upper reaches of the stream, generally above Mt. Moriah Road. Species of duckweed (Lemna, Wolffia) and water fern (Azolla) are frequent among the free floating plants. Milfoil is represented among the submerged higher plants. Grasses, rushes, and sedges are typical in those areas bordering the streams and adjacent aquatic or wet areas. Cattail (Typha latifolia) is common in these habitats. In summary, higher plant aquatic vegetation is adequate to maintain a balanced ecosystem in the upstream areas.

Among the species comprising the plankton of the stream, masses of filamentous algae are rare. This is attributed to the stream conditions resulting from turbidity and intermittent flow in the upper reaches and pollutants in the lower reaches. However, there is a large planktonic population of protozoa and unicellular algae.

In general, the producers (green plants) in the lower reaches of the creek are restricted which in turn limits consumers (vertebrate and invertebrate animals). Decomposers (bacteria and fungi) are abundant below mile 11 because of domestic and industrial wastes discharged into the stream in past years. This is substantiated by high coliform and fecal streptococcal counts, along with standard plate bacterial

counts which often exceed 100,000,000 per 100 ml. The creek is relatively free of organic pollution upstream from Mt. Moriah Road.

Terrestrial species are similarly limited by the extent and quality of forest habitat. Approximately 6,000 acres of the watershed (less than 5 percent) is in forest cover. This cover consists of small, scattered patches of forest land in poor condition. Composition is about 40 percent oak-hickory, 25 percent gum-cypress, and 35 percent elm-ash-cottonwood. Nearly all woodland is privately owned, with only about 300 acres found on institutional, industrial, or municipal lands such as McKellar Park and Calvary Cemetery. No state or national forest lands are located in the watershed. A detailed list of types of native upland flora and aquatic macrophytes of the basin is included in Appendix B. It contains 40 trees, 17 shrubs, and 263 herbs. Over three-fourths of the forested land is less than 40 percent stocked with commercially desirable species. Natural regeneration of quality species is highly unlikely in most of these stands. Stocking in an additional 15 percent is equally poor, but these stands do possess favorable regenerative conditions. The remaining 10 percent of the forest is 40 to 70 percent stocked.

Among the plants, two species of herbaceous types which are rare or unique among the terrestrial flora of West Tennessee are endangered by both the Nonconnah Creek project and by urban expansion if no

project is implemented. These occur within the greenway proposed for the creek. This locality record on Nonconnah Creek is the only record of these two species occurring in the State of Tennessee.

The two species are Rudbeckia amplexicaule (Coneflower) and Franseria acanthacarpa (Sand-bur). Both are members of the Composite family. Rudbeckia is a biennial, rough to the touch, obtaining heights of 1 to 2 feet and blooms between June and August. Franseria acanthacarpa is an annual, ranging from 4 to 32 inches high and blooms between July and October.

Another species, Erythronium albidum (White Dog Tooth Violet) rare in Shelby County was found in the area to be flooded by the proposed lake during initial area investigation. Subsequent area reconnaissance revealed the loss of the entire population at this location, apparently due to farming operations. The species does exist at one other location within Shelby County.

A species of aquatic higher plant, Ammania auriculata (toothcup) is recorded in Nonconnah Creek below the damsite for the lake and while not rare in the U.S., is rare in West Tennessee. The only other record of these species in West Tennessee is in Piersall Lake in Meeman-Shelby Forest State Park.

A total of 52 species of mammals are listed as occurring in the basin although 17 of these have not been positively identified. However, their natural range indicated that they are probably present. Because of limited forest cover and urbanization of most of the basin, larger

mammals such as deer and fox are uncommon. Rabbits, squirrels, and raccoon are frequent in outlying reaches of the basin. The opossum is common. Small mammals such as field mice are frequent. However, most forms are restricted by urbanization. Scavangers such as the opossum, mice and rats are increasingly common under unsanitary conditions which are found in some urban areas in the lower reaches of the creek.

Because of the proximity of urban areas, rural portions of the basin bear intensive sport hunting. Rabbit, quail, and squirrel provide the bulk of the hunting in this order, with doves furnishing little pressure because of their low population. Deer afford some hunting in DeSoto and Marshall Counties in Mississippi. The nearest turkey flock is found on Treasure Island which lies in McKellar Lake across from the outlet of Nonconnah Creek. Furbearer population is low and consequently harvest pressure is low. Fox and raccoon provide practically no hunting. Other than occasional transient use of existing farm ponds and extreme upper reaches of the creek and its tributaries, waterfowl presence in the basin is negligible.

Reptilian fauna is typical of the region, being represented in the basin by 59 species of turtles, lizards and snakes. Of these, 16 species have not been actually recorded but are presumed to be present.

Birds are representative of the region, with the exception of aquatic and water dependent species which are rare because of the intermittent flow of the stream, lack of permanent pools, lack of

cover, scarcity of food, and degree of urbanization. A total of 270 avian species have been positively identified as permanent or transient visitors to the basin.

Fish, amphibians, and some turtles comprise the aquatic vertebrate fauna of Nonconnah Creek and its tributaries. The fish population is very limited, comprising about a dozen species. Carp is common in the lower reaches of the creek. The green sunfish is common upstream. The bluegill sunfish, though not reported, should be present also. The most frequently found fish are top minnows and redfin shiners along with sunfish and carp.

Stream fishing in Nonconnah Creek is presently limited to isolated pools along the upper reaches with some periodic fishing occurring in the extreme lower reaches when Mississippi River backwater is sufficient to overcome pollution and low flow barriers. Frogs, toads, and salamanders are relatively common in the upper reaches of the basin, totaling some 30 species, of which all but 7 have been actually recorded. The lower reaches of the creek itself are not suitable for tadpole and other larvae production because of pollution and lack of oxygen.

Terrestrial invertebrate fauna of the basin are typical of an urbanized area. Insects predominate, as they do the world over. Flies and mosquitos are abundant. Hymenopterans, beetles, lepidopterans, and true bugs are quite common. Among the non-insects, spiders, centipedes, millipedes, slugs and sowbugs are abundant.

Aquatic invertebrates are relatively scarce in the stream, and provide limited or no value in the food web in the lower reaches of the creek. Dragonflies and damselflies are abundant to moderately abundant in the upper reaches of the stream but are rarely seen along the lower portions. Crayfish are relatively abundant, but the variety is limited to about 4 common forms. Fresh-water clams are restricted to the upper portion of the stream. Only the small forms (Sphaerium and Mucculium) are found.

A partial list comprising the more common terrestrial and aquatic invertebrates in the basin includes representatives from 21 orders.

Three species of birds listed as endangered (Appendix D, 50CFR 17, U.S. List of Endangered Fish and Wildlife) have been observed in Shelby County, Tennessee. These are the Southern Bald Eagle (Haliaeetus leucocephalus leucocephalus), Americal Peregrine Falcon (Falco peregrinus anatum), and the Red-cockaded Woodpecker (Dendrocopus borealis). The Bald Eagle is listed as a fairly common winter transient in the county and is rare as a winter resident. The Peregrine Falcon is very rare as a transient and summer resident. The Red-cockaded Woodpecker is a local but rare bird.

While not actually collected and identified as occurring in the Nonconnah Creek Basin, it is likely that the tiger salamander (Ambystoma tigrinum) does occur rarely.

A preliminary archeological survey of all proposed structure sites has been made by a member of the staff of Memphis State University. Archeological finds within the watershed were limited to the Nonconnah Lake site and were Indian camp sites ranging in age from about 1,000 to 10,000 years. Most sites have evidence of several occupations and will probably require excavation to provide an adequate picture of the archeological record. The results of this survey have been made known by letter to the Tennessee Historical Commission. The Commission will be kept informed of the progress of the project so that detailed archeological surveys and any necessary salvage can be carried out prior to the beginning of construction.

There are no properties in Nonconnah Creek basin listed in the National Register of Historic Places. There is a 106-year old church building known as Polk's Chapel adjacent to the proposed reservoir which has historical significance to some residents of Shelby County. The church building will not be affected by the impoundment, and may be preserved as a historical site or continued in use after project construction. There are several graves in an adjacent cemetery which extends into the reservoir area. It will be necessary to relocate or provide protection for these graves to prevent temporary inundation during operation of the flood control reservoir.

Memphis is the major Mid-South center for manufacturing, distribution, retail and wholesale trade, education, medical services, finance, transportation and communication. Of the nation's 500 largest industrial corporations, 130 have manufacturing or distribution facilities in the Memphis area. At least 25 percent of these are located in the Nonconnah Creek watershed.

Land values in Nonconnah Creek Basin are extremely high compared to surrounding areas. This is due to the urban influence of Memphis, prestigious subdivisions in Germantown, and the progressive town of Collierville. Values are influenced by many considerations including location to major transportation facilities, industrial developments, subdivisions, recreation facilities, distance from major trade centers, flood hazards, size of land parcels, and demand for speculation and development. Land values are governed more by the potential for urban development than by potential for agricultural production.

The watershed is serviced by the soil and water conservation districts of Shelby and Fayette Counties, Tennessee, and DeSoto and Marshall Counties, Mississippi. The rural portion of the watershed (70,380 acres) contains approximately 370 farms averaging 183 acres in size. There are approximately 1,065 families residing in the rural areas. About 20,700 acres of the rural area is at present under soil and water conservation plans, with an additional 30,100 acres receiving technical assistance under going district programs. A total of 231 landowners are active cooperators in the district programs. One hundred and fifty-nine farms have basic soil and water conservation plans. It is estimated that about 32 percent

of the needed conservation treatment measures have been applied on the land in the past 10 years with district and other agency assistance.

A considerable acreage of land immediately outside the urbanized areas is being held for speculative purposes. Farming operations on these lands in transition are irregular with little or no thought given to conservation.

Unless measures are taken for its prevention, flood damage will rapidly increase as a major threat to lands within the floodplain portion of Nonconnah Creek and its tributaries with the transition of these areas from farm to urban. The rate of runoff from urban areas can exceed that from agricultural areas by as much as 500 percent. Encroachment into the floodplains by land filling and development will contribute further to this problem by constricting floodwater outflow. Continued piecemeal development of the floodplain will result in an increase in ugly wasteland areas. Projections show forest cover being reduced to less than 1 acre in a hundred unless preventative conservation measures are implemented. The biotic community associated with the stream and floodplain is already limited by the nature and condition of the existing life support system. This will continue to change with uncontrolled encroachment by industry and urbanization. Lack of a concerted program of land treatment, structural measures, and zoning restrictions as jointly proposed by the Chickasaw Basin Authority, Department of Agriculture, and Corps of Engineers will result in an acceleration of flood damages in urban and agricultural areas of the

basin, continued deterioration and loss of forest land, water quality and associated wildlife, and loss of opportunities for the development of water-based outdoor recreation.

The preceding description of the environmental setting of the Nonconnah Creek basin includes a summary of an in-depth investigation made by the professional staff of Memphis State University. The text of this study, which includes a detailed environmental inventory of the project area, is included as a part of this environmental impact statement in Appendix B.

3. The Environmental Impact of the Proposed Action. a. General. The proposed works of improvement in the watershed constitute a needed and harmonious element in the overall economic development program for Shelby County, Tennessee, and Marshall and DeSoto Counties, Mississippi. Economic benefits used in project justification as well as the financial and technical assistance provided as a result of project installation will have a socio-economic impact on the community and surrounding area by improving, conserving, and utilizing the available natural and human resources. Some of the people that will receive direct benefits from the project's development and installation are those who live, trade, travel, or seek employment within the watershed. At least 300,000 citizens now occupying or utilizing watershed facilities will be directly benefited.

b. Recreation Opportunity. There is a large and growing demand for water-based recreational facilities to serve the expanding population of Memphis and the watershed area. Fishing and sailing enthusiasts are now traveling many miles to such areas as Kentucky Lake, Pickwick Lake, and large reservoirs in Mississippi and Arkansas, in order to enjoy water-based sports. A survey by the Memphis and Shelby County Planning Commission has indicated a need for a recreation lake in the upper portion of the Nonconnah Creek watershed. The Chickasaw Metropolitan Surface Water Management Survey reported an estimated 3.2 million man-day deficiency in the supply of water-based recreation within the basin. The recreational development will be readily available to all of the residents of Shelby County and surrounding area, now estimated at 900,000 citizens.

c. Flood Control. The proposed action will provide increased flood protection to users of some 9,000 acres within the 100-year flood zone by reducing frequency, height and duration of floods. The project provides for the accelerated application of soil conservation measures on 35,000 acres. These measures will enhance the capabilities and values of cropland, grassland, and forest land. More than 3,500 residences, 110 commercial properties, 10 churches, and 8 schools are presently located within the floodplain. Approximately 12,000 persons live within this area. Average annual existing and projected damages are $4,931,300. Quantifiable damages prevented are primarily associated with flooding of agricultural lands, residential and apartment housing and industrial and commercial facilities.

d. Economic Development. The combined project measures will provide protection from the 100-year frequency flood and all lesser floods to most developed property in the Nonconnah and Johns Creek floodplains below the proposed floodwater retention structures. The frequency, depth and duration of flooding will be substantially reduced on all other lands below the retention structures. Estimated average annual flood damages will be reduced from $4,931,300 to $43,700, a net reduction of $4,887,600 in annual damages.

Reduction in the flood hazard will enable the city of Memphis to more efficiently operate and maintain city utilities such as the new Nonconnah interceptor sewer, storm drainage systems, gas lines, power transmission lines and transformer stations now located in flood prone areas. Land efficiencies realized from the project will result in a higher type usage. Public and private funds used for repair of damages to fixed improvements and replacement of losses can be shifted to other uses.

The increased demand for sporting goods and services generated by the proposed recreational development will stimulate the local economy on a permanent basis. It is estimated that 150 permanent new jobs will be created by this development. Increased profits will be realized from the sale of recreational and related equipment. These profits are estimated to be $315,000 annually for the life of the project. The construction of 4 dams, North Park and South Park will provide an estimated additional 230 jobs annually during the installation of the project.

e. Water Quality. The quality of the surface water resources will be enhanced by the installation of the project. Suspended sediment has long been the major source of stream pollution in Nonconnah Creek. The long-term average annual suspended sediment concentration at the outlet of Nonconnah Creek will be significantly reduced.

The three floodwater-retarding structures on Johns Creek will provide about 397 acres of suitable habitat for lake fishery that can be used for public fishing. Sanitary facilities on each site will help protect water quality. Fishing values will be maximized by stocking and maintaining the lakes in accordance with current policies of the Tennessee Game and Fish Commission. Since the areas where the structures are proposed will urbanize if no project action is taken, construction of the lakes will have little net effect on plant or animal life of projected values.

All areas disturbed during construction of all dams will be revegetated with grasses or other suitable plants to control erosion.

Construction contractors will be required to adhere to strict guidelines for minimizing soil erosion and water and air pollution during construction. Safety and health regulations will be carried out by contractors for the protection of the general public. Shoreline conditioning of the pool areas at all of the structure sites will be required where needed to conform with state regulations for vector and insect control.

Soils above the proposed lake are erosive, and, therefore, are a potential source of considerable turbidity and sediment. During the period March through June 1972, water samples from tributaries which will flow into the lake were taken weekly and following occurrences of heavy rainfall. This time period includes the season of greatest agricultural activity. Samples were tested for color, turbidity, and sedimentation rates. In addition to the weekly samples at the lake site, grab samples were taken downstream and tested for pH, color, turbidity, suspended solids, total solids, dissolved solids, volatile solids, alkalinity, sulfates, phosphates, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, and phenols. All tests were made according to Standard Methods for the Examination of Water and Wastewater. Water at the site of the proposed dam exhibits an acceptable dissolved oxygen content, and acceptable levels of the other parameters measured.

Construction of the reservoir will have various effects on water quality. The concentration of minerals and heavy metals will increase within the impoundment, however, this accumulation will be partially compensated for by the reduced upstream runoff as a result of land treatment measures. Pesticide/herbicide introduction to the stream will also be reduced through land treatment, as well as by changes in land use. Dissolved oxygen content will increase through greater absorption and a more stabilized photosynthetic component. No significant change in water temperature is anticipated. The pH of the water of the impoundment is expected to rise due to a shift in the carbonate equilibrium.

During the same period of time, water samples were also taken upstream and downstream from the existing Sardis and Arkabutla Lakes, located south of the Nonconnah Creek basin in the state of Mississippi and observed for comparable turbidity. The Nonconnah Creek samples appeared less turbid than Arkabutla, and were approximately equal to the samples taken from Sardis. Both of these lakes are used extensively for all types of water-based recreation.

With implementation of the recommended plan for upstream land treatment, water quality will be improved over that found in the tested samples.

At the present time, fecal coliform counts in water flowing into the lake area are greater than those permitted by standards established by state and local health agencies for body contact sports such as swimming. The source of this contamination is several individual residences above the lake site which discharge untreated wastes into tributary streams, leaks in sewer systems above the lake, and from livestock and other animal life throughout the watershed. As standards for control of wastewater discharge are met and use of lands for livestock production is changed by urban development, the source of contamination will be substantially reduced.

The fecal coliform count will not create adverse conditions for other lake uses and will not be objectionable from the standpoint of odor, discoloration, or other unsightliness. The lake will have substantially less contamination than found in tests of tributary flows because of dilution and assimilative action.

The bottom of the lake will be excavated prior to filling above elevation 316 as necessary to provide minimum conservation depths of 3 feet, with 1 on 3 side slopes to the water's edge. This design will conform to the Tennessee Impounded Water Act.

The water depths in the lake will range from 3 to 18 feet, with depths of 30 to 40 feet within existing channels which will be inundated. These depths will be completely satisfactory for production of fish. The average depth of Nonconnah Lake will compare favorable to existing lakes in adjacent basins as shown in Table 2. These lakes are well known for their recreational value.

Table 2

Comparative Depths - Proposed Nonconnah Lake
and
Existing Reservoirs in This Region
(Based on Conservation Pools)

	Average Depth at Dam (feet)	Storage (acre/feet)	Pool Area (acres)	Overall Average Depth (feet)
Nonconnah Lake	16	13,100	1,900	6.9
Arkabutla Lake	18	31,500	5,100	6.2
Sardis Lake	18	92,000	9,800	9.4
Enid Lake	20	57,600	6,100	9.4
Grenada Lake	23	85,700	9,800	8.7

There are no constant sources of water supply into the lake area, and, therefore, lake levels will fluctuate, depending on rainfall, evaporation, seepage, and rate of discharge.

During the drier months of the year, evaporation may exceed inflow, reducing lake levels and depth. Based on available runoff records and standard evaporation rates as established by the U.S. Weather Service, maximum fluctuation of one-half to one foot can be expected in any given year because of evaporation. The seepage rate can be expected to be about 0.8 foot per month initially assuming no inflow and will be reduced to less than 0.4 foot per month within a period of time as the groundwater content is increased and sedimentation fills the porous lake bottom.

A constant release of approximately 3 cfs will be made during the dry seasons to maintain a constant flow in the channel downstream from the lake. This discharge will reduce lake levels less than 0.2 foot per month assuming no inflow.

Balancing total average losses due to evaporation, seepage, and discharge against average monthly inflows indicates that maximum reduction in lake levels will be approximately 1 foot or less during drier months.

Following periods of heavy rainfall, water levels will rise above the conservation pool level. Normal variations in lake levels because of runoff accumulation will be less than 4 feet, and will require about 1-1/2 days to subside to conservation pool stage. This duration will not destroy vegetation and "mud flats" will be minimal. Following a 100-year frequency storm or on the average

of once every 100 years, lake levels will rise to elevation 326, the top of controlled storage. Approximately 4-1/2 days will be required to subside to conservation pool elevation from the 100-year flood pool.

Water level fluctuations will not affect access to the lake from adjacent park facilities.

f. Fishery Resources. Two significant measures of fishing potential are (1) the drainage area above the lake, and (2) the water depths in the lake. The optimum watershed ratio (number of acres draining into each acre of permanent pool in the lake) would be approximately 9:1. The watershed ratio for Nonconnah Lake will be about 18:1. This indicates there may be excessive amounts of water flowing through the lake for optimum fishery conditions. Excessive exchange of water not only increases the degree of turbidity, but tends to lower the nutrient level of any lake and thus the pounds of fish the lake can produce. Watershed ratios of other lakes in this region known to be suitable for fishing are: Arkabutla, 125:1; Sardis, 101:1; Enid, 59:1; and Grenada, 86:1. Water depths over some 1,400 acres of the lake will range from 3 to 18 feet, which is ideal for fish production. Existing channels which will be inundated will range from 30 to 40 feet deep. About 500 additional acres will average approximately 3 feet in depth. Shallower waters may be troublesome as a result of excessive weed growth. This latter condition can be controlled by various techniques including deepening of shallow areas through excavation or dredging, reservoir water

level manipulation, and biological, mechanical, and chemical processes. Fishing will be enhanced by retaining intermittent strips of flooded timber in the lake between elevations 308 and 312, subject to approval of the Tennessee Department of Public Health. Construction will result in the loss of six miles of stream thru inundation.

There is a potential for recreational fishing in the proposed reservoir in view of the overwhelming need for additional fishing waters in Shelby County.

g. Mosquito Production. Mosquito habitat will be minimized by maintaining mimimum lake levels and by the introduction of predator organisms. The area above the conservation pool will be graded and maintained to prohibit the formation of potholes as flood storage receds.

h. Traffic. In 1968, all levels of Government in the Memphis area conducted a cooperative study to develop a long-range transportation plan for the area anticipated to be urbanized by 1985. This study is known as the Memphis Urban Area Transportation Study (MUATS). A technical coordinating committee functions to update and change the long-range plan as necessary and desirable. The proposed lake development has been coordinated with the MUATS committee, and would have the following effects on the transportation plan.

The segment of the existing Forest Hill-Irene Road through the lake between Shelby Drive and Winchester, and the segment of Shelby Drive through the lake between Forest Hill-Irene Road and Bailey Station Road will be closed with both bridges and road fill removed.

This will result in some inconvenience and rerouting of normal traffic.

The intersection of Shelby Drive and Reynolds Road will be inundated. Table 3 shows 1972 average daily traffic on roads in the vicinity of the lake, and estimated effects on traffic loads as a result of rerouting traffic. Projected traffic loads are within the capacity of existing roadways and those already planned for improvement in the MUATS plan.

Bailey Station Road, Collierville Road, Holmes Road and other roads in the vicinity will not be interrupted. The alignment of the extension of Houston Levee Road as proposed in the MUATS plan southward to Holmes Road will have to be relocated approximately one-half mile eastward to accomodate construction of the lake. Construction of other roadways as proposed in the MUATS plan will not be affected. In a meeting of the MUATS Technical Coordinating Committee on 5 January 1972, a resolution was unanimously adopted, stating that necessary adjustment in the MUATS plan can be made to handle anticipated traffic, without a significant increase in costs. Construction of the three structures on Johns Creek, and the proposed channel improvement and greenway development will require some highway and railroad alterations, but will not have any long term effect on traffic.

i. Public Utilities. The proposed lake will not limit sewer or other utility service to any lands in the surrounding area. A trunkline sewer is proposed to parallel the north shoreline to serve the city of

Collierville and all areas north and east of the lake by carrying waste discharges to a large treatment plant now under construction by the city of Memphis. A similar line can be installed to serve areas south of the lake. Sewer service to lands south of the lake may be accelerated by installation of service for the proposed park facilities.

j. Wildlife Habitat. Nonconnah Lake will have a 1900 acre pool area with the resulting loss of wildlife habitat now provided by this acreage. Another 1760 acres of terrestrial habitat within the flood pool area will be rendered unsuitable periodically. Changes in species composition and numbers will result.

k. Archeological Sites. Archeological funds located in the proposed Nonconnah Lake site will be lost thru inundation.

Table 3

Traffic Analysis - Vicinity of Nonconnah Lake

	1972 ADT	Rerouting of Shelby Traffic 1/	Rerouting of Forest Hill Traffic 2/	Subtotal (Rerouting Effect)	Traffic Effect of South Park 3/ (1,650 Vehicles/Day) 5/	Traffic Effect of North Park 4/ (1,380 Vehicles/Day) 5/	Total Traffic After Project
East-West							
Poplar Ave. (Hwy. 72)	11,670	-	-	11,670	410 (25%)	550 (40%)	12,630
Winchester Rd.	3,000	+405 (50%)	-	3,400	330 (20%)	690 (50%)	4,420
Shelby Drive	810	-	-	-	330 (20%)	280 (20%)	1,420
Holmes Rd.	1,160	+405 (50%)	+420 (90%)	1,980	250 (15%)	140 (10%)	2,370
North-South							
Hacks Cross Rd.	790	+405 (50%)	+420 (90%)	1,610	910 (55%)	410 (30%)	2,930
Forest Hill-Irene Rd.	470	-	-	-	-	550 (40%)	1,020
Bailey Station Rd.	273	+405 (50%)	-	680	80 (5%)	-	760
Byhalia Rd.	1,700	+405 (50%)	+50 (10%)	2,150	80 (5%)	-	2,230

1/ Based on 50 percent of traffic rerouted via Byhalia-Holmes-Hacks Cross Road and 50 percent by Bailey Station-Winchester.

2/ Based on 90 percent of traffic rerouted via Shelby Drive-Hacks Cross Road and 10 percent via Shelby Drive-Byhalia Road.

3/ Based on access distribution of: 25 percent via Poplar-Hacks Cross Road; 20 percent via Winchester westward - Hacks Cross Road; 10 percent via Winchester eastward - Hacks Cross Road; 20 percent via Shelby Drive westward; 15 percent via Holmes-Hacks Cross Road; 5 percent via Reynolds Road; 5 percent via Byhalia-Holmes.

4/ Based on access distribution of: 40 percent via poplar-Forest Hill; 20 percent via Winchester West; 10 percent via Winchester East; 20 percent via Shelby Drive westward - Hacks Cross Road-Winchester; 10 percent via Holmes-Hacks Cross Road-Winchester.

5/ Traffic estimate is double estimated peak vehicular attendance to account for movement to and from recreation areas.

Is this the flood plain width — is it adequate

j. Botanical. The recommended plan calls for establishment of a greenway for a width of 300 feet along each side of the creek below the reservoir. By careful consideration of channel improvements and greenway facilities, much of the natural flora can be preserved. Vegetation can be established on areas presently denuded. The greenway will not only form the physical limits of floodplain encroachment by developers, but will be a factor in bank stabilization, soil erosion, and sediment control.

Two rare species of terrestrial plants occur along Nonconnah Creek within the greenway zone, and thus should be preserved. Franseria acanthicarpa (sand-bur) is located about 200 feet from the stream bed on the east side of Kirby Road. Rudbeckia amplexicaule (Cone-flower) is found 200 feet from the north side of the stream bed about 50 yards west of Lamar Avenue. Preservation of these two species will depend upon the prevention of the clearing and development of the location sites. The necessary protection would be provided with the establishment of the greenway. The locations are spaced sufficiently apart so that each can become the focal point of a "nature study area" to go along with other study areas at selected sites along the creek. Every effort should be made to preserve these two species because they are the only known records of the plants in the state of Tennessee.

Toothcup (Ammania auriculata), an uncommon aquatic plant in West Tennessee is recorded in Nonconnah Creek below the dam site for the lake. While this plant is not rare in the U.S., the only other record

in West Tennessee is in Piersall Lake in Meeman-Shelby Forest State Park. This species can be preserved in the creek by careful consideration of its habitat.

k. Social Effects. Nonconnah Creek has a significant effect on social attitudes in the surrounding area. Approximately one-half of the population of the City of Memphis is within the Nonconnah drainage area. Many view the Nonconnah Creek as a place of opportunity to develop needed recreation and open space for the urbanizing area; others would prefer use of all available land for urban development. Lands adjacent to Nonconnah Creek are being rapidly developed, often within flood plain areas. Lands in upstream areas outside the City of Memphis are being developed as expensive residential homesites both in subdivisions and semi-rural settings.

Beneficial social impacts can be enumerated as (1) reduced disruption of normal community activities due to floods, (2) reduced anxiety and distress of flood plain residents, (3) potential savings in human lives and (4) increased availability of area resources to the general public. Balanced against the beneficial impacts are the following social costs: (1) land use lost through inundation, (2) loss of archeological sites, (3) clearing of some aesthetically pleasing natural timber, (4) forced relocation of 22 families, and (5) curtailment of some speculative land holdings.

l. Community Impact. Construction of the Nonconnah Lake and associated development will have significant impacts on the surrounding community and social attitudes. Lands in the vicinity of the

lake for several years have been developing as high-value residential areas of suburban and semi-rural estate type developments. Construction of the lake and associated park developments may contribute to acceleration of this trend, or because of high density use and an influx of lower income families participating in recreational opportunities there may be a lowering of property values and social preferences of the area.

There are citizens who fear that the recommended project will disrupt the continued growth of the community. There are others who feel that a lake development will stimulate growth, and would be much preferred over alternate projects such as enlarged or paved channels.

Rerouting of normal traffic due to reservoir construction will also be a community impact. The segment of Forest Hill-Irene Road between Shelby Drive and Winchester will be closed, as will the segment of Shelby Drive between Forest Hill-Irene Road and Bailey Station Road. The intersection of Shelby Drive and Reynolds Road will be closed and the alignment of the proposed extension of Houston Levee Road will change. A technical coordinating committee, composed of representatives of various governing bodies of the Memphis area, reviewed the traffic-related impacts of the project and found that the necessary adjustments are feasible.

m. Noise and Air Pollution. Construction or operation of the proposed project is not expected to have any significant adverse effect on noise or air pollution in the area. There may be some

noise generation during project construction, but this will be no more intense than noise generated by continuing urban development in the project area.

Air pollution levels are generally light in the Nonconnah Creek Basin, and will not be affected by the proposed project. Neither of these characteristics will adversely affect the operation of proposed project features for flood control or recreational use. The open space and conservation of natural areas afforded by the project should have some beneficial effect in reduction of noise and air pollution concentration following project construction.

Traffic noise will be a factor in recreational value of the Nonconnah Greenway below Mt. Moriah Road. In this reach the greenway runs parallel to Interstate 240 and passes near the Memphis International Airport. Noise levels from the interstate highway may be reduced in some reaches by strategic spoil placement to form noise barriers, but little can be done to offset noise from aircraft. Noise is not expected to be a factor above Mt. Moriah Road on the greenway, or at the Nonconnah Reservoir site.

4. Any Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented. Implementation of the selected project plan will have fewer adverse impacts in relation to its beneficial environmental aspects than any feasible alternative. Perhaps the most adverse impact will be the relocation of 22 families.

Existing traffic patterns will be interrupted with the closing of sections of Forest Hill-Irene Road and Shelby Drive within the

Nonconnah Creek impoundment.

Approximately 6 miles of low to fair quality existing stream will be lost to permanent inundation as will 2,300 acres within the combined conservation pool of all four reservoirs. Plant and animal life now located in the stream and on lands which will be permanently covered by water will in effect be eliminated. Terrestrial species associated with 1,760 acres of land in the flood pool areas will suffer some adverse effects during times of flooding.

Sedimentation and water turbidity will be increased during and immediately following construction with a corresponding decrease in benthic organisms and other biological parameters.

The existing environment of Nonconnah Creek is undoubtedly marginal for much of the plant and animal life found there. The net effect of project implementation will be potential for increase in numbers and diversity of aquatic and terrestrial organisms. It is highly unlikely that installation of the project will jeopardize any rare or endangered endemic species. The existing environment is simply too harsh to support marginal species. The changes occasioned by the conversion from a stream to lake environment will, however, result locally in fairly drastic changes in species composition and numbers.

Most of the known archeological sites in the basin will be affected by the conservation pool of the Nonconnah Creek impoundment. A selected number of these sites will undergo salvage operations prior to inundation. Proper salvage and collection of data will

minimize adverse effects. The adjacent Wolf River and Loosahatchie River Basins are both characterized by larger and more numerous early Indian sites than is Nonconnah basin.

5. Alternative to the Proposed Action. All feasible alternatives to the proposed project were considered. The recommended plan resulted from the identification of needs which presently exist or are expected to arise with urban expansion and future floodplain development. It includes a combination of preventative and corrective (structural and non-structural) flood control measures. Non-structural alternatives such as relocation of existing developments were considered too socially disruptive and economically burdensome to be implemented. Floodproofing of individual structures and advanced warning systems proved impractical. Recommendations for zoning, participating in flood insurance programs, and use of floodways are non-structural alternatives embodied in the plan of project participants. Discarded alternatives were rejected on the basis of their failure, one way or another, to satisfactorily fulfill these needs. Following is a summary of alternatives which were considered.

a. No-Action. The most obvious result of this alternative is the economic consequence. The no-action alternative would yield a savings equal to the estimated annual project cost (recommended plan-structural features only) or $4,407,000. This option would forego the estimated annual benefits of $6,637,600, thus resulting in the net loss of $2,623,600.

This, however, is only one of many costs attributable to no action. Environmental degradation and foreclosure of opportunities for retention or replacement of renewable resources are unavoidable consequences of uncontrolled floodplain encroachment and development. The floodplain is presently urbanizing at the rate of 5 percent per year, with the rate increasing annually.

Failure to implement some plan for flood control will result in continued loss due to flooding on existing development, and increased damages as urbanization is increased. Without a flood control program, flooding can be expected in future years in several thousand homes, businesses, schools, and churches. The lives of many citizens in this floodplain will be affected by loss and inconvenience due to flooding.

Portions of the proposed greenway along each side of the channel are being excavated to provide fill for development of the adjacent floodplain. This practice is accelerating as it becomes acceptable to other floodplain developers. Local governments have not been inclined to stop this encroachment into the floodplain. It has been the practice of the City of Memphis to meet needs of urban protection by paving stream channels following urbanization of surrounding areas. This is not only extremely expensive, but aggravates downstream flood problems. Perhaps the greatest consequence of no action in the floodplain would be the irretrievable loss of remaining open space and its potential for recreational development, beautification, and retention of esthetic and intangible values associated with water and wooded natural areas and accompanying fish and animal life.

b. Preventive Measures. These are actions which in and of themselves do not eliminate or reduce flooding. They can be used to reduce the threat of damage or loss of life from the design flood. While they may not be completely effective in areas where extensive development already exists, these means should be used to complement structural alternatives, and eliminate the need for structural

alternatives wherever feasible. These measures and their applicability to Nonconnah Creek are discussed in the following subparagraphs.

(1) Evacuation. Where adequate flood warning can be provided, damages, particularly loss of life, can be reduced by evacuating areas subject to flooding. There are extensive existing developments in the Nonconnah floodplain, consisting of homes, commercial and industrial complexes, churches and schools. With this method losses would substantially equal those of no action

Runoff from tributary area is rapid, and floods are concentrated into floodplains in a few hours, giving little time for warning and evacuation. It would be clearly impractical to suggest evacuation as a means of alleviating major damage in the Nonconnah Creek Basin.

Also, this alternative would not prevent continued degradation and destruction of the natural floodplain environment.

(2) Zoning. Zoning and controlling development in floodplain areas is one means of preventing substantial increases in future flood damages. There are several thousand acres of currently undeveloped land in the Nonconnah Basin suitable for urbanization. These lands would have to be zoned to prevent future urbanization, and the economic value of the lands of several million dollars would be lost. If it were possible to eliminate business and home improvements within flood prone areas, the rapid and continued urbanization of adjacent areas would still require that the flood prone stream valleys be crossed and recrossed by transportation and utility systems. Zoning future development would not reduce the present flood hazard to

existing development. Zoning is clearly not practical as the primary solution to flood problems in the Nonconnah Creek Basin, but should be used as an adjunct to any flood control plan developed.

(3) Flood Insurance. The Memphis District, Corps of Engineers is currently developing flood information to serve as a basis for a Federally subsidized flood insurance program for homeowners in the Nonconnah floodplain. The insurance program will not prevent major loss of existing improvements, but will protect individual homeowners from catastrophic personal loss. The insurance program will require strenous controls on future development in flood areas.

(4) Floodway Preservation. One of the most desirable and effective means of reducing potential flood levels, particularly in areas expected to urbanize, is to restrict development within a part of the natural floodplain. This provides for some overbank flow and maintains flow capacity in the natural floodplain.

During the past several years, local interests have attempted to restrict development within a 600-foot strip along the existing channel of Nonconnah Creek. There has been no legally binding restriction, but development within that area has been successfully accomplished by negotiation with land owners. In some reaches the land within the 600-foot strip has been purchased by local government. The purpose of the restriction is to provide for some overbank flow, and reduce the requirement for channel enlargement.

Below Mt. Moriah Road, Mile 12.4, most of the lands immediately adjacent to the 600-foot area are developed on land fills. The land fills installed over the years have been based on historical flood

elevations, and do not meet elevations of current or future flood levels which have been increased by urbanization and increased runoff.

Each of the flood control plans considered in this study anticipates continued preservation of the 600-foot floodway through zoning or land purchase. Project alternatives are designed to reduce design flood elevations below existing fill elevations, and anticipate future landfill and development by private enterprise adjacent to the 600-foot area above Mt. Moriah Road.

c. Corrective Measures. These are physical or structural measures designed to reduce or control floods and flood damage. The following paragraphs discuss the various structural technologies which may be used to control flooding, and the applicability of each to the Nonconnah Creek Basin.

(1) Flood Proofing. Many of the family dwellings, apartments, and commercial buildings within the floodplain are constructed on slab foundations with floor elevations less than 1 foot above ground level, thus eliminating this method as a feasible alternative. The brief interval on Nonconnah Creek tributaries between the beginning of a rain storm and flood peak would render an early warning system ineffective for making the needed closures in the flood proofing system. However, flood proofing of buildings should be considered in all future construction within the floodplain.

(2) Land Treatment Measures. In areas such as the Nonconnah Creek Basin where soils are comprised primarily of loess, capacities

of existing channels are often reduced by sediment accumulations from erosion. Land treatment should be considered as an integral part of any flood control plan to reduce rainfall runoff and erosion. It was agreed with the sponsors that a sound land treatment program was needed to assure full realization of potential benefits from structural measures and to minimize operation and maintenance costs.

The installation of land treatment measures without any structural measures would satisfy the objective of reducing erosion and sediment and improving the efficient use of land resources. It would generally enhance the environment of the watershed area including the increase and improvement of fish and wildlife habitat. However, its effect on flood damage reduction would be mainly limited to supporting the structural program by reducing sediment storage requirements and prolonging the effective life of the overall project. While land treatment alone does provide certain stated objectives and supports the overall project objectives, it will not provide sufficient flood protection to the urban areas.

(3) Flood Control Storage. One of the most effective means of controlling runoff and subsequent flooding is the development of reservoirs to store excess runoff during and following periods of heavy rainfall. The structures are operated to reduce the discharge rate by gated control, storing excess runoff to be released gradually over a period of several hours or days following a heavy storm. The discharge rate can often be controlled to levels within the capacity of the downstream channel, or to reduce the extent of

channel enlargement needed downstream to effectively control flood levels.

Storage structures are considered by many to be the most desirable means of flood control in the Nonconnah Creek Basin because of multiple uses such as recreation and fish and wildlife development which can be incorporated into the lake development. Sites for large structures are limited in the Nonconnah Creek Basin because of topography and extensive improvements in some potential sites. There are several sites for smaller structures on various tributaries. A total of 18 sites were considered in various combinations by the Soil Conservation Service and the Corps of Engineers. Many of these would have some effect on tributaries immediately below dam sites, but would not provide adequate protection on main stem flood plains. Those structures which appeared to be feasible were evaluated in detail as discussed in following paragraphs.

A variation of flood control storage which may be considered in some areas is the use of "dry" dams. This type of structure would not include any permanent water storage, but is drained completely dry following each rainfall.

Such structures are often used in arid areas where lakes cannot be maintained because of extended regular seasons of complete drought, and soil conditions are not conducive of formation of mud flats. In the Nonconnah Creek Basin, such structures are not considered desirable. Project costs would be essentially the same as a structure with permanent storage, but would provide no opportunity

for any recreation use. Such a structure would also result in extensive mud flats and weed control problems because of frequent rainfall throughout the year. Mosquito control and other environmental problems would be significantly increased.

(4) Channel Improvement. It would be possible in the Nonconnah Creek Basin to reduce flood levels by increasing the capacity of Nonconnah Creek to carry flood flows. There are many factors which must be considered in the Nonconnah Creek Basin in design of channel improvement, such as water velocity and the ability of earth channels to withstand velocities without scouring, and the network of roads, bridges, and utilities which would require extensive protection or replacement by channel enlargement. In the Nonconnah Creek Basin, channel banks are alluvial material which is eroded by water velocities greater than 4 to 5 feet per second. Water velocities of more than 5 feet per second for several hours result in severe bank erosion, stream meandering, and subsequent silting and loss of stream capacity.

(5) Levees. In some basins it is possible and feasible to confine floodwaters to a floodway by construction of earth levees or concrete floodwalls on each side and parallel to stream channels. In addition to confining flood flows to stream channels, such structures also restrict or eliminate flows from areas outside levees into main stream channels.

In the Nonconnah Creek Basin there are numerous tributaries flowing through highly developed areas often extending into main channel floodplains. Flow from these tributaries must not be

restricted, otherwise runoff would accumulate in low areas outside levees and the flood control structures would become ineffective. To provide adequate flow from tributary areas into Nonconnah Creek with a levee system, it would be necessary to construct a series of collection systems and pumping plants on each side of Nonconnah Creek to pump tributary drainage over levees. Such a system would clearly not be the most feasible plan for a densely populated area such as Nonconnah Creek.

(6) Headwater Diversion. Very rarely is it feasible to direct flood flows from tributary areas above urban areas into adjacent basins, eliminating damaging flows through downstream floodplains.

In the Nonconnah Creek Basin, flows could be directed northward into the Wolf River Basin, reducing the discharge through the Nonconnah floodplain. Such a diversion, however, would require massive excavation to construct a channel approximately five miles across valuable property, through a ridge approximately 50 feet high, and would require construction of several bridges on major roads in east Shelby County. This alternative is clearly not a feasible means of controlling floods in the Nonconnah Creek Basin, and would contribute to an existing flood problem in the Wolf River Basin.

(7) Rainfall Runoff Prevention. In some areas, particularly in basins with relatively narrow floodplains and a large number of well incised tributaries, it is possible to prevent rainfall from reaching mainstem channels in quantities which would result in flooding by

a series of small runoff retardation structure. Such structures may be the equivalent size of agricultural farm ponds, and may be operated as "dry" reservoirs. This concept was suggested by several citizens in the Nonconnah Creek Basin who object to large reservoirs.

The concept is generally more readily adaptable to a rural or agricultural area where a lower degree of flood protection is acceptable. In order to provide an acceptable level of protection in the Nonconnah Creek Basin, several hundred structures to produce lakes of 1 to 10 acres in size would be necessary. Sufficient sites at strategic locations are not available in the Nonconnah Creek Basin, and if they were, extensive costs of land, construction of runoff controls, and operation and maintenance costs would be prohibitive as compared to large flood control structures.

(8) Urban Redevelopment. Economic feasibility alone prevents serious consideration of this alternative. Also, the bulk of industrial and residential development within the flood plain is relatively new, most having been constructed within the last 10 years.

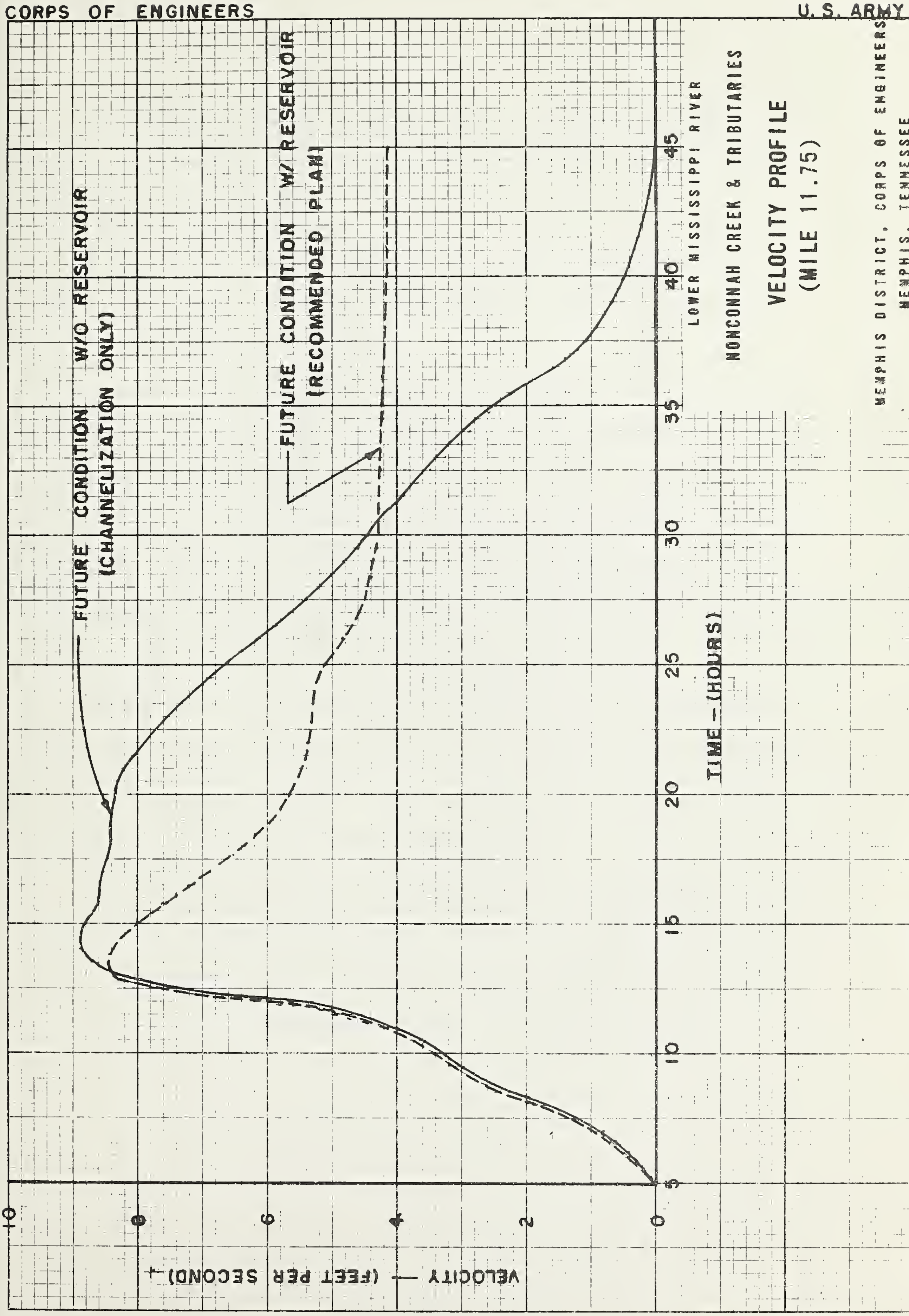
d. Plans of Development Considered. Using the concepts for flood control applicable to the Nonconnah Creek Basin as outlined above, the Department of Agriculture and the Corps of Engineers, working with local sponsors and other agencies, have considered several plans to meet the needs in the Nonconnah Creek Basin.

A sound program of land treatment for erosion and sediment control is considered a desirable and necessary feature of any structural plan for flood control, and should be included as a

part of any alternative.

There are basically two means of reducing flood levels in the Nonconnah Creek floodplain which can be reasonably considered. These are increasing the flow capacity of existing channels and floodwater storage.

On Nonconnah Creek it has been determined that any channel improvement which does not include reservoir storage will necessarily require channel paving to eliminate channel bank erosion. The soils which comprise the channel banks are highly erosive, and water velocities of more than 4 to 5 feet per second for any extended period of time will result in severe bank erosion. Without reservoir storage, the channel will be subjected to velocities of 7 to 8 feet per second for periods of time up to 12 hours. With reservoir storage, the duration of erosive velocities can be reduced to 4.5 hours, and with riprap protection of critical points along the channel and adequate maintenance following flood flows, the channel can be maintained without paving. Figure 1 shows velocity profiles with and without reservoir storage.



LOWER MISSISSIPPI RIVER
NONCONNAH CREEK & TRIBUTARIES
VELOCITY PROFILE
(MILE 11.75)
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
FUTURE CONDITION W/O RESERVOIR
(CHANNELIZATION ONLY)
FUTURE CONDITION W/ RESERVOIR
(RECOMMENDED PLAN)
TIME – (HOURS)
VELOCITY — (FEET PER SECOND)
0
2
4
6
8
10
5
10
15
20
25
30
35
40
45

FIGURE 1

The three structures on Johns Creek are recommended for the purpose of controlling flooding in downstream floodplains of Johns Creek and Nonconnah Creek.

There are no feasible alternatives to construction of these three structures. The cost of enlarging the existing channel of Johns Creek would be prohibitive.

Channel enlargement would require disruption of many residences which are located immediately adjacent to the existing channel and contribute to flows in the main channel of Nonconnah Creek below Johns Creek, thus requiring more extensive enlargement in that reach. The three structures are designed to operate in conjunction with channel improvement on the main channel of Nonconnah Creek, which will reduce backwater effects in the Johns Creek floodplain.

Backwater of Nonconnah Creek, at bankfull stage on Nonconnah Creek will extend upstream in the Johns Creek channel for approximately two miles, and would reduce the effectiveness of any channel enlargment in the lower reach of Johns Creek.

However, the reduction of headwater flows on Johns Creek, accomplished with retarding structures, will result in the reduction of combined Nonconnah Creek backwater and Johns Creek headwater flows to the extent that flood damages will be held at a low level.

All the alternative plans considered include the three Johns Creek structures except Plan 2, which does not include channel enlargement below Johns Creek. Plan 2 does not provide flood protection for the more than 800 residences in the Johns Creek floodplain which are subject to flooding.

(1) Plan No. 1. This plan would consist of enlarging the existing earth channel of Nonconnah Creek from McKellar Lake to the Johns Creek tributary, in combination with proposed land treatment and the three retention structures on Johns Creek. The Nonconnah Creek channel without some means of headwater control would be subjected to water velocities of 7 to 8 feet per second for periods of time up to 12 hours following moderate to heavy rainfall, resulting in severe and repeated bank erosion.

This plan has been rejected as it would not provide needed protection for those areas in the floodplain above Johns Creek, and is not engineeringly feasible.

(2) Plan No. 2. Project alternative No. 2 consists of a facility to store excess runoff in the main channel of Nonconnah Creek, in combination with the land treatment program. A desirable and available site was located on the main stem approximately 20 miles upstream from the mouth of Nonconnah Creek. Sites further downstream would be more effective in controlling floods, but cannot be considered because of extensive existing development in potential reservoir sites. Sites further upstream would control less drainage

area and be less effective in controlling floods. The Corps of Engineers and the Soil Conservation Service have considered a wide range of storage capacities and operational systems of flood control structures at this site. Consideration has also been given to the feasibility of supplemental storage at additional smaller sites upstream from the large structure. Storage can be developed at the site to adequately control flooding from the 100 year frequency flows down to Mt. Moriah Road, in addition to sediment storage for 100 years silt accumulation.

Tributary flows entering the main channel below the reservoir site are such that the structure would not adequately control major floods below Johns Creek.

Constructed and operated as a flood control feature, with no recreation storage or development, the lake would have a conservation or sediment pool elevation of 314.2 feet above mean sea level, with a surface area of 1,200 acres. The lake would contain 18,000 acre feet of flood control storage. The top of controlled storage would be at elevation 323.3 feet above mean sea level.

Without channel improvement below Johns Creek, flooding in the Johns Creek floodplain cannot be effectively controlled because of backwater from Nonconnah Creek. This plan, therefore, does not include the Johns Creek structures, and would not benefit the Johns Creek floodplain.

Environmental effects of the Nonconnah Reservoir are described in paragraph 3. The reservoir development included in Plan 2 is essentially the same as the recommended plan except for the recreation storage and proposed park development.

(3) Plan No. 3. In order to provide effective control of floods up to and including the 100-year return frequency storm, this plan would consist of the flood control structure as described above, the three structures on Johns Creek, and channel enlargement extending from Johns Creek to McKellar Lake. The 100-year design channel and flood storage structures would effectively control headwater flooding in the Johns Creek floodplain and in the mainstem floodplain from the Nonconnah Lake site to McKellar Lake. The alternative as designed anticipates and includes preservation of a 600-foot wide floodway along Nonconnah Creek to provide overbank flow capacity for the larger storms.

Environmental impacts of Plan 3 would be as described in paragraph 3, but would not include greenway or recreational development at Nonconnah Lake.

(4) Plan No. 4. This plan would consist of enlarging the existing earth channel of Nonconnah Creek from McKellar Lake 19.8 miles upstream, in combination with three structures on Johns Creek and a land treatment program. The channel would be designed to provide adequate protection in the Nonconnah floodplain from storms up to and including the 100 year frequency occurrence without flood control storage on the mainstem of Nonconnah Creek.

Above Johns Creek there is an existing strip of trees immediately adjacent to the channel on each bank in most of the 8 mile reach to mile 19.8.

Widening the channel to provide an enlarged earth channel as would be necessary with Plans 4 or 5 would destroy a large part of the existing natural growth.

Unless velocities and discharge rates are controlled by floodwater storage, it will be necessary to pave the channel section to prevent further stream degradation by continued erosion. This plan has been rejected because it is not engineeringly feasible, and would not offer the range of benefits afforded by the recommended plan.

(5) Plan No. 5. This plan would consist of an enlarged earth channel to mile 19.8 (as described in Plan 4 above) in combination with Johns Creek structures and land treatment program for flood control, and development of the 600 foot greenway from McKellar Lake to mile 19.8 for recreational use.

Detailed analysis indicates that without reservoir storage, water velocities will be exessive, and the earth channel and greenway cannot be adequately maintained. This plan has been rejected because it is not engineeringly feasible, and it would not offer the range of benefits afforded by the recommended plan.

(6) Plan No. 6. This plan would consist of flood control storage in Nonconnah Lake and the three structures on Johns Creek, channel enlargement below Johns Creek, the land treatment program, with additional

storage in Nonconnah Lake to provide a suitable development for recreation and development of park facilities adjacent to Nonconnah Lake and within the 600-foot wide floodway-greenway. This plan is described as the recommended plan in paragraph 1. Environmental impacts are described in paragraph 3.

(7) Plan No. 7. Plan No. 7 would consist of the land treatment and storage structures as described in Plan 3 above, with a modified channel improvement design to lower channel maintenance costs. The modified channel section would extend from McKellar Lake to Johns Creek, and would consist of a "v" shaped section approximately 25 feet deep with 1 on 12 side slopes, a top width of 600 feet, and an 80-foot wide paved invert in the channel bottom. The flat slopes would permit maintenance with riding mowers and the paved invert would be designed to carry low flows and prevent undercutting of channel banks.

This channel design would significantly reduce maintenance cost, but, because of higher initial cost, is not justified on a comparative basis. Environmental effects of the modified channel design would be similar to that of Plan 8 following.

(8) Plan No. 8. Plan No. 8 would consist of improved channel capacity on Nonconnah Creek from McKellar Lake to the Johns Creek tributary, in combination with land treatment and the three retention structures on Johns Creek. In order to maintain a stable channel

which would not erode under excessive velocities for several hours duration following moderate to heavy rainfall, the channel would be lined with reinforced concrete.

This plan would be difficult to construct because in many reaches the channel has been excavated to obtain material for constructing landfills, and is much larger than the required concrete design section.

This plan would not provide protection for floodplain areas above Mt. Moriah Road. Paving the channel would detract from the natural appearance of the stream and effectively prevent growth of stream organisms and restoration of semi-natural conditions. Such alteration would not be compatible with other project functions such as greenway development.

This plan has been rejected because of expense and the fact that it would not provide the desired level of protection.

(9) Plan No. 9. This plan would provide land treatment, three control structures on Johns Creek, and a concrete lined channel from McKellar Lake to Johns Creek, mile 11.8, as described in Plan 8, with enlargement of the existing earth channel from Johns Creek to mile 19.8. This design would provide for erosion control below Johns Creek, but could not be adequately maintained above Johns Creek becuase of erosive velocities extending over a period of several hours following moderate to heavy rainfall.

Effects of a paved channel from McKellar Lake to Johns Creek are described in Plan 8 above. Effects of an enlarged earth channel above

Johns Creek are descriped in Plan 4 above. This plan has been rejected because of environmental effects, comparative costs, and the fact that it does not provide the wide range of benefits afforded by the recommended plan.

(10) Plan No. 10. Plan No. 10 would consist of land treatment, three floodwater control structures on Johns Creek and improved channel capacity with a paved concrete channel extending from McKellar Lake to mile 19.8. This plan is designed to provide equivalent flood control protection without reservoir storage on Nonconnah Creek. The concrete lining is necessary to prevent extensive erosion as water velocities in an earth channel of sufficient capacity to carry design flows would range up to 7 to 8 feet per second for periods of time up to 12 hours, unless flows are reduced by reservoir storage.

A paved concrete section would reduce the extent of channel enlargement required, eliminate erosion, and therefore result in less direct effect on woodland adjacent to the stream. However, a concrete channel would detract from the natural appearance of the stream and eliminate growth of stream organism and restoration of natural stream conditions. A paved channel would not be compatible with other project functions such as greenway development. This plan has been rejected because of environmental effects, and lack of economic justification.

(11) Comparable Costs of Plans Considered. Table 4 shows the estimate of installation, operation and maintenance cost for each separable feature of the various plans considered. No operation and maintenance cost is estimated for earth channel enlargments below Johns Creek without reservoir storage, as it has been determined that such enlargments cannot be adequately maintained without reservoir storage to reduce erosive velocity duration.

Table 5 shows a summary of first costs and annual charges for structural features included in the alternate plans of improvement.

Table 6, Benefit Maximization, describes each alternative plan in the standard benefit verses cost manner.

TABLE 4

Estimated Installation and Operation and Maintenance Cost for Individual Project Features Considered in Plans for Flood Control and Recreation Development

	Installation Cost $	OM&R $
LAND TREATMENT	2,390,000	-
CHANNEL IMPROVEMENT:		
1. Trapezoidal Earth Channel to Johns Creek without Nonconnah Reservoir	15,371,000	1/
2. Trapezoidal Earth Channel to Johns Creek with Nonconnah Reservoir	14,695,000	416,000
3. Earth Channel to Mile 19.8 without Nonconnah Reservoir	23,838,000	1/
4. Earth Channel with Paved Invert & Flat Slopes to Johns Creek with Nonconnah Reservoir	36,910,000	166,000
5. Paved Channel to Johns Creek without Nonconnah Reservoir	60,000,000	150,000
6. Paved Channel to Johns Creek and Earth Channel from Johns Creek to mile 19.8	68,500,000	430,000
7. Paved Channel to Mile 19.8	93,000,000	250,000
FLOOD CONTROL STORAGE:		
1. Three Structures on Johns Creek	7,489,000	9,000
2. Nonconnah Flood Storage	24,663,000	150,000

TABLE 4 (Cont)

Estimated Installation and Operation and Maintenance Cost for Individual Project Features Considered in Plans for Flood Control and Recreation Development

	Installation Cost $	OM&R $
RECREATION FEATURES:		
1. Nonconnah Lake Recreation Storage (Separate Cost)	2,600,000	-
2. North Park	1,976,000	20,000
3. South Park	6,493,000	120,000
4. Greenway with Reservoir 2/	6,022,000	80,000
5. Greenway without Reservoir 3/	1,500,000	80,000

1/ Operation and maintenance costs are not estimated as it has been determined that this channel design cannot be maintained with design flow velocities and duration.

2/ Installation cost estimate includes purchase of 600-foot greenway from Johns Creek to mile 19.8. Lands below Johns Creek are included in channel improvement costs.

3/ Installation cost does not include land cost as those costs are included in channel improvement costs.

TABLE 5

Comparative Costs of
Plans Considered for Nonconnah Basin

Plan	Installation Cost	Average Annual Cost of Structural Features		
		Interest & Amortization	OM&R	Total
	$	$	$	$
PLAN 1				
Land Treatment	2,390,000	-	-	-
Structural Work	22,860,000	1,291,000	(Plan not engineeringly feasible)	
Total	25,250,000			
PLAN 2				
Land Treatment	2,390,000	-	-	-
Structural Work	24,663,000	1,393,000	159,000	1,552,000
Total	27,053,000			
PLAN 3				
Land Treatment	2,390,000	-	-	-
Structural Work	46,847,000	2,646,000	575,000	3,221,000
Total	49,237,000			
PLAN 4				
Land Treatment	2,390,000	-	-	-
Structural Work	31,327,000	1,770,000	(Plan not engineeringly feasible)	
Total	33,717,000			
PLAN 5				
Land Treatment	2,390,000	-	-	-
Structural Work	32,827,000	1,854,000	(Plan not engineeringly feasible)	
Total	35,217,000			
PLAN 6				
Land Treatment	2,390,000	-	-	-
Structural Work	63,938,000	3,612,000	795,000	4,407,000
Total	66,328,000			
PLAN 7				
Land Treatment	2,390,000	-	-	-
Structural Work	69,062,000	3,901,000	325,000	4,226,000
Total	71,452,000			

TABLE 5 (Cont)

Comparative Costs of
Plans Considered for Nonconnah Basin

Plan	Installation Cost	Average Annual Cost of Structural Features		
		Interest & Amortization	OM&R	Total
	$	$	$	$
PLAN 8				
Land Treatment	2,390,000	-	-	-
Structural Work	67,489,000	3,812,000	159,000	3,971,000
Total	69,879,000			
PLAN 9				
Land Treatment	2,390,000	-	-	-
Structural Work	75,989,000	4,292,000	439,000	4,731,000
Total	78,379,000			
PLAN 10				
Land Treatment	2,390,000	-	-	-
Structural Work	100,489,000	5,676,000	259,000	5,935,000
Total	102,879,000			

TABLE 6

Benefit Maximization

Project Alternate	Annual Cost $	Annual Benefit $	Net Benefit $	Benefit/Cost Ratio
Plan 1	(Plan not engineeringly feasible)			
Plan 2	1,552,000	2,739,200	1,187,200	1.8
Plan 3	3,221,000	4,887,600	1,666,600	1.5
Plan 4	(Plan not engineeringly feasible)			
Plan 5	(Plan not engineeringly feasible)			
Plan 6	4,407,000	6,637,600	2,230,600	1.5
Plan 7	4,226,000	4,887,600	661,600	1.2
Plan 8	3,971,000	4,246,600	275,600	1.07
Plan 9	4,731,000	4,887,600	156,600	1.03
Plan 10	5,935,000	4,887,600	None	0.8

6. <u>The Relationship between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity</u>. The proposed project ascribes the future course of man's development and uses of a portion of the Nonconnah Creek floodplain. Its implementation will constitute a long-term impact upon the floodplain environment. This course of action will broaden the range of beneficial uses which can be made of existing resources, and will result in an enhancement of man's life support system by creating and preserving open space which can be used and enjoyed by a large and growing urban population. Enactment of the proposal will be a major obstacle to continuation of the present trend of developing the floodplain for maximum short-range returns. Unregulated and destructive practices of land development are rapidly depleting and destroying basin resources, thus foreclosing future options and intelligent land use decisions. There is no known feasible alternative to this proposal which would provide an equivalent degree of flood protection while offering its wide range of long-term, beneficial floodplain uses. This proposal does not justify its implementation upon short-term benefits for which a long-term environmental value would be damaged or sacrificed.

7. <u>Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action Should It be Implemented</u>. Implementation of the proposed action will be a major factor in determining the course of future floodplain uses and development. It will accelerate the process of urbanization, and will particularly stimulate sub-division construction in the vicinity of the proposed reservoir and park site.

However, the project insures a more sensible basin development by denying the most flood-prone lands to new construction, while reducing the flood hazard to existing basin developments.

Direct resource commitments include the dedication of some 8,000 acres of land, of which 2,300 acres will be permanently covered with water, 1,760 acres subject to temporary inundation within the reservoir flood pools, 1,580 acres bordering the flood pools for management, access and conservation purposes, 820 acres for development as public recreation parks; 140 acres for construction of Nonconnah Dam and spillway, and 1,400 acres for floodway and greenway development. The flood pool area will be committed to open-space use compatible with temporary flooding, such as forest and recreation.

The commitment of labor and material resources associated with construction of the project will be irretrievable. Though much of the land resource committed to the project is not physically irretrievable, it is not likely to ever be returned to its present private use.

The only non-renewable resource which will be committed by the project consists of the archeological sites which lie within the reservoir area. Most of these are located within the conservation pool and will eventually become buried with silt. Four sites are located at elevations where they will likely be destroyed by wave action or recreational development.

8. Coordination with Others. a. Public Participation. Public meetings have been held on this project by the Corps of Engineers, the Soil Conservation Service, and the Chickasaw Basin Authority on 9 October 1970, 18 February 1971, 15 September 1971, 5 November 1971, 29 June 1972, 16 February 1973, and 7 May 1973. Each meeting dealt with solutions being considered for Nonconnah Creek and aired anticipated environmental impacts which would result from their implementation. Approximately 5,000 brochures describing basin studies and plans and requesting public input to studies were mailed to residents of the Nonconnah floodplain and to many other individuals and organizations known to have an interest in the area. Corps of Engineers and Soil Conservation Service representatives attended monthly meetings of the Chickasaw Basin Authority and met with the Authority on many other occasions to keep them informed of study progress and to obtain views and comments.

Public participation increased during the meetings of 5 November 1971 and 29 June 1972. Objections raised on these occasions came primarily from persons whose lands would be taken for public use by project construction. Other objections heard concerned the possible lowering of property values for land adjacent to the project, the muddy character of reservoir water and the rate of siltation in reservoirs. Balanced against these were favorable responses to the recreational potential of the project, the provision for environmental enhancement along with flood control, and possible integration of the greenway with the Mississippi Riverfront.

The Public Meeting of 7 May 1973 was very well attended, and produced many comments. Due to the interest in the project demonstrated at this meeting and the number of similar comments, a collation of comments has been prepared under paragraph 8.c. - Citizens Groups.

Additional public involvement in the project study has resulted from meetings with civic, social and professional organizations. Some of these groups are: Memphis Area Chamber of Commerce, Memphis Engineers Club, Memphis Rotary Club, South Memphis Lions Club, Civitan Club, Kiwanis Club, Capleville Community Club, Collierville Rotary Club, Parkway Village Optimist Club, Eastover Garden Club, Memphis Chapter of the Sierra Club, and school and church groups.

Several meetings and conferences were held with representatives of the Nonconnah Improvement Association. The Nonconnah Improvement Association is a group of landowners and citizens who oppose construction of the proposed Nonconnah Lake.

b. Government Agencies. The draft environmental statement was sent to the following governmental agencies requesting their views and comments. Their comments and the response are summarized below and copies of correspondence are attached to the environmental statement as Appendix A.

(1) Environmental Protection Agency

Comment: It is recommended that the project description section include a discussion of controls needed to prevent floodplain development which will produce runoff pollutional loads greater than those presently prevailing.

Response: Controls necessary to preclude any increase of existing runoff pollution might range from a complete ban on further development, small scale treatment plants, settling basins, or replacement of facilities to a type less prone to contributing to runoff pollution. Regardless of the approach the control of the area would be left to state or local governing bodies.

Comment: Guidelines that must be followed by the construction contractors to control erosion and prevent pollution should also be stipulated.

Response: Contracts require that construction activities not introduce fuels, oils, grease, bitumens, calcium chloride, insecticides, herbicides or other similar materials harmful to fish, shellfish or wildlife into lakes, ditches, rivers or reservoirs. Unnecessary destruction of vegetation within the right-of-way boundaries is not permitted. Erosion is further minimized by seeding and mulching.

Comment: The "Environmental Setting Without the Project" section should include data supporting the statement on page 2 (draft), that "The pollution of Nonconnah Creek is more intense than other major streams of the Chickasaw Basin because of its low normal flow."

Response: Comparison of the Wolf and Loosahatchie Rivers with Nonconnah Creek resulted in the following values for the five selected water quality parameters:

	Wolf	Loosahatchie	Nonconnah
Dissolved Oxygen (mg/l)	3.8	9.5	1.2
pH (units)	7.4	7.6	9.0
Temperature (°C)	19	20	22
Fecal Coliform (colonies/100ml)	30,310	50	1,452

Comment: The impacts on water quality should be addressed in terms of applicable water quality standards ....Although some water quality characteristics can be improved by impoundments, others, such as nutrients, dissolved oxygen, and temperature can be adversely affected.

Response: The discussion of water quality has been expanded.

Comment: Results of tests for DO, BOD, and COD at the damsite are not given.

Response: Appendix B lists results of water quality tests.

Comment: The downstream grab samples for BOD would be considered high, therefore, the statement that the water at the site of the proposed dam exhibits a low BOD is unfounded.

Response: The statement has been deleted from the environmental impact statement.

Comment: Additional and more extensive sampling should have been conducted during the summer months, since agricultural and urban runoff probably has a more pronounced effect on water quality during this time of year.

Response: While more pronounced effects may occur during summer months, it is the position of the author agencies that the data are valid throughout the year.

Comment: We further recommend a discussion of the present and future hydrology of the Nonconnah system, and the effect that altering the flow regime will have on water quality.

Response: This topic has been expanded in the statement.

Comment: Maintaining a flow of 3 cfs would improve water quality when the natural flow would be lower than that figure; however, 3 cfs will be lower than the inflow at times, resulting in water of poorer quality. Therefore, the effect of the reservoir operation on downstream water quality needs to be fully explored. A minimum water release schedule for the months of July, August, September, and October, should also be included. During periods of low flow, at least as much water as enters the three flood water control structures should be released to maintain a beneficial equilibrium of biological organisms.

Response: A minimum flow of 3 cfs will be maintained. With the exception of flood periods the volume of water entering the three control structures will be the volume of water released, which will help the biotic systems now present in these man-made channels.

Comment: Channelization will disturb bottom deposits and established benthos. An estimate should be made of the time required for the re-establishment of the benthos community.

Response: The benthic community will probably become re-established and stabilized within three years of channelization.

Comment: The effects of channelization on the re-aeration rate of Nonconnah Creek should be discussed.

Response: The dissolved oxygen content and rate of recharge will increase with the increased and stabilized flow.

Comment: It will be necessary to remove all sources of raw untreated and unchlorinated sewage from the stream before acceptable levels of fecal coliform can be obtained in Lake McKellar.

Response: The Nonconnah Creek project has not been designed to purify McKellar Lake, but will reduce the concentration of pollutants entering the lake as a result of the constant minimum flow, the increased DO content, and reduced runoff and erosion through land treatment measures.

Comment: Turbidity will be less in the streams immediately below the dams, but will increase in those reaches which have been channelized, until such time as they become stabilized.

Response: Concur.

Comment: The provision of the green strip will improve water quality values by affording a floodplain which will absorb nutrients and filter out sediment in times of high water.

Response: Concur.

Comment: It is felt that the environmental impacts of the alternatives have not been adequately presented; therefore, it is inappropriate to state that "implementation of the selected project plan will have fewer adverse impacts in relation to its beneficial environmental aspects than any feasible alternative."

Response: Discussion of the environmental impacts of the alternatives has been expanded.

Comment: It is recommended that fuller discussion be given to the environmental impacts of the alternatives.

Response: Refer to previous response.

Comment: It is inappropriate to state that "there is no feasible alternative to this proposal which would provide an equivalent degree of flood protection, while offering its wide range of long-term, beneficial environmental uses", without discussing adequately the environmental impacts of the alternatives. It also should be stated that the expected increase in urbanization will contribute to increased pollutional loads from urban runoff which will be costly to control.

Response: The environmental impact section has been expanded.

Comment: The project, if implemented, will commit 8,000 acres to provide flood protection to 9,000 acres which will be inundated by the 100-year flood.

Response: The frequency of flooding is greater than indicated by the comment. Overbank flooding occurs on the average of once in ten years, while a damaging flood is experienced once in twenty years. Should no improvements be provided, flooding will increase with increasing development and deterioration of the stream channel.

Comment: It is suggested that a section be included to comply with state and local air pollution standards for open burning, if land waste clearing and construction waste are to be disposed of by this method.

Response: Construction activities will be in conformance to the current publication of Tennessee Air Pollution Control Regulations, as well as applicable local standards.

(2) U. S. Department of the Interior

Comment: Treatment of fish and wildlife aspects is adequate and generally in accord with the Bureau of Sport Fisheries and Wildlife's letter report to the Soil Conservation Service, dated 8 December 1971.

Response: Comment noted.

Comment: We suggest the statement be expanded to quantify the recreation features of the project. This could include descriptions of park areas, pages 46 and 47 of the Interim Report, and the relation of the recreation potential to the 3.2 million man-days deficiency in the basin supply, i.e., the project would provide an estimated 1.7 million man-days total for the reservoir and greenway.

Response: The description of recreational features, as expanded, appears under the project description section.

Comment: It is concluded that the flood pool area would be available for recreation.

Response: The flood pool and conservation pool areas will be available for recreational uses.

Comment: Two of the uses cited, cropland and pastureland, would not be desirable open space uses in relation to use of proposed park areas.

Response: Project lands will not be used as cropland or pastureland. The correction has been made in Impact Statement.

Comment: The proposed stream improvements will provide impetus to the planned urbanization of Nonconnah Creek Basin. Road and street improvements will eventually cause the entire watershed to be open for development. It is expected that resulting zoning regulations will be a principal factor that will affect mineral resource availability. The restrictions imposed by these regulations will determine the ultimate impact on mineral resources. The project alone will have little direct effect on mining and mineral resources in the basin.

Response: Concur.

Comment: Detailed data on the engineering-geology aspects of the proposed project should be provided in the environmental statement.

Response: The environmental statement has been revised to describe the geology of the project area in greater detail. In addition, a composite display of bore-hole information obtained from many individual tests is presented.

Comment: The draft statement does not discuss two important hydrological features of the project area. One of these is the position of the proposed reservoir with respect to the eastern limit of the confining bed overlying the Memphis aquifer. If, as suspected, the confining bed is absent in all or part of the reservoir area, both the quantity and quality of local recharge of the Memphis aquifer could be affected.

Response: If water were impounded in the Nonconnah Creek Basin a few miles upstream from the Memphis City limits, some hydrologic effects could be expected. Much of the area that would be inundated by the proposed reservoir is within an area where the upper confining bed, Jackson Clay, is absent and the "500-foot" sand is directly overlain by permeable alluvial materials. As the alluvial materials are hydraulically connected with the creek, a free exchange of water between the creek and the "500-foot" sand is possible. Moreover, the increased hydrostatic head that would be created by the reservoir would steepen the hydraulic gradient from the reservoir toward the adjoining aquifers. The rate of infiltration that would be induced from the reservoir would depend on the steepness of the hydraulic gradient and the temperature of the water. A high rate of infiltration would result from a high viscosity of warm water in summer and fall, and a low rate would result from a low viscosity of cold water in winter and spring. The infiltration rate could be expected to decrease with time as fine sediments accumulate on the bottom of the reservoir, although the rate would still fluctuate with the seasonal fluctuations of water temperature. Hence, the initial favorable condition for induced recharge to the aquifer would, in time, be offset by a decrease in permeability of the alluvial materials underlying the reservoir.

If the reservoir is made, its effect on the chemical quality of water in the "500-foot" sand would depend on the

chemical quality of water in the reservoir, the rate of infiltration into the "500-foot" sand, and the chemical composition of the formations through which the water would move. A comparison of analyses of the water from the creek and from the "500-foot" sand near the outcrop area shows little difference in their chemical composition. As the water is filtered through the alluvial material, however, the infiltrating water would probably increase in hardness and dissolved solids before reaching the "500-foot" sand. The effects on the quality of the water in the "500-foot" sand would decrease with time as the rate of infiltration from the reservoir decreases, depending on the accumulation of silt on the bottom of the reservoir.

Comment: The second feature that deserves mention is the fact that Nonconnah Creek is a losing stream in much of the reach between Winchester Road and U. S. Highway 78. Although the flow of the creek has not been gaged until recent years, many accounts have been recorded since 1945 of zero flow in certain reaches of the stream during the dry season. This condition is believed to result from the lowering of water levels by pumping from the Memphis aquifer.

Response: Operational plans for the reservoir call for a 3 cfs release which will maintain the creek flow during the dry periods.

(3) U. S. Department of Health, Education and Welfare

No comments received.

(4) National Oceanic and Atmospheric Administration

No comments received.

(5) Chucalissa Indian Museum

No comments received.

(6) Tennessee Historical Commission

No comments received.

(7) Office of Economic Opportunity

Comment: The Office of Economic Opportunity will not undertake any action on the environmental impact statement during the agency's final months of operation.

Response: The OEO position is acknowledged.

(8) Water Resources Council

No comments received.

(9) U. S. Department of Commerce

No comments received.

(10) Tennessee Office of Urban and Federal Affairs

Comment: The State review of the draft environmental impact statement has not been completed, but we hope to forward State comments shortly.

Response: Comment acknowledged. (State comments were forwarded under a separate letter of 6 July 1973 from Governor Winfield Dunn. These comments are presented below.)

(11) State of Tennessee

Comment: The State of Tennessee has suggested that channelization be further considered, in lieu of the proposed project which includes reservoir storage.

Response: The project sponsors believe that an opportunity to provide all the residents of the watershed area with the highest degree of benefits for each dollar expended must be utilized.

Comment: Water resource problems, including flood control, of Shelby County and southwestern Tennessee are very complex, and the concept of this plan was a valid attempt to meet many of the problems simultaneously. However, it was concluded that the proposed project does not adequately fit the topography and economy of the area, and should be modified.

Response: The proposed project has been designed around the existing topography with the most suitable site for maximum storage selected, and no operational difficulties are foreseen. The recommended plan provides the minimum acceptable urban flood protection and recreation development at least cost.

Comment: Many local citizens and the Tennessee State Department of Conservation and Public Health have stated that this site is not an appropriate site for a state park because of the flat, monotonous topography, almost total lack of vegetation, potential severe problems of mosquito control, water quality, and access.

Response: Citing the above mentioned objections, Governor Winfield Dunn had decided that the interests of the State of Tennessee and of Shelby County would best be served if the money originally intended for the Nonconnah State Park were to be used instead to improve and upgrade Meeman-Shelby Forest State Park.

These topics were discussed in a 20 July 1973 meeting of State representatives with Soil Conservation Service and Corps of Engineers

personnel. Topography and vegetation were viewed as more appropriate for an urban park rather than the type of setting normally considered for a state park. State officials recognize the need for such park developments as would serve the urban population of Memphis and agree that a park at this site would provide needed recreation opportunity. However, the state administration does not feel that state park funds in the amount necessary to install this facility should be used to construct parks which are primarily urban-oriented.

The mosquito control fear centered about the potential breeding area in water less than two feet deep as created by spring surcharge to maintain minimum lake depths. A representative of the Tennessee Department of Public Health agreed that without the surcharge there would not likely be any net increase in mosquito production at the reservoir site, if it is constructed and operated to conform to state standards. He further agreed that there would be a decrease in mosquito breeding in the downstream channel if a minimum flow of 3 cfs is made from the reservoir, as proposed. State regulations specify the minimum depth of the normal pool as two feet, the reservoir design would provide the two foot minimum depth plus one foot of freeboard. A detailed analysis of rainfall records and water losses from the proposed lake made by the Corps of Engineers indicates that minimum depth of two feet can be maintained without imposing the objectionable surcharge condition.

Water samples indicate that the reservoir will not be suitable for swimming and other body contact sports. State officials agree that there are no water quality parameters which would restrict use of the lake for activities other than body contact sports.

A network of roads enter the area from various population centers, thus providing adequate access.

Comment: Local support for the proposed state park has declined significantly, with the original sponsors introducing legislation to deauthorize the park. Due to this and the previously mentioned objections, it has been determined that funds originally intended for Nonconnah State Park would be better spent to improve Meeman-Shelby Forest State Park.

Response: To date, no legislation has been introduced to the State Legislature, which would deauthorize the park. The Chickasaw Basin Authority, the Mississippi-Arkansas-Tennessee Council of Governments and the city of Memphis have indorsed the recommended plan. The Chickasaw Basin Authority has indicated that it will sponsor the park in lieu of the state.

Comment: Should the recommended plan be implemented it must be modified to conform to state standards. A minimum water depth of three feet will be required during mosquito breeding season. The lake area covered by the spring surcharge is included under the minimum depth requirement.

Response: Tennessee Impounded Water Act, Regulation 8, specifies a minimum depth of two feet. Necessary design modifications of Nonconnah Lake to conform to state standards will be made and the reservoir will be operated without utilization of a surcharge area.

Comment: If the project cannot be made to conform to state standards, or if it cannot be justified in the absence of the state park, consideration should be given to flood control by way of channel enlargement.

Response: The recommended plan will conform to state standards and is justified without the presence of an adjacent state park. The statement does consider channel enlargement.

(12) Mississippi-Arkansas-Tennessee Council of Governments (Correspondence predates EIS, however, positions remain unchanged.)

Comment: MATCOG believes the project is of tremendous importance to the entire community and urges that its implementation be pursued vigorously.

Response: Concur.

(13) Chickasaw Basin Authority

Comment: The plan as recommended is considered to be the most desirable plan for flood control and has been adopted by the Chickasaw Basin Authority.

Response: Comment noted.

Comment: It is the intention of the Chickasaw Basin Authority to fully develop and utilize the recreation opportunity of the proposed Nonconnah Lake.

Response: There is a large and growing demand for water-based recreational facilities to serve the expanding population of the metropolitan area. The recreational development will benefit all of the residents of Shelby County and surrounding area, estimated to be 800,000 citizens.

Comment: The Chickasaw Basin Authority is fully empowered under state law to serve as local sponsors and meet local cost requirements for Federal water resource development projects in the Nonconnah Basin. The Basin Authority will provide local contribution and other assurances as normally required for construction and operation of the recommended flood control works and recreation developments to include

the recommended recreation storage, the North Park and South Park on the Nonconnah Lake and the greenway development, depending on availability of funds and authorization of the project at the Federal level.

Response: Comment noted.

Comment: Local and state governments have made more than $11,000,000 available to the Authority for advance purchase of lands which will be needed for this project. Lands are currently being purchased for the proposed Nonconnah Reservoir and North Park. It is anticipated that the cost of lands for the flood control reservoir on the main channel of Nonconnah Creek will be assumed by the Corps of Engineers in accordance with established Federal policy. If the funds which have been invested in reservoir lands are returned to the Authority after the project is authorized and funded by the Congress, the funds will be available to meet local cost requirements in other project features.

Response: Comment noted.

Comment: It is requested that authorization of the project be gained as soon as possible to avoid unnecessary delays in proceeding with these vitally needed flood protection measures.

Response: Comment noted.

(14) Memphis Community Action Agency

No comments received.

(15) Central Region, Water Resources Council

No comments received.

(16) Memphis and Shelby County Planning Commission

Comment: The proposed Nonconnah Reservoir and related improvements are consistent with the Planning Commission's Parks, Recreation and Conservation Plan. The Memphis and Shelby County Planning Commission supports these flood control and recreation facilities.

Response: Comment noted.

(17) Shelby County Health Department

No comments received.

(18) City of Memphis

Comment: The city of Memphis fully supports implementation of the proposed project. The cooperative nature of the project will enable the city to provide improved community services with an equitable part in project financing.

Response: Comment noted.

(19) Shelby County Quarterly Court

Comment: The proposed plan provides the most feasible approach to flood control in the Nonconnah Basin. The completion of this most important project would, in addition to protecting areas already developed along the Nonconnah Basin, make available additional lands for both public and private development.

Response: Comment noted.

(20) Bureau of Sport Fisheries and Wildlife, USDI - Letter of 5 June 1973

Comment: The Bureau of Sport Fisheries and Wildlife's report of 6 October 1972, on the Corps' plans, should be included in Appendix G of the report.

Response: The BSF&W report has been included in both the interim report and as an attachment to the environmental statement.

Bureau of Sport Fisheries and Wildlife, USDI - report of 6 October 1972

Comment: The extent to which the channel will be enlarged has not yet been determined, although your letter of 28 April 1972, indicated it will likely be designed to prevent overbank floods of less than 100-year frequency.

Response: The project is designed to contain the 100-year flood within the minimum greenway boundaries.

Comment: The State of Tennessee has authorized development of a state park adjacent to the reservoir.

Response: Citing as the basis of objection the flat, monotonous topography, almost total lack of vegetation, potential severe problems of mosquito control, water quality, and access and the decline in support for the park, as indicated by the reported intent to repeal park authorization; Governor Winfield Dunn has decided that the interests of the State of Tennessee and of Shelby County would best be served if the money originally intended for the Nonconnah State Park were to be used instead to improve and upgrade Meeman-Shelby Forest State Park.

These topics were discussed in a 20 July 1973 meeting of State representatives with Soil Conservation Service and Corps of Engineers personnel. Topography and vegetation were viewed as more appropriate for an urban park rather than the type of setting normally considered for a state park. State officials recognize the need for such park developments as would serve the urban population of Memphis and agree that a park at this site would provide needed recreation opportunity. However, the state administration does not feel that state park funds in the amount necessary to install this facility should be used to construct parks which are primarily urban-oriented.

The mosquito control fear centered about the potential breeding area in water less than two feet deep as created by spring surcharge to maintain minimum lake depths. A representative of the Tennessee Department of Public Health agreed that without the surcharge there would not likely be any net increase in mosquito production at the reservoir site, if it is constructed and operated to conform to state standards. He further agreed that there would be a decrease in mosquito breeding in the downstream channel if a minimum flow of 3 cfs is made from the reservoir, as proposed. State regulations specify the minimum depth of the normal pool as two feet, the reservoir design would provide the two foot minimum depth plus one foot of freeboard. A detailed analysis of rainfall records and water losses from the proposed lake made by the Corps of Engineers indicates that minimum depth of two feet can be maintained without imposing the objectionable surcharge condition.

Water samples indicate that the reservoir will not be suitable for swimming and other body contact sports. State officials agree that there are no water quality parameters which would restrict use of the lake for activities other than body contact sports.

A network of roads enter the area from various population centers, thus providing adequate access.

Comment: It is recommended that an intermittent strip of timber be retained in the reservoir between about elevations 308 to 312 feet mean sea level.

Response: The recommendation will be implemented dependent on approval of the Tennessee Department of Public Health.

Comment: Recommend a minimum reservoir discharge of about 2 cfs be provided.

Response: A minimum discharge of 3 cfs will be maintained.

Comment: Recommend that care be taken to prevent loss of habitat for rare, endangered, and unique flora and fauna of the area.

Response: The area will be disturbed as little as possible while construction is in progress. Selective clearing will be practiced with greenway areas receiving particular attention.

Comment: Recommend that woodlands of the greenway and reservoir area be preserved.

Response: Refer to previous response.

Comment: Recommend a narrow channel design be selected in preference to a wide channel design.

Response: The proposed channel dimension is the minimum to provide adequate flood control.

Comment: Recommend that spoil be deposited along the outside edges of the greenway to shield the area from views and disturbances of highways and other developments.

Response: This recommendation will be followed wherever conditions permit.

Comment: Recommend water-level fluctuation be planned to benefit waterfowl.

Response: This suggestion cannot be implemented because of the necessity to control the water level for mosquito control.

(21) Bureau of Outdoor Recreation, USDI

Comment: An expansion and quantification of the recreation features and benefits of the project would be desirable in this section. It could include descriptions of park areas, and the relation of the recreation potential to the 3.2 million man-days deficiency in the basin supply; i.e., the project would provide an estimated 1.7 million man-days total for the reservoir and greenway.

Response: This subject has been treated in more detail in the environmental statement.

Comment: Commitments of the flood pool area to the several listed purposes is not clear. From information provided in the Interim Report, it is concluded that the flood pool area would be available for recreation.

Response: The conservation pool (permanent water area allowing for small fluctuations) of approximately 1,900 acres will be available for non-contact water sports. The flood control pool

(additional water area resulting from moderate to heavy precipitation), however, will not be retained and thus not be useable for water sports.

Comment: Two of the uses cited, cropland and pastureland, would not be desirable open-space uses in relation to use of proposed park areas.

Response: Project lands will not be used for cropland or pastureland. Correction has been made in Impact Statement.

(22) Geological Survey, USDI

Comment: The comments of the Geological Survey will be incorporated into the response of the Department of the Interior.

Response: Comment noted.

(23) National Park Service, USDI

Comment: The comments of the National Park Service will be incorporated into the response of the Department of the Interior.

Response: Comment noted.

c. Citizens Groups

(1) Chickasaw Environmental Association

No comments received.

(2) National Audubon Society

No comments received.

(3) Volunteer Group, Sierra Club

Comment: The best solution to flood control for Nonconnah Creek and other streams in the Chickasaw basin is effective floodplain zoning.

Response: Floodplain zoning is a valid technique, but not solely adequate in instances of wide floodplains or substantial existing developments.

Comment: Only activities compatible with a wetland environment, such as agriculture, recreation, and timber production, should be allowed in the floodplain. In areas along Nonconnah Creek where substantial construction has already taken place flooding should be controlled by a minimum amount of channel improvement with proper care to protect the greenbelt and restore natural stream state so far as possible.

Response: The minimum channel improvement necessary to provide adequate flood control is a feature of the recommended alternative. Environmental protection has been a major consideration in project formulation.

Comment: The Volunteer Group opposes construction of the project because (1) effective zoning would make it unnecessary and (2) the reservoir site is one of the last large wooded tracts in the area.

Response: The adequacy of zoning is discussed above. In order to provide flood control with the minimum amount of channel enlargement a reservoir must be built. The topography of the area makes only one reservoir site of adequate storage capacity available.

Comment: Recommend intended state park funds be used to purchase this wooded site and surrounding lands so that the holdings can be set aside as a natural area.

Response: Governor Dunn indicated in his letter of 6 July 1973, that he has decided to reallocate these funds to the use of the Meeman-Shelby Forest State Park.

Comment: The Sierra Club believes that preservation of our unique wetland environment should take priority over commercial interest.

Response: The Sierra Club opinion is acknowledged.

(4) The Wildlife Society

Comment: The Wildlife Society believes project benefits outweigh the rather minimal adverse costs to fish and wildlife. The project area is in a highly urban setting and suffers from a variety of pollutants which have reduced severely the attractiveness and habitability of this area to fish and wildlife. While some endangered bird species are listed as possible users of this portion of Nonconnah Creek, we feel these listings portray accidental sightings at best. Certainly, these species can't be depending on Nonconnah Creek in its present state for survival. In summary, fish and wildlife resources will not be further damaged.

Response: The project will preserve some habitat that would surely be lost because of urbanization, if no action were taken. Over a period of time the habitat on park lands and non-developed private lands will be improved.

(5) The Nature Conservancy

No comments received.

(6) West Tennessee Sportsmen's Association

No comments received.

(7) Environmental Action Council of Memphis

No comments received.

(8) Wildlife Management Institute

No comments received.

(9) Tennessee Wildlife Federation

No comments received.

(10) Environmental Defense Fund

No comments received.

(11) Tennessee Conservation League

No comments received.

(12) Nonconnah Improvement Association

Comments offered by representatives of the Nonconnah Improvement Association are included in the presentation of comments received during the 7 May 1973, Public Hearing.

(13) Professor Arlo I. Smith

Comment: The project cannot be endorsed as recommended.

Response: Comment noted.

Comment: More information on the real success of channelization and on the effects of removal of large quantities of vegetation is needed.

Response: Channelization has long been utilized as a drainage tool and continues to be used because of its effectiveness. The environmental impacts of removal of large quantities of vegetation may be severe, such as removal of a natural filtering system, esthetic degradation, loss of food and cover, loss of oxygen producers and soil stabilizers. However,

the most casual observer notes that the watershed is constantly urbanizing, with little indication of land use policies effectively protecting the floodplain vegetation. Accordingly, it seems desirable to opt for a plan which will preserve as much vegetation as possible and which might be enacted within the foreseeable future.

Comment: Land use studies should be made and the desirable land use practices determined by studies should be enforced.

Response: Concur.

Comment: The diversity of life forms found in the Nonconnah Basin indicates a complete and successful ecosystem now exists.

Response: The ecosystem of the Nonconnah Basin is being eroded by continual urbanization and development.

Comment: Extensive pollution of Nonconnah Creek is indicated by the analyses. This is a health hazard at present. The new interceptor sewer will drastically improve the condition, but the problem will exist until all conveniencies are sewer connected.

Response: Concur.

Comment: Reservoirs used for swimming and boating will be health hazards.

Response: Swimming and other body contact sports cannot be provided for at present, because the water of Nonconnah Creek does not meet minimum state standards. State health officials agree that there are no water quality parameters which would restrict use of the lake for activities other than body contact sports. It is also agreed

that the lake will provide good fishing opportunities. If, in the future, the water quality improves to the degree that the state requirements are met, then beach areas and other facilities may be provided.

Comment: Will the reservoirs be chemically treated?

Response: The reservoirs may be treated with herbicides on an as needed basis to control aquatic weed growth.

Comment: How will treatment enhance wildlife?

Response: Care is used in the selection and application of chemicals to insure minimum exposure of non-target species.

Comment: Flooding of river-bottom land yearly renews by inundation; fish, frogs, and salamanders, along with many invertebrate forms which are disseminated periodically. Mammals are renewable since much of their food is abundant there, as the surveys show.

Response: While this principle is valid in generalities it does not precisely fit the situation of Nonconnah Creek on which over-bank flooding occurs irregularly.

Comment: Multi-purpose impoundments have caused a substantial reduction in the total amount of bottomland, hardwood-type wetlands, subject to overflow. The proposed reservoir is situated in one of the more wooded areas, and its loss means a reduction of habitat for many species other than waterfowl.

Response: Implementation of the recommended plan will result in a net loss of terrestrial wildlife habitat as it now exists. However, the plan through its associated recreational lands will guarantee the

preservation of more of this type of habitat than could be expected if area urban expansion continues and necessary flood control is achieved entirely by channel improvement. Aquatic habitat will be increased and will become more pollutant free. It is recognized, of course, that the species composition and concentration of the present ecosystem, and the ecosystem established after construction will differ.

Comment: The management of the Hatchie Wildlife Refuge should be asked to comment on this proposal.

Response: The U. S. Department of the Interior has responded to the proposal.

Comment: We cannot let whole ecosystems die. The inland wetlands as an ecological unit are in peril. This proposal is for only a portion of the Chickasaw Basin project, and consideration must be given to the entire basin.

Response: As previously stated, the recommended plan will tend to preserve natural resources more so than other alternatives. The needs of the Nonconnah Basin were considered in relation to the entire Chickasaw Basin; alternatives of diverting flows through the adjacent basins were studied, but were found to be inadequate.

Comment: On page eight, "stocked with desirable species" (of trees)--by whose interpretation are these species desirable? There is a difference in needs of man and wildlife. This statement needs clarification.

Response: The statement was made with relative lumber values in mind.

Comment: Storage of water in the floodplain is nature's way of preserving the water table. Perhaps this is more efficient than man-made reservoirs in low-lying flatlands.

Response: Existing developments within the floodplain make strictly non-structural alternatives unacceptable to the community.

Comment: Channelization may be causing more serious flooding downstream, rather than alleviating it. Studies of precipitation and flood stages along the lower Mississippi River System should be made comparing pre- and post-channelization values.

Response: Channel improvement does increase the downstream flow and will aggravate a flooding situation in the absence of an adequate outlet. In this particular instance, the amount of additional flow will have insignificant effects on the receiving body, the Mississippi River. River stage forecasts are made daily and have been for many years.

Comment: Natural vegetation along creek and river banks might be superior to channelization for flood control.

Response: Vegetation covered stream banks are desirable for many reasons including erosion control, natural filtering of water, etc. However, in this basin, vegetation is rapidly disappearing from continued urban development. Also, the floodplain is developed to the point that much of the former overbank storage area is not available.

Comment: Vegetation has value as a filtering system.

Response: See previous response.

Comment: Periodic flooding recharges groundwater. Channelization might lower the water table.

Response: Some degree of infiltration of groundwater to adjoining aquifers is expected; however, an adequate recharge will occur.

Comment: Silting-in behind dams and along ditches can require constant dredging. Is this periodic, 50- to 100-year expense considered in the benefit-cost analysis? Whose responsibility is this and who pays for the dredging?

Response: Sediment transport reduction is one of the major benefits of the recommended plan. Land treatment measures to be installed will decrease erosion and sediment at originating sites. Provisions have been made in all structures for storage of sediment from a 100-year yield. This cost of maintenance is included in the benefit-cost ratio with the Corps providing maintenance on flood control storage facilities of the mainstem reservoir. The local sponsoring agency is responsible for maintenance on other structures.

Comment: There will be extensive erosion in the project area; past facts indicate less than satisfactory participation in conservation programs, and this tendency will continue.

Response: Conservation programs are very welcomed by landowners, but funds necessary to implement and fully complete these programs are limited. Authorization of the recommended plan will make additional funds available in excess of the normal program ceiling.

Comment: Memphis is losing its status as the "hardwood capitol of the world" due to loss of Oak-Hickory woodlands. Southern Swamp Red Oak can grow 1-1/2 to 2-inches diameter per year in our floodplains if properly cared for. Drainage and clearing are removing many thousands of acres of this natural resource per year. These hardwoods are relatively unique to the South Central United States, and are not being replaced as rapidly as they are destroyed.

Response: Comment noted.

Comment: Consideration should be given to reserving some basin lands for publicly owned tree farms. These could produce Oak, Tulip, Sweetgum and Cypress for commercial purposes and thus help replace a diminishing, worthwhile product.

Response: This suggestion may be implemented at some time in the future. The proposed plan will hold this option open by preserving some open space.

Comment: Use of floodplains for industrial, commercial, and residential areas has resulted in costly flood damages. The March and April 1973 flood damages in the Mississippi Valley should be heeded. We cannot afford to subsidize building in the floodplain and pay our taxes for compensating those flooded out "victims" of their own stupidity.

Response: Comment noted.

Comment: Are the costs of rebuilding damaged developments included in the project benefit-cost ratio?

Response: Costs included in the Benefit-Cost ratio are for installation, operation, maintenance, repair of project features, and settlement costs when private holdings are adversely affected.

Comment: We must not wait longer for really meaningful land-use regulations.

Response: Comment noted.

Comment: Proposed recreation facilities should be closely scrutinized for duplication of services already in abundance.

Response: The State of Tennessee has recognized a need for additional recreational facilities in the Memphis area. An illustration of this is the decision to upgrade Meeman-Shelby Forest State Park. In addition, studies by the Federal departments of the Interior, Agriculture and Army have identified a deficit in area-recreational opportunity.

Comment: Due to poor water quality, swimming, boating, and water skiing can be a health hazard.

Response: No facilities will be provided for contact water sports, and no benefits are claimed for these endeavors.

Comment: It is dubious that the waters can produce much useful fishing.

Response: The Bureau of Sport Fisheries and Wildlife has stated that good fishing opportunities will exist.

Comment: Survival of fish in low oxygen content during hot summers would be dubious.

Response: Refer to previous response.

Comment: We believe that much better use can be made of the land than for homes around some several dozens of reservoir impoundments in the Chickasaw Basin. If our population continues to soar, we must confine our population to more multi-story dwellings as in many European countries, saving the open spaces for badly needed diminishing resources--like meat, truck, vegetables, fruits, hardwood timber, etc.

Response: The author's opinions are noted.

Comment: It is hoped that land speculation within the area will not lead to a continuing "sprawling - suburbia." Must tax payers continue to support immediate developments for immediate utilitarian service?

Response: Comment noted.

Comment: Overall it is believed that the channelization and construction of reservoirs is not a realistic 1.8:1 benefit-cost.

Response: Based on the many studies conducted in formulation of this project and those performed in consideration of comments on the proposal, the current benefit-cost ratio of 1.5 is believed to accurately reflect the long-term, economic impact.

Comment: A wiser use of the land should be made by controlling Nonconnah Creek and the other tributaries of the Chickasaw Basin thru use of proper vegetation and small area water diversions.

Response: The use of small area water diversions and structures is discussed in the alternatives to the project section of the environmental statement.

PUBLIC MEETING, 7 MAY 1973

The following is a summary of comments made in connection with the final public meeting held on 7 May 1973.

Comment: Plan 6, the recommended plan, is approximately twice as expensive as plans 4 and 5, and each of these plans will accomplish the same thing from the standpoint of flood control. The issue, therefore, seems clear and that is, whether or not the Nonconnah Lake is desirable.

Response: Plan 6 would provide a greater net benefits than any of the alternate plans considered, considering the associated recreation benefit. A more detailed analysis of plans 4 and 5, which include earth channels without reservoir storage on the main channel, shows that channel improvement without reservoir storage for discharge and velocity control would require channel paving. Plans with paved channels were considered but cannot be justified.

Comment: Nonconnah Creek has been channelized from its mouth to a point east of Bailey Station Road for many years. Channel improvement would not create a channel where none exists, but would merely improve the existing channel.

Response: Nonconnah Creek was channelized from Bailey Station Road to U. S. Highway 51 by local governments during the period 1936 to 1946. Since that time the biological community has been reestablished

in the channel. Above Mt. Moriah Road, the channel has been relatively undisturbed since previous improvement, and a relatively natural stream condition exists. Below Mt. Moriah Road, the channel has been used in several reaches as a borrow area for floodplain land filling, and the biological community has been severely limited.

Comment: The proposed 1,900-acre Nonconnah Lake will be in a relatively flat area that is wholly unsuited for a lake.

Response: Field surveys consisting of valley sections, contour mapping, and foundation borings show that the proposed lake can be maintained and will have depths and other characteristics similar to other lakes in the Mid-South area.

Comment: There are no constant sources of water into the Nonconnah Lake area, and therefore lake levels will fluctuate.

Response: Concur. During extended periods of drought, lake levels will be lowered by evaporation, seepage, and discharges to maintain constant flow in downstream channel. Based on actual rainfall records, standard evaporation rate and computed seepage losses, lake levels would have dropped slightly less than one foot below normal pool if it had been in existence in past years. One-half inch of rainfall runoff per month will replace losses. Only one time in 40 years of record, there was less than sufficient rainfall to replace losses in a 2 month period.

Comment: Surcharging the Nonconnah Lake to maintain minimum lake levels will violate state standards for minimum depths and create a marsh area ideal for propagation of mosquitoes, snakes, and other insects and swamp life.

Response: It will not be necessary to surcharge the lake to maintain minimum depths as required by state standards.

Comment: There are no natural predators which can be used for mosquito control in Nonconnah Lake. Control by thermal fog generators or putting fuel oils and surfactants on the lake would destroy fish.

Response: Natural predators such as Purple Martins which feed an adult mosquitoes, or several species of fish which feed on larvae can be used if necessary. Use of thermal fog generators or fuel oil surfactants is not proposed.

Comment: Lake developments are not compatible with urban development as anticipated in the Nonconnah Basin, and would constitute a nuisance.

Response: Many people over the Mid-South consider lake developments as enhancement to urban residential areas, as evidenced by widespread practice of constructing lakes in subdivision developments, or purchase of residential sites near publicly developed lakes.

Comment: The water in the lake will be turbid and the fecal coliform count is so high as to be unsuitable for swimming or any other body contact sport.

Response: No benefit is claimed for any body contact activity. Facilities for such activities will be developed only if turbidity and coliform counts meet state standards.

Comment: The Nonconnah Lake will become more contaminated as urbanization of the area continues.

Response: A major source of contamination in water presently flowing into the lake site is rural housing with no sewer facilities or inadequate systems. As these areas are developed and all housing units are connected to adequate disposal systems, water quality may be significantly improved.

Comment: Constant turbidity and the history of Nonconnah Creek destroys hope for fishing in the proposed Nonconnah Lake. This is evidenced by failure of engineers to find game fish in seining operations at Hacks Cross Road.

Response: Water quality will be satisfactory for production of fish. Failure to find fish in the existing stream is attributed to the fact that the stream has no flow during several days each summer, eliminating possibility for fish production and growth.

Comment: The lake will have no recreational value. The lake site is not suitable for a state park.

Response: The lake is not represented as meeting all standards for optimum recreational lake development. However, in view of the great demand for water based and outdoor recreation facilities, the development will be used extensively by the large population of the Memphis and surrounding area. The need and projected usage is evidenced by constantly overcrowded parks in the Memphis area, particularly those with smaller lake developments.

Typically, a Tennessee State park is developed to characterize the natural environmental character of the state. This may be forest land, geological formations, or other phenomenon such as natural lakes. The site at the Nonconnah Lake does not meet these criteria. The park facilities are conceived and planned as high density recreational facilities to serve large numbers of people. In a sense, developments will be comparable to a well developed urban park. However, natural character on park lands will be preserved and reestablished by landscaping insofar as possible.

Comment: The Nonconnah Lake will interrupt major roads and interfere with future road plans. Traffic on already overloaded roads will be increased by rerouting traffic and by traffic to the proposed lake and parks.

Response: Shelby Drive, including the intersection with Reynolds Road, and Forest Hill-Irene Roads will be closed. A complete analysis of projected effects on traffic is presented in paragraph 3 of this impact statement. The lake will not prevent development of any currently proposed road development, but could result in earlier construction than currently planned to meet increased traffic needs.

Comment: Removal of land required for Nonconnah Lake from tax rolls has not been evaluated, but will result in loss of many thousands of dollars loss in tax revenues to local governments.

Response: Loss of tax revenues from lands which will be converted from private to public ownership are not included in economic feasibility studies. Actual taxes paid on lands in 1973 which will be purchased for the Nonconnah Lake was approximately $42,000. The amount of revenue would no doubt increase in future years as the lands are developed by urbanization, but would not likely exceed revenue from value of development on protected lands as a result of project development.

Comment: Nonconnah Lake would be too muddy, shallow, and would not have enough surface area for recreational uses such as swimming, water skiing, or pleasure boating.

Response: Unless and until water quality standards are met, the lake will not be satisfactory for body contact sports. The depth, area, and other characteristics will be satisfactory for other lake uses.

Comment: The expense of Nonconnah Lake is not justified to protect against a flood of only 1% probability.

Response: The lake and other flood control features will provide protection from the 1% probability flood and all lesser floods, which have a greater probability of occurrence. Computed benefits are based on reduction of average annual damages from all flood occurrences. Under existing conditions significant damages can be expected about every 20 years.

Comment: According to seismologists, Memphis is subject to major earthquakes. An earthquake and dam failure could be disastrous to residents below Nonconnah Lake.

Response: Extensive foundation studies have been made to determine the stability of the retaining structure if subjected to earthquake vibrations. The foundation of the dam would be stable with ground surface accelerations of 0.2g or higher. If the dam were to fail by earthquake action, and water stored in the permanent pool were released over a 6 hour period, resulting flows would be within the capacity of the downstream channel.

Chances of a more rapid failure or ground accelerations in excess of 0.2g concurrent with flood storage are extremely remote.

Comment: There is no need for flood control in Nonconnah Creek as evidenced by fact there was no flooding in 1973, while other areas suffered extensive flooding.

Response: Maximum rainfall in the Nonconnah Creek Basin during spring flood periods of 1973 was less than 3 inches in 24 hours, as compared to 6 to 8 inches in other areas.

Comment: The proposed Nonconnah Lake would flood a church and cemetery.

Response: The Polks Chapel Church building will not be inundated, and can be continued in use. Several graves in an adjacent cemetery will require protection from inundation or relocation.

Comment: The proposed lake would not provide open space, as it would cut roads, flood valuable land, and prevent ingress and egress to thousands of acres.

Response: Open space is defined as an area set aside for preservation and restoration of natural values where people can retreat to an atmosphere uncluttered with buildings, streets, and urban atmosphere, even though the area may be within the geographic boundaries of an urban area. The Nonconnah Lake development would provide such an area by setting aside the lake area and adjacent park land for preservation and restoration of natural values.

Comment: It is not mandatory that a recreational area have a body of water in the form of a lake to provide recreation.

Response: Concur. However, many people are attracted to areas which include lakes, and the recreation experience is often enriched by the presence of a body of water.

Comment: The sites for the proposed North and South Parks will be barren farmland, as the lake will surround the forested areas.

Response: The lake will inundate the most heavily forested areas within the development. However, there are several scattered wooded areas and individual trees in the park sites which will provide cover and shading for development. The proposed plan includes planting of new vegetation which will provide additional vegetation in future years.

Comment: The depth of the sedimentation basin has been included in representing the depth of the recreational pool, a practice which seems very questionable .

Response: Depths of the lake as described in the report recommending authorization and this impact statement reflects conditions as they will be immediately after the lake is constructed. While the volume computed as sediment pool will be reduced by siltation over a period of time, the volume of water will be available for use for most of the 100 year evaluation period. Many lakes throughout the country constructed for flood control have no separable storage for recreation, but are well recognized as valuable recreation facilities by use of sediment pool for recreation use. The proposed Nonconnah Lake will have recreational value throughout the evaluation period because of additional storage for the purpose of providing adequate area and depth even though siltation will occur. The specific location, area, or depths of the sediment pool cannot be identified in the lake, but is computed as separable storage volume to insure adequate volume for sedimentation without detracting from flood control storage volume, and to permit cost allocation of local cost sharing in construction of recreation storage.

Comment: Water quality and depth will not permit motorboating or sailboating.

Response: It is expected that motorboating will be prohibited in the lake because of limited surface area. Expected uses of the lake are paddleboating and fishing. An area of over one square mile in the lower area of the lake will be completely satisfactory for sailboating.

Comment: Utility services in the vicinity of the lake will have to be relocated.

Response: Cost of utility relocations has been included in economic analysis.

Comment: The cost to taxpayers of certain communities and Shelby County is disproportionate to benefits to be derived.

Response: It is understood that non-Federal costs will be financed from general revenues of the city of Memphis, Shelby County and the state of Tennessee, with no special assessment in any community.

Comment: The habitat of the White Dog Tooth Violet, *Erythronium albidum*, recorded as occurring in the site of the proposed Nonconnah Reservoir has been destroyed.

Response: Comment is acknowledged and environmental impact statement corrected.

Comment: The city of Collierville had contracted for acreage west of Byhalia Road near Nonconnah Creek for the construction of a sewage lagoon in order to accommodate present improvements and future expansion of Collierville south of State Highway 57. The construction of this sewage lagoon has been prevented by the proposal to build Nonconnah Lake, and the growth and expansion of Collierville to the south is prevented.

Response: Tennessee denied the proposed sewage lagoon because of certain chemical wastes from industries in Collierville which cannot be handled in a lagoon treatment facility. The proposed Nonconnah Lake was not a factor in that decision. The city of Memphis has proposed and drafted a contract with the city of Collierville to build an interseptor sewer to Collierville which would carry the waste discharges to a treatment plant in Memphis for adequate treatment. The sewer can be constructed without interference by the Nonconnah Lake.

Comment: The growth and development of communities above the lake will be limited by difficulty in constructing sewers and unattractiveness of mud flats.

Response: The lake development will not cause significant difficulty in construction of sewer systems to serve areas upstream from the lake, and may accelerate the installation of such systems by provision of sewers to serve park developments. Duration of flood storage will average only 1 to 5 days, which will not destroy vegetation and create mudflats of any significance.

Comment: Included in the immediate lake area, as well as in adjacent areas, are quite a number of new and fine homes whose values in all probability would be adversely affected by the close proximity of such a public recreation area which would generate more than normal vehicular traffic.

Response: The value of several prestigous homes in the vicinity of the lake may be lowered as stated, particularly in early project years, until the community becomes accustomed to the development. Experience has shown however that over a period of time, property values in the vicinity of lake development are increased.

Comment: Many property owners in the basin of the proposed lake would be forced to sell, under condemnation, their lands which they do not want to sell, and at condemnation prices, which would undoubtedly be less than they could realize in a competetive market.

Response: Land values for public purchase will be based on appraisals of land values at time of purchase, consistent with value of recent land sales in the geographic area.

Comment: In the original presentations to the various legislative bodies concerned, the backers of this project included maps and text matter indicating that upstream from the main lake (in the Forest Hill-Irene Road area) there would be several catch-basins, or smaller settlement lakes, thru which the water would pass and allow the sediment to settle out before entering the main lake. Information from the U. S. Soil Conservation Department and the U. S. Engineers now is that these basins were later reduced to one, and that this one basin has now been eliminated from the plans, and all waters will now flow directly into the main lake, without prior clarification thru settlement. This will tend to give a shallow, muddy lake, unsuitable for water recreation purposes. It almost appears that the original plans were a ruse to get the matter thru the legislative bodies.

Response: During investigations, several sites upstream from the recommended Nonconnah Reservoir were considered for the purpose of flood control. The structures were not economically justified on the basis of flood control, and would have little identifiable effect on water quality.

The sites would control only a limited area above the Nonconnah Lake and detention time would be insufficient for significant effects in sediment control. The recommended plan includes an intensified program of land treatment which will significantly reduce erosion and increase water quality.

Comment: The rate of siltation in the Nonconnah Lake will be two inches per year. If the so-called lake is designed to have a life span of one year, obviously the 2 inch deposit of silt (mud) on the bottom will be of no consequence. Since the depth of more than one-fourth of the area of the lake will be a mere 36 inches, then simple mathematics will prove that 18 years will have ended that portion of the lake and it will have become merely muddy swampland.

Response: Storage space reserved in the reservoir for sediment is calculated to store about 2 inches of sediment from the watershed area above the lake. This upstream erosion is typical of the projected land use on these soils and slopes. The design of 2 inches of sediment describes the watershed area and is equivalent to about 5,700 acre-feet. The storage in the reservoir is adequate to store at least 100 years of erosion from the drainage area.

Comment: The proposed 1,900 acre reservoir is the most effective and least damaging tool for controlling the run-off in the Nonconnah Creek Basin. The employment of a reservoir, apart from the fringe benefits as recreation received, would minimize the amount of channelization needed. Channelization is opposed. However, in the case of a metropolitan area where the floodplain is already developed by man, some channelization is unavoidable if vital property is to be protected. Ecologically a lake is preferrable to a ditch.

Response: Comment acknowledged.

Comment: The lake is the best alternative considering the economic and ecologic factors. The owners of the 8,000 acres are naturally opposed to parting with their land. However, they should be honest enough to give the real reason for their objections: sale of their land based on present usage and not on potential usage (developments).

Response: Comment noted.

Comment: Basically, flood protection is best accomplished by the strict regulation of development in planned floodplains - restricting it to agriculture, much needed recreation or open space, or other uses not subject to great damage from floods. (This can still be accomplished in the Loosahatchie and Wolf River floodplains.) In the Nonconnah Basin, where recent land fills have increased the potential damage to older developments and endangered areas not previously subject to flooding, other flood protection is now required. The multi-purpose plan recommended by the Corps of Engineers, including greenways, lake and parks, will give the taxpayers the most return for their money.

It provides for a balanced program of flood control, soil and wildlife conservation, recreation, and aesthetic enjoyment.

Response: Comment noted.

Comment: Greenways along the creek would assure year round use of the land by man and nature. Linear greenway parks would add a new dimension to the award-winning Memphis Park System - freedom of movement. All other parks are bounded on 4 sides by other development. The Nonconnah Greenway would open up McKellar Lake and the Mississippi Riverfront to hikers and bicyclists. It could tie into greenways along the Wolf and Loosahatchie offering miles of trails where cyclists would not be fumed at by automobile drivers or exhausts.

Response: Comment noted.

Comment: The greenway would provide a habitat for the birds, rabbits, squirrels, raccoons and other wildlife being displaced by urban development. It would make green open space with flowers, trees, and wildlife easily available.to communities along the Nonconnah Creek. Because it would parallel the expressway, it would provide a buffer against the air and noise pollution generated there as well as beautifying the view from the expressway. The greenway would be a ribbon of green through the city where her citizens can relax and enjoy God's creation.

Response: Comment noted.

Comment: While an alternate plan providing for channelization of the entire creek also provides for a greenway, it necessitates a wider channel and steeper banks requiring the destruction of most existing vegetation and making it less suitable for recreation and less aesthetically enjoyable. Under this plan the channel would be dry most of the time. It would not likely provide enough recreational benefit to call it a truly multi-purpose development.

Response: Channelization without reservoir storage to reduce duration of velocities and peak discharge rates would require channel paving, which is not economically justified, and would prevent establishment of any desirable biological community in the channel.

Comment: The site for the lake and park recommended in the plan may not be ideal, but this development would satisfy part of the great need for urban recreation created by the booming construction of apartments, townhouses, and single-family homes in the Nonconnah Basin. With skyrocketing land values in the Nonconnah Basin, what comparable recreation site can be provided for this area in the future.

Response: Comment noted.

Comment: High quality water is not necessary to make a lake attractive to people. Look at the children playing in the flooded gutters after a rain. Crowds can always be found at Audubon Lake where fishing and feeding the ducks are the only attractions other than enjoyment of the out-of-doors. Nonconnah Lake would especially benefit families lacking the time to travel great distances to Arkansas

or Mississippi, but wanting a few hours of canoeing, sailing, rowing, or fishing. Paddleboats, such as those found on the Tidal Basin in Washington, D. C., could provide hours of fun. The energy crisis makes this type of recreation particularly valuable. The dam and lake would also provide for a flow of water in the creek bed.

Response: Comment noted.

Comment: Besides water-based recreation, the park would be developed to provide opportunities for camping, picnicking, horseback riding, and nature study. The open fields in the proposed park areas could be specifically planted to provide nature trails and serve as wildlife habitat. In the plantings, some emphasis should be on preservation of wildflowers, such as thistles and pokeberry, that are disappearing because they are called weeds in the city; and trees, such as persimmon and sassafrass, that are not grown commercially or found in landscape plans. Blackberry and brier patches should be included to provide food and protection for wildlife. Schools, Scout troops, and garden clubs could benefit from participation in this development. The park would provide a much needed haven in the middle of what will soon be a highly urbanized area.

Response: Plantings in greenways and park areas will consist of many varieties and species of domestic and wild plant life.

Comment: The multi-purpose plan recommended by the Corps of Engineers provides for flood control, soil and wildlife conservation, recreation and aesthetic enjoyment. It includes the greenway, lake and park and gives Memphis a chance to do something useful, beautiful, and imaginative.

Response: Comment noted.

Comment: In the preliminary draft, on Page 12, the following statement is made, "The preceding description of the environmental setting of the Nonconnah Creek Basin includes a summary of an in-depth investigation made by the professional staff of Memphis State University. The text of this study prepared by the professional staff of Memphis State University, which includes a detailed environmental inventory is included as a part of this Environmental Impact Statement in Appendix A". Pages 184, 185, and 186 of the Preliminary Document have been omitted from the Corps Draft Statement. On page 185 a statement made by the staff of Memphis State University, and not included in the Corps statement says, "In considering the development suitable for the proposed park, the lake was recognized as the focal point of most use and activity. It will be suitable for boat and bank fishing, sail, paddle, flatbottom boating, and canoeing. The lake will not be suitable for water skiing, or the use of internal combustion engines. Neither would it be suitable for swimming. Why were these pages deleted out of context out of this Environmental Impact Draft Statement?

Response: Pages 184, 185, and 186 of the Environmental Inventory Report prepared by Memphis State University were descriptions from a report prepared for the author agencies by the Tennessee Department of Conservation, describing a proposal for the South Park, then recommended as a state park. These pages constitute a description of a part of the recommended plan of improvement, as opposed to inventory

information on existing facilities in the basin. The pages were therefore omitted as inventory information, with knowledge and consent of the Memphis State staff. For further clarification, the omitted pages are included as a part of this response.

PROPOSED NONCONNAH CREEK STATE PARK

Introduction:

In 1964 the Shelby County Conservation Board requested the U. S. Department Agriculture Soil Conservation Service to review the land and water resource problems in Shelby County. The Soil Conservation Service advised the Shelby County Conservation Board that a river basin type survey could be made under authority of Section 6 of the Watershed Protection and Flood Prevention Act. Consequently, an application for a basin wide survey was made through the Commissioner of the Tennessee Department of Conservation. In September 1966 the Soil Conservation Service informed the Shelby County Conservation Board that it was ready to proceed with the survey.

The survey was completed and a written report entitled "Chickasaw-Metropolitan Surface Water Management Survey Report" was produced in June 1971. Reservoirs, to retard flood waters, on Nonconnah Creek are recommended as part of the survey findings.

Nonconnah Creek has 5 potential impoundment sites. Two sites are partially in Mississippi and three are in Tennessee. Reservoir Site Number 3 is the only reservoir designed to have recreational benefits. It is located in the southeast portion of Shelby County approximately 2½ miles south of Germantown.

Proposed State Park Developments:

A. Location

The state would only be interested in developing a park on the south shore of the proposed lake. The south side is a large contiguous unit, is in a less developed area and does not have the environmental intrusions found on the north shore. Furthermore it is sufficiently removed from mass developments that

184

exist, and will occur, on the north side to create a state park atmosphere.

B. Land Base

The state considers that at least 650 acres and no more than 1465 acres will be needed for the type of developments needed and proposed for the park. Effective park acreage with 650 acres of state acquisition would be approximately 1159 acres. The state would propose to use the lands located between the permanent pool and the flood pool (509 acres). If the larger acreage is acquired (1465 acres) the effective park acreage would be 1974 acres.

C. Type of Developments

In considering the developments suitable for the proposed park the lake was recognized as the focal point of most use and activity. It will be suitable for boat and bank fishing, sail, paddle, flat bottom, boating, and canoeing. The lake would not be suitable for water-skiing or large internal combustion type engines. Neither would it be suitable for swimming.

In addition to the lake oriented opportunities, recreational developments will include campgrounds, picnic sites, game fields, a 30 par golf course, trails, a group camp, a swimming pool, and a skeet and trap range. Because of the proximity of the future Nonconnah Greenway horse stables will be available in the park so that people riding horses along the Greenway can terminate or start their trips at the park.

Needs and Annual Visitation

The 1969 Tennessee Statewide Comprehensive Outdoor Recreation Plan shows that recreation region 9, which includes Shelby County, has the following proportion of the state's needs for the listed recreational facilities:

1973

FACILITY	PERCENT
Fishing Ponds, lakes, Reservoir	27.7
Swimming Pools	35.5

FACILITY	PERCENT
Boat Docks	30.2
Boat Parking & Launching Area	42.5
Horseback Riding Trails	34.7
Play Fields	27.0
18 Hole Golf Course	41.1
Tennis Courts	25.7
Picnic Area	29.0
Trailer Camping Area	86.1
Tent Camping Area	41.7
Group Camp	82.5

These needs will generally increase by 1980, 1990 and 2000. It is obvious that neither local nor state governments are presently meeting the needs nor will they in the future if additional developments such as Nonconnah Park do not take place.

The state estimates that annual visitation will be 700,000 persons when the park is completed. Although additional people could be accommodated it would deteriorate the park and operation and maintenance costs would increase substantially. Ideally, a pleasant experience should be obtained by each visitor to the park. When overcrowding occurs, this is not possible.

CORPS OF ENGINEERS

U. S. ARMY

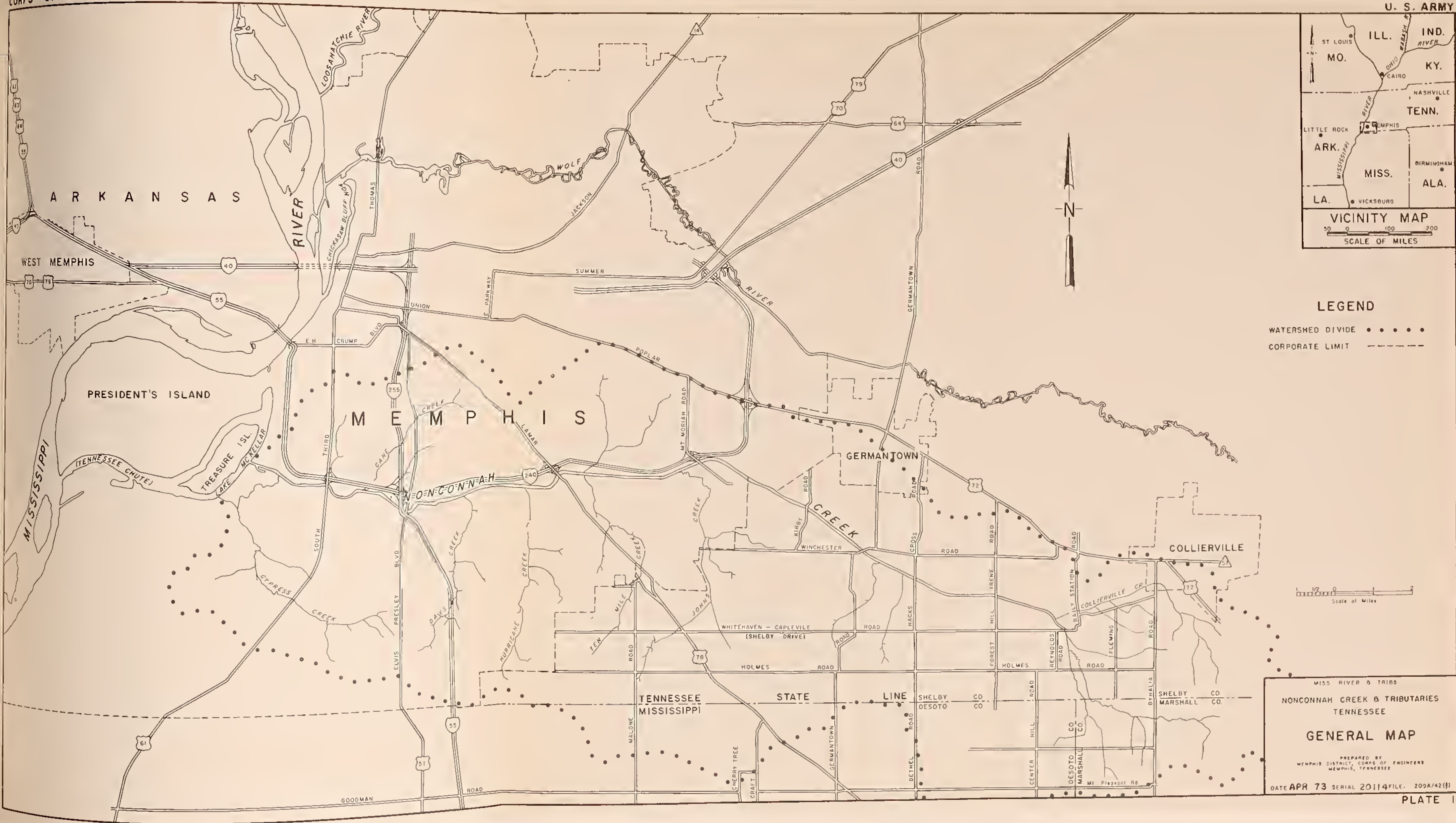


PLATE I


MISSISSIPPI
ARK.
RIVER
PRESIDENT'S ISLAND
(TENNESSEE CHUTE)
PRESIDENT'S ISL.
MC KELLAR LAKE
NONCONNAH
CREEK
M E M P H I S
GERMANTOWN
COLLIERVILLE
WOLF RIVER
Poplar Ave.
Park Ave.
Winchester Rd.
Raines Rd.
Shelby Drive
Holmes Rd.
Goodman Rd.
Mt. Pleasant Rd.
Desoto Rd.
Poplar Pike
Proposed North Park
Proposed South Park
ROBCO LAKE
CORO LAKE
NORTH HORN LAKE
HORN LAKE
TENNESSEE
MISSISSIPPI
SHELBY CO.
DESOTO CO.
SHELBY CO.
MARSHALL CO.
DESOTO CO.
MARSHALL CO.
SHELBY CO.
FAYETTE CO.
-N-
Scale of Miles
LEGEND
WATERSHED DIVIDE
CHANNEL ENLARGEMENT
GREENWAY
NONCONNAH LAKE
MAXIMUM POOL
CORPORATE LIMIT
RESERVOIR PARK AREA
NOTE:
FLOOD CONTROL STRUCTURES AT SITES 11, 15 AND 17 PROPOSED FOR CONSTRUCTION BY SOIL CONSERVATION SERVICE.
NONCONNAH RESERVOIR, PARK FACILITIES CHANNEL IMPROVEMENT, AND GREENWAY PROPOSED FOR DEVELOPMENT BY CORPS OF ENGINEERS.
MISS. RIVER & TRIBS.
NONCONNAH CREEK & TRIBUTARIES
TENNESSEE
PLAN OF IMPROVEMENT
PREPARED BY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
DATE. APR 73 SERIAL: 20114 FILE. 209A/42(2)

PLATE 2

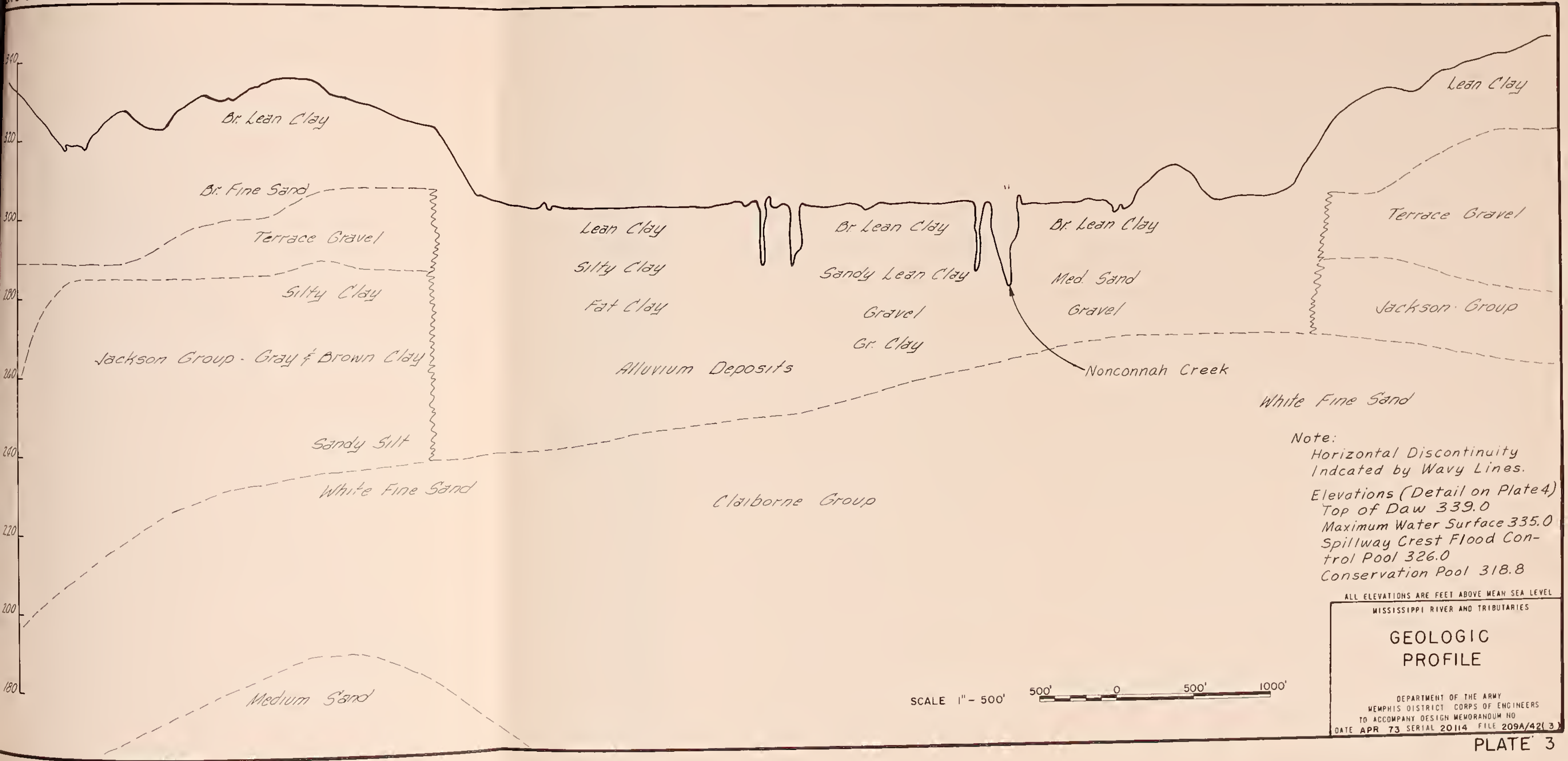
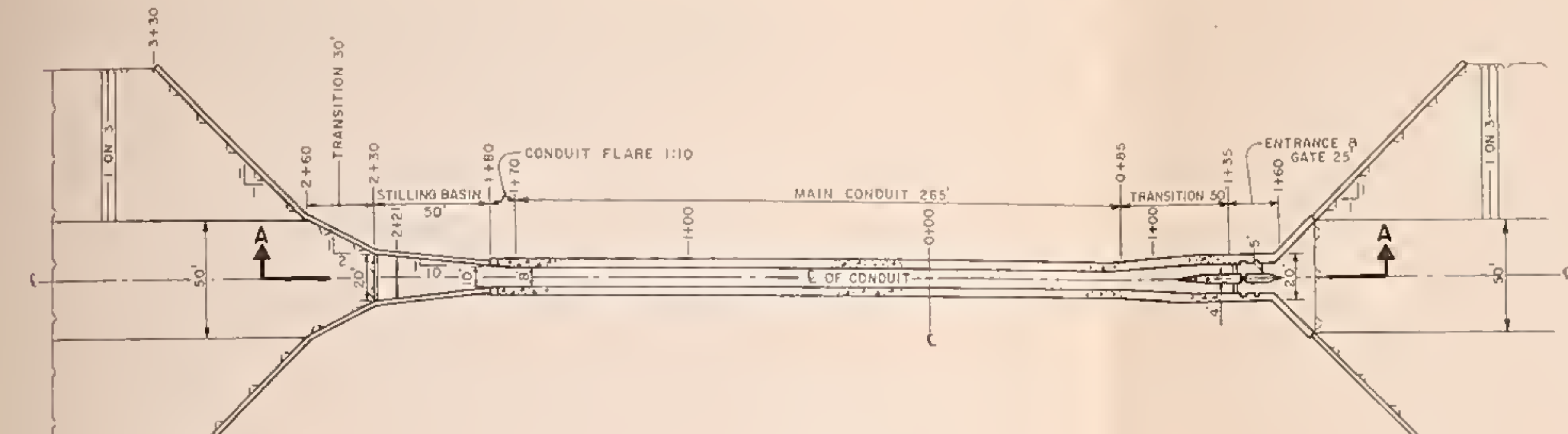
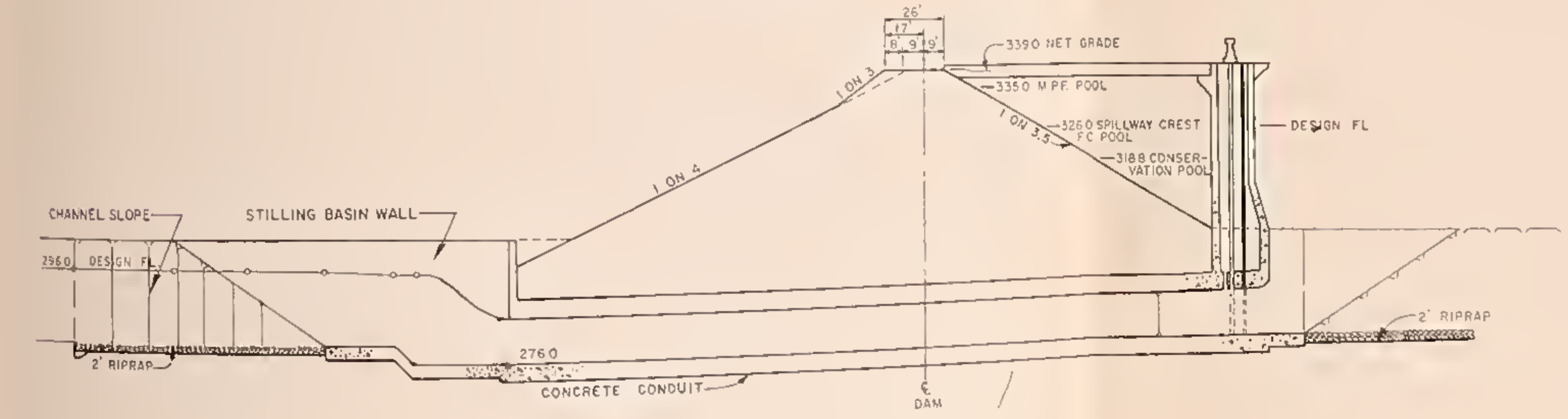

340
320
300
280
260
240
220
200
180
Br. Lean Clay
Br. Fine Sand
Terrace Gravel
Silty Clay
Jackson Group - Gray & Brown Clay
Sandy Silt
White Fine Sand
Medium Sand
Lean Clay
Silty Clay
Fat Clay
Alluvium Deposits
Br. Lean Clay
Sandy Lean Clay
Gravel
Gr. Clay
Br. Lean Clay
Med. Sand
Gravel
Noncannah Creek
Claiborne Group
Lean Clay
Terrace Gravel
Jackson Group
White Fine Sand
Note:
Horizontal Discontinuity
Indcated by Wavy Lines.
Elevations (Detail on Plate 4)
Top of Daw 339.0
Maximum Water Surface 335.0
Spillway Crest Flood Control Pool 326.0
Conservation Pool 318.8
SCALE 1" - 500'
500' 0 500' 1000'
ALL ELEVATIONS ARE FEET ABOVE MEAN SEA LEVEL
MISSISSIPPI RIVER AND TRIBUTARIES
GEOLOGIC
PROFILE
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS
TO ACCOMPANY DESIGN MEMORANDUM NO
DATE APR 73 SERIAL 20114 FILE 209A/42(3)

PLATE 3

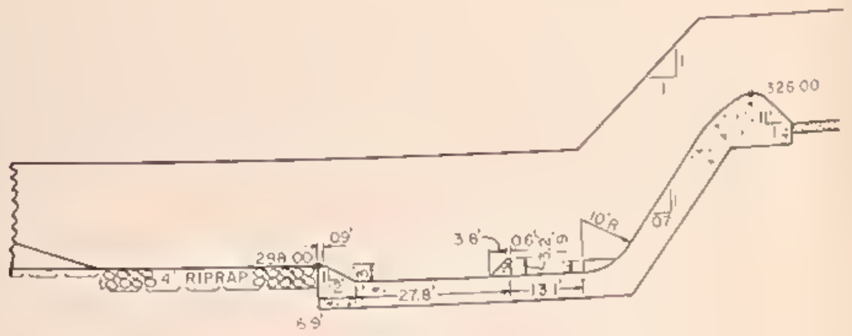


PLAN VIEW

SCALE



SECTION A-A



EMERGENCY SPILLWAY WEIR SECTION

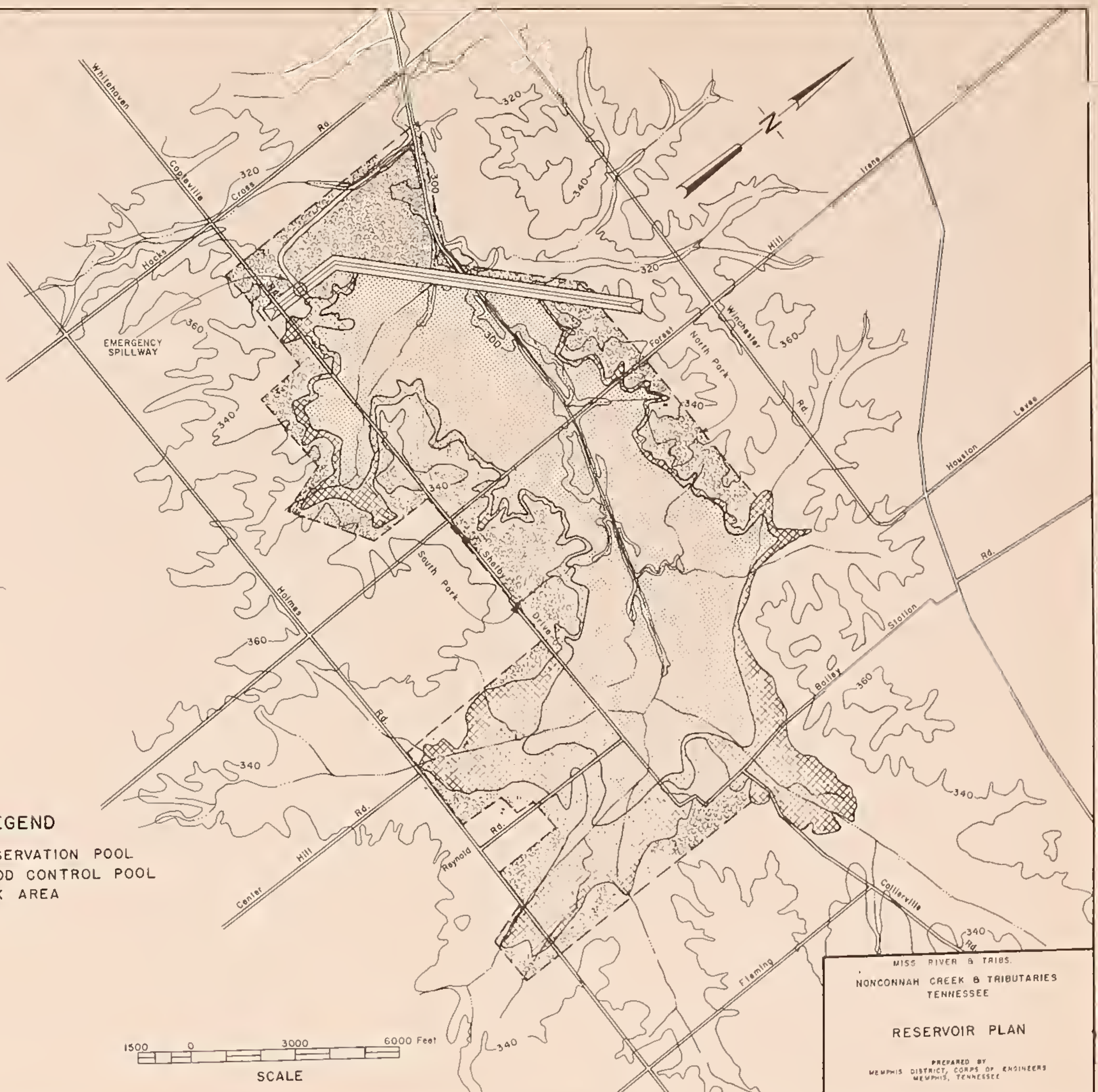
SCALE

LEGEND

CONSERVATION POOL

FLOOD CONTROL POOL

PARK AREA



MISS RIVER & TRIBS.

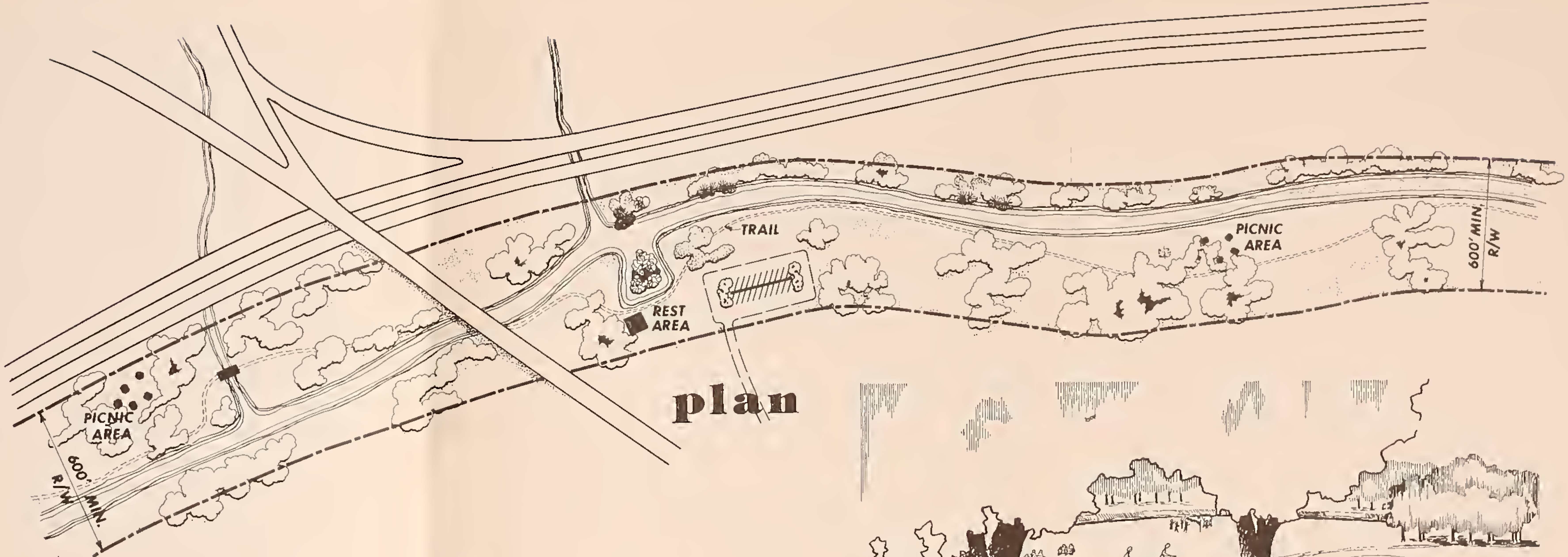
NONCONNAH CREEK & TRIBUTARIES
TENNESSEE

RESERVOIR PLAN

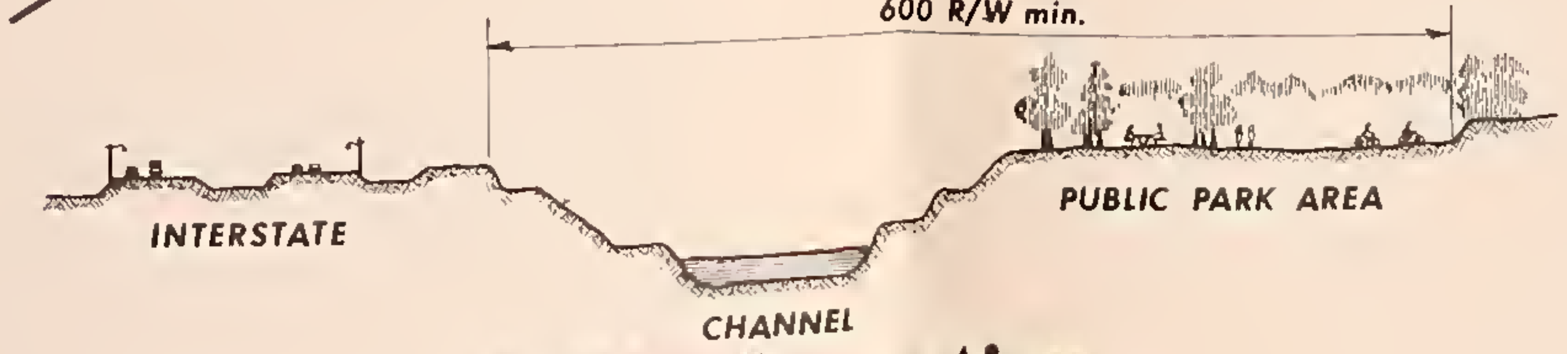
PREPARED BY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

DATE APR 73 SERIAL 2014 FILE 209A/42(3)

PLATE 4



plan



typical section

typical park area

MISS. RIVER and TRIBS.

NONCONNAH CREEK and TRIBUTARIES
TENNESSEE

PLAN AND SECTION
PREPARED BY
MEMPHIS DISTRICT, CORPS OF ENGRS.
MEMPHIS, TENN.

DATE: APR73 SERIAL: 2D114 FILE: 209A/42 (4)

LEGEND

PROPOSED GREENWAY

OUTLINE OF 100 YEAR FLOOD WITHOUT PROJECT

AERIAL PHOTOGRAPHY FLOWN 8 AUGUST 1972

CORPS OF ENGINEERS, U.S. ARMY
MEMPHIS TENNESSEE DISTRICT

PROPOSED PROJECT

NONCONNAH CREEK

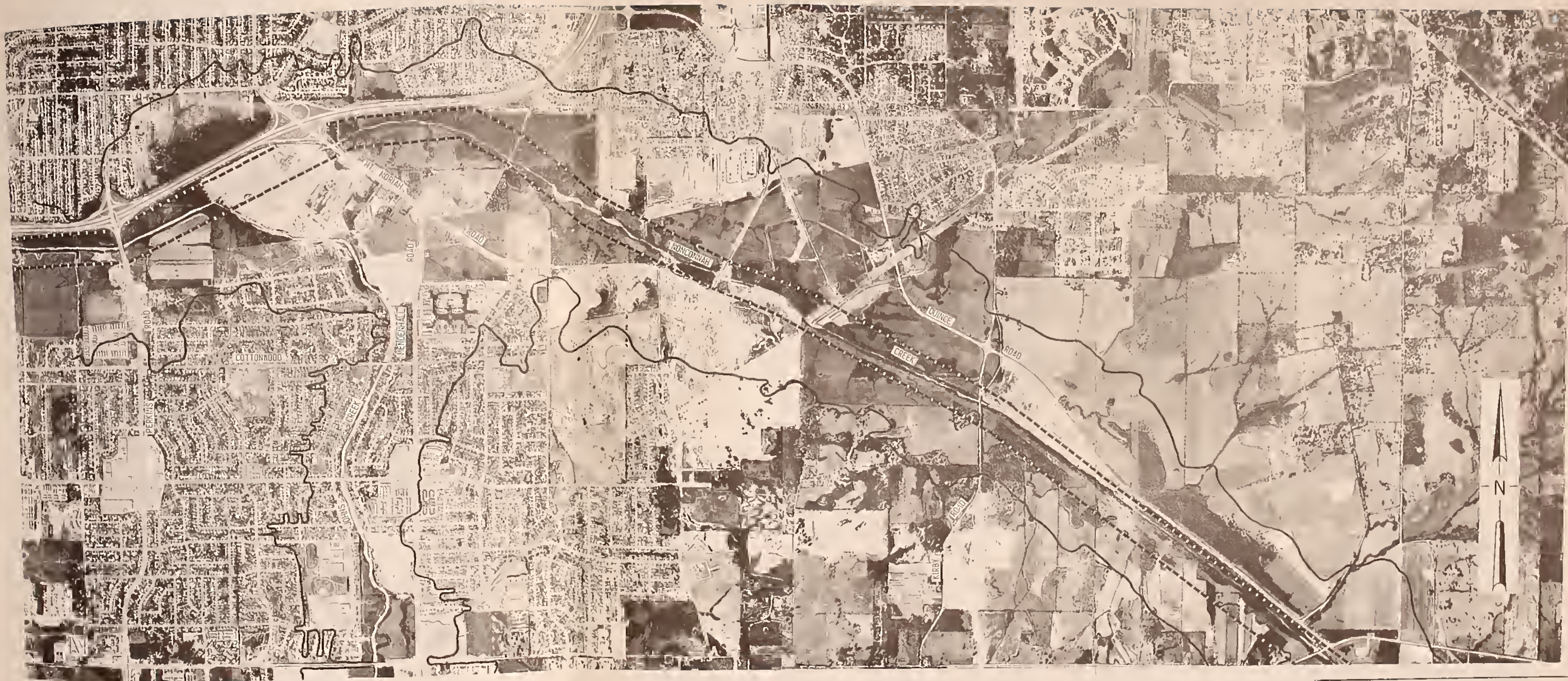
MEMPHIS, TENNESSEE

1000 0 2000

PLATE 6


NONCONNAH
CREEK
DEMOCRAT
ROAD
LAMAR AVE
GETWELL ROAD
MALLORY
AIRWAYS
N
LEGEND
PROPOSED GREENWAY
OUTLINE OF 100 YEAR FLOOD WITHOUT PROJECT
AERIAL PHOTOGRAPHY FLOWN 8 AUGUST 1972
CORPS OF ENGINEERS, U. S. ARMY
MEMPHIS TENNESSEE DISTRICT
PROPOSED PROJECT
NONCONNAH CREEK
MEMPHIS, TENNESSEE

PLATE 7



LEGEND

PROPOSED GREENWAY

OUTLINE OF 100 YEAR FLOOD WITHOUT PROJECT

AERIAL PHOTOGRAPHY FLOWN 8 AUGUST 1972

CORPS OF ENGINEERS, U.S. ARMY
MEMPHIS TENNESSEE DISTRICT

PROPOSED PROJECT

NONCONNAH CREEK

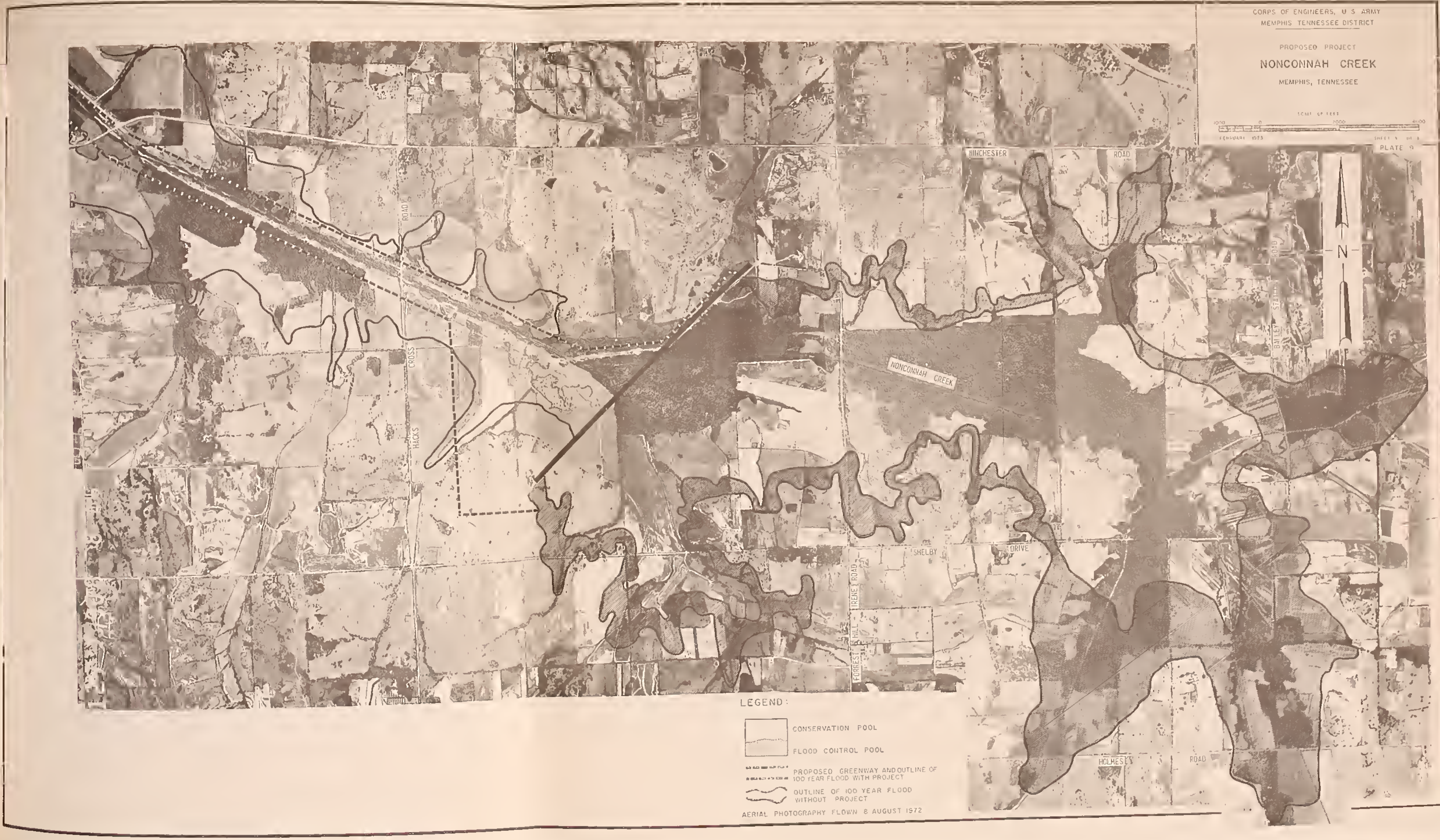
MEMPHIS, TENNESSEE

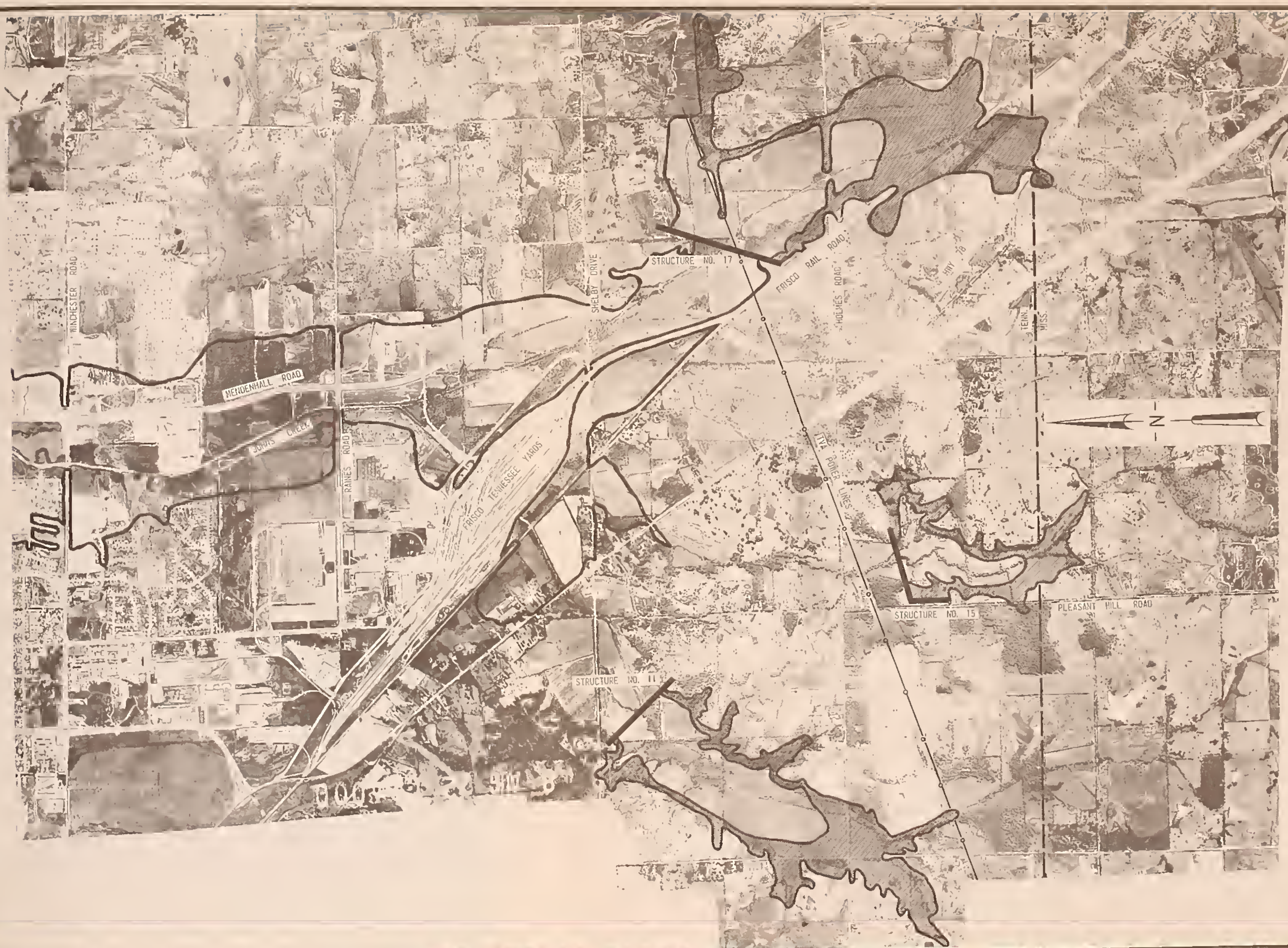
SCALE OF FEET

FEBRUARY 1973

SHEET 3 OF 4

PLATE 8


CORPS OF ENGINEERS, U S ARMY
MEMPHIS TENNESSEE DISTRICT
PROPOSED PROJECT
NONCONNAH CREEK
MEMPHIS, TENNESSEE
1000 0 2000 4000
PLATE 9
WINCHESTER
ROAD
ROAD
CROSS
HACKS
NONCONNAH CREEK
BAILEY STATION ROAD
N
SHELBY
DRIVE
FORREST HILL IRENE ROAD
HOLMES
ROAD
LEGEND:
CONSERVATION POOL
FLOOD CONTROL POOL
PROPOSED GREENWAY AND OUTLINE OF 100 YEAR FLOOD WITH PROJECT
OUTLINE OF 100 YEAR FLOOD WITHOUT PROJECT
AERIAL PHOTOGRAPHY FLOWN 8 AUGUST 1972



LEGEND:

SEDIMENT POOL

FLOOD CONTROL POOL

OUTLINE OF 100 YEAR FLOOD WITHOUT PROJECT. THE 100 YEAR FLOOD WILL BE CONTAINED IN THE CHANNEL

AERIAL PHOTOGRAPHY FLOWN 8 AUGUST 1972

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NASHVILLE, TENNESSEE

PROPOSED PROJECT

JOHNS CREEK

MEMPHIS, TENNESSEE

SCALE OF FEET
1600 0 2000 4000

FEBRUARY 1973

SHEET 1 OF 1

PLATE 10

APPENDIX A

LETTERS RECEIVED
AFTER
REVIEW OF PRELIMINARY DRAFT

NONCONNAH CREEK
ENVIRONMENTAL IMPACT STATEMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N. E.
ATLANTA, GEORGIA 30309

June 5, 1973

Colonel John V. Parish, Jr.
District Engineer
Memphis District, Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Parish:

We have reviewed the Preliminary Draft Environmental Impact Statement for Nonconnah Creek Watershed in Tennessee and Mississippi and feel that, primarily, it does not adequately discuss the effects of the project on water quality. Our specific comments in this area of concern are as follows:

1. Project Description - It is recommended that this section include a discussion of controls needed to prevent floodplain development which, unless checked, will produce runoff pollutional loads greater than those presently prevailing. Guidelines that must be followed by the construction contractors to control erosion and prevent pollution should also be stipulated.

2. Environmental Setting Without the Project - This section should include data supporting the statement on page 2 that "the pollution of Nonconnah Creek is more intense than other major streams of the Chickasaw Basin because of its low normal flow.

3. The Environmental Impact of the Proposed Action - The impacts on water quality should be addressed in terms of applicable water quality standards.

The report has a fair presentation of present water quality; however, the impoundments will cause alteration of water quality parameters other than color and turbidity. Although some water quality characteristics can be improved by impoundments, others, such as nutrients, dissolved oxygen, and temperature can be adversely affected.

The results of sampling for dissolved oxygen, BOD, and COD at the dam site are not indicated in the report. The BOD_5 values 4.2-13.2 mg/l of the grab samples taken downstream from the dam site would be considered high. Therefore, the statement that the water at the site of the proposed dam exhibits a low BOD is unfounded. Additional and more extensive sampling should have been conducted during the summer months since agricultural and urban runoff probably has a more pronounced effect on water quality during this time of year.

We further recommend a discussion of the present and future hydrology of the Nonconnah system and the effect that altering the flow regime will have on water quality. Maintaining a flow of 3 cfs would improve water quality when the natural flow would be lower than that figure; however, 3 cfs will be lower than the inflow at times, resulting in water of poorer quality. Therefore, the effect of the reservoir operation on downstream water quality needs to be fully explored. A minimum water release schedule for the months of July, August, September, and October should also be included. During periods of low flow, at least as much water as enters the three flood water control structures should be released to maintain a beneficial equilibrium of biological organisms.

Channelization will disturb bottom deposits and established benthos. An estimate should be made of the time required for the re-establishment of the benthos community. The effects of channelization on the re-aeration rate of Nonconnah Creek should be discussed.

In addition, it is recommended that additions or alterations be made to include the following:

a. The retention of the water in the reservoirs will improve fecal coli count in that portion of the stream below the dams and also in the lower portion of the reservoirs at the dams. However, urban runoff contains a high fecal coli count and it will be necessary to remove all sources of raw untreated and unchlorinated sewage from the stream before acceptable levels of fecal coli can be obtained in Lake McKellar. For instance, septic tank seepage, leaky sewers or raw sewage discharges would be heavy contributors to a high fecal coli count.

b. Turbidity will be less in the streams immediately below the dams but will increase in those reaches which have been channelized until such time as they become stabilized.

c. The provision of the green strip will improve water quality values by affording a floodplain which will absorb nutrients and filter out sediment in times of high water.

d. The soil conservation and erosion control measures will improve water quality values by holding back silt, farm fertilizers, and pesticides.

4. Any Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented - It is felt that the environmental impacts of the alternatives have not been adequately presented; therefore, it is inappropriate to state that "implementation of the selected project plan will have fewer adverse impacts in relation to its beneficial environmental aspects than any feasible alternative."

5. Alternatives to the Proposed Action - It is recommended that fuller discussion be given to the environmental impacts of the alternatives.

6. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity - Again, it is inappropriate to state that "there is no feasible alternative to this proposal which would provide an equivalent degree of flood protection while offering its wide range of long-term, beneficial environmental uses" without discussing adequately the environmental impacts of the alternatives. It also should be stated that the expected increase in urbanization will contribute to increased pollutional loads from urban runoff which will be costly to control.

7. Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action Should it be Implemented - The project, if implemented, will commit 8,000 acres to provide flood protection to 9,000 acres which will be inundated by the 100-year flood.

Finally, it is suggested that a section be included to comply with State and local air pollution standards for open burning if land waste clearing and construction waste are to be disposed of by this method.

If we can be of further assistance in any way please let us know.

Sincerely,

Sheppard N. Moore

Sheppard N. Moore
Chief, EIS Staff

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / 148 Cain St., N.E. / Atlanta, Ga. 30303

ER 73/781

September 5, 1973

Mr. Gene A. Dodson
Chief, Engineering Division
U.S. Army Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Mr. Dodson:

This is in response to your letter of June 1, 1973, to the Assistant Secretary, Program Development and Budget. We have reviewed the draft environmental impact statement for Nonconnah Creek, Shelby and Fayette Counties, Tennessee; Marshall and DeSoto Counties, Mississippi, for project effects on fish and wildlife resources, historic sites, parks, recreation, mineral resources, geology and hydrology.

Treatment of fish and wildlife aspects is adequate and generally in accord with the Bureau of Sport Fisheries and Wildlife's letter report to the Soil Conservation Service dated December 8, 1971.

We suggest the statement be expanded to quantify the recreation features of the project. This could include descriptions of park areas, pages 46 and 47 of the interim report, and the relation of the recreation potential to the 3.2 million man-days deficiency in the basin supply, i.e., the project would provide an estimated 1.7 million man-days total for the reservoir and greenway.

Commitments of the flood-pool area to the several listed purposes is not clear. From information provided in the interim report, it is concluded that the flood-pool area would be available for

recreation. Two of the uses cited, cropland and pastureland, would not be desirable open space uses in relation to use of proposed park areas.

The only significant mineral resource in the Nonconnah Creek Basin is sand and gravel which occurs in many of the low-lying areas. In the past, over 20 separate sand and gravel deposits were worked. Presently, there are only six operators in the basin reporting production, all in Shelby and Fayette Counties; however, some of the operators produce from more than one deposit. Annual production of sand and gravel is approximately 5 million tons (1970) and valued at $8 million.

The proposed stream improvements will provide impetus to the planned urbanization of Nonconnah Creek Basin. Road and street improvements will eventually cause the entire watershed to be open for development. It is expected that resulting zoning regulations will be a principle factor that will affect mineral resource availability. The restrictions imposed by these regulations will determine the ultimate impact on mineral resources. The project alone will have little direct effect on mining and mineral resources in the basin.

Detailed data on the engineering-geology aspects of the proposed project should be provided in the environmental statement. The geology of the damsite, with bore-hole data across the axis, is of particular concern.

The draft statement does not discuss two important hydrological features of the project area. One of these is the position of the proposed reservoir with respect to the eastern limit of the confining bed overlying the Memphis aquifer. If, as suspected, the confining bed is absent in all or part of the reservoir area, both the quanity and quality of local recharge to the Memphis aquifer could be affected.

The second feature that deserves mention is the fact that Nonconnah Creek is a losing stream in much of the reach between Winchester Road and U.S. Highway 78. Although the flow of the creek has not

been gaged until recent years, many accounts have been recorded since 1945 of zero flow in certain reaches of the stream during the dry season. This condition is believed to result from the lowering of water levels by pumping from the Memphis aquifer.

Thank you for the opportunity to review and comment on the draft statement.

Sincerely yours,

June Whelan

(Miss) June Whelan
Special Assistant to the Secretary
Southeast Region

OFFICE OF ECONOMIC
OPPORTUNITY

EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20506

February 12, 1973

MEMORANDUM TO HEADS OF ALL FEDERAL AGENCIES

SUBJECT: Meeting Requirements of National Environmental Policy Act of 1969 (NEPA)

The Office of Economic Opportunity is currently in the process of being dismantled. The Agency will not undertake any actions in its last months with regards to either Environmental Impact Statements or comments pursuant to the National Environmental Policy Act of 1969. It would not be appropriate nor beneficial to submit any further activities being undertaken for our comments. It would be in keeping with the meaning and spirit of the NEPA if future activities were subjected to the Office of Management and Budget Circular A-95 clearinghouse procedures and submitted to interested and affected local community groups and organizations for their review and comments.

Arthur J. Reid, Jr.
Director, Intergovernmental
Relations Division
Office of Program Review

STATE OF TENNESSEE

OFFICE OF URBAN AND FEDERAL AFFAIRS

SUITE 1312
ANDREW JACKSON STATE OFFICE BUILDING
NASHVILLE 37219

I. SASSE
CTOR

615-741-2714

June 5, 1973

Colonel John V. Parish, Jr.
Corps of Engineers
District Engineer
Memphis District
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Parish:

Since receiving your draft Environmental Impact Statement for the Nonconnah Creek Project in late April, we have been working closely with concerned State agencies and with Dr. Ed Thackston to evaluate the report and return State recommendations to you and to the Soil Conservation Service.

I regret that we have been unable to complete our review by the June 1 date that you requested. The Governor's schedule in May and June has been unusually busy, due to his work with the National Governors Conference for the Lake Tahoe meetings this week. Upon his return we expect to conclude our review in short order. I hope that we will be able to forward State comments to you by mid-June. Please let me know immediately if this delay would unduly burden you. Thank you for your patience.

Sincerely,

John L. Wellborn

John L. Wellborn
Grant Review Coordinator

JLW/bh

cc: Paul Howard

Winfield Dunn
Governor

State of Tennessee

July 6, 1973

Colonel Albert C. Lehman
District Engineer
Memphis District Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Lehman:

For over a year my staff has been closely following the progress of the study and design of the flood control project for Nonconnah Creek in Shelby County, Tennessee. During the last two months, my staff and several departments of the state government have carefully reviewed the Interim Report of this project. After carefully considering their comments and discussing this project thoroughly with my staff, I have concluded that the project as presently proposed is not in the best interests of the State of Tennessee.

The water resources problems, including flood control, of Shelby County and southwestern Tennessee are very complex, and the concept of this plan was a valid attempt to meet many of these problems simultaneously. However, we have concluded that the proposed project does not adequately fit the topography and economy of the area and should be modified.

The Interim Report discloses that the primary advantage claimed for Alternative 6, which includes the proposed Nonconnah Reservoir, over the advantages of Alternative 5, which depends upon channel enlargement to solve the flood control problems, is that of recreational development. However, many local citizens and the Tennessee State Departments of Conservation and Public Health have stated that this site is not an appropriate site for a state park because of the flat, monotonous

topography, almost total lack of vegetation, potential severe problems of mosquito control, water quality, and access.

Local support for the proposed state park has declined significantly within the past two years. The original sponsors of the bill to establish the state park have now introduced another bill to repeal the original act and deauthorize the park. For this reason and the objections to the proposed Nonconnah Park enumerated above, I have decided that the interests of the State of Tennessee and of Shelby County would best be served if the money originally intended for the Nonconnah State Park were to be used instead to improve and upgrade Meeman-Shelby Forest State Park. I intend to include this request in the proposed budget to be submitted to the next session of the Tennessee General Assembly.

If the Corps of Engineers and the Soil Conservation Service still wish to proceed with the project in the absence of a state park on the south shore, the design will have to be modified to meet state standards. The Department of Public Health advises me that the proposed method of constructing and operating the reservoir will not meet their minimum standards for mosquito control and the Corps of Engineers would not be able to receive a permit for construction of the impoundment as presently designed. They will require that no areas be covered by water less than three feet deep during the mosquito breeding season, and they consider the area covered by the spring surcharge as part of the normal lake subject to this requirement.

If the project as currently proposed by the Corps of Engineers and the Soil Conservation Service cannot be modified to overcome these deficiencies, or cannot be justified in the absence of a state park, I request that further study be given to solving the flooding problems along Nonconnah Creek by enlargement and improvement of the existing channel within a greenway, similar to that proposed as Alternative 5 in the Interim Report.

If you have any questions concerning my position on

this matter, I would be happy to meet with you personally or to send a member of my staff to talk with you at length.

Sincerely,

Winfield Dunn

Winfield Dunn

lms

DISPOSITION FORM

use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

ENCE OR OFFICE SYMBOL	SUBJECT
MED-PF	Conference with State Agencies Concerning Nonconnah State Park

EMO FOR RECORD   FROM Plan Formulation Section   DATE 23 July 1973   CMT 1
Caldwell/jwh/3347

. This is a record of a meeting held in the Andrew Jackson Office Building in ashville on 20 July 1973. Present at the meeting were: Mr. Ed Thackston; r. Jim Paine, Department of Urban and Federal Affairs; Mr. Walter Criley and two ssistants, Tennessee Conservation Department; Mr. Jim Alt, Tennessee Department of Public Health; Mr. Jim Mitchell and Mr. Dwight Treadway, Soil Conservation ervice; and Mr. M. B. Flanary, Mr. N. D. Caldwell, and Mr. Steve Wilson, Corps of Engineers.

2. The purpose of this meeting was to discuss the comments of the state concerning the proposed lake on Nonconnah Creek, and particularly the proposed state park as set forth in letter from Governor Dunn to Colonel Lehman dated 6 July 1973.

3. Representatives of the state stated that the state park plan had been prepared at the direction of the State Legislature because of a recognized need for recreation development in southwest Tennessee, and this site appeared to be the only option open to the state. However, state planning officials have always recognized that the Nonconnah Park site does not provide the natural setting normally desired for a state park. Within the past several months, certain members of the Legislature who sponsored the bill to authorize the state park have reconsidered and are now in opposition to the park development. It is expected that a bill to deauthorize the park will be considered in the next legislative session. In addition, certain lands adjacent to the existing Shelby Forest State Park have been put on the market for sale, and if purchased by the state, would provide a more favorable option to the state for state park development.

4. State officials are also concerned with probable cost of lands for the state park at the Nonconnah site. It is apparent from opposition expressed by landowners that condemnation will be required for land purchase. The state believes that because of this and the rate of current land price increases that lands could cost as much as two to three times the current estimate by the time they are actually purchased.

5. The following paragraphs outline discussions on specific points of concern mentioned in Governor Dunn's letter of 6 July 1973.

a. Topography and Vegetation. The proposed park site is not in the type of setting normally considered for a state park. The park as proposed would be a high density use facility, generally in an open area and urban atmosphere, and would be more appropriately described as a large urban park than a park with the rural character which typifies a state park. State officials recognize the need for such park developments as would serve the urban population of Memphis, and agree that a park at this site would provide needed recreation opportunity

A FORM 1 FEB 62 2496   REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE ISSUED AND USED UNTIL 1 FEB 63 UNLESS SOONER EXHAUSTED.   ☆U. S. GPO: 1972 – 473-063 P.O. 13

nd would likely be intensively used. However, the state administration does ot feel that state park funds in amount necessary to install this facility hould be used to construct parks which are primarily urban-oriented. They elieve that parks to serve localized urban areas, as they think this park ould, should be financed by local governments using only those state funds ppropriated for grants to urban areas for local park development.

b. Mosquito Control. The primary concern of the state on this point was osquito breeding potential of the area of less than 2 feet depth created by pring surcharge to maintain minimum lake depths. Mr. Alt of the Health Service greed that without the surcharge there would not likely be any net increase in osquito production at the reservoir site if it is constructed and operated to onform to state standards. He further agreed that there would be a decrease in osquito breeding in the downstream channel if a minimum flow of 3 cfs is made rom the reservoir as proposed.

It was also agreed that the minimum depth of normal pool as specified in he Health Commissioner regulation is 2 feet as opposed to 3 feet. The lake as proposed would provide the 2 feet minimum depth plus 1 foot of freeboard. A etailed analysis of rainfall records and water losses from the proposed lake made by the Corps of Engineers indicates that minimum depths of 2 feet can be maintained without imposing the objectionable surcharge condition.

c. Water Quality. The primary concern of the state with regard to water quality is related to proposed body contact sports, such as swimming, in the lake. The Health Department does not encourage swimming in any open water but does not usually enforce standards for swimming areas except those actually operated by the state or by an organized group.

Water quality standards for swimming require less than 200 fecal coli/100 ml and visibility of a specified object at a depth of 5 feet. Water sample tests from tributaries entering the lake site contain a much higher level of fecal coli than permitted by the standard for body contact sports. It is believed that a large part of that contamination comes from inadequately designed septic systems and leakages from Collierville sewers, and that water in the lake will never meet the standard for swimming. State officials agree that there are no water quality parameters which would restrict use of the lake for activities other than body contact sports. They agree that the lake would provide good fishing opportunity. There is some concern over possible turbidity and appearance of the lake from silt, but this does not constitute concern from a standpoint of public health.

d. Access. State officials agreed that the network of roads through the area of the lake would likely provide adequate access to the lake and recreation areas. The concern over access was evidently based on the supposition that all traffic would reach the area by Poplar Avenue without recognizing several other roadways coming into the area from various population centers.

6. From this discussion, it is apparent that the state administration does not desire to pursue development of the state park through the Corps of Engineers, primarily for reasons outlined in paragraphs 4 and 5a above.

7. It is expected that Colonel Lehman will meet with Governor Dunn within the next few days to further discuss these matters.

N D Caldwell

N. D. CALDWELL
Civil Engineer
Plan Formulation Section

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office. Engr

REFERENCE OR OFFICE SYMBOL	SUBJECT
MMED-PF	Meeting with Governor Dunn Concerning Nonconnah General Investigation Studies

TO Memo For Record FROM Executive Office DATE 2 August 1973 CMT 1

1. This memorandum is prepared as a record of a meeting with Governor Winfield Dunn of Tennessee on 30 July 1973. Persons attending the meeting were as follows:

Corps of Engineers:
COL A. C. Lehman
Mr. Gene Dodson
Mr. N. D. Caldwell

Soil Conservation Service:
Mr. Paul Howard
Mr. Jim Mitchell

State of Tennessee:
Governor Winfield Dunn
Mr. Jim Paine
Mr. Ed Thackston
Mr. Walter Criley
Mr. Jim Alt

Chickasaw Basin Authority:
Mr. Robert James
Mr. Thomas Todd
Mr. William Farris
Mr. Marvin White

News reporters for the Commercial Appeal and WREC-TV.

2. The purpose of this meeting was to discuss the position of the state administration as set forth in Governor Dunn's letter dated 6 July 1973.

3. Governor Dunn stated that his position as set forth in the letter of 6 July stands. However, he stated further that his position has apparently been misunderstood or misrepresented, particularly concerning flood control features of the proposed plan. Primarily because of increasing land costs, local opposition to the state park, and the fact that the state planning staff does not consider the Nonconnah site to be the best location for state park expansion in Shelby County, Governor Dunn stated that he will not pursue nor participate directly in establishing a state park on Nonconnah Lake. The state's concern with the flood control features of the Nonconnah were related to questions concerning whether the proposed lake can be justified without the state park, and can be constructed to meet state standards for mosquito control or other requirements.

LMMED-PF 2 August 1973

SUBJECT: Meeting with Governor Dunn Concerning Nonconnah General Investigation Studies

4. From a conference with state agency representatives on 20 July 1973 (reference memo dated 23 July 1973), we have determined that the proposed Nonconnah Lake can be modified to meet state standards for flood control operation. The Governor was informed that because of greater dependability, reduced cost and inconvenience of annual maintainance, and considerations of environmental quality, the Memphis District is prepared to recommend construction of the reservoir in favor of the more extensive channel enlargement alternative. The reservoir plan, without the state park, will offer opportunity for needed recreation, fish and wildlife development. The final plan to be recommended will include such recreation development as the Chickasaw Basin Authority, the city of Memphis, or Shelby County may wish to sponsor.

5. Governor Dunn stated that in his own mind he is not assured that the most favorable means of flood control in the Nonconnah Basin is the proposed impoundment. However, recognizing the urgent need for flood control, he is willing to leave the question of the most efficient means of flood control to the expertise of the Corps of Engineers and the Soil Conservation Service. He stated that these agencies should look to the Chickasaw Basin Authority for a final decision on the desirability of the proposed lake, since that agency is the legally constituted arm of state and local governments which will serve as local sponsor for any flood control or recreation development.

6. Governor Dunn indicated that although he does not wish to participate in the proposed state park he has taken no official stand on the lake for flood control or recreation development by local agencies and will not oppose the lake if adopted as the recommended plan of the Chickasaw Basin Authority.

A C Lehman
A. C. LEHMAN
Colonel, Corps of Engineers
District Engineer

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

ERENCE OR OFFICE SYMBOL	SUBJECT
LMMED-PF	Coordination with MATCOG - Nonconnah General Investigation Studies

	FROM	DATE	CMT 1
MEMORANDUM FOR RECORD	Plan Formulation Section	9 October 1973 Caldwell/jwh/3347	

In a meeting with General William M. Fondren (Ret.), director of MATCOG, and Mr. Tom Welman, project coordinator, on 8 October 1973, they stated that MATCOG had no comment on the Nonconnah Creek project recommendations other than those furnished to the Chickasaw Basin Authority by letter dated 24 August 1973.

N D Caldwell

N. D. CALDWELL
Civil Engineer
Plan Formulation Section

A FORM 1 FEB 62 2496 REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE ISSUED AND USED UNTIL 1 FEB 63 UNLESS SOONER EXHAUSTED. ☆U. S. GPO: 1972 – 473-063 P.O. 13

Mississippi-Arkansas-Tennessee
Council of Governments
ROOM 501 ■ 125 NORTH MAIN STREET ■ MEMPHIS, TENNESSEE 38103
TELEPHONE (901) 534 9775

August 24, 1972

Mr. Robert James, Chairman
Chickasaw Basin Authority
160 North Main - Room 741
Memphis, Tennessee 38103

Re: PNRS/Metropolitan Clearinghouse
Application for Funds
Nonconnah Creek Watershed Project

Dear Bob:

At its meeting on August 23, 1972, the MATCOG Executive Committee considered the above referenced project. Prior to this review and because of its regional implications, the project was referred to various agencies for their comments.

The Executive Committee, after considering the project and all comments received, strongly endorsed it. The Committee believes that it's a project of tremendous importance to the entire community and urges that its implementation be prusued vigorously.

The comments of the Shelby County Engineer and those of the Environmental Action Council of Memphis are attached. These are forwarded for your consideration in any future technical evaluation of the project.

Best wishes.

Sincerely,

Bill

William M. Fondren
Executive Director

WMF/gr
Enclosures (2)

AUG 28 1972

SHELBY COUNTY COMMISSIONERS

160 NORTH MAIN STREET
MEMPHIS, TENNESSEE 38103

LEE HYDEN
COMMISSIONER OF
BRIDGES AND PENAL FARM

GEORGE DANDO
COUNTY ENGINEER
ROOM 771

R[illegible] D
AUG [illegible] 1972
M[illegible] G
[illegible]FICE

August 1, 1972

Mr. William N. Fondren
Executive Director
Mississippi-Arkansas-Tennessee
Council of Governments
Room 501, 125 North Main
Memphis, Tennessee 38103

Re: PNRS/Metropolitan Clearinghouse
Application for Funds
Nonconnah Creek Watershed Project

Dear Mr. Fondren:

I appreciate the opportunity to comment on referenced project.

It is my opinion that the project is one of the most important and far-reaching under consideration in our community. I believe that the pluses to the community far outweigh any of the negatives and that implementation should be pursued vigorously.

Thorough consideration appears to have been given to all the affects of Reservoir No. 3. However, it appears that the other structures (11, 13, 15 and 17) will also require alteration in existing facilities and it appears to the writer that the affects of these alterations should be evaluated and considered.

If I can be of any other assistance, please advise.

Yours very truly,

George A. Dando
County Engineer

GAD:bj

cc: Commissioner Lee Hyden
Mr. Robert James
Mr. C. R. Patton

AUG 28 1972

THE UNIVERSITY OF TENNESSEE MEDICAL UNITS
COLLEGE OF PHARMACY
DEPARTMENT OF MOLECULAR AND QUANTUM BIOLOGY
MEMPHIS, TENNESSEE 38103

August 21, 1972

RECEIVED
AUG 22 1972
M... O...

Mr. William M. Fondren
Mississippi-Arkansas-Tennessee
Council of Governments
125 North Main Street
Room 501
Memphis, Tennessee 38103

Dear Mr. Fondren:

Your letter dated August 2, 1972, and the attached copy of the Environmental Statement for the Nonconnah Creek Watershed Project to Doctor Howard Vogel has been referred to me for my comments.

In general the Environmental Action Council of Memphis supports the philosophy of developing green ways along our urban streams. I personally feel that the development of a green way along Nonconnah should incude some flood control measures.

My major criticism of the project as presently outlined is that not enough acreage is being planned for public use as park land, hiking, and bicycle trails as well as wilderness areas. The project states that 1,050 acres of bottom land hardwood trees will be cut while only 734 acres are to be planted. As the flood control project will provide a considerable financial benefit to industries and individuals in the present 100 year flood plain as well as land speculators in the upper basin area, it seems that the public's benefit should be greater than the limited green way and recreational area presently planned. I feel that the major recreational lake (#3) should be surrounded completely by publicly owned land. I would also like to see smaller parks developed at the other Floodwater retarding structures. As the value of the land in these areas will increase in place, it would seem that now would be the time to plan increased recreational facilities.

Sincerely,

Larry J Powers

Larry J. Powers, Ph.D.
President, Environmental
Action Council of Memphis

LJP:slh

cc: Dr. Howard Vogel

CHICKASAW BASIN AUTHORITY

ROOM 741 • 160 NORTH MAIN STREET
SHELBY COUNTY ADMINISTRATION BUILDING
MEMPHIS, TENNESSEE 38103

September 14, 1973

Colonel A. C. Lehman, District Engineer
Corps of Engineers
Federal Building
Memphis, Tennessee

Mr. Paul Howard
Tennessee Conservationist
Federal Building
Nashville, Tennessee

Gentlemen:

The alternative plans for erosion control, flood control, recreation, and other improvements in the Nonconnah Basin as jointly developed by the Corps of Engineers and the Soil Conservation Service have been reviewed by the Chickasaw Basin Authority. The plan as recommended by the Corps and Soil Conservation Service, to include flood control storage on the Main Channel of Nonconnah Creek and the Johns Creek Tributary is considered to be the most desirable plan for flood control and has been adopted by the Chickasaw Basin Authority.

It is our intention to fully develop and utilize the recreation opportunity of the proposed Nonconnah Lake.

The Chickasaw Basin Authority is fully empowered under state law to serve as local sponsors and meet local cost requirements for Federal water resource development projects in the Nonconnah Basin. The Basin Authority will provide local contribution and other assurances as normally required for construction and operation of the recommended flood control works, and recreation developments to include the recommended recreation storage, the North Park and South Park on the Nonconnah Lake and the greenway development, depending on availability of funds and authorization of the project at the Federal level.

Colonel A. C. Lehman
Mr. Paul Howard

As you are aware, local and state governments have made more than $11, 000, 000. 00 available to the Authority for advance purchase of lands which will be needed for this project. Lands are currently being purchased for the proposed Nonconnah Reservoir and North Park. It is anticipated that the cost of lands for the flood control reservoir on the Main Channel of Nonconnah Creek will be assumed by the Corps of Engineers in accordance with established Federal policy. If the funds which have been invested in reservoir lands are returned to the Authority after the project is authorized and funded by the Congress, the funds will be available to meet local cost requirements in other projects features.

It is requested that authorization of the project be gained as soon as possible to avoid unnecessary delays in proceeding with these vitally needed flood protection measures.

Very truly yours,

Robert B. James

Robert B. James, Chairman
Chickasaw Basin Authority

Memphis and Shelby County Planning Commission

CITY HALL ▪ 125 NORTH MAIN STREET ▪ MEMPHIS, TENNESSEE 38103 ▪ TELEPHONE 534-9626

May 30, 1973

John V. Parish, Jr.
Colonel, Corps of Engineers
District Engineer
Memphis District, U. S. Army Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Re: Nonconnah Creek Basin Project

Dear Colonel Parish:

In response to your letter of April 18, 1973, the draft report and preliminary draft environmental impact statement on the Nonconnah Basin project have been reviewed by the staff of the Memphis and Shelby County Planning Commission.

The proposed Nonconnah Reservoir and related improvements are consistent with the Planning Commission's <u>Parks, Recreation and Conservation Plan</u>, and I am pleased to offer my support for these flood control and recreation facilities.

I look forward to assisting in the continued planning and development of these projects.

Sincerely,

Robert H. Miller
Director of Planning

RHM/jr

City of Memphis
Tennessee

October 17, 1973

WYETH CHANDLER
MAYOR

Colonel A. C. Lehman, District Engineer
Memphis District, Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Lehman:

Reference is made to the proposed flood control project along the Nonconnah Creek basin described as the recommended Plan 6 of the draft Interim Report of Nonconnah Creek, Tennessee-Mississippi, prepared by your office jointly with the Nashville office, Department of Agriculture and Soil Conservation.

After review with the City Engineer's office, I would like to convey to you my full support and recommendations for the proposed implementation of this major flood control, flood management project with probably recreational amenities.

The City of Memphis is cognizant of the tremendous need for such a project in view of the rapid urbanization which is currently taking place along this major drainage basin in the city.

The City of Memphis views this as an extremely welcomed opportunity for resolving a problem, the solution of which requires exorbitant funds which the City of Memphis has been unable to provide. The project would enable the City to join with its equitable share in the financing of such a project. You can be assured that the City will back this project to its full implementation.

If I can be of further assistance in the future process of securing Congressional approval, please advise.

Sincerely,

Wyeth Chandler

WC:mh

CITY HALL — 125 No. MAIN — MEMPHIS, TENNESSEE 38103 — 901 534-9611

SHELBY COUNTY QUARTERLY COURT
C. W. BAKER, CHAIRMAN
ROOM 619 • 160 NORTH MAIN STREET
SHELBY COUNTY ADMINISTRATION BUILDING
MEMPHIS, TENNESSEE 38103

October 23, 1973

Colonel A. C. Lehman, District Engineer
Memphis District Corp of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Lehman:

The Quarterly County Court of Shelby County, Tennessee has long been a supporter of the proposed flood control project along the Nonconnah Creek Basin and enclosed you will please find a certified copy of the Quarterly County Court's resolution duly adopted on October 2, 1972, which sets forth the County of Shelby's support of this project.

The recommended Plan No. 6 of the draft interim report of the Nonconnah Creek Basin as prepared by your office, jointly with the Nashville Office of the Department of Agriculture Soil Conservation Service, has been reviewed with the County Engineer and provides the most feasible approach to flood control in the Nonconnah Basin. The completion of this most important project would, in addition to protecting areas already developed along the Nonconnah Basin, make available additional lands for both public and private development.

Sincerely yours,

C W Baker

C. W. Baker, Chairman
Shelby County Quarterly Court

CWB/jke

Enclosure

Shelby County Quarterly Court

OCTOBER Term, 19 72

Memphis, Tenn. OCTOBER 2, 1972

Court met, pursuant to adjournment, Honorable C. W. Baker Chairman, present and presiding, when the following proceedings, among others, were had, to-wit:

ITEM 12
NONCONNAH BASIN PROJECT - PETITIONING CONGRESS FOR INITIAL FUNDING APPROPRIATION

Mr. Drennon, County Attorney, announced Item 12, Discussion/Resolution - Petitioning the U. S. Congress to authorize and make an initial appropriation for funding the Nonconnah Basin Project.

The following resolution was presented to the Court:

(SEE FOLLOWING PAGES FOR RESOLUTION)

#12

Squire Perkins

Stern 12
10-2-72

RESOLUTION

WHEREAS, The U. S. Corps of Engineers and the U. S. Soil Conservation Service have proposed to complete a joint report as requested by the U. S. Senate Public Works Committee on or about January 1, 1973; said project to provide flood control, surface water management, erosion and sediment control, water oriented recreation, water pollution control, Greenway development and other environmental enhancement of the Nonconnah Creek basin lying in Shelby County, Tennessee, DeSoto County Mississippi and Marshall County Mississippi, and vitally effecting the urban area of Memphis, Tennessee, and

WHEREAS, The plans for this project have been intensively and extensively researched, and

WHEREAS, The Quarterly Court of Shelby County, Tennessee and the City Council of Memphis, Tennessee have already expended approximately one and one quarter million dollars on land purchase to prevent preemption of part of the site for a reservoir and have secured parcel surveys for the site of the major reservoir and have authorized the appropriation (by bond issues, if necessary) of two and one half million dollars each, a total of five million dollars for advance land acquisition, and

WHEREAS, The General Assembly of the State of Tennessee has authorized the issuance of five million dollars in bonds to match the five million dollars provided by the County of Shelby and the City of Memphis, and

WHEREAS, The request for this project has gone forward to the Public Works Committee of the U. S. Senate for authorization under Public Law 87-639 of 1962, and

WHEREAS, The urbanizing process of the City of Memphis presents serious threats of preemption of necessary sites for flood control as well as enhancing values of land, and

WHEREAS, If authorization and initial funding is not provided this year 1972, it will be deferred for two years until 1974.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED BY THE QUARTERLY COUNTY COURT OF SHELBY COUNTY, TENNESSEE, That the Governor and Speakers of the House and Senate of the General Assembly of Tennessee and the City Council of the City of Memphis, Tennessee be urged to petition the Senate and House of Representatives of the United States to authorize and make an initial appropriation for the Nonconnah Creek basin project in Tennessee and Mississippi contingent on a feasible project being submitted to the Senate Public Works Committee.

ADOPTED October 2, 1972

Whereupon, passage of the resolution was moved by Justice Perkins, duly seconded by Justice Butler.

Chairman Pro Tempore Farris asked the Clerk to call the roll. The roll was called, with the following results: Bailey, Cooper, Turner, Perkins, Butler, Maxwell, Taliaferro, Schilling, Canale and Farris voting aye. Ayes, ten; Noes, none; Absent, one (Baker).

Chairman Pro Tempore Farris declared the MOTION CARRIED.

te of Tennessee, } ss.
BY COUNTY

, ROBERT M. GRAY, Clerk of the County Court of this County, do hereby certify that the foregoing

ur (4) pages contain a full, true and exact copy of the

solution - Petitioning the U. S. Congress to authorize and make an

itial appropriation for funding the Nonconnah Basin Project.

le same appears of record or on file in Minute Book No. 66, Pages 169 and 170

is office.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seal of said Court, at office,

le City of Memphis, this 22 day of October 19 73.

ROBERT M. GRAY,
County Court Clerk

By Patricia Russell D. C.

-MEMPHIS

United States Department of the Interior
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
17 EXECUTIVE PARK DRIVE, N. E.
ATLANTA, GEORGIA 30329

AIRMAIL

July 2, 1973

District Engineer
U.S. Army Corps of Engineers
668 Federal Office Building
Memphis, Tennessee 38103

Dear Sir:

Reference is made to our letter of June 5, 1973, concerning our review of a report and preliminary draft environmental statement on the Nonconnah Creek Basin in Tennessee. The last sentence of this letter recommended inclusion of a Bureau of Sport Fisheries and Wildlife report in Appendix G of your report. The correct date of this Bureau report is October 6, 1972, instead of December 8, 1971, as stated in our June 5 letter.

Sincerely yours,

C. Edward Carlson

Regional Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

17 EXECUTIVE PARK DRIVE, N. E.

ATLANTA, GEORGIA 30329

June 5, 1973

District Engineer
U.S. Army Corps of Engineers
668 Federal Office Building
Memphis, Tennessee 38103

Dear Sir:

Reference is made to your letter of April 18, 1973, addressed to Mr. Paul Smith, Bureau of Sport Fisheries and Wildlife, Vicksburg, Mississippi, concerning the draft report and preliminary environmental impact statement on the Nonconnah Creek Basin.

Since this is a preliminary draft environmental impact statement and was not routed through normal channels for official review and comments, our letter does not constitute official comments of the Bureau of Sport Fisheries and Wildlife. However, we have reviewed the subject report and environmental impact statement and find that adequate consideration has been given to fish and wildlife aspects of work to be accomplished by the Corps of Engineers. Our only comment is that the Bureau of Sport Fisheries and Wildlife's report of ~~December 8, 1971~~, on the Corps' plans should be included in Appendix G of the report.

October 6, 1972

Sincerely yours,

Jack E. Hemphill

Deputy Regional Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

PEACHTREE-SEVENTH BUILDING

ATLANTA, GEORGIA 30323

October 6, 1972

District Engineer
U.S. Army, Corps of Engineers
Memphis, Tennessee

Dear Sir:

Reference is made to your letter, LMMED-PF, dated April 28, 1972, requesting our comments on your proposed plans for flood control and recreation in the Nonconnah Creek Basin in Shelby County, Tennessee. These plans are a part of the Wolf and Loosahatchie Rivers and Nonconnah Creek project, Mississippi and Tennessee. Your studies for this project were authorized by the Committee on Public Works of the United States by resolution of October 28, 1970, directing the Chief of Engineers to review previous reports on the Mississippi River and Tributaries project to determine the advisability of modifying previous recommendations. Our studies have been conducted in cooperation with the Tennessee Game and Fish Commission and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and Section 102(2)(C) of the National Environmental Policy Act of 1969.

Nonconnah Creek rises about 5½ miles west of Mt. Pleasant, Mississippi, and flows westward through suburbs and the city of Memphis, Tennessee, before emptying into Lake McKeller which in turn is connected to the Mississippi River. The 117,300-acre watershed is located in the Gulf Coastal Plain physiographic province. According to land use data provided by the U.S. Soil Conservation Service, about 39,882 acres of the area are cropland, 5,865 acres are woodland, 19,941 acres are pasture and idle land, and 46,920 acres are urbanized. Approximately 9,400 acres of the areas are inundated by floods of a 100-year frequency.

The Bureau previously examined plans for a Public Law 566 project designed by the Soil Conservation Service known as the Nonconnah Creek Watershed project. Essentially, the plans proposed by the Soil Conservation Service were for construction of five floodwater-retarding structures with permanent pools ranging in size from 47 to 1,900 surface acres and totaling 2,572 acres; brushing and snagging below the top of channel banks for a distance of 19,000 linear feet; provisions for a constant release of water from the multiple-purpose structure equivalent to 0.05 cubic feet per second per square mile of drainage to maintain base flows; construction of eight timber

overfall structures in the channel; and land-treatment measures. Flood pools for the proposed reservoirs would have a total surface area of 5,592 acres. One of the proposed reservoirs, at a location designated as site 3, approximately 20 miles upstream from the mouth of Nonconnah Creek was to have a 1,900-acre conservation pool and contain storage for recreation.

DESCRIPTION OF THE PROJECT

Project features presently being considered by your staff for the Nonconnah Creek Basin include construction of a 1,900-acre multiple-purpose reservoir at approximately the same location as site 3 in the Soil Conservation Service's small watershed project. The dam will intercept runoff from about 22,800 acres. Channel dimensions will be increased downstream from John's Creek. A greenway 300 feet each side of the centerline of the channel will extend from the mouth of Nonconnah Creek to the proposed multiple-purpose reservoir. The proposed reservoir and greenway will provide flood control and recreational benefits. The extent to which the channel will be enlarged has not yet been determined, although your letter of April 28, 1972, indicated it will likely be designed to prevent overbank floods of less than 100-year frequency. Purchase of approximately 5,000 acres of right-of-way will be necessary for construction and operation of the reservoir. The State of Tennessee has authorized development of a State park adjacent to the reservoir. Two alternative operational procedures are being considered for the proposed reservoir which will be designated as plans A and B in this report.

Alternative Plans for Nonconnah Creek Multiple-Purpose Reservoir

	Elevation (m.s.l.)	Area (acres)	Volume (acre-feet)
Plan A			
Flood control pool	326.0	3,275	30,100
Conservation pool	318.8	1,900	13,100
Plan B			
Flood control pool	323.3	2,650	23,050
Conservation pool			
During period May-Aug.	318.8	1,900	13,100
During period Sept.-Apr.	314.2	1,200	6,195

FISH AND WILDLIFE RESOURCES

Much of the area has been cleared and is used for urban and agricultural purposes, although there is a potential for development to provide for recreational needs. According to an environmental inventory prepared by Memphis State University, a few

species of flora are present that are regarded as rare or endangered. The only records of Dracopis amplexicaulis and Franseria acanthacarpa in the State of Tennessee are from the proposed site for the project greenway. The white dog tooth violet (Erythronium albidum) found in the area that will be inundated by the reservoir has been found in only one other locality in Shelby County, Tennessee. Toothcup (Ammania auriculata) occurs below the damsite and is known to be present in only one other locality in western Tennessee. Rare or endangered fauna that may be present include the southern bald eagle, American peregrine falcon, red-cockaded woodpecker, and Indiana bat.

Fishing and hunting pressure in the project area is of low to moderate intensity. Streamflow sometimes approaches zero and municipal and industrial pollution often becomes severe; consequently, there is little desirable stream fish habitat. Deeper pools in the upper reaches of Nonconnah Creek, however, contain a small population of largemouth bass, bluegill, other sunfishes, catfishes, minnows, and suckers. Woodlands and agricultural areas support a few white-tailed deer, squirrels, rabbits, raccoon, opossum, bobwhite quail, and mourning dove. When flooding occurs during fall and winter, inundated areas provide resting and feeding opportunities to migrating waterfowl of the Mississippi Flyway.

We anticipate a continued decline in quantity and quality of wildlife habitat. Increased pollution from municipal and industrial sources could also occur with greater urbanization that would degrade the quality of the habitat for fish and wildlife. The need for fishing, hunting, and other outdoor recreational opportunities in the area exceeds the present capacity, and demands for such needs are certain to increase as the human population increases.

PROJECT EFFECTS AND MITIGATION PLAN

With the project, opportunities for sport fishing and wildlife oriented recreation will be improved, although habitat for some species of wildlife will be degraded. Habitat for certain unique species of vegetation could also be destroyed or significantly altered. About 1,900 acres of wildlife habitat will be inundated by the conservation pool of the proposed reservoir. Reduced flooding downstream from the reservoir will also diminish the area's attraction to migratory waterfowl. On the other hand, the reservoir will provide sport-fishing opportunities and the proposed park surrounding the reservoir and greenway will offer wildlife-oriented recreation opportunities.

The operational plan for lowering the conservation pool in the fall of the year, referred to as plan B, would be more desirable than plan A in regard to managing the reservoir fishery resource. Lowering the pool in the fall of the year would aid in controlling aquatic vegetation and concentrate fish in a smaller area where the predator and prey relationship would tend to adjust the size and species composition to a more desirable balance for sport fishing.

Mitigation for hunting loss is not considered. Planned water-level manipulations could benefit waterfowl use in the area. After an early August drawdown, Japanese millet could be sown on exposed mudflats, reflooding just prior to or during waterfowl season. This area could serve as a refuge or limited shooting area.

Fishing would be greatly enhanced if an intermittent strip of flooded timber were retained in the lake between about elevations 308 and 312 feet, mean sea level. Such a strip of tree trunks would also help retard shoreline erosion. We do not believe this strip of flooded timber would contribute to a mosquito problem. A sustained streamflow of at least 0.05 c.f.s. per square mile of drainage would help preserve downstream aquatic life.

Care should be taken to prevent the loss of habitat for rare, endangered, and unique species throughout planning, construction, and development of the area. In this regard, the necessary lands for all project features should be acquired at an early date, or easements should be obtained to prevent unnecessary clearing. Selection of a narrow channel design in preference to a wide channel would also reduce damaging effects on flora and fauna of the area. Spoil should not be deposited inside the proposed greenway. Consideration should be given to placing spoil along the cleared, outside edges of the greenway to help shield it from highways and municipal and industrial developments. However, the scenic beauty of the greenway will be enhanced by leaving as many trees as possible, particularly mast-producing trees.

RECOMMENDATIONS

In consideration of fish and wildlife, we recommend that:

1. An intermittent strip of timber be retained in the reservoir between about elevations 308 to 312 feet mean sea level;

2. A minimum reservoir discharge of about 2 c.f.s. be provided;

3. Care be taken to prevent loss of habitat for rare, endangered, and unique flora and fauna of the area;

4. Woodlands of the greenway and reservoir area be preserved;

5. A narrow channel design be selected in preference to a wide channel design; and

6. Spoil be deposited along the outside edges of the greenway to shield the area from views and disturbances of highways and other developments.

7. Water-level fluctuation be planned to benefit waterfowl.

This report has been reviewed and concurred in by the Tennessee Game and Fish Commission. A draft of this report was furnished the Tennessee Department of Conservation for review. In response, we were provided a copy of Chief Naturalist John Page's September 5, 1972, memorandum commenting on the project. Copies of Director Goodrich's and Director Boswell's letters and enclosure are attached.

We appreciate this opportunity to comment on your proposed plans for the Nonconnah Creek Basin project.

Sincerely yours,

Jack E. Hemphill

Acting Regional Director

Attachments

Tennessee Game and Fish Commission
Ellington Agricultural Center • P. O. Box 40747 • Nashville, Tennessee 37220
DAVID M. GOODRICH, DIRECTOR
HAROLD E. WARVEL, ASS'T DIR.

September 7, 1972

Mr. John D. Green
Acting Regional Supervisor
Division of River Basin Studies
U. S. Fish and Wildlife Service
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Green:

We have reviewed and concur with your comments of August 7, 1972 concerning the Nonconnah Creek Watershed.

Very truly yours,

TENNESSEE GAME AND FISH COMMISSION

David M Goodrich

David M. Goodrich
Director

DMG/jk

cc: Mr. Hudson Nichols
Mr. Reid Tatum

IELD DUNN
NOR
IAM L. JENKINS
SSIONER
S. FOREMAN
ANT COMMISSIONER
R. TUCK
ANT COMMISSIONER

TENNESSEE DEPARTMENT OF **Conservation**

DIVISION OF STATE PARKS

2611 WEST END AVENUE • NASHVILLE, TENNESSEE 37203

W. T. BOSWELL, *Director*

September 7, 1972

Mr. John D. Green
Acting Regional Supervisor
Division of River Basin Studies
Fish and Wildlife Service
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Green:

Your report of Nonconnah Creek Basin, Tennessee, has been reviewed by myself and staff.

This division concurs in the recreational benefits of this project, and with the exceptions outlined by our Chief Naturalist in his enclosed memorandum, we concur with your preliminary draft.

Thank you for the information and for the opportunity to comment.

Cordially,

W.T. Boswell, Director
Division of State Parks

WTB:dw
Enc.

·TIELD DUNN
·RNOR
·LLIAM L. JENKINS
·MISSIONER
·NS. FOREMAN
·STANT COMMISSIONER
·N R LUCK
·STANT COMMISSIONER

TENNESSEE DEPARTMENT OF **Conservation**

DIVISION OF STATE PARKS

2611 WEST END AVENUE • NASHVILLE, TENNESSEE 37203

W. T. BOSWELL, *Director*

MEMORANDUM

TO: W. T. Boswell

FROM: John Page

RE: Proposed Nonconnah Creek Basin (Naturalist Views)

DATE: September 5, 1972

Our staff's primary concern is that of a continual degradation man places on HIS environment without realization of the consequences. Conclusive and inconclusive engineering analysis must go beyond commonly recognized major objectives to consider all significant factors involved or disturbed. Especially in this case when a noticeably large engineering project is undertaken, an adequate concept of the relations between obvious purposes and the less obvious socialogical and ecological factors of our environment must be realized.

A steadily increasing part of the American population is coming to realize that the natural environment is one of our most precious possessions, and as such should not be unnecessarily destroyed, mutilated or wasted.

Seemingly, the entire purpose of this 1900 acre reservoir is to provide (1) flood control and (2) recreational benefits. I am not against flood control; this is a vital and necessary function in our technological and engineering competent society. However, the gain realized does not outweigh the possibility of a severe detrimental effect on the ecology of the area. The flooding that has occurred in this area is on a 100 year frequency.

Creeks and rivers are known to overflow their banks during certain times of the year. Man has yet to control nature by damming every tributary in the country.

This area is not in a metropolitan area; Memphis will not become submerged if this creek is not dammed. The proposed site mainly consists of the following:

> 39,882 acres of cropland, 5,865 acres of woodland, 19,941 of pasture and idle land, (total: 65,688). 46,920 acres are urbanized. Only 9,400 acres of the area is inundated by floods of a 100 year frequency.

In reference to recreational facilities provided with the addition of the reservoir, only migratory waterfowl hunting will be benefited. Even this facet has its drawbacks; reduced flooding downstream from the reservoir will diminish the area's attraction to migratory waterfowl. Not one single asset to recreation could develop that is not already available in the surrounding Memphis area.

According to an environmental inventory prepared by Memphis State University, a few species of flora are present that are regarded as rare or endangered. The only records of Dracopis amplexicaulis and Franseria acanthacarpa in the State of Tennessee are from the proposed site for the greenway. The white dog tooth violet (Erythronium albidum) found in the area that will be inundated by the reservoir has been found in only one other locality in Shelby County, Tennessee. Toothcup (Ammania auriculata) occurs below the dam site and is known to be present in only one other locality in western Tennessee. Rare or endangered fauna that may be present include the Southern bald eagle, American peregrine falcon, red-cockaded woodpecker, and Indiana bat. Deep pools in the upper reaches of Nonconnah Creek contain a samll population of largemouth bass, bluegill, other sunfishes, catfishes, minnows, and suckers. Woodlands and agricultural areas support white-tailed deer, squirrels, rabbits, racoon, opossum, bobwhite quail, and mourning dove. When flooding occurs in the fall and winter, inundated areas provide resting and feeding opportunities to migrating waterfowl of the Mississippi Flyway.

With the project, opportunities for sport fishing and wildlife oriented recreation may be improved, although other areas are available, but habitats for some species of wildlife will be impaired. Habitat for certain unique species of vegetation could also be destroyed or significantly altered. About 1900 acres of wildlife habitat will be inundated by the conservation pool of the proposed reservoir. Reduced flooding downstream from the reservoir will also diminish the area's attraction to migratory waterfowl.

The views I have expressed are from a conservationist-naturalist point of view and are not necessarily cognizant of the entire Parks Division. This report was prepared from material received from the District Engineer, Memphis, Tennessee relayed to this office through the U. S. Department of Interior, Fish and Wildlife Service, Atlanta, Georgia. Aerial photographs were also utilized to further understand the entire spectrum of the proposed area in that I have not personally inspected the site.

I have not dwelled on other factors that should be considered when acquiring land and implementing damming procedures. How do local farmers and residents feel about this proposal? Have thorough investigations been initiated to inquire into the feasibility of this Mississippi bottomlands' capability of holding water? These and many other items should be studied extensively before further action is taken.

JP:ss

United States Department of the Interior
BUREAU OF OUTDOOR RECREATION
SOUTHEAST REGIONAL OFFICE
810 New Walton Building
Atlanta, Georgia 30303

IN REPLY REFER TO:
D6427

JUN 1 1973

Colonel John V. Parish, Jr.
District Engineer
U.S. Army Engineer District,
Memphis
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Parish:

We have reviewed the interim report, Nonconnah Creek, Tennessee and Mississippi and related preliminary draft environmental statement provided by your letter of April 18, 1973.

Interim Report

We view the recommended plan as the most appropriate of the alternate plans discussed in the report. Cooperation by the Chickasaw Basin Authority and the Tennessee Department of Conservation in operating park areas at the reservoir should assure extensive and diverse recreation opportunity for residents of the Memphis area for both day and overnight use. We find the combined acreage of the State park and local park adequate.

Although the perimeter of the flood pool is buffered by parklands for the greater part of its perimeter, we propose that additional acquisition be considered in the northeast quadrant. A minimum strip 300 feet in width would connect north shore parklands with those on the south. Such additional lands are schematically shown in red on the attached copy of plate 3 from the interim report. While the acreage involved in this additional area is small, its functional importance for public recreation as a buffering strip is evident. Moreover, inclusion of this additional area could allow establishment of a trail or connecting trails around the perimeter of the reservoir. From plate 9 and C-2 in the report, it appears

that existing land use in this area is nonintensive although subject to urbanization and more intensive development. Public acquisition of this additional area could be a desirable and prudent investment.

Preliminary Draft Environmental Statement

1. Project Description

   The description of the proposed project is adequate.

2. Environmental Setting Without the Project

   We have no comments on this portion of the statement.

3. The Environmental Impact of the Proposed Action

   An expansion and quantification of the recreation features and benefits of the project would be desirable in this section. It could include descriptions of park areas, pages 46 and 47 of the interim report, and the relation of the recreation potential to the 3.2 million man-days deficiency in the basin supply; i.e., the project would provide an estimated 1.7 million man-days total for the reservoir and greenway.

4. Any Adverse Environmental Effects Which Cannot Be Avoided Should the Proposal Be Implemented

   We have no additions to suggest for this section.

5. Alternatives to the Proposed Action

   Alternates are adequately presented and described.

6. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

   The basic relationship is expressed.

7. Any Irreversible and Irretrievable Commitments of Resources Which Would Be Involved in the Proposed Action Should It Be Implemented

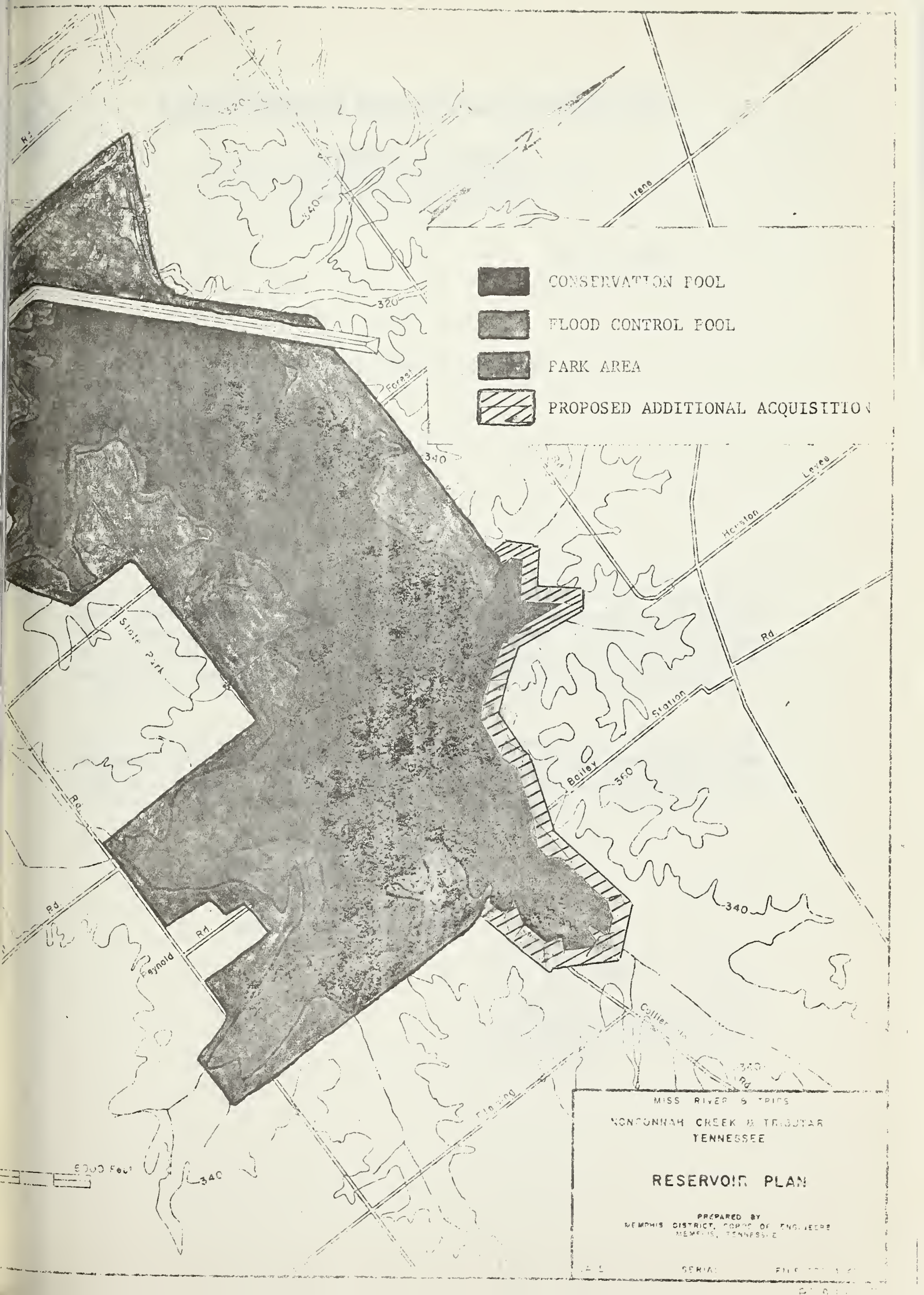
   Commitments of the flood-pool area to the several listed purposes is not clear. From information provided in the interim report, it is concluded that the flood-pool area

would be available for recreation. Two of the uses cited, cropland and pastureland, would not be desirable open space uses in relation to use of proposed park areas.

Sincerely yours,

Robert M. Baker
Regional Director

Attachment


CONSERVATION POOL
FLOOD CONTROL POOL
PARK AREA
PROPOSED ADDITIONAL ACQUISITION
Irene
Forest
Houston
Levee
Rd.
Station
Bailey
State Park
Reynold
Rd.
Collier
320
340
360
5000 Feet
MISS RIVER & TRIBS
TENNESSEE
RESERVOIR PLAN
PREPARED BY

United States Department of the Interior

GEOLOGICAL SURVEY
1459 Peachtree St., N. W., Suite 200
Atlanta, Georgia 30309

May 24, 1973

Colonel John V. Parish, Jr., District Engineer
Corps of Engineers
Department of the Army
Memphis District
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Ref: LMMED - PF

Dear Colonel Parish:

We recently received copies of the draft report and the preliminary draft environmental impact statement on the Nonconnah Creek Basin. Our comments and the comments from our District office in Tennessee, who also received a copy, will be incorporated in the Department of Interior's response to your request for technical assistance and review.

By the way, I would like to take this opportunity to advise you that Regional Office in St. Louis was closed during September 1972. The personnel formerly in that office, known as the Mid-Continent Region, are now in the new Regional Office. Our address in Atlanta is:

U.S. Geological Survey
Southeastern Region, WRD
Suite 200
1459 Peachtree St., N.E.
Atlanta, Georgia 30309

Very Truly Yours,

A N Turcan Jr

A. N. Turcan, Jr.

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHEAST REGIONAL OFFICE
3401 WHIPPLE AVENUE
ATLANTA, GEORGIA 30344

REPLY REFER TO:

L7619-SER-PSP

John V. Parish, Jr.
Colonel, Corps of Engineers
Memphis District, Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Parish:

We thank you for the copy of environmental impact statement on Noconnah Creek Basin, received in this office on May 18, 1973.

We have been directed that the comments of this office should be included with those of the Department of the Interior, which are being coordinated by Mr. Bruce Blanchard, Director, Environmental Project Review, Department of the Interior, Washington, D.C., to whom we are forwarding the draft environmental statement by copy of this letter.

In order to save you time and effort in the future, distribution for official review of draft and final environmental statements by Department of the Interior Agencies, nine copies should be sent to Mr. Blanchard only, and not to the individual Bureaus and central and field offices of the Department.

Sincerely yours,

Willis P. K.

Willis P. Kriz

3822 Allen Road
Memphis, Tenn. 38128
May 31, 1973

Mr. Paul Howard
Tenn. State conservationist, Soil Conservation Service
561 U.S. Court House
Nashville, Tn. 37203

Dear Sir:

This is The Volunteer Group's reply to the environmental impact statement on the Nonconnah Creek flood control project:

The Volunteer Group of the Sierra Club believes that the best solution to flood control for the Nonconnah Creek and other streams in the Chickasaw basin is effective flood plain zoning. Only activities that are compatible with a wetland environment, such as agriculture, recreation, and timber production, should be allowed in the flood plain. In areas along Nonconnah Creek where substantial construction has already taken place flooding should be controlled by a minimum amount of channel improvement with proper care being taken to protect the greenbelt and restore the stream to as nearly its natural state as possible (e.g. excavation on one bank only with landscaping following is one approach).

The Volunteer Group opposes the construction of Nonconnah Lake as a flood control project. The reasons being: 1) with effective flood plain zoning it would be unnecessary, and 2) the site of the lake includes one of the last large tracts of wooded land in the area. We recommend that funds that were to be spent for a state park adjacent to the lake be used to purchase the wooded tract and surrounding land and that this land be set aside as a Natural Area.

The Sierra Club believes that preservation of our unique wetland environments should take priority over commercial interest.

Very truly yours,

George R. Lightsey

George R. Lightsey, Chairman
Volunteer Group, Sierra Club

SEE
TER

THE WILDLIFE SOCIETY

June 15, 1973

District Engineer
U.S. Corps of Engineers
668 Clifford Davis Federal Office Building
Memphis, Tn. 38103

Dear Sir:

Please accept the following statement as the review of Nonconnah Creek Project by the Wildlife Society, as requested from Dr. Fred Evenden, Executive Director, Washington, D. C. Dr. Evenden had asked the Tennessee Chapter to review the draft environmental statement on behalf of the Society.

"After reviewing the draft environmental statement re: Nonconnah Creek Project the Tennessee Chapter of The Wildlife Society believes project benefits outweigh the rather minimal adverse costs to fish and wildlife. The project area is in a highly urban setting and suffers from a variety of pollutants which have reduced severely the attractiveness and habitability of this area to fish and wildlife. While some endangered bird species are listed as possible users of this portion of Nonconnah Creek we feel these listings portray accidental sightings at best. Certainly these species can't be depending on Nonconnah Creek in its present state for survival.

In summary, the Tennessee Chapter of The Wildlife Society is of the opinion that fish and wildlife resources will not be further damaged by the proposed Nonconnah Creek channelization and snagging project."

We appreciate this opportunity to review the project's draft environmental statement.

Sincerely,

James H. Burbank

James H. Burbank,
President
1811 Ridgecrest Dr.
Knoxville, Tn. 37918

cc: Dr. Fred G. Evenden
Executive Director
The Wildlife Society
Washington, D.C.

SOUTHWESTERN AT MEMPHIS
A College of Liberal Arts and Sciences
FOUNDED IN 1848
MEMPHIS, TENNESSEE 38112

RTMENT OF BIOLOGY

May 23, 1973

Col. John V. Parish
Memphis District, Corps of Engineers
668 Clifford Davis Federal Building
Memphis, Tennessee 38103

Dear Colonel Parish:

Enclosed are some comments on the Preliminary Statement on Nonconnah Creek Project. After careful studies relating to the project, I am afraid I am unwilling to see the project completed as it is now planned. More information must be gained from research on the real success of channelization and removal of so much vegetation, on such a wide scale before results are conclusive. this is brought out in the enclosed report.

Unfortunately for Memphis and Shelby County, there are no real and meaningful land use studies and regulations to enforce land use designations. Until land use is a regulated thing, there will be building in the flood plains as long as our officials will allow it. It would be very valuable if you engineers would insist upon limiting use of flood plains to less potential destruction facilities. I was glad to note a statement in the draft statement to the effect that the city does not seem inclined to regulate such building in the flood plain. Perhaps the message might get across some day.

Please put this information in the proper files for some consideration when the final draft statement is drawn up.

Sincerely,

Arlo I. Smith

Arlo I. Smith,
Professor of Biology

encl: Comments on
Nonconnah Project.

Comments On Preliminary Draft Environmental Statement, Nonconnah Creek

April 1973 USA Eng. Dist. Mfs.

I. Wildlife Considerations

In a flowing stream, planktonic forms are not the main source of food for higher organisms. Bacteria and plankton may be indicative of pollution along the stream, but food matter comes from organic materials and organisms living upon these. These materials support the invertebrates, amphibians (30 species) and mammals in a complex food web or ecosystem. The fact that there are 52 species of mammals supported in the basin area, along with those lesser organisms and supporting vegetation, indicates a complete and successful ecosystem existing now.

We would not call 4 to 16 million (and more) coliform and fecal bacteria per 100 ml (about 3/4 cup) of water "relatively free of noticeable amounts of pollution from Mt. Moriah Road upstream to its headwaters" (p.7,8). This is what is shown for stations 17 to 25 on pages 32 to 35. This tremendous pollution with coliform bacteria (indicating a great possibility of the presence of serious pathogens) is over the entire length of Nonconnah Creek, according to the analyses. This is definitely a health hazard at present. With the new interceptor sewer, the condition will be drastically improved but is not likely to be completely solved until all conveniences are sewer connected. This will not likely be accomplished very soon. Reservoirs used for swimming and boating will be health hazards. Will these reservoirs be chemically treated? How will this enhance wildlife.

Flooding of river-bottom land yearly renews by inundation, fish, frogs, and salamanders, along with many invertebrate forms which are disseminated periodically. Mammals are renewable since much of their food is abundant there, as the surveys show.

Multipurpose impoundments have caused a substantial reduction in the total amount of bottom-land hardwood type wetlands subject to overflow, due to reservoir clearing and downstream flows. The Collierville lake is unfortunately situated in one of the more wooded areas. Such reduction of wetlands will be detrimental to habitat for many wildlife species other than waterfowl; turkey and deer for instance. The Hatchie Wildlife Refuge is a prime example of proper utilization of such area. The management of this refuge should be asked to comment on this proposal.

We cannot let whole ecosystems die. The inland wet lands as an ecological unit are in peril. This proposal is for only a portion of the 3-Rivers Project, the Chicksaw Basin Project. This Nonconnah Creek Project must be considered in conjunction with the whole basin and compounded effects noted.

On page eight, "stocked with desirable species" (of trees) — by whose interpretation are these species desirable? There is a difference in needs of man and wildlife. This statement needs clarification.

II. Conservation Measures Considered

Natural storage of water in the basin flood-plain is nature's way of preserving the water table. Perhaps this is more efficient than man-made reservoirs in low lying flatlands. Channelization may be causing more serious flooding downstream, rather than alleviating it. Serious studies must be made all along the lower Mississippi River System relative to amounts of precipitation and flood stages, in comparison with pre-channelization years. Since enough time has not yet elapsed for adequate proof that channelization is definitely a superior method of controlling floods, 1973 should be proof enough that adequate statistics may now be available. Natural vegetation along creek and river banks might just be superior to channelizatin for flood control.

Natural vegetation in swampy areas has been found to be a good filtering system for holding back certain slowly biodegradable chemical pollutants, allowing more time for degrading them. References for the above are available for studies in Pennsylvania, Massachusetts, Georgia and other states. (H.P. Nicholson 1962, 1967, 1969; S.A. Cain 1969; Water Spectrum I (1) 10-14 U.S. Army Corps of Engineers, Washington, D.C.; and Commonwealth of Massachusetts 1967, Senate Document No. 1273, Boston).

It has been pointed out (H. Tomas, 1951, "Conservation of Groundwater". McGraw-Hill, and other references) that ditching lowers the water table. Periodic flooding of river basins and flood plains bring about the recharge of ground water. Ditching or channelization might just present off-setting factors to lower the water table.

Silting in behind dams and along ditches (your estimates show as musch as 150,000 tons per year" at the dam") can require constant dredging -- for this 20-25 mile stretch. Is this periodic, 50 to 100 year expense considered in the 1.8 to 1 benefit-cost analysis? Whose responsibility is this and who pays the dredging costs? There will be extensive erosion in the project area and past facts indicate soil conservation in the area has been less than satisfactory. Page 11 indicates "32% farms practicing conservation treatment measures with district and other agency assistance"-- does not offer much hope that much beyond this can be accomplished. Even with most extensive erosion preventive plantings, severe spring and summer rains can be devastating to the plants before they become established over 35,000 acres.

III. Land Use Considerations

On page eleven appears this statement, " major Mid-South center for manufacturing--". Memphis was formely the "hardwood capitol of the world". Due to loss of Oak-Hickory woodlands for sub-urban expansion and removal of river flood plain

woodlands, Memphis is rapidly losing that status. Southern Swamp Red Oak can grow 1 1/2 to 2 inches diameter per year in our flood plains if properly cared for. Drainage and clearing are removing many thousands of acres of this natural resource per year. These hardwoods are relatively unique to the South central U.S. and are not being replaced as rapidly as they are destroyed. It might be very timely for consideration of reserving some Chickasaw Basin lands for publicly owned tree farms. These could be to specifically produce Oak, Tulip, Sweetgum and Cypress for commercical purposes. These could be planted in proper habitats, not intended for wildlife preservation, although they could help, but simply to replace a rapidly diminishing worthwhile product. This is done in some european countries and we believe it will have to be done here; the Chickasaw Basin would be a good place to start.

Purpose (5), the "use of the flood plain for open space, and the development of industrial, commercial and residential areas". This purpose, in 1973 has cost millions of dollars in destruction in the Mississippi River basin during March and April alone. This flood plain should be used for open space, possible tree, truck, and dairy farms etc., not for industrial commercial and especially residential areas. Where are the land use studies relative to flood control? We cannot afford to subsidize building in the flood plain and pay our taxes for compensating those flooded out "victims" of their own stupidity. Are these costs figured in the 1.8:1 analyses? We must not wait longer for really meaningful land-use regulations.

Purpose (3), "development of outdoor recreation facilities to meet recreational needs of the area" should be very closely scrutinized for duplication of services already in abundance. As before mentioned reservoirs for swimming, boating and water skiing can be a health hazard because of coliform bacteria. It is also dubious that the waters, shallow and warm, can produce much useful fishing. Survival of fish in low oxygen content during hot summers would be dubious.

We believe that much better use can be made of the land than for homes around some several dozens of reservoir impoundments in the Chickasaw Basin. If our population continues to soar, we must confine our populations to more multi-story dwellings as in many european countries, saving the open spaces for badly needed diminishing resources -- like meat, truck, vegetables, fruits, hardwood timber, etc.

On page 11 -- "a considerable acreage of land immediately outside the urbanized areas is being held for speculative purposes". It is hoped that much wiser use can be made of this land than to continue "sprawling - suburbia". Must we tax-payers continue to support such immediate developments which must have immediate utility services? It seems much wiser use of the land can be found and wise land-use laws put into effect.

Considering the over-all studies, and excellent and impressive array of statistical information, it is our opinion that channelization and construction of reservoirs is not a realistic 1.8:1 Benefits: Cost. Instead, attempts should be made to make wiser use of the land and use proper vegetation and small area water diversions to control the Nonconnah Creek and the other tributaries of the Chickasaw Basin Project. It is believed that in the long haul, more can be accomplished for flood control, erosion, and land production of man's more sorely needed products and services.

Arlo I. Smith
3724 Oakley Avenue
Memphis, Tennessee 38112

APPENDIX B

NONCONNAH CREEK BASIN

ENVIRONMENTAL INVENTORY

PROJECT: Nonconnah Creek & Tributaries Tennessee

SUBJECT: Location and correct spelling of misspelled works - Appendix B, Subappendices A, B, G, L

LOCATION	CORRECT SPELLING
P. 1, Para 1, Line 10	aquatic
P. 6, Col. 2, Line 15	Buttonbush
P. 7, Col. 1, Line 8	Boehmeria
P. 7, Col, 1, Line 9	Ammannia
P. 7, Col. 1, Line 14	erythrorhizos
P. 7, Col. 1, Line 22	floribunda
P. 9, Col. 1, Line 6	Acer
P. 9, Col. 1, Line 17	illinoensis
P. 9, Col. 1, Line 23	Allbizia
P. 10, Col. 1, Line 35	cephalophora
P. 11, Col. 1, Line 22	annuu
P. 11, Col. 1, Line 33	carolinianum
P. 13, Col. 1, Line 11	multiflorum
P. 13, Col. 1, Line 24	paspalum
P. 13, Col. 1, Line 31	annua
P. 49, Col. 2, Line 12	Bluegill
P. 58, Para 1, Line 7	anatum
P. 58, Para 1, Line 8	Woodpecker
P. 58, Para 1, Line 10	summer

NONCONNAH BASIN
ENVIRONMENTAL INVENTORY

prepared for

UNITED STATES ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT

by

HERFF COLLEGE OF ENGINEERING
INSTITUTE FOR ENGINEERING RESEARCH
MEMPHIS STATE UNIVERSITY

Contract Number

DACW66-72-C-0116

submitted on

OCTOBER 12, 1972

NONCONNAH BASIN

ENVIRONMENTAL INVENTORY

A detailed inventory of the social, biological, archeological, and related elements of the Nonconnah Creek Basin was untertaken by the task force at Memphis State University. Attached Appendicies are the results of this Report. This has been broken down by sections, and a topical table of contents is provided.

The inventory can be basically summarized in the following major areas:

a. Hydrologic Elements

All bodies of water existing at the present time within the basin have been identified and evaluated as to present usage and recreational value. This identification consisted of actual field inventory, discussions with landowners, and detailed literature search.

There were no water or wetlands having significant scientific or aesthetic value found within the basin. The underlying sand strata is the principal aquifer for Memphis drinking water and accordingly has a very high value. Consequently only this sand strata warrants preserving in its natural state. The water and wetlands at the present time play an insignificant role in relation to waterfowl, wading birds, etc. from a regional and natural standpoint due primarily to the lack of year around water supply.

The pollutional status of the stream has been defined as well as existing kinds, sources, and extent of water pollution. Federal, state and local authorities were contacted during this phase of the study. Water samples were taken at five points along the upper Nonconnah to evaluate settle ability of the pollutants and natural purification tendencies. Aquatic fauna and plants existant in the study area have been listed as well as several species in the rare or endangered category.

The assessment of the relative value of water-oriented resources in the study area was easy since there are none available.

b. Land and Related Elements

All public-owned land within the study area has been compiled. The City of Memphis has been designated as a bird sanctuary but other than that, no other lands have been dedicated to ecologically oriented purposes. Recreational use on the existing land is limited by the lack of water, poor quality of what water exists, suitable areas being unavailable, and present land use restrictions. No lands were found which have significant scientific or aesthetic value. Those lands which lie in the proposed greenway areas should be preserved in their natural state.

Non-point source pollution from pesticide run-off and erosion was estimated from information supplied by local, state, and federal agencies. Existant terrestrial flora and fauna have been tabulated and some species on the rare and endangered lists have been identified.

The relative value of land-related resources in this study area lies primarily in the greenway along the channel and is probably of less value than similar areas in the Wolf and Loosahatchie River basins. The land itself is available for housing and developments which is a different land use than at the present time, but probably of no greater value than similar land in the other two basins.

c. Social Elements

The different types of community services have been tabulated and are presented in Section III. None of these services is limited by the basin hydraulics since most of the services have evolved around the basin. Identification of population distribution patterns and health and safety problems has also been made and are presented in Section III.

The present recreational usage is less than that for the other two basins due to the relative sizes of the basins and land available for this purpose. Detailed description is provided of the proposed park development.

The archeological sites are shown on a separately attached map as requested. No sites listed with the National Register of Historical Places were found. Many reported sites in the lower basin have been destroyed by urban developments. There are no archeological or historical sites which warrant preservation in their natural state. All the sites in this basin are of extremely lesser value than other known sites in the Wolf and Loosahatchie Basins.

It must be noted that the impoundment must conform to the Tennessee Impounded Water Act.

TOPICAL TABLE OF CONTENTS

SECTION I

NONCONNAH CREEK BASIN:

A BIOLOGICAL INVENTORY

Ecology:

Nonconnah Creek has an intermittant flow with the upper reaches of the stream being dry much of the time. The creek and the adjacent basin lies almost totally in the Memphis - North Mississippi urban or urban development area. Small farms and pastureland occupy the basin at the upper reaches of the creek. The intermittant flow, pollution in the urban area, and heavy siltation from urban and industrial development together with farm practices provide restrictions on the variety of acquatic plants and animals.

The creek flows through highly erodable lands. The lower reaches meander through gray to brown alluvial deposits of sand, silt, clay and gravel with a thickness of 20 feet or less upstream to more than 100 feet thick at its junction with McKellar Lake. The upper reaches of the basin are composed of loess deposits of gray to brown clay and sandy silt thinning eastward toward the headwaters.

Average yearly rainfall in the basin is about 50 inches. October is the driest month with about 3 inches, and January is the wettest with about 6 inches. Thunderstorms during spring and summer are often of high intensity resulting in heavy run-off and high flash-type elevation of the creek and its tributaries.

Mean annual temperature is about 62° F. January is the coldest month averaging about 41° F. July is the hottest month with an average temperature of 81°.

Nonconnah Creek drains the extreme southern half of Shelby County, Tennessee and northern portions of DeSoto and Marshall Counties in Mississippi.

Topography is gently rolling, interrupted by small ridges and drainage divides. Swampy conditions along the creek are common. The Nonconnah Creek Basin lies entirely in the West Tennessee Plains, a portion of the Mississippi Embayment of the Gulf Coastal Plain.

Forests:

Less than 20% of the Nonconnah Creek Basin is forested. Most of this is restricted to bottom-land species along the creek flow and in the swampy areas. Typically, the forest cover is about equally divided between Elm - Ash - Cottonwood stands on the better drained immature soils and gum-cypress stands in swampy areas. Bottom-land oak-hickory is the typical climax forest on mature soil of areas such as the Nonconnah Creek Basin. However, this succession is restricted to small patches and remnants due to urban development and to conversion of lands to agriculture. (Appendix B, lists the known terrestial Macrophytes of Basin).

Aquatic flora:

Aquatic macrophytes are well represented in the Nonconnah Creek Basin. Species of duckweed (*Lemna*, *Wolffia*) and water fern (*Azolla*) are frequent among the free floating plants. Milfoil is represented by *Myriophyllum corolinensis*, among the submerged higher plants. Grasses, rushes and sedges are typical in those areas bordering the streams and adjacent acquatic or wet areas. Cattail (*Typha latifolia*) is common in these habitats. In summary, higher plant acquatic vegetation is adequate, particularly in the upstream areas, to maintain a balanced ecosystem other factors being equal. (Appendix A lists the aquatic macrophytes).

Among the species comprising the plankton of the stream, masses of filamentous algae (Oscillatoria, anabaena , oedogonium, spirogyra, etc.) are rare. This can be attributed to the characteristics of the stream itself such as turbidity, intermittent flow and pollutants. However, there is a large planktonic population of protozoa and unicellular algae.

In general the producers (green plants) in the creek are somewhat restricted which in turn limits the consumers (vertebrate and invertebrate animals). (Appendix C shows the plankton data).

Decomposers (bacteria and fungi) are abundant, particularly in the lower reaches of the stream. This is typical of a stream which is contaminated by industrial and domestic wastes or with farm and urban runoff water. Extremely high bacterial counts, often exceeding 100,000,000, together with elevated total coliform, fecal coliform and fecal streptococcal counts indicates the prevalence of contamination. (Appendix D shows the microbiological data).

Terrestrial Vertebrate Fauna:

Because of the limited forest cover and urbanization of most of the basin, larger mammals such as deer and fox are uncommon. Rabbits, squirrels, and raccoon are frequent in the outlying reaches of the basin. The opossum is common. Small mammals such as field mice are frequent. However, all these forms are restricted by urbanization. Scavengers such as the opossum, mice and rats are frequently found in the urban areas under unsanitary conditions which abound in the lower portion of the creek. (Appendix E lists the mammals).

The reptilian fauna is typical for the region. The species of snakes, lizards and turtles are representative of most low land habitats. The frequency of reptiles is restricted because of urbanization. (Appendix F lists the reptiles).

The birds of the basin are typical for the region. The intermittent flow of the stream, lack of permanent pools, lack of cover, scarcity of aquatic food and urbanization restricts or eliminates most of the aquatic and water dependent birds. Therefore, while ducks and geese are reported for the basin as winter residents, rarely are they found in the stream itself. They may be found in ponds in the basin. (Appendix G lists the birds and their frequency).

Aquatic Vertebrate Fauna:

Fish, amphibians, and some turtles comprise the acquatic vertebrate fauna of Nonconnah Creek and its tributaries. The fish population is very restricted, being made up of about a dozen species. Carp is common in the lower reaches of the creek. The green sunfish is frequent upstream. The bluegill sunfish, while not reported, undoubtably occurs also. The most frequently found fish include: top minnows, gambusia, and red fin shiners along with sunfish and carp. (Appendix H lists the fish).

Frogs and salamanders are relatively common in the upper reaches of the basin, mostly adjacent to the more permanent ponds and swampy areas. The lower reaches of the creek itself have not been suitable for tadpole and other larvae production because of lack of oxygen and pollution. (Appendix I lists the frogs and salamanders).

Terrestial Invertebrate Fauna:

The terrestial invertebrate fauna of the basin is about typical of an urbanized region. Insects predominate as they do the world over. Flies and mosquitos are abundant. Hymenopterans, beetles, lepidopterans, and true bugs are quite common. Among the non-insects, spiders, centipedes, millipedes, slugs, and sowbugs are abundant.

Aquatic Invertebrate Fauna:

The abundance and variety of the aquatic invertebrate fauna of any body of water reflects stream conditions and provides a yardstick for measuring the ecological balance of a stream. This is particularly true of the larval and nymph stages of insects. Dragonflies and damselflies along with mosquito larvae are importamt members of the aquatic food web. Mosquito larvae are abundant in the basin in those areas where water stands such as creek-bed potholes, farm ponds, and swamps. In addition, where trash such as cans, bottles, and automobile tires are prominant mosquito larvae are abundant. Therefore, adult mosquitos are abundant throughout the basin. Dragonflies and damselflies are abundant to moderately abundant in the upper reaches of the stream but they are rarely seen along the lower portions. In the creek itself, even the upper reaches and tributaries, the immature dragonflies and damselflies are seldom found. This indicates that the adults, while abundant along the stream, may have matured in adjacent ponds and marshy areas.

Crayfish are relatively abundant in the stream but the variety is limited to about four common forms.

Fresh water clams are restricted to the upper portion of the stream and are rare or absent in the metropolitan lower portion of the creek. The number of species is quite restricted. Only the small forms (Sphaerium and Musculium) are found.

Generally, the aquatic dependent invertebrates are relatively scarce and provide limited or no value in the food web in the lower reaches of the creek. While restricted in variety there is some contribution to the ecosystem upstream. However, the overall nature of the life support system of the stream is quite restrictive at this time and will continue to degrade with encroachment by industry and urbanization (Appendix J provides a partial list with the abundance of the terrestrial and aquatic dependent invertebrate fauna of the basin).

APPENDIX A

A list of the aquatic Macrophytes of Nonconnah Creek Basin.

AQUATIC MACROPHYTES
(including those semi-aquatic species which are often found rooted in shallow, standing water)

Trees (in order of decreasing abundance)

Salix nigra	Black Willow
Acer negundo	Box Elder
Betula nigra	River Birch
Carpinus carolinianus	Ironwood
Plantanus occidentalis	Sycamore
Fraxinus pensylvanica var subintegerrima	Green Ash
Populus deltoides	Cottonwood
Quercus palustris	Pin Oak
Crataegus crusgalli	Cockspur Hawthorn
Salix interior	Sandbar Willow
Gleditsia triacanthos	Honey Locust
Crataegus viridis	Hawthorn
Taxodium distichum	Bald Cypress
Planera aquatica	Water Elm

Shrubs (in order of decreasing abundance)

Cephalanthus occidentalis	Bottonbush
Arundinaria gigantea	Giant Cane
Ludwigia alternifolia	Rattlebox
Amorpha fruticosa	False Indigo
Ilex decidua	Deciduous Holly

Herbs (in order of decreasing abundance)

Senecio glabellus	Butterweed
Polygonum lapathifolium	Smartweed
Ranunculus pusillus	Water Crowfoot
Cardamine bulbosa	Bulbed Bitter Cress

Herbs (continued)

Juncus effusus var. solutus	Rush
Saururus cernuus	Lizard Tail
Typha latifolia	Narrow-leaved Cattail
Polygonum punctatum	Smartweed
Echinochloa crusgalli	Barnyard Grass
Eleocharis obtusa	Spike Rush
Mimulus alatus	Monkey Flower
Bochmeria cylindrica	False Nettle
Ammania coccinea	Toothcup
Rorippa sessiliflora	Marsh Cress
Sagittaria latifolia	Arrowhead
Lemna valdiviana	Duckweed
Carex cherokeensis	Sedge
Cyperus erithrorhizos	Sedge
Elephantopus carolinianus	Elephant's Foot
Equisetum hyemale	Horsetail
Spirodela polyrhiza	Duckweed
Sabatia angularis	Marsh Pink
Onoclea sensibilis	Sensitive Fern
Leersia oryzoides	Cut Grass
Cyperus pseudovegetus	Sedge
Samolus florabunda	Water Pimpernel
Scirpus cyperinus	Sedge
Penthorum sedoides	Ditch Stonecrop
Lemna minima	Duckweed
Lippia lanceolata	Frog Fruit
Eclipta alba	
Gratiola neglecta	Hedge Hyssop
Ceratophyllum demersum	Coontail
Ludwigia palustris	
Myriophyllum brasiliense	Parrot Feather
Hydrolea uniflora	
Tripsacum dactyloides	Gama Grass
Scutellaria laterifolia	Scullcap
Spermacoce glabra	Buttonweed
Polygonum hydropiperoides	Smartweed
Azolla caroliniana	Water Fern
Equisetum arvense	Horsetail
Carex grayii	Sedge
Cicuta maculata	Water Hemlock
Callitriche heterophylla	Water Starwort
Gratiola virginiana	Hedge Hyssop
Cardamine pensylvanica	Bittercress
Rorippa islandica var fernaldiana	Yellow Cress

Herbs (continued)

Ammannia auriculata Toothcup
(this species very rare in this area, the only other record of it is in West Tennessee at Piersall Lake in Meeman-Shelby Forest State Park)

APPENDIX B

A list of the known terrestrial macrophytes of Nonconnah Creek Basin

TERRESTRIAL SPECIES

Trees (in order of decreasing abundance)

Salix nigra	Black Willow
Acer negundo	Box Elder
Ulmus rubra	Slippery Elm
Liquidambar styraciflua	Sweet Gum
Platanus occidentalis	Sycamore
Acar saccharinum	Silver Maple
Betula nigra	River Birch
Carpinus caroliniana	Ironwood
Celtis laevigata	Sugarberry
Gleditsia triacanthos	Honey Locust
Ulmus alata	Winged Elm
Quercus palustris	Pin Oak
Quercus nigra	Water Oak
Populus deltoides	Cottonwood
Nyssa sylvatica	Black Gum
Cornus racemosa	Roughleaf Dogwood
Carya illinoinensis	Pecan
Crataegus crus-galli	Cockspur Hawthorn
Diospyros virginiana	Persimmon
Quercus michauxii	Basket Oak
Aralia spinosa	Hercules Club
Aesculus pavia	Red Buckeye
Albizia julibrissin	Mimosa
Cercis canadensis	Redbud
Juniperus virginiana	Red Cedar
Fagus grandifolia	Beech
Quercus alba	White Oak
Robinia pseudoacacia	Black Locust
Crataegus viridis	Hawthorn
Sassafras albidum	Sassafras
Salix interior	Sandbar Willow
Acer rubrum	Red Maple
Morus rubra	Red Mulberry
Liriodendron tulipifera	Tulip Poplar
Ulmus americana	American Elm
Quercus phellos	Willow Oak
Cornus drummondii	Drummond's Dogwood
Planera aquatica	Water Elm

<u>Shrubs and Woody Vines</u> (in order of decreasing abundance)

Ligustrum vulgare	Privet Hedge
Sambucus canagensis	Elderberry
Arundinaria gigantea	Cane
Cephalanthus occidentalis	Buttonbush
Lindera benzoin	Spicebush
Rosa multiflora	Climbing Rose
Ludwigia alternifolia	Rattlebox
Rhus glabra	Smooth Sumac
Berchemia scandens	Rattan Vine
Hydrangea arborescens	Hydrangea
Hypericum hypericoides	St. Andrew's Cross
Prunus angustifolius	Chickasaw Plum
Ilex decidua	Deciduous Holly
Clematis virginiana	Virgin's Bower
Amorpha fruticosa	False Indigo
Hypericum walteri	
Cocculus carolinus	Coralbeads

<u>Herbs</u> (These species are so numerous as to make it impossible to arrange them along an order of decreasing abundance line. They have been grouped under the headings as follows.)

Common:

Acalypha virginica	Three Seeded Mercury
Allium canadense	Wild Onion
Allium vineale	Wild Leek
Alopecurus carolinianus	Foxtail Grass
Ambrosia artemisiifolia	Ragweed
Ambrosia bidentata	Ragweed
Ambrosia trifida	Giant Ragweed
Andropogon virginicus	Broom Sedge
Arabidopsis thaliana	Mouse-ear Cress
Arabis laevigata	Sicklepod
Aster lateriflorus	Aster
Aster pilosus	Aster
Aster sagittifolius	Aster
Bidens polylepis	Tickseed
Brassica napus	Field Mustard
Bromus catharticus	Rescue Grass
Campsis radicans	Trumpet Creeper
Cardamine hirsuta	Bitter Cress
Carex cephalophoro	Sedge
Carex cherokeensis	Sedge
Carex rosea	Sedge

Cassia fasciculata	Partridge Pea
Cerastium glomeratum	Mouse-ear Chickweed
Chaerophyllum tainturieri	Chervil
Cirsium discolor	Thistle
Claytonia virginica	Spring Beauty
Conyza canadensis	Horseweed
Croton capitatus	
Croton glandulosus	
Cynodon dactylon	Bermuda Grass
Cyperus esculentus	Sedge
Cyperus strigosus	Sedge
Dactylis glomerata	Orchard Grass
Digitaria sanguinalis	Crab Grass
Draba verna	Whitlow Grass
Duchesnea indica	Indian Strawberry
Echinochlo crus-galli	Barnyard Grass
Elephantopus carolinianus	Elephant's Foot
Eleusine indica	Yard Grass
Elymus virginicus	Wild Rye
Equisetum hyemale	Horsetail
Erianthus alopecuroides	Plume Grass
Erigeron annus	Daisy Fleabane
Erigeron philadelphicus	Daisy Fleabane
Erigeron strigosus	Daisy Feeabane
Eupatorium rugosum	White Snakeroot
Eupatorium serotinum	White Snakeroot
Euphorbia chamaesyce	Spurge
Euphorbia maculata	Spurge
Festuca arundinacea	Fescue Grass
Euphorbia supina	Spurge
Festuca elatior	Fescue Grass
Galium aparine	Bedstraw
Geranium carolianum	Wild Geranium
Geum canadense	Avens
Helenium amarum	Sneezeweed
Helianthus hirsutus	Sunflower
Hemarocallis fulva	Day Lily
Heterotheca latifolia	Golden Aster
Hordeum pusillum	Wild Barley
Houstonia minima	Bluet
Houstonia pusilla	Bluet
Hypericum punctatum	St. Johnswort
Impatiens capensis	Touch-me-not
Ipomoea hederacea	Morning glory
Ipomoea lacunosa	Morning-glory
Cyperus odoratus	Sedge

Campanula americana	Bellwort
Capsella bursa-pastoris	Shepherd's Purse
Carex retroflexa	Sedge
Carex vulpinoidea	Sedge
Chenopodium album	Lamb's Quarters
Commelina communis	Day flower
Cyperus iria	Sedge
Cyperus pseudovegetus	Sedge
Dioscorea villosa	Wild Yam
Draba brachycarpa	Whitlow Grass
Eragrostis spectabilis	Love Grass
Eupatorium coelestinum	Mist Flower
Galium circaezans	Goosegrass
Galium obtusum	Goosegrass
Hypericum mutilum	St. John's Wort
Leersia oryzoides	Cut Grass
Leersia lenticularis	Catchfly Grass
Leersia virginica	White Grass
Lobelia cardinalis	Cardinal Flower
Lobelia siphilitica	Lobelia
Melothria pendula	Creeping Cucumber
Myosotis verna	Forget-me-not
Oenothera speciosa	Evening Primrose
Onoclea sensibilis	Sensitive Fern
Oxalis violacea	Wood Sorrel
Paspalum floridanum	
Penthorum sedoides	Ditch Stonecrop
Phytolacca americana	Pokeweed
Pilea pumila	Clearweed
Plantago aristata	Buckhorn
Poa autumnalis	Bluegrass
Ranunculus bulbosus	Buttercup
Ranunculus parviflorus	Crowfoot
Ranunculus recurvatus	Water Crowfoot
Rorippa sessiliflora	Marsh Cress
Rudbeckia hirta	Coneflower
Rumex altissimus	Water-dock
Sabatia angularis	Marsh Pink
Samolus floribundus	Water Pimpernel
Silphium perfoliatum	Cup-plant
Spermacoce glabra	Buttonweed
Strophostyles leiosperma	Wild Bean
Trillium recurvatum	Wake Robin
Uniola sessiliflora	Wild Oats
Viola eriocarpa	Yellow Violet
Vitis palmata	Wild Grape

Lactuca serriola	Prickly Lettuce
Lamium amplexicaule	Henbit
Lamium purpureum	Henbit
Laportea cannadensis	Stinging Nettle
Lathyrus hirsutus	Sweet Pea
Lepidium virginicum	Pepper Grass
Lespedeza cuneata	Lespedeza
Lespedeza stipulacea	Lespedeza
Lespedeza striata	Lespedeza
Lithospermum arvense	
Lolium multiflorium	Italian Rye-grass
Lonicera jap nica	Japanese Honeysuckle
Luzula echinata	Wood Rush
Mimulus alatus	Monkey Flower
Mollugo verticillata	Carpet Weed
Myosurus minima	Mousetail
Narcissus pseudo-narcissus	Daffodil
Oenothera biennis	Evening Primrose
Oenothera laciniata	Evening Primrose
Oxalis dillenii	Wood Sorrel
Panicum anceps	Panic Grass
Panicum dichotomiflorum	Panic Grass
Parthenocisus quinquefolia	Virginia Creeper
Paspaum dilatatum	Dallis Grass
Passiflora incarnata	Passion-flower
Perilla frutescans	
Phlox divaricata	Phlox
Plantago lanceolata	Ribgrass
Plantago rhodosperma	Plantain
Plantago rugelii	Plaintain
Poa anhua	Annual Bluegrass
Poa pratensis	Kentucky Bluegrass
Podphyllum peltatum	May Apple
Polygonum pennsylvanicum	Smartweed
Polygonum scandens	False Bucksheat
Potentilla simplex	Five-finger
Prunella vulgaris var lanceolata	Self-heal
Ptilimnium capillaceum	Mock Bishopweed
Pyrrhopappus carolinianus	
Ranunculus abortivus	Cursed Crowfoot
Rhus radicans	Poison ivy
Rubus argutus	Blackberry
Rubus trivialis	Southern Dewberry
Rumex crispus	Curly Dock
Sagina decumbens	Pearlwort
Salvia lyrata	Cancerweed
Sanicula canadensis	Black Snakeroot
Sanicula gregraria	Black Snakeroot

Senecio glabellus	Butterweed
Setaria faberi	Squirreltail-Grass
Setaria geniculata	Squirreltail-Grass
Sida spinosa	
Smilax glauca	Greenbrier
Smilax hispida	Greenbrier
Smilax rotundifolia	Greenbrier
Solanum carolinense	Horse-nettle
Solidago altissima	Goldenrod
Solidago gigantea	Goldenrod
Sorghum halepense	Johnson Grass
Specularia biflora	Venus Looking Glass
Specularia perfoliata	Venus Looking Glass
Sphenopholis nitida	
Stachys tenuifolia	Hedge-nettle
Stellaria media	Chickweed
Taraxacum officinale	Dandelion
Teucrium canadense	Wood-sage
Tridens flavus	Purpletop Grass
Trifolium campestre	Little Hop-clover
Trifolium procumbens	Big Hop-clover
Trifolium repens	White Clover
Uniola latifolia	Wild Oats
Valerianella radiata	Corn Salad
Verbesina alternifolia	Wingstem
Verbesina virginica	Crownbeard
Vernonia altissima	Ironweed
Veronica arvensis	Speedwell
Veronica peregrina	Speedwell
Vicia angustifolia	Vetch
Vicia dasycarpa	Vetch
Viola missouriensis	Violet
Viola papilionacea	Violet
Viola rafinesquii	Field pansy
Vitis rotundifolia	Muscadine Grape
Xanthium strumarium	Cocklebur

Frequent:

Acalypha rhomboidea	Three Seeded Mercury
Agalinis obtusifolia	Gererdia
Anisostichus capreolatus	Cross Vine
Anthemis cotula	Dog fennel
Arisaema dracontium	Green Dragon
Arisaema triphyllum	Jack in the Pulpit
Boltonia asteroides	
Boltonia diffusa	
Brunnichia cirrhosa	Ladies Eardrops

Infrequent:

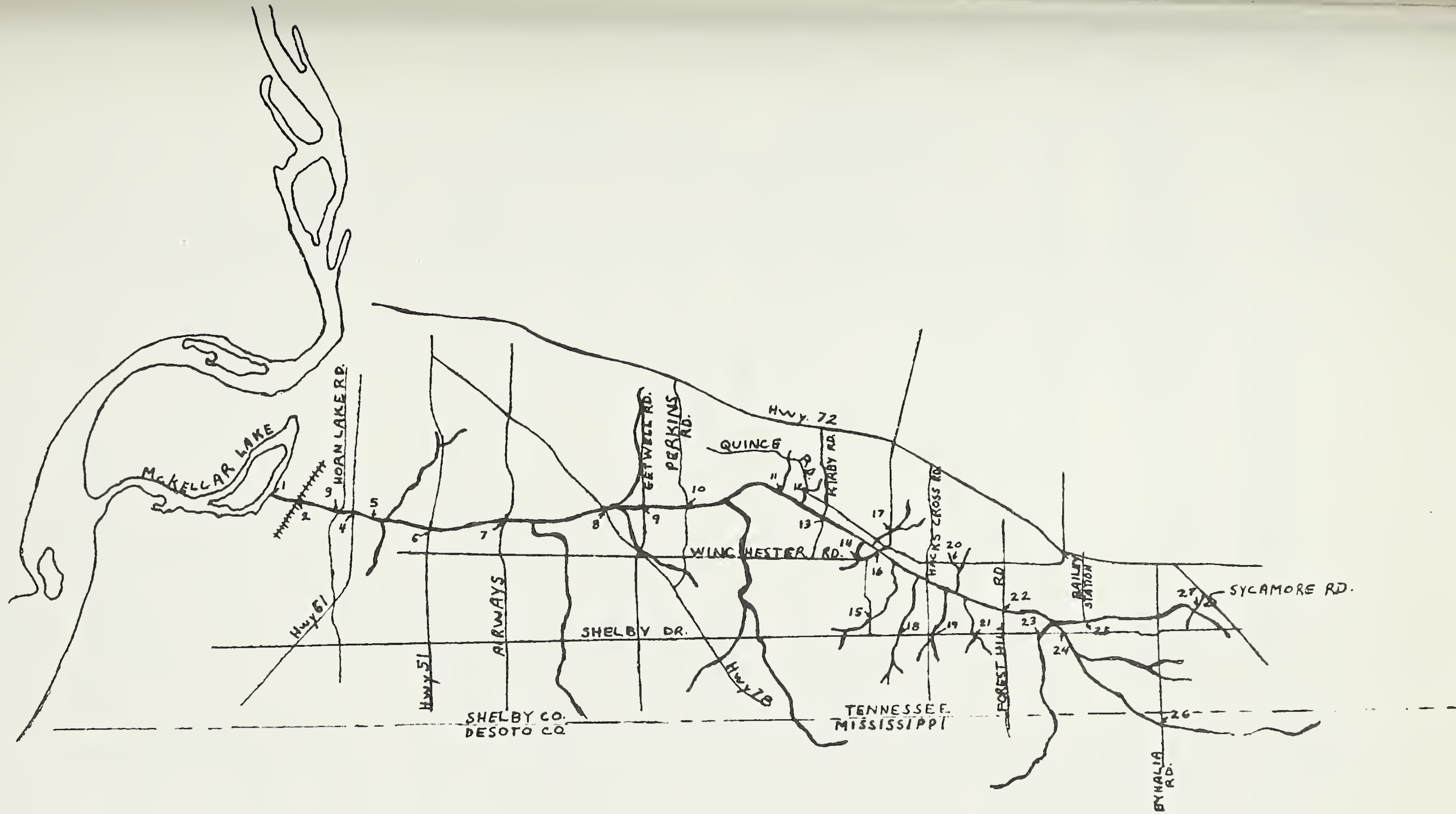
Abutilon theophrastii	Pie Marker
Apios americana	Indian Bean
Carex annectens	Sedge
Carex grayii	Sedge
Coreopsis pubescens	Tickseed
Cuscuta campestris	Dodder
Equisetum arvense	Horsetail
Eragrostis lugens	Love's Grass
Helenium flexuosum	Sneezeweed
Hydrolea uniflora	
Lippia lanceolata	Frog Fruit
Ludwigia palustris	
Lycopus americanus	Bugle-weed
Myriophyllum brasiliense	Parrot Feather
Nemophila microcalyx	
Osmorhiza longistylis	Sweet Cicely
Panicum stipitatum	Panic Grass
Paspalum bifidum	
Passiflora lutea	Yellow Passion-flower
Pycnanthemum tenuifolium	Mountain Mint
Rhexia virginica	Meadow-beauty
Scutellaria laterifolia	Skullcap
Sesbania exaltata	
Strophostyles umbellata	Wild Beam
Trachelospermum difforme	
Tripsacum dactyloides	Gama Grass

Rare:

Dracopsis amplexicaulis - Only record of this species in Tennessee.
Erythronium albidum - This and one other location in Shelby County.
Franseria acanthicarpa - Only record of this species in Tennessee.

APPENDIX C

Plankton of Nonconnah Creek



Location of Sampling Points
for
Biological Inventory

Station: #3

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Anacyst	721
Blue-Green, Filamentous:	
Green, Coccoid:	
Chlorella	1,874
Chlorococcum	1,442
Ankistrodesmus	288
Other	2,307
Green, Filamentous:	
Green, Flagellates:	
Pandorina	3,207
Chlamydomonas	1,009
Euglena	1,009
Phacus	865
Diatoms:	
Centric	288
Pennate	577
Protozoa:	
Rotifers:	
Crustacea:	

Station: #8

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Blue-Green, Filamentous:	
Green, Coccoid:	
Chlorella	577
Tetraedron	577
Chloroccum	288
Scenedesmus	144
Ankistrodesmus	144
Closterium	144
Other	577
Green, Filamentous:	
Green, Flagellates:	
Phacus	433
Chlamydomonas	288
Euglena	144
Diatoms:	
Centric	288
Pennate	3,172
Protozoa:	288
Rotifers:	
Crustacea:	

Station: #13

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Blue-Green, Filamentous:	
Green, Coccoid:	
Ankistrodesmus	1,586
Chlorella	721
Scenedesmus	144
Phytoconis	144
Chlorococcum	144
Coelastrum	144
Other	433
Green, Filamentous:	
Green, Flagellates:	
Euglena	144
Chlamydomonas	144
Diatoms:	
Centric	288
Pennate	5,767
Protozoa:	144
Rotifers:	
Crustacea:	

Station: #16

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Blue-Green, Filamentous:	
Green, Coccoid:	
Chlorococcum	1,874
Chlorella	1,586
Ankistrodesmus	577
Volvox	144
Actinastrum	144
Scenedesmus	288
Other	144
Green, Filamentous:	
Green, Flagellates:	
Euglena	288
Chlamydomonas	144
Diatoms:	
Centric	288
Pennate	1,009
Protozoa:	288
Rotifers:	
Crustacea:	

Station: #22

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Anacyst	433
Blue-Green, Filamentous:	
Green, Coccoid:	
Chlorococcum	2,307
Chlorella	1,874
Scenedesmus	433
Coelastrum	288
Actinastrum	288
Ankistrodesmus	144
Oocyst	144
Pediastrum	144
Other	144
Green, Filamentous:	
Green, Flagellates:	
Euglena	288
Chlamydomonas	144
Other	1,154
Diatoms:	
Centric	144
Pennate	577
Protozoa:	144
Rotifers:	
Crustacea:	

Station: #25

Date: 5-23-72

PLANKTON POPULATION

	No. per ml.
Blue-Green, Coccoid:	
Anacyst	29
Blue-Green, Filamentous:	
Green, Coccoid:	
Chlorella	2,618
Chlorococcum	1,500
Scenedesmus	824
Phytoconis	441
Ankistrodesmus	412
Closterium	118
Tetraedron	88
Volvox	88
Staurastrum	29
Other	588
Green, Filamentous:	
Green, Flagellates:	
Euglena	500
Chlamydomonas	412
Pyrobotrys	29
Other	147
Diatoms:	
Centric	118
Pennate	1,206
Protozoa:	118
Rotifers:	
Crustacea:	118

APPENDIX D

Summary of microorganisms found in Nonconnah Creek

Sampling Station: #1

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
7- 2-65 L		27			120,000				
5-19-66 L		22			300,000				
5-26-66 L		21			42,000				
6- 3-66 L		21			400				
6-17-66 L		27			70				
6-29-66 L		29			400				
7- 7-66 L		32			>1,000				
7-21-66 L		31			>1,000				
8- 9-66 L		28			140,000				
9-22-70 HD					>30,000	45,000			
2- 8-71 P		10			Negative		6,300,000		
3- 4-71 P		13			24,000		11,700,000		
4-19-71 P		17			32,000		52,000,000		
5-10-71 P		21			220,000	9,000	83,000,000		
6-15-71 P		21			570,000	15,000	120,000,000		
[illegible] HD					1,770,000				
7-13-71 P		25			360,000	17,500	60,000,000		
4-17-72 HD		19			>30,000	1,200			

Sampling Station: #2

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
6-18-65 L		28			2,200				
5-16-66 L		23			136,000				
5-25-66 L		25			422,000				
6- 1-66 L		26			Negative				
6- 9-66 L		24			67,000				
6-29-66 L		34			1,000				
7-20-66 L		32			Negative				
8- 1-66 L		32			Negative				
2-23-71 P		10			1,000		26,300,000		
3-23-71 P		13			74,000		19,300,000		
4-26-71 P		20			110,000	54,000	74,000,000		
5-24-71 P		21			TNTC	78,000	160,000,000		
6-29-71 P		25			5,000,000	126,000	430,000,000		
7-20-71 P		27			<1,000	2,000	500,000		

Sampling Station: #3

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5-11-72 H	0 in.	25			5,700,000	700	3,900,000	Penicillium Gliocladium Trichoderma Other	900

Sampling Station: #4

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
3-18-66 L		12			500				
4-18-66 L		17			90,000				
5-16-66 L		22			207,000				
5-25-66 L		23			178,000				
6- 1-66 L		24			TNTC				
6- 7-66 L		28			1,000,000				
6-29-66 L		29			2,000,000				
7-20-66 L		30			1,000,000				
8- 1-66 L		31			90,000				

Sampling Station: #5

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
6-29-66 L		30			22,000				
7-20-66 L		30			378,000				
8- 1-66 L		30			1,290,000				
2- 8-71 P		11			Negative		10,000,000		
3- 4-71 P		12			37,000		23,000,000		
4-19-71 P		17			500,000		72,000,000		
5-10-71 P		22			300,000	66,000	120,000,000		
6-15-71 P		21			560,000	78,000	170,000,000		
7-13-71 P		26			76,000	30,000	50,000,000		

Sampling Station: #6

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
4-18-65 L		19			20				
5-16-66 L		21			85,000				
5-25-66 L		23			300,000				
6- 1-66 L		26			20,000				
6- 7-66 L		31			2,000				
6-29-66 L		29			2,100				
7-20-66 L		30			4,000				
8- 1-66 L		30			21,000				
5-11-72 H	0.0"	25			13,000,000	1,300	3,700,000	Penicillium Gliocladium Aspergillus Trichoderma Other	2,500

Sampling Station: #7

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5-16-66 L	0.79"	20			100,000				
6- 1-66 L		27			300				
6- 7-66 L		30			6,500				
6-29-66 L		28			3,000				
7-20-66 L		30			>10,000				
8- 1-66 L		30			[illegible]				
2-23-71 P		10			<1,000		480,000		
3-23-71 P		13			7,500		570,000		
4-26-71 P		20			5,100		730,000		
5-24-71 P		21			14,000		930,000		
6-29-71 P		25			13,000	4,000	7,000,000		
7-20-71 P		27			3,500,000	100,000	200,000,000		

Sampling Station: #8

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5-16-66 L	0.79"	23			50,000				
6- 1-66 L		25			300				
6- 7-66 L		22			300				
6-29-66 L		27			400				
7-20-66 L		30			>10,000				
8- 1-66 L		28			14,000				
2- 8-71 P		10			Negative		400,000		
3- 4-71 P		12			4,600		820,000		
4-19-71 P		17			6,500		930,000		
5-10-71 P		21			3,500	2,000	630,000		
6-15-71 P		22			3,000	3,000	800,000		
7-13-71 P		27			530,000	3,000	1,000,000,000		

Sampling Station: #9

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5-11-72 H	0.0"	25			36,000,000	1,400	24,000,000	Penicillium Aspergillus Other	1,200

Sampling Station: #10

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
4- 1-66 L		18			140				
5-16-66 L	0.79"	21			63,000				
6- 1-66 L		26			900				
2-23 71 P		10			<1,000		520,000		
3-23-71 P		13			4,300		270,000		
4-26-71 P		20			9,500	<1,000	380,000		
5-24-71 P		21			22,000	1,000	430,000		
6-29-71 P		24			<1,000	<1,000	750,000		
7-20-71 P		28			150,000	1,600	20,000,000		

Sampling Station: #11

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		470,000	710,000	1,180,000	5,300	5,000,000	*Phycomycetes Trichoderma Gliocladium	800
5-12-72 H	0.21"	18			23,000,000	45,000	37,000,000	Aspergillus Penicillium Trichoderma Gliocladium Other *Phycomycetes	6,200

Sampling Station: #12

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	BACTERIA: Fecal Streptococcus (No. per 100 ml)	BACTERIA: Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	FUNGI: Total Count (No. per 100 ml)
5- 7-72 H	0.0"		350,000	400,000	750,000	3,600	15,000,000	Gliocladium Penicillium Aspergillus Other	700
5-12-72 H	0.21"	19			30,000,000	80,000	140,000,000	Penicillium Gliocladium Trichoderma Aspergillus *Phycomycetes Other	6,200

Sampling Station: #13

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	BACTERIA: Fecal Streptococcus (No. per 100 ml)	BACTERIA: Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	FUNGI: Total Count (No. per 100 ml)
5-11-72 H	0.0"	25			3,100,000	500	1,400,000	Penicillium Aspergillus Other	300

MICROBIOLOGICAL DATA

Sampling Station: #14

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		100,000	110,000	210,000	12,400	2,300,000	Aspergillus Gliocladium Penicillium Trichoderma	1,900
5-12-72 H	0.21"	16			1,900,000	58,000	6,100,000	Penicillium Aspergillus Trichoderma Gliocladium	4,500

Sampling Station: #15

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		10,000	80,000	90,000	5,300	1,800,000	Gliocladium Other	300
5-12-72 H	0.21"	18			4,100,000	31,000	4,200,000	Aspergillus Penicillium Gliocladium Trichoderma Other *Phycomycetes	2,600

Sampling Station: #16

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
4- 1-66 L		12			40				
5-16-66 L	0.79"	20			50,000				
6- 1-66 L		22			200				
6- 7-66 L		23			200				
6-29-66 L		28			700				
2- 8-71 P		11			Negative				
3- 4-71 P		13			3,000		260,000		
4-19-71 P		16			1,000		630,000		
5-10-71 P		21			10,000	<1,000	620,000		
6-15-71 P		21			9,000	1,000	140,000		
7-13-71 P		24			10,000	1,000	360,000		
							40,000,000		
5- 7-72 H	0.0"		10,000	40,000	50,000	200	2,500,000	Gliocladium Other	300
5-12-72 H	0.21"	18			1,000,000	3,700	1,500,000	Penicillium Aspergillus Gliocladium Trichoderma Other	2,700

MICROBIOLOGICAL DATA

Sampling Station: #17

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		70,000	100,000	170,000	8,800	4,200,000	Penicillium Other Gliocladium	2,300
5-12-72 H	0.21"	17			14,000,000	100,000	21,000,000	Penicillium Gliocladium Trichoderma Other	13,500

Sampling Station: #18

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		30,000	10,000	30,000	4,500	1,100,000	Gliocladium Other	300
5-12-72 H	0.21"	17			17,000,000	68,000	18,000,000	Trichoderma Aspergillus *Phycomycetes Penicillium	10,000

Sampling Station: #19

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		40,000	50,000	90,000	3,400	1,500,000	Penicillium Gliocladium Other	1,900
5-12-72 H	0.21"	17			17,000,000	100,000	47,000,000	Gliocladium Aspergillus Trichoderma Penicillium Other Phycomycetes	25,000

MICROBIOLOGICAL DATA

Sampling Station: #20

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		60,000	90,000	150,000	1,700		Penicillium Gliocladium Aspergillus Other	1,200
5-12-72 H	0.21"	17	0	0	<10,000	900	110,000	Trichoderma	100

Sampling Station: #21

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		0	0	<10,000	600	4,000,000	Aspergillus *Phycomycetes Gliocladium Other	800
5-12-72 H	0.21"	17	190,000	490,000	680,000	15,000	4,900,000	Penicillium Trichoderma Gliocladium Other *Phycomycetes	4,300

Sampling Station: #22

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5-12-72 H	0.21"	18			570,000	1,200	2,900,000	Aspergillus Penicillium Gliocladium	1,400

MICROBIOLOGICAL DATA

Sampling Station: #23

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		10,000	0	10,000	<100		Aspergillus Gliocladium Other	1,900
5-12-72 H	0.21"	18	70,000	70,000	140,000	400	3,000,000	Gliocladium Penicillium Trichoderma Other	800

Sampling Station: #24

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Coliform Non-fecal	Coliform Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		0	20,000	20,000	400		Aspergillus Trichoderma Penicillium Other	1,000
5-12-72 H	0.21"	17	50,000	10,000	60,000	400	1,800,000	Penicillium Aspergillus Gliocladium *Phycomycetes Trichoderma	2,000

Sampling Station: #25

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		0	10,000	10,000	600	16,000,000	Penicillium Trichoderma	300
5-12-72 H	o.21"	18	1,800,000	1,400,000	3,200,000	16,000	1,500,000	Gliocladium Penicillium Other *Phycomycetes Trichoderma	3,500

Sampling Station: #26

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		20,000	20,000	40,000	1,200	2,400,000	Penicillium Gliocladium Trichoderma *Phycomycetes Other	1,700
5-12-72 H	0.21"	16	350,000	350,000	700,000	5,000	5,400,000	Gliocladium Penicillium Aspergillus Trichoderma Other	3,000

Sampling Station: #27

MICROBIOLOGICAL DATA

Date of Sample	Rainfall (24 hrs)	TEMP. °C	BACTERIA: Coliform (No. per 100 ml) Fecal	Non-fecal	Total	Fecal Streptococcus (No. per 100 ml)	Standard Plate Count (No. per 100 ml)	FUNGI: Genera (In order of decreasing abundance)	Total Count (No. per 100 ml)
5- 7-72 H	0.0"		10,000	10,000	20,000	600	560,000	Aspergillus	1,000
5-12-72 H	0.21	16			390,000	1,800	6,000,000	Gliocladium	700
								Penicillium	
								Trichoderma	
								Other	

APPENDIX E

A list of the mammals in Nonconnah Creek Basin (Those species marked (*) have not been positively identified but should occur in the basin).

MARSUPIALIA

Didelphis marsupialis	Opossum

EDENTATA

*Dasypus novemcinctus	Nine-banded Armadillo

CHIROPTERA

*Myotis austroriparius mumfordi	South Eastern Bat
Myotis sodalis	Indiana Bat
Lasionycteris noctivagans	Silver-haired Bat
Pipistrellus subflavus subflavus	
Eptesicus fuscus fuscus	Big Brown Bat
Lasiurus borealis borealis	Red Bat
Lasiurus cinereus cinereus	Hoary Bat
Nycticeius humeralis humeralis	Evening Bat
Plecotus rafinesquii	Eastern Big-eared Bat
*Myotis grisescens	Gray Bat
*Myotis keenii	Keen's Bat
*Myotis lucifugus	Little Brown Bat

ARTIODACTYLA

Odocoileus virginianus virginianus	White-tailed Deer

RODENTIA

*Marmota monax monax	Woodchuck
*Glaucomys volans saturatus	Southern Flying Squirrel
Tamias striatus striatus	Eastern Chipmunk
Sciurus niger rufiventer	Fox Squirrel
Sciurus niger bachmani	Fox Squirrel
Sciurus c. carolinensis	Gray Squirrel
Castor canadensis carolinensis	Beaver
Mus musculus	House Mouse
Rattus n. norvegicus	Norway Rat
Reithrodontomys humulis humulis	E. Harvest Mouse

*No records within Nonconnah Creek Basin

RODENTIA (continued)

*Neotoma floridana illinoensis	E. Wood Rat
Sigmodon hispidus hispidus	Common Cotton Rat
Oryzomys palustris palustris	Eastern Rice Rat
*Ochrotomys nuttalli aureolus	Golden Mouse
Peromyscus maniculatus bairdii	Deer Mouse
Peromyscus gossypinus megacephalus	Cotton Mouse
Peromyscus l. leucopus	White-footed Mouse
Ondatra zibethicus zibethicus	Muskrat
Microtus pinetorum auricularis	Pine Vole

LAGOMORPHA

Sylvilagus floridanus alacer	Eastern Cottontail
Sylvilagus a. aquaticus	Swamp Rabbit

INSECTIVORA

Scalopus aquaticus machrinus	Eastern mole
Blarina brevicauda carolinensis	Short-tailed Shrew
*Cyrptotis parva parva	Least Shrew
*Sorex longirostris longirostris	Southern Shrew

CARNIVORA

Urocyon c. cinereoargenteus	Gray Fox
Vulpes f. fulva	Red Fox
Procyon lotor varius	Raccoon
Lynx rufus floridanus	Bobcat
*Spilogale putorius putorius	Eastern Spotted Skunk
Mephitis mephitis nigra	Common striped skunk
*Lutra canadensis interior	River Otter
Mustela vison mink	Mink
*Mustela fernata arthuri	Long-tailed Weasel
*Mustela frenata olivacea	Long-tailed Weasel
*Mustela frenata novel-boracensis	Long-tailed Weasel
*Mustela vison vulgivaga	Mink

*No records within Nonconnah Creek Basin

APPENDIX F

A list of reptiles found in Nonconnah Creek Basin
(Those species marked (*) have not been positively
identified but should occur in the basin)

REPTILES

TURTLES (CHELONIA)

Trionyx spinifer spinifer	Spiny Softshell
trionyx spinifer hartweigi	Western Spiny Softshell
Trionyx muticus muticus	Smooth Softshell
Chelydra serpentina serpentina	Snapping Turtle
Macroclemys temmincki	Alligator Snapping Turtle
Kinosternon subrubrum	Mud Turtle
Kinosternon s. subrubrum	Eastern Mud Turtle
*Kinosternon subrubrum hippocrepis	Mississippi Mud Turtle
Sternothaerus odoratus	Stinkpot
Terrapene carolina	Box Turtle
Graptemys kohni	Mississippi Map Turtle
Graptemys pseudogeographica ouachitensis	Ouachita Map Turtle
Chrysemys picta	Painted Turtle
Chrysemys picta dorsalis	Southern Painted Turtle
Pseudemys scripta elegans	Red-eared Turtle
Pseudemys concinna hieroglyphica	Slider
Pseudemys floridana hoyi	Missouri Slider

LIZARDS (LACERTILIA)

*Ophisaurus attenuates	Slender Glass Lizard
Lygosoma laterale	Ground Skink
Eumeces inexpectatus	Southeastern Five-lined Skink
Eumeces laticeps	Broad-headed Skink
Eumeces fasciatus	Five-lined Skink
Anolis carolinensis	Green Anole
Sceloporus undulatus hyacinthinus	Northern Fence Lizard
Chemidophorus sexlineatus	Six-lined Racerunner

SNAKES (SERPENTES)

*Sistrurus miliaris streckeri	Western Pigmy Rattlesnake
Crotalus horridus atricaudatus	Canebrake Rattlesnake
Agkistrodon contortrix contortrix	Copperhead
Agkistrodon piscivorus leucostoma	Cottonmouth
Thamnophis sauritus sauritus	Eastern Ribbon Snake

*No records within Nonconnah Creek Basin

SNAKES (SERPENTES) continued

Thamnophis sirtalis sirtalis	Eastern Garter Snake
*Cemophora coccinea	Scarlet Snake
Lampropeltis getulus holbrooki	Speckled Kingsnake
*Lampropeltis getulus niger	Black Kingsnake
*Lampropeltis triangulum syspila	Red Milksnake
*Lampropeltis c. calligaster	Prairie Kingsnake
*Lampropeltis t. triangulum	Eastern Milksnake
*Storeria o. occipitomaculata	Northern Red-bellied Snake
Storeria dekayi wrightorum	Midland Brown Snake
Carphophis amoenus helenae	Midwest Worm Snake
Virgina striatula	Rough Earth Snake
*Virgina v. valeriae	Eastern Earth Snake
*Farancia abacura reinwardti	Western Mudsnake
Heterodon p. platyrhinos	Eastern Hognose Snake
Opheodrys aestivus	Routh Green Snake
*Natrix c. cyclopion	Green Water Snake
Natrix rhombifera rhombifera	Diamond-backed Water Snake
Natrix taxispilota	Brown Water Snake
Natrix sipedon confluens	Broad-banded Water Snake
Natrix sipedon pleuralis	Midland Water Snake
*Natris fasciata	Banded Water Snake
*Natris grahami	Graham's Water Snake
*Natrix erythrogaster	Red-bellied Water Snake
Natrix erythrogaster flavigaster	Yellow-bellied Water Snake
*Masticophis f. flagellum	Eastern Coachwhip
Coluber constrictor priapus	Southern Black Racer
Elaphe guttata guttata	Corn Snake
Elaphe obsoleta spiloides	Gray Rat Snake
Diadophis punctatus stictogenys	Mississippi Ringneck Snake

*No records within Nonconnah Creek Basin

APPENDIX G

A list of the birds and their frequency in the Nonconnah Creek Basin

BIRDS (AVES)*

ABBREVIATIONS:

A -- Accidental

PR -- Permanent Resident

SR -- Summer Resident

WR -- Winter Resident

T -- Transient

V -- Visitor

ab -- abundant

c -- common

vc -- very common

fc -- fairly common

un -- uncommon

r -- rare

vr -- very rare

* -- endangered

*Coffey, Ben B., Jr: Birds of Shelby County and Environs. Mimeographed Pamphlet, Jan., 1970.

BIRDS

Gavia immer	Common Loon	un WV
Podiceps auritus	Horned Grebe	un WV
Podilymbus podiceps	Pied-billed Grebe fc WR,	un SR
Pelecanus erythrorhynchos	White Pelican	un T
Phalacrocorax auritus	Dbl-Crested Cormorant	un WR
Anhinga anhinga	Anhinga	un SR
Ardea herodias	Great Blue Heron	un PR
Butorides virescens	Green Heron	fc SR
Florida caerulea	Little Blue Heron un exc. local	SR
Casmerodius albus	Common Egret un exc. local	SR
Leucophoyx thula	Snowy Egret un exc. local	SR
Nycticorax nycticorax	Black-cr Night Heron	un SR
Nyctanassa violacea	Yellow-cr Night Heron	un SR
Ixobrychus exilis	Least Bittern un T,	r SR
Botaurus lentiginosus	American Bittern fc T,	r SR
Mycteria americana	Wood Ibis	un SV
Branta canadensis	Canada Goose c T and	WR
Chen hyperborea	Snow Goose c T and	un WR
Anas platyrhynchos	Mallard	vc WR
Anas rubripes	Black Duck	un WR
Anas strepera	Gadwall	c WR
Anas carolinensis	Green-winged Teal c T,	fc WR
Anas discors	Blue-winged Teal c T,	un WR
Mareca americana	American Widgeon	c WR
Spatula clypeata	Shoveler	c WR
Aix sponso	Wood Duck	fc PR
Aythya americana	Redhead	un WR
Aythya collaris	Ring-necked Duck	vc WR
Aythya valisineria	Canvasback	c WR
Aythya marila	Greater Scaup	A
Aythya affinis	Lesser Scaup	c WR
Bucephala clangula	Common Goldeneye	fc WR
Bucephala albeola	Bufflehead	c WR
Clangula hyemalis	Old Squaw	r WR
Oxyura jamaicensis	Ruddy Duck	vc WR
Lophodytes cucullatus	Hooded Merganser	c WR
Mergus merganser	Common Merganser	un WR

BIRDS (continued)

Mergus serrator	Red-breasted Merganser un WR
Cathartes aura	Turkey Vulture un mid-W, PR
Coragyps atratus	Black Vulture un mid-W, PR
Ictinia misisippiensis	Miss Kite not un SR
Accipiter striatus	Sharp-shinned Hawk un WV
Accipiter cooperii	Cooper's Hawk un PR
Buteo jamaicensis	Red-tailed Hawk fc PR
Buteo lineatus	Red-shouldered Hawk un PR
Buteo playpterus	Broad-winged Hawk fc SR
Buteo lagopus	Rough-legged Hawk r WV
Aquila chrysaetos	Golden Eagle r WV
*Haliaeetus leucocephalus	Bald Eagle local, fc WR, r SR
Circus cyaneus	Marsh Hawk fc WR
Pandion haliaetus	Osprey not un, T
*Falco peregrinus	Peregrine Falcon vr T & SR
Falco columbarius	Pigeon Hawk r to un, T
Colinus virginianus	Bobwhite c PR
Meleagris gallopavo	Turkey un PR
Grus canadensis	Sandhill Crane vr T
Rallus elegans	King Rail r WV, un SR
Falco sparverius	Sparrow Hawk not un, PR
Rallus limicola	Virginia Rail un T
Porzana carolina	Sora fc T
Porphyrula martinica	Purple Gallinule un T
Gallinula chloropus	Common Gallinule fc T
Fulica americana	American Coot un SR, vc WR
Charadrius semipalmatus	Semipalmated Plover fc T
Charadrius vociferus	Killdeer fc SR, un WR
Pluvialis dominica	Am. Golden Plover c T
Squatarola squatarola	Black-bellied Plover r T
Philohela minor	Am. Woodcock fc T, un SR
Capella gallinago	Common Snipe c WR
Bartramia longicauda	Upland Plover fc T
Actitis macularia	Spotted Sandpiper c T
Tringa solitaria	Solitary Sandpiper c T
Catoptrophorus semipalmatus	Willet r T
Totanus melanoleucus	Greater Yellowlegs c T
Totanus flavipes	Lesser Yellowlegs c T
Erolia melanotos	Pectoral Sandpiper vc T
Erolia fuscicollis	White-rumped Sandpiper un T
Erolia minutilla	Least Sandpiper un WR, c T
Erolia alpina	Dunlin r WR, un T
Limnodromus griseus	Short-billed Dowitcher fc T

BIRDS (continued)

Limnodromus scolopaceus	Long-billed Dowitcher	r T
Micropalama himantopus	Stilt Sandpiper	un T
Ereunetes pusillus	Semipalamated Sandpiper	fc T
Ereunetes mauri	Western Sandpiper	un T
Crocethia alba	Sanderling	r T
Steganopus tricolor	Wilson's Phalarope	un T
Larus argentatus	Herring Gull	un WV
Larus delawarensis	Ring-billed Gull	c WR
Larus atricilla	Laughing Gull	c A
Larus pipixcan	Franklin's Gull	r T
Larus Philadelphia	Bonaparte's Gull	un WV, un T
Sterna forsteri	Forster's Tern	fc T
Sterna hirundo	Common Tern	fc T
Sterna albinfrons	Least Tern not (but on Miss. River only)	un SR
Hydroprogne caspia	Caspian Tern	un T
Childonias niger	Black Tern	c T
Zenaidura macroura	Mourning Dove	vc SR, un WR
Coccyzus americanus	Yellow-billed Cuckoo	c SR
Coccyzus erythropthalmus	Black-billed Cuckoo	fc T
Tyto alba	Barn Owl	un PR
Otus asio	Screech Owl	un PR
Bubo virginianus	Great Horned Owl	un PR
Strix varia	Barred Owl	fc PR
Asio otus	Long-eared Owl	r WR
Asio flammeus	Short-eared Owl	un WR
Aegolius acadicus	Saw-whet Owl	A
Caprimulgus carolinensis	Chuck-will's-widow	fc SR
Caprimulgus vociferus	Whip-poor-will	fc T, r SR
Chordeiles minor	Common Nighthawk	fc SR
Chaetura pelagica	Chimney Swift	c SR
Archilochus colubris	Ruby-throated Hummingbird	fc SR
Megaceryle alcyon	Belted Kingfisher	un SR & WR
Colaptes auratus	Flicker	fc PR
Dryocopus pileatus	Pileated Woodpecker	un PR
Centurus carolinus	Red-bellied Woodpecker	c PR
Melanerpes erythrocephalus	Red-headed Woodpecker	un WR un SR
Sphyrapicus varius	Yellow-bellied Sapsucker	fc WR
Dendrocopos villosus	Hairy Woodpecker	c PR
Dendrocopos pubescens	Down Woodpecker	c PR
*Dendrocopos borealis	Red-cockaded Woodpecker	local rare

BIRDS (continued)

Tyrannus tyrannus	Eastern Kingbird	c SR
Myiarchus crinitus	Great Crested Flycatcher	c SR
Sayornis phoebe	Eastern Phoebe	r WR, un SR
Empidonax flaviventris	Yellow-bellied Flycatcher	fc T
Empidonax virescens	Acadian Flycatcher	fc SR
Empidonax traillii	Traill's Flycatcher local SR	fc T
Empidonax minimus	Least Flycatcher	un T
Contopus virens	Eastern Wood Pewee	c SR
Nuttallornis borealis	Olive-sided Flycatcher	un T
Eremophila alpestris	Horned Lark WR (flocks)	fc SR
Iridoprocne bicolor	Tree Swallow r SV,	vc T
Riparia riparia	Bank Swallow	c T
Stelgidopteryx ruficollis	Rough-winged Swallow	un SR c T
Hirundo rustica	Barn Swallow	fc SR
Petrochelidon pyrrhonota	Cliff Swallow fc SR 100 mi. dist c T	
Progne subis	Purple Martin	fc SR
Cyanocitta cristata	Blue Jay	c PR
Corvus brachyrhynchos	Common Crow	c PR
Corvus ossifragus	Fish Crow (Miss. R. local fc SR)	un WR
Parus carolinensis	Carolina Chickadee	fc PR
Parus bicolor	Tufted Titmouse	fc PR
Sitta carolinensis	White-breasted Nuthatch	un WV
Sitta canadensis	Red-breasted Nuthatch	un WV
Certhia familiaris	Brown Creeper	un WR
Troglodytes aedon	House Wren un T r SV,	WV
Troglodytes troglodytes	Winter Wren	fc WR
Thryomanes bewickii	Bewick's Wren	un PR
Thryothorus ludovicianus	Carolina Wren	c PR
Telmatodytes palustris	Long-billed Marsh Wren	r T
Cistothorus platensis	Short-billed Marsh Wren	un T r WV
Mimus polyglottos	Mockingbird	c PR
Dumetella carolinensis	Catbird	fc SR
Toxostoma rufum	Brown Thrasher c SR	fc WR
Turdus migratorius	Robin	c PR
Hylocichla mustelina	Wood Thrush	c SR
Hylocichla guttata	Hermit Thrush	fc WR
Hylocichla ustulata	Swainson's Thrush	c T
Hylocichla minima	Gray-cheeked Thrush	c T
Hylochichla fuscescens	Veery	un T

BIRDS (continued)

Sialia sialis	Bluebird un to fc	PR
Polioptila caerulea	Blue-gray Gnatcatcher	fc SR
Regulus satrapa	Golden-crowned Kinglet	fc WR
Regulus calendula	Ruby-crowned Kinglet	fc WR
Anthus spinoletta	Water Pipit un WV	fc T
Anthus spragueii	Sprague's Pipit local	WV
Bombycilla cedrorum	Cedar Waxwing cT, erratic,	WR
Lanius ludovicianus	Loggerhead Shrike	fc PR
Sturnus vulgaris	Starling	ab PR
Vireo griseus	White-eyed Vireo	c SR
Vireo bellii	Bell's Vireo (local in E. Ark.)	
Vireo flavifrons	Yellow-throated Vireo	fc SR
Vireo solitarius	Solitary Vireo r WV	un T
Vireo olivaceus	Red-eyed Vireo	fc SR
Vireo philadelphicus	Philadelphia Vireo	un T
Vireo gilvus	Warbling Vireo (local)	fc SR
Mniotilta varia	Black & White Warbler fc T,	un SR
Protonotaria citrea	Prothonotary Warbler	fc SR
Limnothlypis swainsonii	Swainson's Warbler	un SR
Helmitheros vermivorus	Worm-eating Warbler	fc T
Vermivora chrysoptera	Golden-winged Warbler	fc T
Vermivora pinus	Blue-winged Warbler	fc T
Vermivora peregrina	Tennessee Warbler	ab T
Vermivora celata	Orange-crowned Warbler un T,	r WR
Vermivora ruficapilla	Nashville Warbler	fc T
Parula americana	Parula Warbler	fc SR
Dendroica petechia	Yellow Warbler	fc T
Dendroica magnolia	Magnolia Warbler	c T
Dendroica tigrina	Cape May Warbler	un T
Dendroica coronata	Myrtle Warbler	c WR
Dendroica virens	Black-throated Green Warbler	c T
Dendroica cerulea	Cerulean Warbler	fc SR
Dendroica fusca	Blackburnian Warbler	fc SR
Dendroica dominica	Yellow-throated Warbler	fc SR
Dendroica pensylvanica	Chestnut-sided Warbler	fc T
Dendroica castanea	Bay-breasted Warbler	fc T
Dendroica striata	Black-poll Warbler (spring)	fc T
Dendroica pinus	Pine Warbler un PR, fc in pine areas	
Dendroica discolor	Prairie Warbler	fc T

BIRDS (continued)

Dendroica palmarum	Palm Warbler	fc	T
Seiurus aurocapillus	Ovenbird	c	T
Seiurus noveboracensis	Northern Water-thrush	un	T
Seiurus motacilla	Louisiana Water-thrush	fc	SR
Oporornis formosus	Kentucky Warbler	fc	SR
Oporornis agilis	Connecticutt Warbler	un	T
Oporornis philadelphia	Mourning Warbler	un	T
Geoghlypis trichas	Yellowthroat	fc	SR
Icteria virens	Yellow-breasted Chat	fc	SR
Wilsonia citrina	Hooded Warbler	fc	SR
Wilsonia pusilla	Wilson's Warbler	fc	T
Wilsonia canadensis	Canada Warbler	fc	T
Setophaga ruticilla	American Redstart	fc	SR
Passer domesticus	House Sparrow	c	PR
Dolichonyx oryzivorus	Bobolink (spring)	c	T
Sturnella magna	Meadowlark, Eastern	c	PR
Sturnella neglecta	Meadowlark, Western	un	WR
Agelaius phoeniceus	Redwinged Blackbird (ab WR)	c	PR
Icterus spurius	Orchard Oriole	c	SR
Icterus galbula	Baltimore Oriole	fc	SR
Euphagus carolinus	Rusty Blackbird	c	WR
Euphagus cyanocephalus	Brewer's Blackbird	un	WV
Quiscalus quiscula	Common Grackle (ab. WR)	c	PR
Molothrus ater	Cowbird (ab. WR)	c	PR
Piranga olivacea	Scarlet Tanager	c	T
Piranga rubra	Summer Tanager	c	SR
Richmondena cardinalis	Cardinal	vc	PR
Pheucticus ludovicianus	Rose-breasted Grosbeak	c	T
Guiraca caerulea	Blue Grosbeak (local fc)	un	SR
Passerina cyanea	Indigo Bunting	c	SR
Passerina ciris	Painted Bunting	un	SR
Spiza americana	Dickcissel	c	SR
Hesperiphona vespertina	Evening Grosbeak	un	WV
Carpodacus pupureus	Purple Finch	c	WR
Spinus pinus	Pine Siskin (erratic)	fc	WV
Spinus tristis	American Goldfinch un Sr,	C	WR
Pipilo erythrophathalmus	Rufous-sided Towhee	c	PR
Passerculus sandwichensis	Savannah Sparrow	c	WR
Ammodramus savannarum	Grasshopper Sparrow	un	SR
Passerherbulus caudacutus	Le Conte's Sparrow	un	WR
Ammospiza caudacuta	Sharp-tailed Sparrow	r	T
Passerherbulus henslowii	Henslow's Sparrow	r	T
Pooecetes gramineus	Vesper Sparrow un WR,	c	T
Chondestes grammacus	Lark Sparrow (local SR)	un	T
Aimophila aestivalis	Bachman's Sparrow (now)	r	SR

BIRDS (continued)

Junco hyemalis	Slate-colored Junco	c WR
Spizella arborea	Tree Sparrow	r WR
Spizella passerina	Chipping Sparrow	r WR, un to c SR
Spizella pusilla	Field Sparrow	c PR
Zonotrichia querula	Harris' Sparrow	un WR
Zonotrichia leucophyrs	White-crowned Sparrow	fc WR
Zonotrichia albicollis	White-throated Sparrow	c WR
Passerella iliaca	Fox Sparrow	fc WR
Melospiza lincolnii	Lincoln's Sparrow	fc T
Melospiza georgiana	Swamp Sparrow	c WR
Melospiza melodia	Song Sparrow	c WR
Calcarius lapponicus	Lapland Longspur (erratic flocks in W)	
Calcarius pictus	Smith's Longspur (local, uncommon WV)	

VERY RARE - ACCIDENTALS AND CASUALS SINCE 1923

Bubulcus ibis	Cattle Egret	(now) fc T
Hydranassa tricolor	Louisiana Heron	
Plegadis chihi	White-faced Ibis	
Charadrius melodus	Piping Plover	
Buteo harlani	Harlan's Hawk	
Numenius phaeopus	Whimbrel	
Calidris canutus	Knot	
Erolia bairdii	Baird's Sandpiper	
Tryngites subruficollis	Buff-breasted Sandpiper	
Recurvirostra americana	American Avocet	
Tyrannus verticalis	Western Kingbird	
Pyrocephalus rubinus	Vermilion Flycatcher	
Salpinctes obsoletus	Rock Wren	
Loxia leucoptera	White-winged Crossbill	
Chlorura chlorura	Green-tailed Towhee	
Junco oreganus	Oregon Junco (now) r to un in winter	

FISH OF NONCONNAH CREEK

Cyprinus carpio	Carp
Fundulus olivaceus	Blackspotted Topminnow
Gambusia affinis	Gambusia
Ictalurus melas	Black Bullhead
Lepomis cyanellus	Green Sunfish
Notropis lutrensis	Red Shiner
Phenacobius mirabilis	Suckermouth Minnow
Semotilus atromaculatus	Creek Chub
Notropis umbratilis	Redfin Shiner
Ictalurus natalis	Yellow Bullhead
*Lepomis macrochirus	Blue-gill Sunfish
Lepisosteus platostomus	Short-nosed Gar

*No records within Nonconnah Creek Basin but likely to occur.

APPENDIX I

A list of the frogs and salamanders found in Nonconnah Creek Basin

(Those marked (*) have not been positively identified but should occur in the basin)

AMPHIBIANS

FROGS AND TOADS

Gastrophryne carolinensis carolinensis	Eastern Narrow-mouthed Toad
Scaphiopus holbrooki	Eastern Spadefoot
Bufo americanus americanus	American Toad
Bufo woodhousei fowleri	Fowler's Toad
Hyla avivoca avivoca	Bird-voiced Treefrog
Hyla v. versicolor	Common Treefrog
Hyla crucifer crucifer	Spring Peeper
Hyla c. cinerea	Green Greefrog
Acis gryllus gryllus	Southern Cricket Frog
Acris crepitans crepitans	Northern Cricket Frog
Pseudacris triseriata feriarum	Upland Chorus Frog
Rana clamitans clamitans	Bronze Frog
*Rana areolata	Crawfish Frog
Rana catesbeiana	Bullfrog

SALAMANDERS

Siren intermedia intermedia	Siren
*Amphiuma means	Amphiuma
Amphiuma tridactylum	Amphiuma
Notophthalmus viridescens Louisianensis	Newt
Ambystoma texanum	Small-mouthed Salamander
Ambystoma opacum	Marbled Salamander
Ambystoma maculatum	Spotted Salamander
*Ambystoma tigrinum	Tiger Salamander
*Ambystoma talpoideum	Mole Salamander
Desmognathus fuscus brimleyorum	Dusky Salamander
*Desmognathus fuscus fuscus	Dusky Salamander
Pseudotriton ruber ruber	Red Salamander
*Eurycea bislineata cirrigera	Southern Two-lined Salamander
Eurycea longicauda gutto-lineata	Three-lined Salamander
Plethodon glutinosus glutinosus	Slimy Salamander
*Necturus maculosus	Mud Puppy

*No records within Nonconnah Creek Basin

APPENDIX J

A partial list of the terrestrial and aquatic dependent invertebrates in the Nonconnah Creek Basin

Terrestrial

Organisms	Relative abundance	
	UPSTREAM	DOWNSTREAM
Coleoptera		
Cicindelidae-Tigerbeetles		
Cicindela repanda		
C. celeripes	xxx	xx
C. punctulata	xxx	
C. rufiventris	xxx	
C. sexguttata	x	x
Tetracha carolina	x	
T. sexguttata	x	
Coccinellidae	x	x
Bibionidae-Marchflies	x	x
Muscidae	xx	
Musca domestica		
Calliphoridae	xxx	xx
Callitroga homnivorax		
Sarcophagidae		
Wolfartia sp.	xx	xx
Sarcophaga sp.	xx	xx
Hymenoptera		
Formicidae-Ants	xxx	xxx xx
Vespidae-paper & potter wasps	xx	
Sphecidae-sphecoid wasps	xx	
Apidae-Bees	xx	
Lepidoptera		
Papilionidae	xx	x
Pieridae	xx	x
Nymphalidae	xx	x

	UPSTREAM	DOWNSTREAM
Orthoptera		
Acrididae	x	
Tetrigidae	xxx	xx
Tridactylidae	xx	
Tettigoniidae	x	
Gryllidae-Crickets		
Trygoniidae	x	
Gryllinae	x	
Blattidae-Roaches	x	
Arachnida		
Araneida		
Pisauridae-Fishing spiders	xx	
Lycosidae	xx	

Aquatic dependent

Organisms	Relative Abundance	
	UPSTREAM	DOWNSTREAM
Dytiscidae	x	
Gyrinidae	x	
Hydrophilidae	xx	
Ephemeroptera-Mayflies	0	
Diptera		
Culicidae-Mosquitoes		
Aedes vexans	xxx	xxx
A. stricticus	x	xx
A. Triseriatus	x	x
Anopheles Quadrimaculatus	xx	xxx
A. punctipennis	xx	
A. crucians	0	xxx
Culex pipiens	xxx	xx
C. erraticus	x	xx
Psorophora confinnis	x	xx
P. discolor	0	xx
P. ferox	0	x
P. ciliata	x	x
Culiseta impatiens		0
		xx
Tendipedieae-Midges		
Tanypodinae		
Procladius sp.		
Chirominae	xx	xx
Tendipes sp.	x	x
Tipulidae-Crane flies		
Dicranota sp.	xx	
Tabanidae		
Tabanus sp.	xx	xx
Crysops sp.	xx	x
Syrphidae-Rattail maggots		
Tubifera sp.	xxx	xxx
Empididae-Dance flies	x	
Muscidae		
Musca domestica	xxx	xxx

	UPSTREAM	DOWNSTREAM
Calliphoridae		
Callitroga homnivorax	xxx	xx
Calliphora vomitoria	xx	xx
Sarcophagidae		
Wolfartia sp.	xx	xx
Sarcophaga sp.	xx	xx
Ephydidae-Shoreflies	xxxx	xxx
Hemiptera-True bugs		
Gelastocoris oculatus	xxxx	xxxx
Nepidae	x	0
Gerridae		
Gerris sp.		
Hydrometra sp.	xxx	xxx
Megaloptera		
Sialidae		
Sialis sp.	x	
Odonata		
Anisoptera-Dragonflies		
Anax Junius	xxx	
Epiashna heros	xxx	
Pachydiplax longipennis	xx	
Tetragoneuria sp.	xx	
Tramea sp.	xx	
Plathemis lydia	xx	
Zygoptera-Damselflies		
Coenagrionidae	xx	
Trichoptera	0	0
		0
Plecoptera	0	0
Turbellaria		
Bhabdocoela	x	
Alloeocoela	x	

	UPSTREAM	DOWNSTREAM
Annelida		
Oligochaeta		
Tubificidae		
Tubifex sp.	xxxx	xxxx
Lumbricidae	xxx	xxx
Branchiobdellid	xxx	
Hirudinea-Leeches		
Bryozoa		
Plumatella sp.	x	
Cristatella sp.	x	
Mollusca		
Gastropoda		
Physidae		
Physa sp.	xxx	
Lumnaeidae		
Planorbidae	xx	
Gastropoda-cont.		
Lancidae	x	
Ancylidae	x	
Pelecypoda-clams		
Sphaeriidae		
Sphaerium sp.	xxx	
Musculium sp.	xx	
Isopoda-sowbugs	x	
Asellus sp.	x	
Amphipoda		
Gammarus sp.	x	
Hyallela sp.	x	
Decopoda-crawfishes		
Procambarus _acutus_	xxx	xxx
_P._ _Clarkii_	0	x

	UPSTREAM	DOWNSTREAM
P. viaeviridis	x	0
Orconectes palmeri palmeri	xxx	xxx
Cambarus diogenes diogenes	xxx	xxx
Fallicambarus fodiens	xx	xx
Coelenterata		
Hydra sp.	x	

APPENDIX K

RELATIVE ABUNDANCE AND DIVERSITY OF FISH IN NONCONNAH CREEK

RELATIVE ABUNDANCE AND DIVERSITY OF FISH IN NONCONNAH CREEK

Upper Reaches of Nonconnah Creek at Hacks Cross Road:

Notropis umbratilis	Redfin Shiner	14
Semotilus atromaculatus	Creek Chub	3
Lepomis megalotis	Long-eared Sunfish	3
Fundulus olivaceus	Black-spotted Topminnow	1
Lepomis cyanellus	Green Sunfish	1
Notropis lutrensis	Red Shiner	1
		23

Lower Reaches of Nonconnah Creek at Hwy. 61:

Cyprinus carpio	Carp	7
Gambusia affinis	Gambusia	6
Lepisosteus platostomus	Shortnose Gar	1
		14

Fish collections were made using a 12 x 14-foot nylon seine with one-fourth inch mesh. The Hacks Cross Road site averaged 3 feet in depth, 12 feet in width and 40 feet in length. The collection site at Hwy. 61 averaged 4 feet in depth, 12 feet in width and 40 feet in length.

The bottom at the Hacks Cross Road was sand and mud.

The bottom at Hwy. 61 was gravel and mud.

Date of Sample: May 27, 1972

APPENDIX L

RARE, THREATENED, AND ENDANGERED SPECIES

RARE, THREATENED, AND ENDANGERED SPECIES

Three species of birds listed as endangered (Appendix D, 50CFR 17, U. S. List of Endangered Fish and Wildlife) are listed as occuring in Shelby County, Tennessee. These are the Southern Bald Eagle (*Heliaetus leucocephalus leucocephalus*) American peregrine falcon (*Falco perigrinus anatus*) and the Red-cockaded Woodpacker (*Dendrocopus borealis*). The Bald Eagle is listed as a fairly common winter resident in the county, rare as a winter resident. The Perigrene Falcon is very rare as a transient and summer resident. The Red-cockaded Woodpecker is a local but rare bird.

While not actually collected and identified as occuring in the Nonconnah Creek Basin it is likely that the tiger salamander (*Ambystoma tigrinum*) does occur rarely.

Among the plants three species of herbaceous types which are rare or unique among the terrestrial flora of West Tennessee are endangered by the Nonconnah Creek project. Two of these occur within the greenway proposed for the creek. These are *Dracopsis amplexicaulis* and *Franseria acanthicarpa*. Neither species has a common name. This locality record on Nonconnah Creek within the 300 foot greenway is the only record of these two species occuring in the state of Tennessee. Efforts should be made to preserve these two localities. Another species, *Erythronium albidum* (white dog tooth violet) is rare in Shelby having been found in only one other locality. This species occurs in the area to be flooded by the proposed lake.

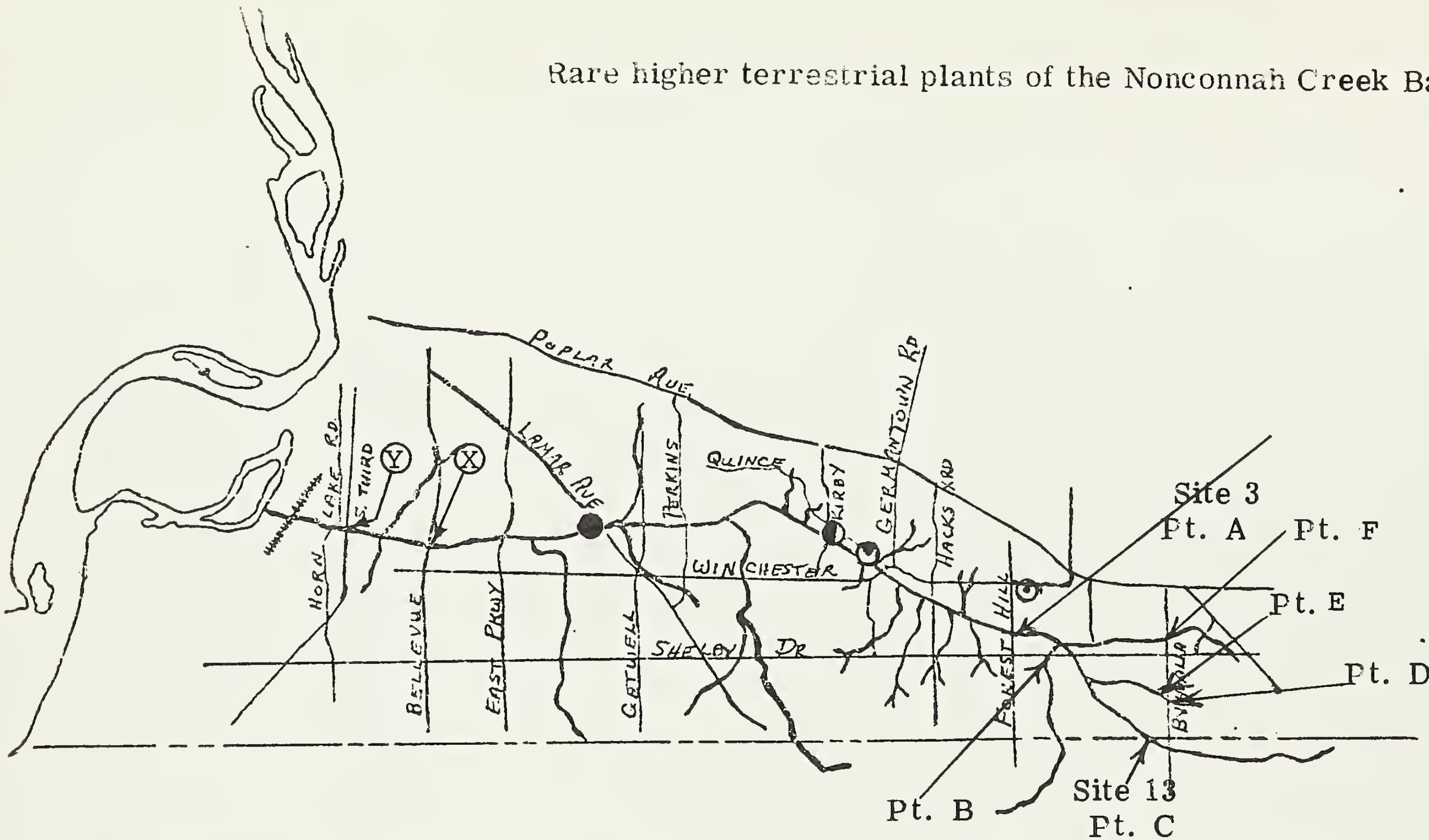
A species of aquatic higher plant, *Ammannia auriculata* (toothcup) is recorded in Nonconnah Creek below the damsite for the lake and is also a rare species in West Tennessee. The only other record of this species in West Tennessee is in Piersall Lake in Meman-Shelby Forest State Park. This species should be preserved in the creek and probably can be by careful consideration of its habitat.

Considering the fact that urban encroachment will continue to eradicate the naturally occuring flora and fauna, both aquatic and terrestrial, the proposed project or projects along the creek can have no detrimental effect as great as urban development. In fact, much of the natural life can be preserved and allow for the development of a diversity of species greater than present by controlling the flow of the creek. Because of the scarcity of habitats within the basin it is highly unlikely that any of the three species of birds listed as rare in the county can be now found in the basin even though reported in Shelby County. With the impoundment there is a good possibility that the number of species of water birds will be increased correlating to the formation of a permanent pool. The diversity of fish species should also increase. Permanent pooling and flow will provide habitats for more and diverse aquatic species of insects now occuring in restricted numbers in the creek and which are important in the natural aquatic food web. Species diversity among the algae in the stream and lake would improve providing a greater abundance of producers in the stream and at the same time insuring a more balanced aquatic environment.

SECTION II

LAKES, SOIL POLLUTION, WATER QUALITY

Rare higher terrestrial plants of the Nonconnah Creek Basin.



● <u>Dracopsis</u> <u>amplexicaulis</u> (Fifty yards west of Lamar Avenue at junction with Nonconnah Creek, west bank, 50 feet from bed)

◐ <u>Franseria acanthicarpa</u> (East side of Kirby Road on north bank of Nonconnah Creek, 150-200 feet from stream bed)

<u>Ammannia</u> <u>auriculata</u> (Alongside Quince Road, 1.7 miles north of Winchester, west bank of Nonconnah Creek, 50 feet from stream bed)

⊙ <u>Erythronium</u> <u>albidum</u> (South of Winchester where small tributary crosses just east of Forest Hill Road, east bank, 50 feet from bed)

APPENDIX A

NONCONNAH BASIN LAKE INVENTORY

METHOD: Visual inspection and talking with owners of lakes.

U. S. Army Corp of Engineers Maps (scale 1:62,500) were used to locate the lakes. No lakes smaller than those shown on these maps were included in our survey.

Lakes shown on map	247
Lakes drained	48
Lakes now in Basin	199

		Fishing	Livestock	Swine
Farm Ponds	154	114	139	4
Industrial	9			
Parks & Golf Courses	13	9		
Fishing	23	23		
Total	199	146		

FOR RECREATION

Farm	114
Parks & Golf Course	13
Fishing	23
	150

APPENDIX B

METHODS USED TO DEFINE THE SOURCE AND EXTENT OF SOIL POLLUTION

To fulfill requirements to define the source and extent of soil pollution in the Nonconnah Basin, three approaches were taken. First the gross amount of erosion and the estimated soil runoff for the basin were obtained from the Soil Conservation Service. The Soil Conservation Service figures for runoff were checked from laboratory data taken under measured flow conditions. Data was broken down into conditions of high flow, average flow, low flow, and no flow. The number of days that these conditions persist was also estimated to obtain the silt load at Site 3 (ptA) and Site 3 (ptC) in tons/yr. The area was then scanned according to soil types in the basin as shown on Soil Conservation Service Soil Maps. The prevalent types were summarized with respect to general erosion characteristics and land treatment techniques required to limit erosion. Finally, the types and amount of pesticides used in the basin were obtained; and the amount of runoff on a basin-wide basis was calculated for each chemical used. The designations of Site 3, Site 13, Pt. A, and Pt. C correspond to locations of the proposed main reservoir (Site 3-Pt. A) and a desilting reservoir (Site 13-Pt. C) as shown on page 60.

SILT LOAD CALCULATIONS FOR
SITE 3 (PT. A) AND SITE 13 (PT. C)

Pt. A Site 3 Main Dam Site

<u>Max Flow</u>: 4000cfs = 258 5MGD Rainfall = 1.5 in.
Susp. solids: 1092 mg/l
Daily silt load: 11,780 ton/day
Occurrence frequency: 10 days/yr
Yearly silt load: <u>117,800 ton/yr</u>

<u>Avg Flow</u>: 150 cfs = 97 MGD
Susp. solids: 420 mg/l
Daily silt load: 170 tons/day
Occurrence frequency: 200 days/yr
Yearly silt load: <u>34,000 tons/yr</u>

<u>Low Flow</u>: 5 cfs = 3.24 MGD
Susp. solids: 150 mg/l
Daily silt load: 2.025 tons/day
Occurrence frequency: 150 days/yr
Yearly silt load: <u>304 tons/yr</u>

Total Yearly Silt Load
At Point A (Site 3) <u>152,104 tons/yr</u>

Soil Conservation Service Estimated
Silt Load At Point A <u>98,745 tons/yr</u>

Pt. C Site 13

<u>Max Flow</u>: 1520 cfs = 983 MGD Rainfall = 1.5 in.
Susp. solids: 788 mg/l
Daily silt load: 3225 tons/day
Occurrence frequency: 10 days/yr
Yearly silt load: <u>32,250 tons/yr</u>

Pt. C Site 13 (continued)

Avg Flow:	15 cfs = 9.7 MGD Susp. solids: 120 mg/l Daily silt load: 4.85 ton/day Occurrence frequency: 200 day/yr Yearly silt load: 970 ton/yr
Low Flow:	1.0 cfs = 0.646 MGD Susp. solids: 80 mg/l Daily silt load: 0.215 ton/day Occurrence frequency: 100 day/yr Yearly silt load: 21.5 tons/yr
No Flow:	No erosion contribution Occurrence frequency: 55 days/yr

Total Yearly Silt Load At Point C (Site 13)	33,242 tons/yr
Soil Conservation Service Estimated Silt Load At Point C	43,069 tons/yr

CONCLUSIONS OF SILT LOAD CALCULATIONS

Point C (Site 13) is estimated to contribute 22% of the silt load at point A (Site 3) according to calculations based on laboratory data. According to the Soil Conservation Service figures, pt. C contributes 44% of the silt load at point A.

Laboratory figures used as the basis of these calculations come from initial readings of suspended solids and flow rates from the eleven samples taken. Estimates of the frequency of occurrence of the cited conditions are projected from the three month sampling period. For more accurate silt load calculations, more frequent and prolonged sampling of creek conditions would be necessary.

Erosion Characteristics of the soil

The Nonconnah Basin is composed primarily of the Memphis Silt Loam Series, Grenada Silt Loam Series, Waverly Silt Loam, Loring Silt Loam, and Falaya Silt Loam. In addition, large areas along Nonconnah Creek within the city limits are silty filled land designated Fs. A brief description of the general characteristics of these soil types with emphasis on erosion properties and land treatment methods to control erosion follows.

The Memphis Silt Loam Series within the basin varies from 2-5 percent to 12-30 percent slopes, severely eroded. The series consists of deep, well-drained, silty soils on uplands, formed in loess ranging in thickness from about 100 feet in the western part of the county to about 4 feet in the eastern part of the county. The plow layer is brown, very friable silt loam 7 inches thick underlain in the uppermost part of the subsoil by 10 to 20 inches of brown to reddish-brown, friable silty clay loam. Below this is brown to reddish-brown, friable silt loam several feet thick. As the slope of the soil increases, the thickness of the plow layer and uppermost subsoil layer decreases. The main management problems of these soils are the control to runoff and erosion. Even with gentle 2-5 percent slopes, some washing occurs if the soil is cultivated. Therefore, clean-tilled row crops should not be grown every year. Suitable cropping systems should be established such as alternating years of a row crop and hay or pasture land. Contouring, terracing, and stripcropping should be practiced. In addition, grasses should be established in natural watercourses. Slopes of greater than 8-12 percent are not suitable to frequent cultivation but make excellent pasture or woodlands on the steeper slopes.

Grenada Silt Loam occurs in the basin on 0-2 percent to 8-12 percent slopes, eroded. The series consists of moderately well drained, silty soils that have a fragipan. The soils formed in loess more than 4 feet thick. The surface layer is brown, very friable silt loam 6-12 inches thick, underlain by a yellowish-brown, friable silt loam subsoil to a depth of about 2 feet. Below this layer is a brittle, compact fragipan 1-3 feet thick. Under the fragipan is brown, friable silt loam extending to a depth of several feet. Runoff is slow, tilth is generally good and seasonal wetness because of the impenetrable fragipan limit the hazard of erosion on the lesser slopes. On slopes of greater than 5 percent, extensive land treatment however is required to limit erosion. Suitable cropping systems of 1 year of row crop and 4 years of grass and legumes as hay and pastureland when coordinated with contour farming, terracing, stripcropping, and grassed waterways help control erosion. Because of the limited movement of water, runoff is rapid on the steeper slopes, especially during rainy seasons. On slopes of greater than 8 percent, row crops are not suited, but well-maintained pastures or hay should be established to control erosion.

Waverly Silt Loam is poorly drained, level, silty soil on low, broad first bottoms. It occurs extensively along the borders of Nonconnah Creek. In the winter and spring the water table is seldom more than a foot below the surface. After the soil dries, row crops can be grown every year without fear of excessive erosion. More than half of the acreage is woodland, further restricting the stream silt load attributable to Waverly soil

The Loring Silt Loam series occurs on 2-5 percent to 5-12 percent slopes, severly eroded. The series consists of deep, moderately well drained silty soils that have a fragipan. The plow layer is brown, very friable silt loam about 7 inches thick, underlain by brown, friable to firm silt loam subsoil. A weak fragipan begins at a depth of about 30 inches and is from 12-25 inches thick. Below the fragipan is brown, friable silt loam extending to a depth of several feet. The soil is used mainly for crops and pasture, very few tracts are wooded. Slope is the main limitation; therefore, row crops should not be grown every year even on the lesser slopes. A suitable cropping system ranging from alternating years of row crop and hay and pasture crops on the lesser slopes to 1 year of row crop to 3 years of grass and legumes on slopes of 5-8 percent help reduce runoff and control erosion. On slopes of greater than 8 percent, row crops should not be grown because the soil erodes easily. All crops should be grown on contour, with stripcropping, or with a system of terraces. Grassed waterways are also necessary. Even where woodlands exist on slopes of greater than 8 percent, the hazard of erosion is moderate. Therefore, unnecessary disturbance of the soil should be avoided. Grasses and legumes are more effective erosion preventors.

The Falaya Series consists of somewhat poorly drained, nearly level silty soil on bottom lands. Falaya Silt loam occurs extensively along Nonconnah Creek and throughout the county except on the Mississippi River Bottoms. The surface layer is brown, friable silt loam 6 inches thick underlain by friable silt loam containing brown and gray mottles to a depth of several feet. The water table rises to within a foot of the surface in the winter and spring. Floods cover most of the areas but the floodwaters rarely stand more than a few hours. After the soil dries in the spring, it is well suited to nearly all commonly grown crops. Excess water is the only management problem. The erosion hazard is nominal.

Silty Landfill consists of moved material for building up sites for industrial, commercial or residential development. Some areas have been filled with trash, tree trunks, slabs of concrete and other materials that could cause building settlement. Areas that are adjacent to graded land, silty materials, generally consist of clean, silty fill. No erosion characteristics are given.

Graded land, silty materials occurs on areas which have been graded in preparation for subdivisions and for commercial and industrial buildings. The depth to which these areas have been graded varies from a few inches to 5 feet or more. Grenada, Loring, and Memphis soils were predominant in these areas before grading. These areas range in size from a few acres to about 400 acres on the outer edges of the city and in the county just outside the city. These areas especially while under development contribute considerable sheet erosion.

NONCONNAH BASIN SOIL SURVEY

SOIL POLLUTION BY PESTICIDES

Based on agricultural statistics for 1970-71 and a farm survey, we have produced the following tables.

The broad calssification of pesticide was broken down into insecticide, fungicide, and herbicide in Tables 2 & 3.

Table 1

TOTAL PESTICIDE USED IN THE NONCONNAH BASIN

CROP	ACRES OF CROP IN BASIN	TOTAL PESTICIDE USED PER ACRE-YR.	TOTAL PESTICIDE USED PER YEAR
Cotton	5400	2.71 Lb.	14600 Lb.
Soybeans	20430	0.97	19800
Corn	1540	1.68	2590
Nursery	1655	5.94	9815
Total	29025	Avg. use = 1.6 lb/Acre-yr.	46815 Lb.

Table 2

POUNDS/ACRE-YEAR OF PESTICIDES (I,H,F) USED

CROP	INSECTICIDE	HERBICIDE	FUNGICIDE	TOTAL PESTICIDE
	Lb/Acre-yr.	Lb/Acre-yr.	Lb/Acre-yr.	Lb/Acre-yr.
Cotton	0.854	1.668	0.179	2.71
Soybeans	0.000	0.960	0.009	0.97
Corn	0.025	1.650	0.000	1.68
Nursery	3.530	1.240	0.170	5.94
Total	4.409	5.518	1.358	11.30

Table 3

POUNDS/YEAR OF PESTICIDES (I,H,F) USED

CROP	INSECTICIDE	HERBICIDE	FUNGICIDE	TOTAL PESTICIDE
	Lb/yr	Lb/yr	Lb/yr	Lb/yr
Cotton	4600	9000	962	14,600
Soybeans	0	19600	184	19,800
Corn	39	2540	0	2,590
Nursery	5850	2055	1,940	9,845
Total	10489	33195	3,086	46,835

METHODS FOR PESTICIDE STUDY

The amount of acres of the four major crops in the basin (cotton, soybeans, corn, and nursery stock) were obtained from the Tennessee Agricultural Statistics Booklet. With this information and the recommended use rates of the various pesticides (insecticides, fungicides, and herbicides) as supplied by the Tennessee Agricultural Extension Service the amount of chemicals used on crops was computed on a lb. per year basis. The amount of chemicals used on nursery stock in Shelby County was supplied by the Shelby County Health Department. The amount of chemicals used on nursery stock in the Nonconnah Watershed was then determined on a direct area ratio basis, the acreage in the basin and in Shelby County coming from the 1971-72 "List of Tennessee Certified Nurseries..." (State of Tennessee Department of Agriculture).

Chemical characteristics of each of the pesticides used in the basin were then defined according to manuals provided by the Shelby County Health Department and the Plant Industries Division of the USDA. Included in the characteristics were commonly used names, chemical composition, toxicity and residual characterisiics. From the soil residual period the probability of runoff with respect to the active period was computed as follows: a chemical with a soil residual life of 7 months would have a yearly probability of runoff of 7/12. For chemicals with residual times of less than 4 months (used during the growing season) the probability for runoff was computed on a four month basis. That is, all of the possible runoff will occur during the growing season but will be recorded as runoff on a yearly basis. For instance, a chemical with a residual life of 1 month would have a probability of runoff of 1/4. For long residuals of greater than one year, runoff probability was computed from data showing loss over a given period as if no residual were initially present to contribute to runoff. For instance, a chemical with a residual life of 12 years would have a yearly runoff probability of 1/12.

Once the probability of runoff with respect to chemical characteristics was defined, the amount of soil residual that actually gets into the streams was found by using the same 10% factor applied by the Soil Conservation Service to the gross amount of erosion as that amount of erosion reaching the streams. As can be seen, this method assumes that all the pesticide treated area experiences some erosion - an assumption that causes the amount of runoff to appear higher than it actually is.

The figure given as applicable acreage was obtained by considering the probable use characteristics. That is, for four comparable chemicals the amount used was considered to be that amount necessary to individually treat 1/4 of the acreage for the crop.

Since insecticides are used in amounts dependent upon the seasonal severity of insect problems, lb. per year figures were based on an average intensity season when possible. The same method was applied to fungicides and herbicides.

Using the lb. of pesticide/acre times the applicable acreage, the amount of each pesticide used in lb/yr. was computed. This number times the probability of runoff times the 10% erosion factor gives the runoff in lb/yr. It must be noted that this lb/yr. figure is on a watershed-wide basis. In some cases data was available on a ppm basis such that the same runoff calculations could be made on a ppm basis with respect to the soil. Again the ppm runoff number is on an overland flow basis for the whole basin and does not indicate a prediction as to the ppm of pesticide that would be found in the streams upon dilution.

Because of the methods applied to the runoff calculations it is expected that the numbers indicate the maximum possible runoff that could occur under adverse conditions of erosion.

PESTICIDE CHARACTERISTICS, USE AND CALCULATED POSSIBLE RUNOFF IN THE NONCONNAH CREEK WATERSHED

I. INSECTICIDES

A. Corn - Very little or no insecticide used

B. Cotton - (5400 Acres)

<u>Toxaphene</u>: Octachlorocamphene

Use dependent on insect age and resistance

Use Rates: early season: 1 pt/acre
middle season: 2 pt/acre = 2.08 lb/A
late season: 3 pt/acre

Toxicity: Stable, persistant, highly toxic long residual; fish can build up resistance at 100 ppm application = 45% residual loss in 14 yr.

Applicable Acreage: 1800 A @ 2.08 lb/A

Runoff: Max 540 ppm/yr
Max 10.8 lb/yr

Runoff probability: .03

<u>Malathion</u>: S-(1,2-bis(ethoxycarbonyl)ethyl) 0,0, dimethyl phosphorodithioate

Used in 5% solutions

Rates: early season: 1.5 pt/acre = 1.57 lb/A
late season: use methyl parathion

Toxicity: highly toxic

Residual: plant surfaces: 1-3 days
unexplsed surfaces: 2 wks to 1 mo.
Soil: Short Residual (1 wk) not hazardous
Water: No groundwater pollution

One of safest to use

Tests on Watershed @ 2 lb/A = Watershed Unaffected

Runoff probability: 1/16

Applicable Acreage: 1800 A

Runoff: 112 ppm/yr
17.6 lb/yr

Bidrin (dicrotophos): 3 hydroxy-n, n-dimethyl-
cis-crotonamide
dimethyl phosphate
Use limited primarily to early season
used in 75% solution, water insoluble
Rates: 2 oz/A
Toxicity: highly toxic, dangerous to use
Residual: Soil: Short
Water: Short
Unexposed surfaces: 30 days
Very little or no use due to danger
Applicable acreage: 0
Runoff: none

Methyl Parathion: 0,0-dimethyl o-p-nitrophenyl
phosphorothioate
Used in 25% solution
Rates: early season: 1 pt/acre
late season: 2 pt/acre
Toxicity: highly toxic, one of most poisonous
phosphates
Residual: plant surfaces: a few days
unexposed surfaces: 1 mo.
soil: 1 mo.
Runoff probability: 1/4
Applicable Acreage: 1350 A
Runoff: 43.2 ppm/yr
69.5 lb/yr

Toxaphene/Methyl Parathion Mixture
Used in Tox. Meth. Par. Ratio = 8:2 in
60% solution
Rates: early season: 3.3 pt/acre
late season: used for boll weevil
control when necessary - very seldom
1 pt mixture/A to 2 pt mixture/A
Toxicity: very toxic
Applicable Acreage: 540 A
Runoff: Toxaphene: 4.5 lb/yr
Meth. Para.: 9.3 lb/yr

Sevin (Carbaryl): 1-naphthyl methylcarbamate
Premixed in 80% solution, used widely for
cutting and chewing insects
Rate: 0.8 lb/Acre, up to two applications
per season
Toxicity: Slight to moderate
Residual: Soil: 3 wks.
Water: Relatively short

Runoff probability: 3/16
Applicable Acreage: 1800 A
Runoff: 574 ppm/yr
40.5 lb/yr

Disyston (disulfoton): 0,0-diethyl S-2 (ethylthio) ethyl phosphorothioate
Used in 7.5 to 10% formulated solution
Rate: 3-4 lb mixture/acre
Toxicity: very highly toxic, to be used only by professional operators
Residual: unexposed surfaces: 6-8 wks.
soil: 40-180 days
water: 1 season
Applicable Acreage: 0
Runoff: None

Thimet (phorate): 0,0-diethyl S-(ethylthio/ methyl/phosphorodithioate)
Used in 7.5 to 10% formulated solution
Rate: 3-4 lb mixture/acre
Toxicity: very toxic, to be used only by professional operators
Residual: unexposed surfaces: 6-8 wks.
soil: 60 days
Applicable Acreage: 0
Runoff: none

C. Soybeans - Very little or no insecticide used
D. Nursery (1655 Acres)
Chlordane: (1,2,3,5,6,7,8,8-octachloro-2,3, 3a,4,7,72-hexahydro-4,7-methanoindene)
0.86 lb used in basin
Toxicity: moderate to highly toxic
Residual: plant surfaces: long
unexposed surfaces: long
water: long
soil: several years
at 50 ppm application = 50% loss in 8 yrs.
Probability of Runoff: 0.0625
Runoff: 0.00535 lb/yr.

DDT: 1,1,1-trichloro-2,2-bis(p-chlorophenyl) ethane
505 lb in Shelby Co., 61.6 lb in basin
Toxicity: moderate to high
very stable and persistent, use phased out & now banned.

Residual: plant surfaces: 12-16 days
unexposed surfaces, soil, water: several years

100 ppm to sandy loam: = 39% residual after 17 years (lb/A application may persist as residual for 30 years with little decrease in concentration for first 9 yrs.)
Probability of Runoff: 0.036
Runoff: 0.222 lb/yr

<u>Diazinon</u>: 0,0-diethyl 0-(2-isopropyl-4-methyl-6-pyramidyl) phosphorothioate
0.6/lb in basin
Toxicity: moderate to high
Residual: plant surfaces: 1 week
unexposed surfaces: 2 mos.
soil: 10 days
Probability of Runoff: 1/16
Runoff: 0.0038 lb/yr

<u>Dieldrin</u>: not less than 85% of 1,2,3,4,10,10-hexachloro-6,7 epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-<u>endo</u>-<u>exo</u>-5,8-dimethanonaphthalene
3229 lb/Shelby Co., 3009 by USDA for roadside white fringe beetle control
26.8 lb in basin by nursery, - 750 lb in basin by USDA
Toxicity: high
Residual: long persistence
25 ppm application had loss of 50% in 8 years
Plant Surf: 1-6 wks
Unexposed surf: several mos.
Soil: several years
Water: several years
Probability of Runoff: 0.0625
Runoff: 0.168 lb/yr - nurseries
<u>4.7 lb/yr - USDA</u>
4.869 lb/yr Total Runoff

<u>Disyston</u> (Disulfoton)
characteristics previously discussed
92 lb used in basin
Probability of runoff: 1
Runoff: 9.2 lb/yr

Lindane (Isotox): gamma isomer of 1,2,3,4,
5,6-hexachlorohexane of
99+% of purity

19.4 lb used in basin
Toxicity: moderate to high
Residual: Plant surf: 10-14 days
unexposed surf: 1 year
soil: 1 year
water: long residual
At 100 ppm application, 10% residual after 14 yrs.
Probability of Runoff: 0.064
Runoff: 0.124 lb/yr

Malathion

characteristics previously discussed
91 lb. used in basin
Runoff: 0.57 lb/yr. from nursery

Sevin (Carbaryl)

characteristics previously discussed
150 lb used in basin
Runoff: 2.82 lb/yr from nursery

Lead Arsenate

11.6 lb used in Basin
Toxicity: moderate
Residual: Soil: 15 yrs. as arsenic
Probability of Runoff: 1/15
Runoff: 0.233 ppb as Arsenic
0.0774 lb/yr as Arsenic

Thimet (Phorate)

characteristics previously discussed
0.25 lb used in Basin
Probability of Runoff: 0.50
Runoff: 0.0125 lb/yr

II. FUNGICIDES

A. Corn - very little to no fungicide used.
use of pretreated, resistant strains of seed widespread.

B. Cotton - use of pretreated seed widespread
additional treatment after planting also occurs.

Terraclor Super-X (PCNM): pentachloronitrobenzene

Used in 10% solution
Rate: 10 lb/100 lb secd

Toxicity: non-toxic to slightly toxic
Residual: Soil: 1 season
(80% loss in 10 mo.)
Runoff: Assume none by seed treatment

Demosan: 1,4-dichloro-2,5 dimethoxybenzene used in 10% solution
Rate: 5 lb/100 lb seed
Toxicity: non-toxic to slightly toxic
Residual: soil: 1 season
Runoff: none

Mixture { TCNB: 1,2,4,5-tetrachloro-3-nitrobenzene
CAPTAN: N-(trichloromethylthio)-4-aplohexane-1,2-dicarboximide }
used in 1:1 mixture in 10% solution
Rate: 10 lb/100 lb cotton seed
Toxicity: TCNB: very slightly toxic
CAPTAN: very slightly toxic
Residual: Plant surf: 1-2 weeks
soil: 2 weeks
unexposed surf: several weeks
Runoff: none-seed treatment

C. Soybeans - (20,430 A) fungicide rarely used
CAPTAN:
characteristics discussed previously
Rate: 10 lb/acre
Probability of Runoff: 1/8
Runoff: 254 lb/yr

D. Nursery
Bordeaux Mixture: mixture of copper sulfate and calcium hydroxide forming a basic copper sulfate
Rate: 0.25 lb in Basin
Toxicity: slight to moderate
higher fish tolerance in hard waters
Residual: soil, water, unexposed surfaces: stable, insoluble, adsorbs tightly to soil particles.
Probability of runoff: 1
Runoff: 0.025 lb/yr as copper sulfate

Copper Sulfate
122 lb. used in Basin
Toxicity: slight to moderate
Residual: soil: 1 year
Probability of runoff = 1
Runoff: 12.2 lb/yr

Folpet: N-(hichloromethylthio) phthalimide
1.71 lb. used in Basin
Toxicity: very slight
Residual: plant surfaces: 1-2 weeks
Probability of Runoff: 1/8
Runoff: 0.0212 lb/yr

Fermate (Ferbam): ferric dimethyl dithio-carbamate
2.44 lb. used in Basin
Toxicity: slight to moderate
Residual: plant surfaces: 40 days
soil: 2 mos.
Probability of Runoff: 0.50
Runoff: 0.061 lb/yr

Karathane (Dinocap): 2-(methylheptyl)-4,6-dinitrophenyl-crotonate
0.244 lb. used in Basin
Toxicity: slightly toxic
Residual: plant surfaces: 4-6 wks unless washed off
water soluble, washed off by rain
Probability of Runoff: 5/16
Runoff: 0.00764 lb/yr

Maneb: Manganese (or manganous) ethylene-bisdithiocarbamate
8.4 lb. used in Basin
Toxicity: slight to moderate
Residual: plant surfaces: 15-30 days
soil: half-life = 1-2 weeks
water: short
Probability of Runoff = 1/4
Runoff: 0.210 lb/yr

Sulfur
79.5 lb. used in Basin
Toxicity: non-toxic to slightly toxic
Residual: plant surfaces: 2-3- weeks
unexposed surfaces
soil
water
long residual? 4 yrs.

Probability of Runoff: .25
Runoff: 1.98 lb/yr

Zineb: Zinc ethylene bisdithiocarbamate
5.86 lb. used in Basin
Toxicity: almost non-toxic
Residual: plant surfaces: 1 mo.
soil: 45 days
Probability of Runoff: 0.33
Runoff: 0.195 lb/yr

III. HERBICIDES

A. Corn (1540 A)

Atrazine: 2-chloro-4-ethylamino-6-isopropylamino-s-triazene
Rate: as pre-emerge: 2-2.4 lb/acre
as post-emerge: 2 lb/acre
Note: premerge seldom requires postmerge treatment
Toxicity: slightly toxic
Residual: at 2 lb/acre residue lasted 17 mo.
Probability of Runoff: 0.70
Applicable Acreage: 770 A
Runoff: 118 lb/yr

2,4-D: 2,4 dichlorophenoxy acetic acid
applied once/season
Rate: 0.5 lb/acre
Toxicity: moderate
Residual: soil: 2-3 weeks, longer at higher use rates
Probability of Runoff: 3/16
Runoff: 7.22 lb/yr

B. Cotton - (1540 acres)

Cotoran (Fluometuron): 3-(m-trifluoromethylphenyl)-1,1-dimethylurea
applied once/season as premerge
Rate: as premerge:
Sandy soil: 1 lb/acre
Silty loam: 1.5 lb/acre
Silty clay loam: 2.0 lb/acre
Toxicity: slight to moderate
Residual: 1 month
Probability of Runoff: 1/4
Applicable acreage: 360 A
Runoff: 13.5 lb/yr.

Cotoran/MSMA or Cotoran/DSMA Mixture
used as post-emerge
MSMA: methanearsonic acid, (nonosodium salt)
Rate: 1.6 lb. lb. MSMA + 1 lb. Cotoran/acre
Toxicity: MSMA: moderate as arsenic
Residual MSMA: about 6 yr as arsenic
Probability of Runoff: 1/6
Applicable acreage: 360 acres
Runoff: 9 lb/yr as cotoran
9.8 lb/yr MSMA as arsenic
DSMA: $CH_3AsO(ONa)_2$/cotoran mixture
used to control more difficult post-emerge problems
Rate: 2 lb DSMA + 1 lb. cotoran/acre
Toxicity: same as MSMA
Runoff: 9 lb/yr cotoran
12 lb/yr DSMA as arsenic

Treflan (Trifluralin): Alpha, Alpha, Alpha-trithcoro-2,6-dinitro-N,N-dipropyl-p-toluidine
Used once/season as pre-emerge
Rates: sandy loam: 0.50 lb/acre
silt loam: 0.75 lb/acre
silty clay loam: 1.0 lb/acre
Toxicity: slight
Residual: rapid decomposition by volatilization, uv light, microbial decomposition.
No residual one season to next at recommended rates
Probability of Runoff: 0.50
Applicable acreage: 360 A
Runoff: 13.5 lb/yr

Planavin
pre-emerge as treflan
Rate: same as treflan
assume same characteristics as treflan
Runoff: 13.5 lb/yr

Comex
pre-emerge, once/season
Rate: sandy loam: 0.75 lb/acre
silt loam: 1.0 lb/acre
silty clay loam: 1.1 lb/acre

Assume same characteristics as Treflan
Applicable acreage: 360 A
Runoff: 18 lb/yr.

<u>DSMA (disodium methanearsonate)</u>
applied as post-emerge weed control once to twice/season
Rate: 2 lb/acre with surfactant
toxicity: moderate as arsonic
Residual: 6 years as arsonic
soluble salt leaches readily through soil; arsenic may remain considerable time.
Applicable acreage: 360 A
Probability of Runoff: 1/6
Runoff: 12 lb/yr as arsenic

<u>MSMA</u>
Used at same rate as DSMA for post-emerge control
Similar characteristics to DSMA
Runoff: 12 lb/yr. as arsenic

<u>MSMA/Comex</u>
As post-emerge once/season
Rate: 0.3 lb. Comex + 2 lb. MSMA/acre
Use small, characteristics same as before mentioned

<u>DSMA/Comex</u>
As Post-emerge once/season
Rate: 0.3 lb Comex + 2 lb. DSMA/acre
Use small, characteristics same as before mentioned

C. Soybeans (20,430 Acres)
<u>Treflan</u>
Rate: applied at same rate as with cotton
0.5 to 1.0 lb/acre
as pre-emerge
Runoff: 192 lb/yr

<u>Lorox (Linuron)</u>: 3-(3,4-dichlorophenyl)-1-methoxy-1 methylurea
Used as pre-emerge once/season
Rate: 1/2 lb/acre
Toxicity: slight
Residual: soil: 6-8 wks
Probability of Runoff: 0.50
Applicable Acreage: 5100 A
Runoff: 127 lb/yr

Dinoseb (DNBP): 2,4-dinitro-6-sec-butylphenol
as pre-emerge once/season
Rate: 4-6 lb/acre
Toxicity: highly toxic to humans, rats, fish
Residual: 4 wks.
Probability of Runoff: 1/4
Runoff: 3/8 lb/yr

4-(2,4-DB): 4-(2,4-dichlorophenoxy) butyric acid
used as post-emerge
Rate: 0.2 lb/acre
Toxicity: safer to use than 2,4-D
moderate toxicity
Residual: Beta oxidized to 2,4-D
Soil: 2-3- wks. as 2,4-D
Probability of Runoff: 3/16
Applicable Acreage: 5100 A
Runoff: 19.1 lb/yr

Lasso: (Characteristics unknown)
Used as pre-emerge once/season
Rate: 2-2.5 lb/acre
Assume probability of Runoff: 0.20
Applicable Acreage: 5100 A
Runoff: 510 lb/yr

Tinaran: (characteristics unknown)
Post-emerge
Rate: 1 lb/acre + surfactant
Assume 3/16 probability as 2,4-DB
Applicable Acreage: 5100 A
Runoff: 96 lb/yr

D. Nursery

Atrazine:
Characteristics previously discussed
61 lb. used in Basin
Runoff: 4.3 lb/yr

Casoran (Dichlorobenil): 2,6-dichlorobenzonitrile
6.1 lb. used in Basin
Toxicity: moderate
Residual: 7 mo. to 1 yr.
Probability of Runoff: 0.66
Runoff: 0.403 lb/yr.

Banvel D (Dicamba): 3,6-dichloro-O-anisic acid
4.08 lb. used in Basin
Toxicity: slight
Probability of Runoff: 0.50
Residual: 2 mo. in soil
Runoff: 0.204 lb/yr

DSMA
Characteristics previously discussed
8.2 lb. used in Basin
Runoff: 0.136 lb/yr

Dacthal (DCPA): dimethyl tetrachloro-terephthalate
100 lb. used in Basin
Toxicity: slight
Residual: 60 days
Probability of Runoff: 0.50
Runoff: 5 lb/yr.

2,-4-D
Characteristics previously discussed
6.35 lb. used in Basin
Runoff: 0.118 lb/yr.

Dowpon (Dalapon): 2,2-dichloropropionic acid
0.48 lb. used in Basin
Toxicity: low toxicity to man and most animals
Residual: 2 wk. to 2 mo.
Probability of Runoff: 1/4
Runoff: 0.012 lb/yr.

Dymid(diphenamid): N-N-dimethyl-2,2-diphenylacetamide
Used as pre-emerge
6.1 lb. used in Basin
Toxicity: slight
solubility in water 260 ppm
Residual: soil: 6-8 mo.
Probability of Runoff: 7/12
Runoff: 0.356 lb/yr
15.1 ppm/yr

Eptam (EPTC): S-ethyl-N,N-dipropylthiocarbamate
Pre-emerge once/yr.
24.4 lb. used in Basin
Toxicity: slight
Residual: soil: 3-8 wk.
very volatile, tied up longer in dry soils and in those of high organic content.
Solubility: 375 ppm in H_2O
Probability of Runoff: 0.25
Runoff: 0.61 lb/yr
9.4 ppm/yr

MSMA
Characteristics perviously discussed
Runoff: 0.187 lb/yr as arsenic

Paraquat: 1,1^1-dimethyl-4,4^1-bipyridynium ion.
12.2 lb. used in Basin
Toxicity: low to moderate
Residual: soil: 6 to 23 days
rapidly adsorbs on plant surfaces
soil - inactivated upon contact with exchange sites
Probability of Runoff: 1/8
Runoff: 0.153 lb/yr.

Planavin:
Characteristics previously discussed
1.02 lb. used in Basin
Runoff: 0.05 lb/yr.

Simazine: 2-chloro-4,6-bis(ethylamino)-S-triazine
43.5 lb. used in Basin
Toxicity: moderate
Residual: soil: 1 yr.
at rate of 1-4 lb/acre persists in soil 3-6 mo. with little or no leaching under summertime conditions.
Probability of Runoff: 0.75
Runoff: 3.26 lb/yr.

Treflan:
Characteristics previously discussed
35 lb. used in Basin
Runoff: 1.75 lb/yr.

Trioxone (Triox):
23.1 lb. used in Basin
Toxicity: high
(24 hr. LC_{50} to Rainbow trout = 12 ppm)
Assume probability of Runoff = 1.0
Runoff: 231 lb/yr.

Vapam (SMDC): sodium-N-methyldithiocarbamate
4.07 lb. used in Basin
Toxicity: moderate
Residual: soil: 1 yr.
Probability of Runoff: 1.0
Runoff: 0.407 lb/yr.

APPENDIX C

DISCHARGES INTO NONCONNAH CREEK

METHOD - The data and list of polluters shown here is the compilation of data acquired from the MSU Department of Biology, the Memphis-Shelby County Health Department, the Permit Section, Navigation Branch, U. S. Army Corps of Engineers, and from conversations with a Memphis city environmental engineer.

POLLUTERS OF NONCONNAH CREEK	(GPD) FLOW	(°F) TEMP	pH	ALKAL.	BOD	COD	SS	N	P
Burk-Hall Company	3,000	W-72°		daily avg.					
2336 S. Lauderdale			6.5	72	0	122	8	0.15	0.075
PAINT MANUFACTURING PLANT		S-84°		avg. lb/dy	-	3.05		0.004	0.002
				1.8			0.2		
Carrier Ready-Mix	3,000			daily avg.					
STORM DRAIN TO				590		90	644	0.235	0.210
NONCONNAH			11.5	avg. lb/dy					
Chapman Chemical Co.*	6,000			daily avg.	7				0.2
OPEN DITCH TO									
NONCONNAH				avg. lb/dy					
Construction Aggregates,	180,000	W-45°		daily avg.					
Inc.			6.9	54	25	266.56	13984	.494	.201
CARRIER RD. & NON-		S-75°		avg. lb/dy					
CONNAH CREEK				81	37	399.84	20976	.134	.741
Coyne Cylinder Co.	1,650	W-60°		daily avg.					
155 W. Boaley Ave.			8.6	163	0	12	11	0.25	0.14
				avg. lb/dy					
				2.3	0	0.17	0.15	0.003	0.002
Delta Refinery*	720,000	W-55°		daily avg.					
			9.7	900	675	6500	850	0.3	0.2
		S-104°		avg. lb/dy					
				5390	4040	38935	5090	2	1

POLLUTERS OF NONCONNAH CREEK	(GPD) FLOW	(°F) TEMP	pH	ALKAL.	BOD	COD	SS	N	P
Hunt-Wesson 1351 Williams CANE & NONCONNAH CREEKS	1,460		6.4	daily avg. 38 avg. lb/dy 665			total solids 217 mg/l	Ammonia 28	6
ICRR Johnson Yard 545 So. Main	16,000	W-50° S-75°	7.6						
Memphis Lead Co. 304 West Industrial Avenue	15,000	W-85° S-90°	7.0	daily avg. 476 avg. lb/dy	2.4 0.3	138 17	568 71	0.1 0.01	1.5 0.19
Shevendell Ready-Mix Walker Ave. CANE CREEK TO NONCONNAH	30,000		11.5	avg. lb/dy 714	32	121	176	0.20	0.15
Jos. Schlitz Brewery* DITCH TO JOHN'S CREEK	380,000	Cooling water, weak waste							
Southern R.R. Southern Avenue STORM SEWER TO NONCONNAH	900	W- S-86°	7.3	turbidity 22	oil & grease lb/dy 3.68 mg/l 491.0	phenoles mg/l 220			

POLLUTERS OF NONCONNAH CREEK	(GPD) FLOW	($^{\circ}$F) TEMP	pH	ALKAL.	BOD	COD	SS	N	P
St. Louis - SF R.R. Capleville, Tn.	4,000	W-50° S-70°	8.6						
W.S. Jordan & Sons Mine #1	270,000	W-40°	7.2	Avg. mg/l 24	4	82.32	26,900	.637	0.251
Holmes @ Getwell SAND & GRAVEL CO.		S-63°		Avg. lb/dy 54	9	185.2	60,525	1.43	0.56

* Now discharge into Nonconnah Interceptor Sewer.

APPENDIX D

METHODS FOR MEASURING WATER QUALITY

Water quality criteria, color, turbidity, and suspended solids, were measured daily on samples taken at sample points A, B, C, D, and E over the course of the study period (see page 60). Samples were normally taken each Monday beginning March, 1972 through June 1972. At this time sampling was discontinued until a final sample was taken on June 13 because of low flow. In addition, samples were taken as soon as possible following large rainfall causing high flow in the creek and thus a high amount of erosion due to rapid run off. Grab samples were taken at each sampling time in gallon plastic jugs. Estimates of flow at each sampling point were also made by measurements of channel width, depth, and velocity. Upon return to the laboratory, the samples in the plastic jugs were then shaken well and transferred to glass gallon jugs to begin sedimentation tests. After initial attempts to define settlement zones by taken aliquots at the top and bottom of the jugs at frequent intervals over the course of a day, it was found more practical due to only minute fluctuations in the measurements to take only daily samples from approximately 1 inch below the surface in each jug. Color and turbidity were measured using the Hach Model No.585 Colorimeter. Suspended solids were determined on 25 ml aliquots using Millipore membrane filters of 0.45 M (micron) pore size. All measurements correspond to methods given in Standard Methods for Water and Wastewater Analysis.

Since colloid sizes range from 1 Å to 1 micron in size, some colloidal suspended solids were probably passed. However, the majority were filtered out. Daily sampling of each sample continued until graphs of the measured parameters indicated that the amount of clarification had reached a plateau. This time period to plateau was normally two to three weeks for each sample. After the plateau was reached, the samples were discarded. Any unusual behavior in tests or general appearance of the sample was noted (e.g., algae growth, sudden settlement or clarification such as @ sample point E.).

In addition to the normal samples taken at weekly intervals for measurement of color, turbidity, and suspended solids, grab samples were taken at downstream points (Lamar, 51 N., & Horn Lake Road) to run more extensive quality tests: pH, color turbidity, suspended solids, total solids, dissolved solids, volatile solids, alkalinity, sulfates, phosphates, dissolved oxygen, Chemical oxygen demand, Biochemical oxygen demand, and phenols according to standard methods.

Also, heavy metal, pesticide, and other determinations were performed on two bottom samples taken from the stream bed near the Highway 51 South and Horn Lake Road bridges. The two samples of soil were transported to laboratory, where one was serially extracted with deionized water for 24 hours and the other serially extracted with hexane for 24 hours. Total organic carbon, phosphate, nitrogen, and heavy metals (copper, lead, mercury, arsenic, cadmium, chromium, and cyanide) were performed on the aqueous extracts while gas chromatographic analyses of the hexane extracts were performed for pesticides and insecticides. This information was requested by the Environmental Protection Agency relative to any possible leachates from bottom deposits if these deposits are disturbed.

GENERAL WATER POLLUTION PARAMETERS OF NONCONNAH CREEK

Grab samples were taken Thursday, June 1, 1972 during low flow at three locations: Lamar Ave., Hwy. 51 S., and at Horn Lake Road. All tests were performed according to standard methods.

	LAMAR	HWY. 51 S	HORN LAKE
BOD (5), mg/l	4.2	5.0	13.2
COD, mg/l	46	54	61
DO, mg/l	7.3	6.1	6.3
pH	7.6	7.3	7.5
Pheonl, mg/l			0.09
Total Alkalinity, mg/l As $CaCO_3$	26	42	82
Total Solids	630	414	424
Suspended Solids	572	324	228
Volatile Solids	34	10	88
Sulfates, mg/l	4160	4800	5000
Total phosphates			0.25

COLOR, TURBIDITY, AND SUSPENDED SOLIDS DATA

The following are tabular and graphical data which are the results of tests for color, turbidity, and suspended solids on samples taken at the specified points A,B, and C. In addition, data is included for sample points D and E, sampling at which began on April 29. Sample point D is located on Whitehaven-Capleville Road about ¼ mile west of the intersection with Reynolds Road. Sample point E is located on Bailey Station Road near the intersection with Collierville Road.

NONCONNAH CREEK
SAMPLE POINT -A-

Sample 1   3/27/72

DATE & TIME		COLOR	TURBIDITY	S.S.
3/27	1500	520	160	145
3/28	0800	500	142	260
3/28	1300	470	140	44
3/28	1600	480	145	104
3/29	0830	340	100	124
3/29	1700	370	120	88
4/3	0930	310	80	4
4/4	0900	300	80	--
4/5	0900	290	80	44
4/6	1100	280	75	--
4/7	1600	260	65	0

Sample 2   4/3/72

4/3	1530	220	55	26
4/4	0900	210	50	--
4/4	1630	190	42	8
4/5	0900	180	40	20
4/6	1100	150	35	--
4/7	1600	150	38	--
4/10	1700	130	35	40
4/11	1700	130	30	20
4/12	1900	110	25	52
4/13	1600	120	30	56
4/17	1400	110	35	4

Sample 3   4/10/72

4/11	2000	480	145	136
4/12	1900	340	105	96
4/13	1600	320	85	72
4/17	1400	300	75	68.
4/18	1500	280	80	76
4/19	1700	290	80	16

Sample 3 4/10/72 (continued)

DATE & TIME		COLOR	TURBIDITY	S.S.
4/20	1530	280	80	24
4/21	2100	280	80	36
4/25	1400	260	74	16
4/26	1300	260	70	32
4/28	1130	250	65	28

Sample 4 4/17/72

4/17	1700	500	150	100
4/18	1500	380	105	56
4/19	1700	350	100	48
4/20	1530	300	82	40
4/21	2100	300	82	16

Sample 5 4/25/72

4/25	1045	490	150	92
4/26	1300	440	145	68
4/27	1400	400	114	36
4/28	1130	385	103	56
4/29	1300	360	95	28
5/1	1600	360	97	52
5/2	1500	350	95	60
5/3	1700	350	96	32
5/4	1400	350	95	32
5/5	2100	320	90	8

Sample 6 Rainfall = 1.5 in. 4/29/72 Flow = 6000 cfs

4/29	1300	2350	840	1092
5/1	1600	1050	330	200
5/2	1500	860	240	152
5/3	1700	960	280	172
5/4	1400	880	255	148
5/5	2100	800	235	108
5/8	1500	600	160	148
5/9	1530	300	80	40
5/10	1530	280	75	40
*5/11	1700	570	160	48
*5/12	1400	520	160	92

*disturbed samples

Sample 6 (continued)

DATE & TIME		COLOR	TURBIDITY	S.S.
5/5	1600	270	63	8
5/17	1700	300	80	--

Sample 7 5/1/72 Rainfall = 1.0 in. Flow = 68.6 cfs

5/1	1600	560	160	204
5/2	1500	440	130	80
5/3	1700	415	140	88
5/4	1400	390	110	52
5/5	2100	380	110	16
5/8	1500	350	95	52
5/9	1530	340	99	68
5/10	1530	338	96	40
*5/11	1700	330	91	88
*5/12	1400	330	100	80
5/15	1600	330	82	48
5/16	1400	290	75	32
5/17	1700	290	73	--

*disturbed samples

Sample 8 5/8/72 Rainfall = 0.5 in. Flow = 150 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/8	1300	1600	580	420
5/9	1530	960	315	192
5/10	1530	760	230	132
5/11	1700	680	220	172
5/12	1400	500	143	116
5/15	1600	360	90	60
5/16	1900	360	95	76
5/17	1700	360	100	--
5/18	1800	365	100	48
5/19	1700	320	98	108
5/22	1700	300	85	68
5/23	1700	375	98	50
5/24	1600	460	125	72
5/25	1450	380	110	60

Sample 9 5/15/72 Rainfall = .22 in. Flow = 3.21 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/15	1600	440	119	80
5/16	1400	380	110	80
5/17	1700	315	86	--
5/18	1800	310	85	24
5/19	1700	300	80	76
5/22	1700	260	80	40
5/23	1700	300	79	12
5/24	1600	295	80	36
5/25	1450	240	75	16
5/29	1430	260	60	20

Sample 11 5/22/72 Rainfall = 0 Flow = 0.834 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/22	1700	465	140	76
5/23	1700	370	109	56
5/24	1600	340	98	56
5/25	1450	300	90	52
5/29	1430	265	65	40
5/30	1530	260	71	--
5/31	1530	250	73	18
6/2	1900	215	70	28
6/5	1600	220	68	16
6/8	1430	240	55	32
6/13	1430	200	53	60

Sample 10 5/17/72 Rainfall (2000-2200 hrs. on 5/16) = 1.5 in. Flow = 600 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/17	1700	5850	2210	4216
5/18	1800	1920	600	416
5/19	1700	1320	520	296
5/22	1700	930	290	200
5/23	1900	740	205	100
5/24	1600	500	140	108
5/25	1450	400	109	52
5/29	1430	350	89	40
5/31	1530	285	78	20
5/2	1400	310	82	44
6/5	1600	240	65	0
6/8	1430	240	49	28
6/13	1430	215	54	52

NONCONNAH CREEK
SAMPLE POINT -B-

Sample 1   3/27/72

DATE & TIME		COLOR	TURBIDITY	S.S.
3/27	1500	300	80	20
3/28	0800	280	75	112
3/28	1300	290	80	36
3/28	1600	280	80	40
3/29	0830	220	50	80
3/29	1700	220	62	48
4/3	0930	170	40	8
4/4	0900	175	50	--
4/5	0900	175	45	8
4/6	1100	150	35	--
4/7	1600	140	30	--

Sample 2   4/3/72

4/3	1530	110	20	16
4/4	0900	120	25	--
4/4	1630	90	20	2
4/5	0900	100	15	4
4/6	1100	85	20	--
4/7	1600	70	16	--
4/10	1700	70	15	0
4/11	1700	50	10	4
4/12	1900	35	10	4
4/13	1600	40	10	24
4/17	1400	35	2	28

Sample 3   4/10/72

4/11	2000	185	50	32
4/12	1900	120	40	12
4/13	1600	120	30	12
4/17	1400	80	20	16
4/18	1500	90	20	10

Sample 3 4/10/72 (continued)

DATE & TIME		COLOR	TURBIDITY	S.S.
4/19	1700	90	15	4
4/20	1530	80	30	4
4/21	2100	75	25	4
4/25	1400	80	20	4
4/26	1300	80	23	0

Sample 4 4/17/72

4/17	1700	320	95	72
4/18	1500	285	72	40
4/19	1700	250	65	20
4/20	1530	230	62	28
4/21	2100	220	55	4

Sample 5 4/25/72

4/25	1045	210	55	28
4/26	1300	170	44	16
4/27	1400	140	30	8
4/28	1130	100	20	0
4/29	1300	70	10	0
5/1	1600	68	19	4
5/2	1500	65	15	0
5/3	1700	70	19	24
5/4	1400	65	20	0

Sample 6 4/29/72 Rainfall = 1.5 in. Flow = 45 cfs

4/29	1300	560	160	140
5/1	1600	480	135	100
5/2	1500	460	125	76
5/3	1700	475	125	96
5/4	1400	450	125	96
5/5	2100	460	125	12
5/8	1500	440	120	84
5/9	1530	410	110	96
5/10	1530	395	100	48
*5/11	1700	420	110	120
*5/12	1400	385	105	76
5/15	1600	380	97	68
5/17	1700	360	80	--

*disturbed samples

Sample 7 5/1/72 Rainfall = 1" Flow = 5 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/1	1600	380	105	96
5/2	1500	360	100	52
5/3	1700	310	80	60
5/4	1400	310	90	64
5/5	2100	290	80	0
5/8	1500	270	75	48
5/9	1530	260	70	40
5/10	1530	260	65	16
5/11	1700	270	70	24
5/12	1400	240	73	52
5/15	1600	250	60	32
5/16	1400	230	60	24
5/17	1700	240	60	--

Sample 8 5/8/72 Rainfall= 0.5 in. Flow = 7.15 cfs

5/8	1300	480	150	60
5/9	1530	310	90	52
5/10	1530	250	58	4
5/11	1700	240	65	4
5/12	1400	200	62	20
5/15	1600	170	40	0
5/16	1400	140	40	0
5/17	1700	140	38	-

Sample 9 5/12/72 Rainfall = .22 in. Flow = 0.0417 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/15	1600	270	68	52
5/16	1400	180	60	24
5/17	1700	180	50	--
5/18	1800	175	50	16
5/19	1700	165	45	36
5/22	1700	145	40	16
5/23	1700	155	35	4
5/24	1600	150	48	0
5/25	1450	140	40	0

Sample 10 5/17/72 Rainfall (200-2200 hrs. 5/16) = 1.5 in. Flow = 1 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/17	1700	600	200	168
5/18	1800	440	130	76
5/19	1700	410	125	120
5/22	1700	300	90	32
5/23	1900	270	70	24
5/24	1600	260	70	28
5/25	1450	250	73	12
5/29	1430	210	50	44
5/31	1530	230	60	0
6/2	1400	220	58	24
6/5	1600	220	51	0
6/8	1430	230	50	12
6/13	1430	220	60	40

Sample 11 5/22/72 Rainfall = 0 Flow = 0 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/22	1700	420	125	76
5/23	1700	330	83	60
5/24	1600	290	82	28
5/25	1450	280	80	84
5/29	1430	250	64	48
5/30	1530	260	75	--
5/31	1530	260	70	16
6/2	1900	240	60	64
6/5	1600	230	60	12
6/8	1430	240	55	64
6/13	1430	222	65	32

NONCONNAH CREEK
SAMPLE POINT -C-

Sample 1 3/27/72

DATE & TIME		COLOR	TURBIDITY	S.S.
3/27	1500	488	138	60
3/28	0800	420	115	136
3/28	1300	420	125	56
3/28	1600	410	110	76
3/29	0830	340	100	100
3/29	1700	350	98	44
4/3	0930	250	70	8
4/4	0900	250	65	-
4/5	0900	250	60	16
4/6	1100	220	50	--
4/7	1600	215	60	36

Sample 2 4/3/72

4/3	1530	220	55	22
4/4	0900	220	65	--
4/4	1630	210	50	8
4/5	0900	210	50	4
4/6	1100	200	50	--
4/7	1600	190	40	--
4/10	1700	175	40	24
4/11	1700	160	35	36
4/12	1900	140	30	32
4/13	1600	140	35	28
4/17	1400	120	30	24

Sample 3 4/10/72

4/11	2000	460	135	132
4/12	1900	340	100	76
4/13	1600	300	80	64
4/17	1400	280	70	84
4/18	1500	260	70	52
4/19	1700	250	70	44

Sample 3 4/10/72 (continued)

DATE & TIME		COLOR	TURBIDITY	S.S.
4/20	1530	280	70	36
4/21	2100	240	68	20
4/25	1400	240	61	60
4/26	1300	240	59	48
4/28	1130	240	60	16

Sample 4 4/17/72

4/17	1700	500	150	92
4/18	1500	410	110	100
4/19	1700	380	100	52
4/20	1530	340	95	16
4/21	2100	290	80	28

Sample 5 4/25/72

4/25	1045	700	186	168
4/26	1300	560	165	108
4/27	1400	580	155	104
4/28	1130	540	150	104
4/29	1300	450	115	40
5/1	1600	460	125	68
5/2	1500	470	125	92
5/3	1700	460	130	72
5/4	1400	440	120	68
5/5	2100	440	120	16

Sample 6 4/29/72 Rainfall 1.5 in. Flow = 1520 cfs

4/29	1300	2220	720	788
5/1	1600	1500	480	292
5/2	1500	1095	315	200
5/3	1700	1050	327	204
5/4	1400	1200	375	232
5/5	2100	960	300	148
5/8	1500	680	190	136
5/9	1530	540	160	92
5/10	1530	370	95	36
*5/11	1700	840	260	228
*5/12	1400	800	250	216

*disturbed samples

Sample 6 4/29/72 (continued)

DATE & TIME		COLOR	TURBIDITY	S.S.
5/15	1600	800	225	144
5/17	1700	660	195	--

Sample 7 5/1/72 Rainfall = 1 in. Flow = 5 cfs

5/1	1600	560	170	116
5/2	1500	420	123	28
5/3	1700	475	150	88
5/4	1400	420	130	68
5/5	2100	380	110	24
5/8	1500	340	100	48
5/9	1530	350	100	76
5/10	1530	340	95	36
5/11	1700	360	98	56
5/12	1400	320	95	60
5/15	1600	330	80	36
5/16	1400	290	88	32
5/17	1700	300	80	--

Sample 8 5/8/72 Rainfall = 0.5 in. Flow = 12.5 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/8	1300	300	80	80
5/9	1530	400	115	48
5/10	1530	340	90	32
5/11	1700	330	90	80
5/12	1400	300	90	60
5/15	1600	260	68	20
5/16	1900	250	65	40
5/17	1700	250	63	--
5/18	1800	240	65	36
5/19	1700	250	68	76
5/22	1700	220	60	36
5/23	1700	360	88	30
5/24	1600	280	80	28
5/25	1450	250	68	28

Sample 9 5/12/72 Rainfall = .22 in. Flow = 1 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/15	1600	500	135	88
5/16	1400	420	115	56
5/17	1700	390	105	--
5/18	1800	380	100	24
5/19	1700	360	95	88
5/22	1700	320	85	56
5/23	1700	340	75	60
5/24	1600	330	85	40
5/25	1450	300	80	16
5/29	1430	290	69	28

Sample 10 5/17/72 Rainfall (2000-2200 Hrs. 5/10) = 1.5 in. Flow = 80.6 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/17	1700	4500	1600	1916
5/18	1800	1440	432	288
5/19	1700	1080	330	256
5/22	1700	560	160	116
5/23	1900	460	120	76
5/24	1600	430	115	72
5/25	1450	500	140	84
5/29	1430	260	63	20
5/31	1530	260	71	0
6/2	1400	270	65	36
6/5	1600	250	60	12
6/8	1430	240	47	12
6/13	1430	220	60	48

Sample 11 5/22/72 Rainfall = 0 Flow = 0.0278 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/22	1700	980	335	276
5/23	1700	800	245	192
5/24	1600	560	170	104
5/25	1450	560	170	124
5/29	1430	360	95	44
5/30	1530	360	90	--
5/31	1530	340	90	44
6/2	1900	315	87	72
6/5	1600	255	65	32
6/8	1430	310	70	40
6/13	1430	335	90	84

NONCONNAH CREEK
SAMPLE POINT -D-

Sample 1 4/29/72 (first sample @D) Rainfall = 1.5 in.
Flow = 199.5 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
4/29	1300	580	180	168
5/1	1600	400	120	48
5/2	1500	350	97	12
5/3	1700	380	110	64
5/4	1400	360	105	48
5/5	2100	310	90	0
5/8	1500	315	80	24
5/9	1530	290	88	44
5/10	1530	280	80	24
*5/11	1700	280	75	80
*5/12	1400	260	70	16
5/15	1600	250	60	8
5/17	1700	235	60	--

Sample 2 5/1/72 Rainfall = 1 in. Flow = 10 cfs

5/1	1600	560	166	128
5/2	1500	500	150	96
5/3	1700	440	137	84
5/4	1400	390	115	68
5/5	2100	380	110	16
5/8	1500	340	92	80
5/9	1530	340	95	76
5/10	1530	320	90	88
5/11	1700	340	94	108
5/12	1400	330	90	124
5/15	1600	350	90	72
5/16	1400	340	90	64
5/17	1700	340	90	--

Sample 3 5/8/72 Rainfall = 0.5 in. Flow = 42.9 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/8	1300	1600	510	320
5/9	1530	930	300	216
5/10	1530	880	260	152
5/11	1700	760	250	212
5/12	1400	680	215	172
5/15	1600	490	130	88
5/16	1900	600	160	84
5/17	1700	395	100	--
5/18	1800	330	90	44
5/19	1700	350	95	104
5/22	1700	320	87	88
5/23	1700	250	65	16
5/24	1600	320	90	64
5/25	1450	300	75	32

Sample 4 5/12/72 Rainfall = .22 in. Flow = 0.33 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/15	1600	880	260	212
5/16	1400	720	225	168
5/17	1700	540	160	--
5/18	1800	600	168	120
5/19	1700	600	180	180
5/22	1700	450	125	96
5/23	1700	440	119	60
5/24	1600	440	115	80
5/25	1450	420	110	28

Sample 5 5/17/72 Rainfall (2000-2200 hrs. 5/16) = 1.5 in. Flow = 22.85 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/17	1700	1600	525	556
5/18	1800	840	270	200
5/19	1700	640	200	156
5/22	1700	420	130	92
5/23	1900	400	100	52
5/24	1600	400	118	72
5/25	1450	320	85	32
5/29	1430	240	57	20
5/31	1530	200	60	0
6/2	1400	250	68	28
6/5	1600	160	50	0
6/8	1430	190	25	40
6/13	1430	120	41	32

Sample 6 5/22/72 Rainfall = 0 Flow = 0.0125 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/22	1700	560	180	108
5/23	1700	430	128	84
5/24	1600	285	79	56
5/25	1450	260	75	56
5/29	1430	280	75	32
5/30	1530	292	81	--
5/31	1530	280	80	24
6/2	1900	243	70	0
6/5	1600	245	68	0

NONCONNAH CREEK
SAMPLE POINT -E-

Sample 1 4/29/72 (First sample @ E)
Rainfall = 1.5 in. Flow = 420 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
4/29	1300	1350	420	668
5/1	1600	800	280	132
5/2	1500	570	165	68
5/3	1700	620	180	112
5/4	1400	500	145	80
5/5	2100	470	140	20
5/8	1500	420	115	80
5/9	1530	420	120	56
5/10	1530	380	105	56
5/11	1700	380	105	60
5/12	1400	360	100	32
5/15	1600	340	85	40
5/17	1700	300	80	--

Sample 2 5/1/72 Rainfall = 1,0 in. Flow = 22.8 cfs

5/1	1600	380	115	124
5/2	1500	310	90	52
5/3	1700	300	92	48
5/4	1400	260	90	56
5/5	2100	240	75	8
5/8	1500	230	65	32
5/9	1530	230	65	32
5/10	1530	220	60	28
*5/11	1700	215	65	64
*5/12	1400	210	55	44
5/15	1600	220	55	40
5/16	1400	190	50	36
5/17	1700	190	50	--

*disturbed samples

Sample 3 5/8/72 Rainfall = 0.5" Flow = 20 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/8	1300	300	90	36
5/9	1530	150	50	12
5/10	1530	160	45	8
5/11	1700	145	40	24
5/12	1400	110	40	8
5/15	1600	110	22	0
5/16	1900	80	25	0
5/17	1700	80	20	--

Sample 4 5/12/72 Rainfall = .22 in. Flow = 0.416 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.	
5/15	1600	200	42	12	
5/16	1400	150	40	4	
5/17	1700	130	32	--	
5/18	1800	145	39	100←	(very bright
5/19	1700	175	46	124←	yellow residue.
5/22	1700	10	7	0	heavy, but
5/23	1700	7	-2	7	filtered quickly)

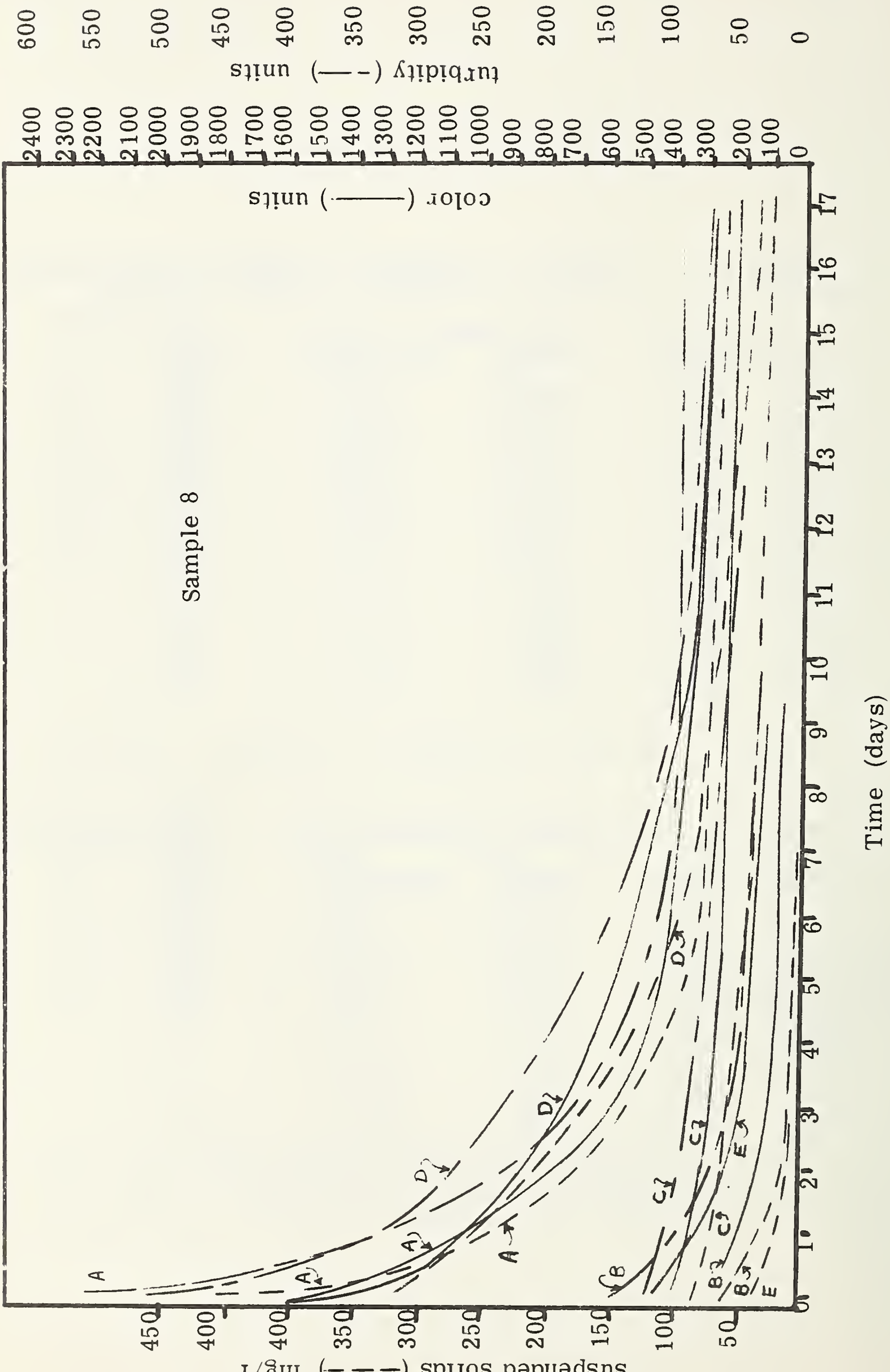
An oily residue was observed on the banks and in the water where this sample was taken. The smell of pesticide was very strong, also. The presence of a pesticide in the sample could account for this strange data.

Sample 5 5/17/72 Rainfall (2000-2200 Hrs. 5/18) = 1.5 in. Flow = 40 cfs

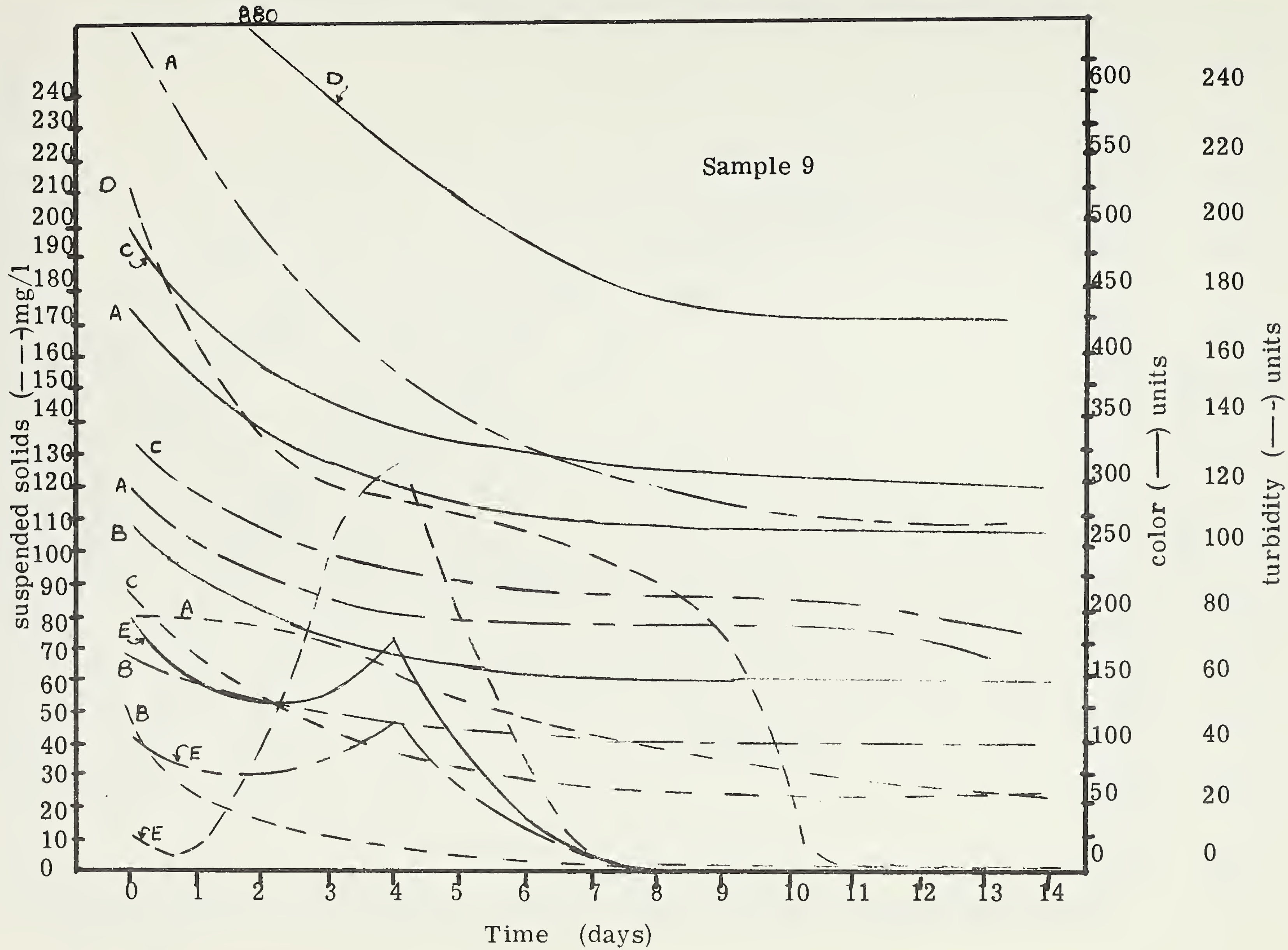
DATE & TIME		COLOR	TURBIDITY	S.S.
5/17	1700	1200	400	308
5/18	1800	800	240	132
5/19	1700	600	180	156
5/22	1700	470	145	80
5/23	1900	480	140	84
5/24	1600	460	135	80
5/25	1450	410	115	64
5/29	1430	310	79	48
5/31	1530	250	65	0
6/2	1400	250	70	28
6/5	1600	190	50	24
6/8	1430	205	30	30
6/13	1430	190	50	40

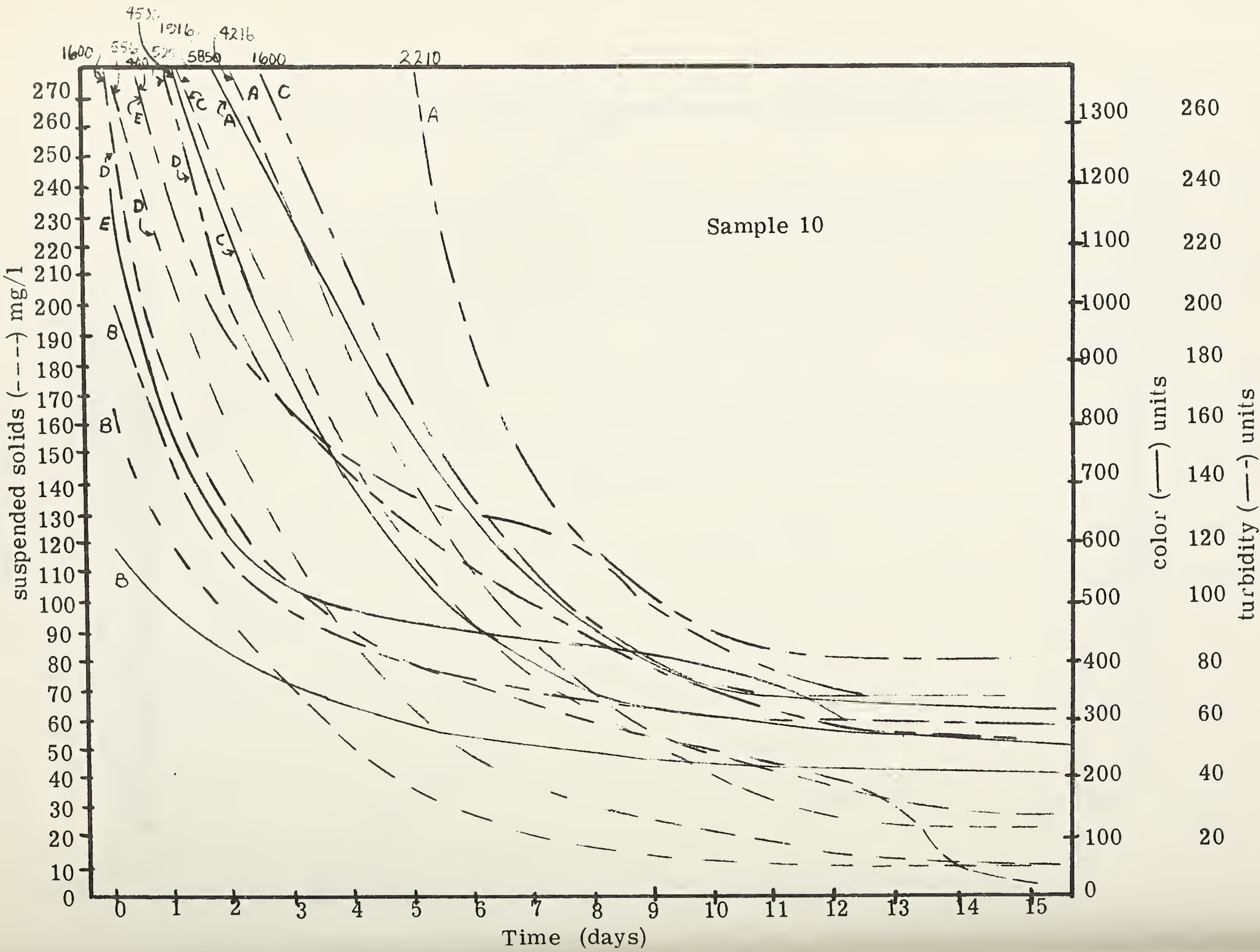
Sample 6 5/22/72 Rainfall = 0 Flow = 0.25 cfs

DATE & TIME		COLOR	TURBIDITY	S.S.
5/22	1700	150	35	40
5/23	1700	100	25	44
5/24	1600	60	20	8
5/25	1450	60	18	28
5/29	1430	40	7	0
5/30	1530	50	18	0
5/31	1530	45	15	0
6/2	1900	35	10	0
6/5	1600	40	15	0

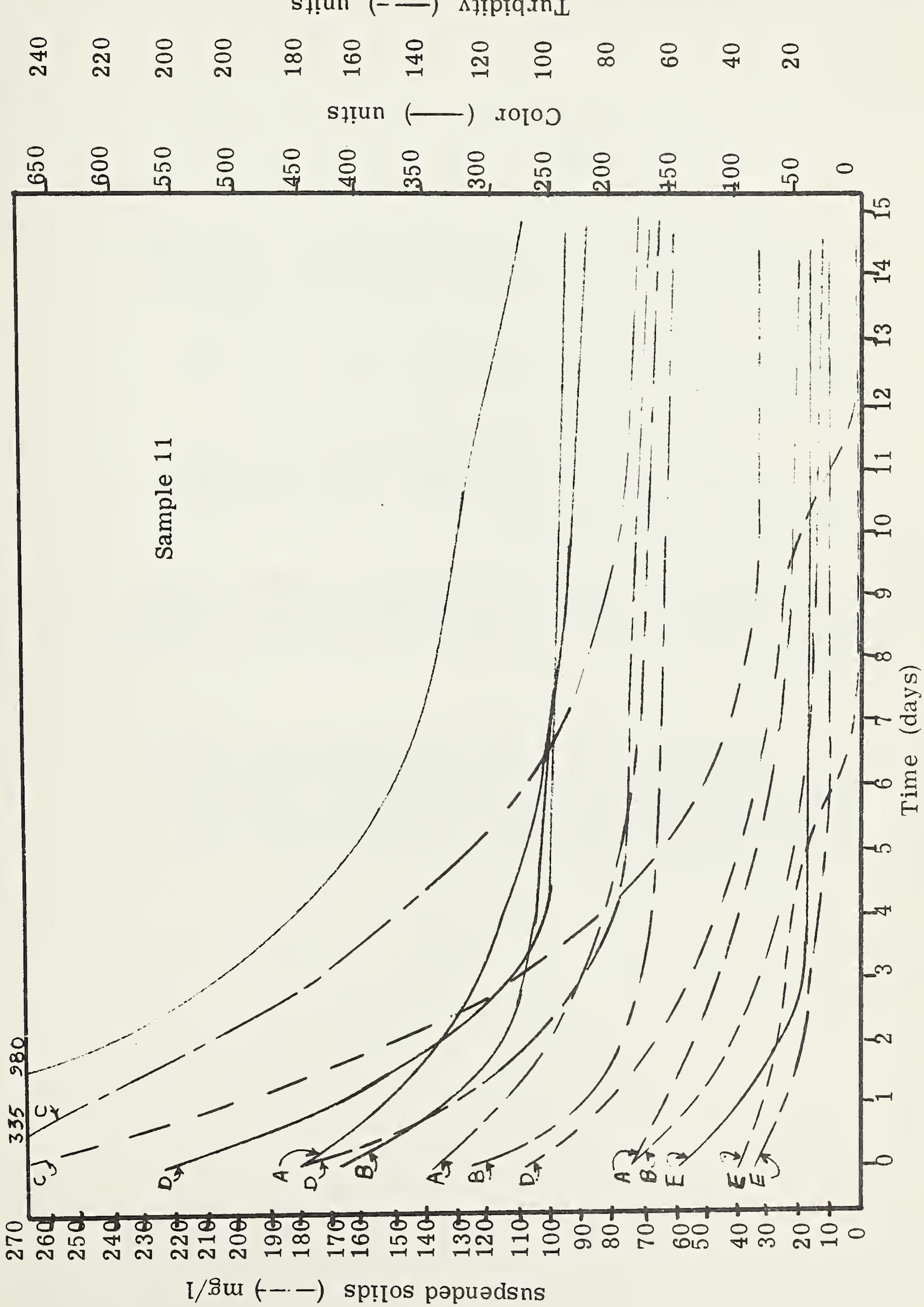


Sample 8
suspended solids (— — —) mg/l
color (———) units
turbidity (— —) units
Time (days)


Sample 9
suspended solids (— — —) mg/l
color (——) units
turbidity (— -) units
Time (days)
880
A
D
C
B
E
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
1
2
3
4
5
6
7
8
9
10
11
12
13
14
350
250
300
400
450
500
550
600



Sample 10
suspended solids (- - - -) mg/l
color (——) units
turbidity (—-) units
Time (days)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300
20 40 60 80 100 120 140 160 180 200 220 240 260
1600
1600
2210
5850
4216
A
A
A
B
B
B
C
C
C
D
D
D
E
E


Sample 11
Time (days)
Color (——) units
Turbidity (- —) units
suspended solids (—·—) mg/l
335
980
A
B
C
D
E

CONCLUSIONS OF WATER QUALITY TESTS

From the graphs of the samples taken, it can be seen that the three parameters color, turbidity, and suspended solids decrease in magnitude by at least 50 percent with a retention time of 7 days. The rates of the reduction are greatest immediately following high flow conditions at which the parameter are at high magnitudes. The rates of reduction are less but still present under conditions where the initial measured parameters are low.

The question concerning "clear" water involves a value judgment as to what is aesthetically pleasing to the user of the proposed facility.

Chemically, the water at the site of the proposed dam exhibits an acceptable dissolved oxygen content, a low BOD and COD, and acceptable levels of the other parameters measured.

The results of the heavy metal and pesticide studies are presented on the following page. Heavy metal analysis was by wet-chemistry and atomic adsorption techniques while the pesticide techniques are described in the table and chromatographs.

APPENDIX E

CHARACTERISTICS OF BOTTOM DEPOSITS

The potential problem of leachates caused by construction was considered in a series of special tests. The results of these are shown in the following tables. Soil samples (a three-inch diameter core eighteen inches long) were serially extracted with deionized water for 24 hours to simulate the leaching action of the stream. Serial hexane extractions were performed to desorb any pesticides or insecticides from the soil. This is considered a much more severe leaching than what would occur with water alone. The hexane extracts were concentrated to a volume of 1 ml and gas chromatographic analyses performed on this concentrate. A blank soil sample was collected from the Horn Lake Road area from a spot outside the immediate channel to evaluate any background interferences.

As can be seen from an analysis of the data in the following tables, the bottom deposits removed from the stream contained no detectable pesticides or insecticides and very low levels of heavy metals and other more typical pollutants (organic carbon, phosphorous, and nitrogen). All analyses were duplicated, but duplicate soil samples were not analyzed. Based on the data obtained from these special studies, the quantity of pollutants which could be released into the aqueous environment by construction operations is very limited. The amount of the materials evaluated in these studies which would leach into the water will be very minute compared to the silt and other soil materials produced during construction.

The data presented in the following tables may at first seem impossible considering the pollution this reach of the stream has received in the past from a textile and a pesticide industry. Several factors, however, may explain these data. The industrial discharges have ceased to be discharged directly to the stream, but enter the city sanitary sewer system. Consequently, no contaminants have reached the stream for some time. Also, the stream carries a large silt and sediment load, a lot of which settles out in this particular reach. This deposition of material is enhanced by backwater and associated sediments from McKellar Lake. In addition, the pesticide-insecticide formulator prepares almost entirely phosphate based materials which have a limited life. This combination of continual deposition of silt, lack of recent contamination, and limited life of some previously deposited materials makes the data in the following tables more acceptable.

The two (Pts. X and Y, Page 60), were chosen after a review of past and present sources of pollutants along the stream. This reach was considered most likely to have received the contaminants in the past and, consequently, present the greatest potential for leachates resulting from construction.

STREAM BOTTOM DEPOSITS - WATER SOLUBLES

Sample	Sample Weight	Total Phosphorus	Total Organic Carbon	Kjeldahl Nitrogen	Heavy Metals, µg/Kg						
					Cu	Pb	As	Cd	Cr (1)	CN	Hg
Blank (2)	0.033 Kg	0.01 mg/Kg	0.114 mg/Kg	0.0085 mg/Kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Highway 51-S	0.047 Kg	0.0096 mg/Kg	0.80 mg/Kg	0.007 mg/Kg	0.6	0.2	0.8	0.3	0.1	0.06	0.04
Horn Lake Road	0.065 Kg	0.006 mg/Kg	1.0 mg/Kg	0.006 mg/Kg	0.4	1.0	1.3	0.4	0.2	0.03	0.33

(1) Total Chromium

(2) Taken approximately 100 yards from the Horn Lake Road sample from an area not in the immediate channel.

STREAM DEPOSITS - HEXANE SOLUBLES

Sample	Sample Weight	Chlorinated Pesticides (1)	Phosphate based Pesticides (2)	Chlorinated Insecticides (1)	Phosphate based Insecticides (2)
Blank	0.035 Kg	N D (3)	N D	N D	N D
Highway 51-S	0.056 Kg	ND	ND	ND	ND
Horn Lake Road	0.063 Kg	N D	N D	N D	N D

(1) Fisher/Victoreen Model 4400; Ni 63 detector; 1/8" SS column; 5% OU-1 on 100/120 chromosorb Q; temperature-ambient to 200° C; minimum detectable DDT - 0.1 ng

(2) Fisher/Victoreen Model 4400; Flame ionization detector; 1/8" SS column; 10% DC 200 on 80/90 Anakron Q; temperature-ambient to 200° C; minimum detectable Ramrod - 0.1 μg

(3) None detected

SECTION III

SOCIAL ELEMENTS

Chapter I

COMMUNITY SERVICES

There are two major utility districts which are contained by the Nonconnah River Basin. In addition, portions of two municipalities are also tangent to the area. The larger of the districts is administered by the Memphis Light, Gas and Water Division (MLG&W). MLG&W estimates that one-half of all its facilities lie between the northern boundary of the study area and the Tennessee State line. The second major area, the Southeast Memphis Utility District, is completely enclosed. Portions of two municipalities, Germantown and Collierville, touch the northeastern border or the Basin area. The location of the principal areas can be seen on Map 1.*

Map 2* illustrates the location of the larger delivery systems. Several gas mains, serviced by MLG&W and Texas Gas, cross the Basin. TVA electric power lines also occur frequently. The location of sanitary sewer lines and water mains are also indicated on Map 2.

Water plant locations as well as electrical substation sites can also be determined from an inspection of the maps. Four plants are found in the area: Allen, Sheahan, Holmes Road, and Lichterman. The substations are Weaver Road, Mill Branch, Southgate, Getwell, South Eastgate, and Winchester.

Transportation

Airports

There are four airports in the Basin: Memphis International, Colonial Airport, Olive Branch, and

* Maps not reproduced in report (pages 125 and 126).

Wilson Field. A fifth airport, DeSoto Airpark, lies just outside the Southwestern boundary.

Both Wilson Field and Colonial are unpaved airports with no services. Due to the lack of facilities they are not expected to continue in operation. However, the termination dates are not known at this time.

Olive Branch has a paved runway, but is not considered operational due to construction of new facilities. This is intended to be a reliever airport to supply the great demand for general aviation facilities in the Memphis area.

Memphis International lies just south of Nonconnah Creek. It is the largest airport in the area both in acreage and volume of traffic. Including runway cleared zones, there are 3,337 acres of land reserved for Memphis International. The volume of traffic can be inferred from the number of fixed base operators and air carriers which are housed on airport property. (See Table 1.)

Motor Carriers

The network of highways that converge from the Mid-South region make Memphis an advantageous site for the trucking industry. About thirty motor carriers licensed to haul in Tennessee have located offices or depots in the Basin area.

Most of the motor carriers are located in close proximity to the intersection of the North-South and East-West Interstate highways. Thus, they are concentrated in the western and northern sections of the Basin nearer the mouth of the creek. Table 2 presents a list of the motor carriers and their street locations.

Railroads

Eight railroad companies own trackage which crosses through the Nonconnah area. Three companies, the Frisco, the Illinois Central, and the Southern, own

Table 1

AIRCRAFT FACILITIES IN NONCONNAH RIVER BASIN

<u>Memphis International Airport</u>

<u>Air Carriers</u>
- American Airlines
- Braniff International
- Delta Airlines
- Eastern Airlines
- United Airlines
- Allegheny Airlines
- Frontier Airlines
- Piedmont Airlines
- Southern Airways
- Texas International
- Mid-Continent
- Orion

<u>General Aviation Fixed Base Operators</u>
- Delta Beechcraft
- Dixie Flight Center
- Hi-Air, Inc.
- Memphis Aero
- Wilson Helicopters, Inc.

<u>Colonial Airport</u>

General Aviation Transient

<u>Olive Branch</u>

General Aviation Transient

<u>Wilson Field</u>

General Aviation Transient

Table 2

TENNESSEE MOTOR CARRIERS LOCATED IN NONCONNAH RIVER BASIN

Carrier	Address
Atlas Transit, Inc.	1749 Florida
Braswell Motor Freight Lines, Inc.	621 East Brooks Road
Burnett Truck Line	1700 Kansas
Campbell 66 Express, Inc.	2325 Kentucky
Clark Truck Lines	3636 Old Getwell Road
Dean Truck Line, Inc.	3126 Carrier
ET & WNC Transportation Co.	1620 Dunn
East Texas Motor Freight Lines, Inc.	3400 Millbranch Road
Ford Truck Line	954 Barton
Garrison Truck Lines	3013 Sandbrook
Hay Trucking Company	954 Barton
McLean Trucking Co.	130 Terminal Center Drive
Magnolia Truck Line, Inc.	3097 Fontaine
Mason & Dixon Lines	205 South Parkway West
Mercury Motors, Inc.	222 East Mallory Avenue
Powell Truck Line	1749 Florida
Pulaski Highway Express, Inc.	1600 Florida Street
Red Ball Motor Freight, Inc.	1156 Channel
Reliable Cartage Co.	1501 Latham Street
Roadway Express, Inc.	3310 Gill Road
Ryder Truck Lines, Inc.	1242 Orgill Avenue
Southwestern Transportation Co.	171 West Industrial
Spector Freight System, Inc.	2415 Florida
Strickland Transportation Co., Inc.	143 South Parkway West
Superior Forwarding	3100 Stonebrook Circle
T.I.M.E. Freight, Inc.	1803 East Brooks Road
Terminal Transport Co., Inc.	90 Terminal Center Drive
Transcon Lines	66 East Farrow
Western Gillette, Inc.	3086 Carrier

Source: Memphis Motor Carriers' Association, 10-1-69.

the majority of the trackage. Table 3 presents a list of all eight railroads in operation.

Table 3

RAILROAD OWNED TRACKS IN NONCONNAH RIVER BASIN

Chicago, Rock Island and Pacific
Gulf, Mobile and Ohio
Illinois Central
Louisville and Nashville
Missouri Pacific
St. Louis-San Francisco
St. Louis Southwestern
Southern

There are also four large switching yards located in the area. The largest single yard, Johnston Yard, lies between Brooks Road on the south and Nonconnah Creek on the north, with Highway U.S. 61 as the east limit. Johnston Yard has 388,900 feet of yard trackage. There are approximately 152 miles of yard trackage in all four yards combined. Table 4 breaks down the information by number of feet and number of tracks for the various yards.

Table 4

RAILROAD YARDS IN NONCONNAH RIVER BASIN

Name	Number of Tracks	Total Yard Trackage
Johnston Yard	93	73.7 miles
Forrest Yard	24	15.7
Tennessee Yards	70	50.0
Frisco Yale Yards	14	12.6

Source: Memphis-Shelby County Planning Commission "Railroad Planning Study."

Automobile and Mass Transit

In 1964-1965, a study of three Memphis Transit Authority routes was conducted by the Bureau of Business Research at Memphis State University for the Memphis Transit Authority and the Housing and Home Finance Agency. The primary purpose of the study was to determine the characteristics and travel requirements of persons who lived in areas where suburban developments were taking place.

Information was gathered by interviews with bus riders and also by interviews with a sample of project area residents.

Two of the project study areas are relevant here, Chicasaw and Oakville-Parkway Village. The third area, Raleigh Bartlett, is located northeast of Memphis and, therefore, is outside the limits of Nonconnah River Basin. This study should be consulted for specifics relative to this area.

Schools

There are currently 89 Memphis city schools in the Basin with approximately 8 more in construction. Table 11 provides an alphabetical list of those schools along with their street locations.

Shelby County also operates five schools in the area. The schools are Capleville High, Coro Lake Elementary, Germantown Elementary, White's Chapel, and M. C. Williams.

There are no public schools in the portions of Fayette County, Tennessee, DeSoto County, Mississippi, or Marshall County, Mississippi, that lie within the limits of Nonconnah River Basin.

Table 5

MEMPHIS PUBLIC SCHOOLS WITHIN NONCONNAH BASIN

Airways Junior High
2601 Ketchum Road

Alcy Road Elementary
1750 Alcy Road

Alton Elementary
2020 Alton Avenue

Balmoral Elementary
5905 Grosvenor Avenue

Bethel Grove Elementary
2459 Arlington Avenue

Carver High
1591 Pennsylvania

Charjean Elementary
2140 Charjean

Cherokee Elementary
3061 Kimball Road

Colonial Elementary
1360 Colonial Road

Colonial Junior High
4778 Sea Isle Road

Corry Junior High
2230 Corry Road

Cromwell School
4989 Cromwell Road

Cummings Elementary
1037 Cummings Street

Dunbar Elementary
2606 Select Avenue

Dunn Elementary
1500 Dunn Avenue

Evans, Marion G., Elementary
4949 Cottonwood Road

Fairley High School
4950 Fairley Road

Florida Elementary
1560 Florida

Ford Road School
3336 Ford Road

Fox Meadows Elementary
2960 Emerald Street

Gardenview Elementary
4075 Hartz Drive

Geeter Elementary
4649 Horn Lake Road

Geeter School
4649 Horn Lake Road

Georgia Elementary
690 Mississippi Blvd.

Getwell School
3530 Old Getwell Road

Goodlett Road Elementary
3001 Goodlett Road South

Graceland School
3866 Patte Ann Drive

Graves School
3398 Graves Road

Hamilton Elementary
1378 Ethlyn Avenue

Hamilton High
1478 Wilson

Hanley Elementary
680 Hanley

Havenview School
1481 Hester Road

Hill, A. B., Elementary
1372 Latham

Hillcrest High
4184 Graceland Drive

Kansas Elementary
1353 Kansas

Knight Road
3237 Knight Road

Lakeview School
5132 Jonetta Street

LaRose Elementary
851 South Wellington Street

Lauderdale Elementary
995 South Lauderdale

Levi School
3939 Highway 61 South

Lincoln Elementary
1566 South Orleans Street

Lincoln Junior High
667 Richmond Avenue

Locke, Alonzo, Elementary
688 St. Paul Avenue

Longview Elementary
656 Alice Avenue

Longview Junior High
1895 South Orleans

Magnolia Elementary
2061 Livewell Circle

Mallory Heights School
2058 Shelby

Melrose High
843 Dallas

Memphis Area Vocational
Technical Aviation School
2752 Winchester Road

Memphis Community Learning Lab
370 South Orleans Street

Messick School
703 South Greer

Mitchell Road School
548 Mitchell Road

Newberry Elementary School
5540 Newberry Avenue

Norris Elementary
1490 Norris Road

Oakhaven Elementary
3795 Bishop Bridge Road

Oakhaven High
3125 Ladbrook Road

Oakshire Elementary
1765 E. Holmes Road

Oakville School
3594 Highway 78

Orleans Elementary
1400 McMillan Street

Overton High
1770 Lanier Lane

Pine Hill Elementary
1087 Alice Avenue

Porter Junior High
620 South Lauderdale Street

Prospect School
2300 Hernando Road

Raineshaven School
430 Clarice Drive

Ridgeway Elementary
1775 Ridgeway Road

Ridgeway High School
4315 Sheffield Cove

Riverview Junior High
241 Majuba Avenue

Sea Isle Elementary
5220 Sea Isle Road

Sharpe Elementary
3431 Sharpe

Sheffield Elementary
4290 Chuck Avenue

Sheffield High School
4315 Sheffield Avenue

Sherwood Elementary
3717 Vanuys Avenue

Sherwood Junior High
3480 Rhodes Road

South Park Elementary
1736 Getwell Road

South Side High
1880 Prospect

Stafford Elementary
1237 College Street

Training School
Memphis State University Campus

Walker School
322 King Road

Washington, Booker T., High
715 South Lauderdale Street

Weaver School
3543 Weaver Road

Westhaven School
4585 Hodges Road

Westwood Elementary
778 Parkrose Avenue

Westwood High
4480 Westmont Square

Whitehaven High
4851 Highway 51 South

Whitehaven Elementary
4851 Highway 51 South

Willow Oaks Elementary
4417 Willow Road

Winchester School
3587 Boeingshire

Wooddale High
5151 Scottsdale

Wooddale Junior High
3467 Castleman

Police and Fire Protection

Tables 6, 7, and 8 present a detailed listing of the eighteen station houses maintained by the Memphis Fire Department. The units maintained by Shelby County are found in Table 9.

Future water requirements for the entire Shelby County area appear in Table 10. It is not possible to break out only the Nonconnah area from this information.

There are only two law enforcement agencies in the area, a Memphis Police Department Substation and a Tennessee State Highway Patrol Station.

Table 6

FIRE STATION HOUSES, VOLUNTEER FIRE DEPARTMENTS, AND LAW ENFORCEMENT AGENCIES IN NONCONNAH RIVER BASIN

Fire Stations (Memphis Fire Department)

Station House Number	Address
16	1078 E. Parkway South
18	3426 Southern Avenue
20	2034 South Lauderdale
22	2788 Lamar
25	4735 Willow Road
29	2147 South Bellevue
30	1150 Getwell
33	2555 Winchester
34	3901 Knight Arnold
35	3305 South Mendenhall
36	3215 South Third
37	3950 Weaver Road
38	3715 Horn Lake Road
39	1025 E. Raines Rd.
40	2231 E. Shelby Drive
41	2169 Ridgeway
42	3242 Fontaine
43	1253 E. Holmes Road

County Volunteer Fire Departments

Capleville
Collierville
Germantown

Law Enforcement Agencies

Memphis Police Dept. Substation	869 E. Raines Rd.
Highway Patrol Station	2507 East Shelby Drive

Table 7

Inventory of Structures and Equipment
Memphis Fire Department
(May, 1968)

Station Number	Location (Nearest Intersection)	Structure Age	Structure No. of Bays	Pumpers Age	Pumpers GPM*	Ladders Age	Ladders Length (feet)	Foam Truck (age)	Hose Tender (Age)	Rescue (Age)	Salvage (Age)	No. Ambulance	Other (Age)
1	Main and Adams	58	2	12	1,500	2	100						
2	Main and Butler	15	3	26	1,500	5	100				7		
3	Third and Linden	44	2	1	1,000							1	
				19	1,500								
4	Closed	-	-										
5	Front and Union	1	4	6	1,500	6	75**						
6	Thomas and Vollintine	18	4	17	1,000						4		
7	Jefferson and Pauline	10	3	9	1,500	8	65**			16			
8	Crump and Mississippi	29	1	16	1,000							1	
9	(Same as No. 5)	-		12	1,500								
10	South Parkway, West west of Kansas	12	2	18	1,250	3	100		10				
				24	1,000								
11	Union and McLean	16	3	2	1,000	2	100				4		
12	S. Bellevue, N. of Walker	28	1	7	1,000								
13	East Parkway and Broad	44	1	11	1,500				7			1	
14	McLemore, E. of Latham	58	2	7	1,000	11	100					1	
15	Faxon and Decatur	49	1	14	1,000							1	10 Floodlight truck
16	Southern and E. Parkway	43	2	7	1,000	11	100						
17	National and Broad	39	1	20	1,000								
18	Southern, E. of Prescott	38	1	19	1,000								
				23	1,000								
19	Chelsea and Lambert	36	1	6	1,000								
20	Lauderdale and Alice	28	1	3	1,000								
21	Mendenhall, N. of Black	7	3	9	1,000	2	75			16		1	
22	Lamar and Kimball	16	1	17	1,000	24	65						
23	Jackson and Mayfair	16	2	11	1,000	14	100						
24	Berclair and Powell	13	2	16	1,000	18	65					1	
25	Colonial and Lanier	10	3	27	1,000	32	100						
26	Thomas and Millington	10	3	3	1,000	20	65					1	
27	Trezevant and Whitney	8	3	14	1,000								
				17	500								
28	Chelsea and Watkins	6	3	17	1,000	6	100						3 High-pressure wagon
				24	1,000								
29	S. Bellevue between Elliston and Effie	6	3	11	1,000			26				1	
				31	1,250								
				23	1,000								
30	Getwell and Rhodes	6	3	3	1,000	9	100						
31	Overton Crossing and Hawkins Mill	2	1	21	1,000								
32	Channel and Dock	5	1	26	1,250								
				27	1,000								
33	Winchester & N/S Runway	4	8	27	1,000	18	65	4					6 Dry Chemical Crash Truck
								5					4 5,000-gal. Tanker-nurse truck
34	Knight-Arnold and Getwell	1	3	2	1,000							1	
35	Mendenhall	2	3	27	1,000	26	50***						
36	Third and Rollins	1	3	27	1,000	26	100						
				31	1,250								
Armour Center	Flicker and Avery	10	4	39	1,000	31	100						6 Communications Control truck
Repair Shop	Adams	12									26(reserve)	1	31 High-pressure wagon; 26 High-pressure Wagon (both reserve)

* Gallons Per Minute
** Snorkel
*** Pumper-ladder combination

Source: Memphis and Shelby County Planning Commission, Fire Protection, Memphis and Shelby County, Tennessee. November. 1968.

Table 8

Fire Station Locations

Site Number	Location	Current Operator	Programming	Site Costs: Land Amount	Land Year	Structures Amount	Structures Year	Total
1	Vicinity of Benjestown Rd. and Circle Rd.	--	Future Rural-Urban Site	$ 40,000	75-75	$281,000	75-90	$ 321,000
2	Vicinity of Fite Rd. and U. S. Highway 51	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
3	Vicinity of U. S. Highway 51 and Nome Acres Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
4	Navy and Nelson	City of Millington	Upgrading	--	--	281,000	75-90	281,000
5	Millington Naval Air Station	U. S. Navy	Not Evaluated					
6	Millington-Arlington Rd. and Kroop Rd.	Cloverhaven Util. District	Upgrading	--	--	281,000	75-90	281,000
7	Vicinity of Rosemark Rd. and Brunswick Rd.	--	Future Rural Site	20,000	75-90	281,000	75-90	301,000
8	Thomas and Millington	City of Memphis #26	--	--	--	--	--	--
9	Overton Crossing and Hawkins Mill Rd.	City of Memphis #31	--	--	--	--	--	--
10	Vicinity Hawkins Mill and New Allen Rds.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
11	Vicinity Egypt-Central and Gordon Rds.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
12	5350 Egypt-Central Rd.	Raleigh Utility District	--	--	--	--	--	--
13	Vicinity of Ellendale Rd. and Dutwiler Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
14	Vicinity U.S. Highway 70 and Canada Rd.	--	Future Rural-Urban Site	40,000	75-90	281,000	75-90	321,000
15	Mott St. - Arlington	City of Arlington	Upgrading	--	--	--	--	--
16	Tresevant and Whitney	City of Memphis #27	--	--	--	--	--	--
17	Vicinity of Scenic Highway and Walnut Rd.	City of Memphis #42	Urban Site-Annex on 12-31-72	30,000	72-72	251,000	72-75	281,000
18	Austin-Peay Highway and Coleman Rd.	City of Memphis #43	Urban Site-Annex on 12-31-72	30,000	72-72	251,000	72-72	281,000
19	4164 James Rd.	Raleigh Utility District	Close on 12-31-72 when annexed	--	--	--	--	--
20	Vicinity Billy Maher Rd. and New Memphis-Arlington Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
21	Vicinity of U.S. Highway 70 and Andrews Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
22	Woodlawn and Shelby	City of Bartlett	--	--	--	--	--	--
23	Vicinity of LaGrange and Thomas Rds.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
24	Vicinity of Stage Rd. and WMC Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
25	Vicinity U.S. Highway 64, Interstate Highway 40 and Brunswick Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
26	Thomas and Vollintine	City of Memphis #6	--	--	--	--	--	--
27	Chelsea and Watkins	City of Memphis #28	--	--	--	--	--	--
28	Chelsea and Lambert	City of Memphis #19	Replace Structure	--	--	281,000	75-90	281,000
29	Jackson and Mayfair	City of Memphis #23	--	--	--	--	--	--
30	Vicinity of Macon Rd. and Interstate 40	City of Memphis #45	Future Urban Site	40,000	75-72	281,000	75-75	321,000
31	Vicinity of Dexter Rd. and Appling Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
32	Faxon and Decatur	City of Memphis #15	Replace Structure	--	--	281,000	75-90	281,000
33	East Parkway and Broad	City of Memphis #13	Relocate	39,000	68-69	281,000	68-69	320,000
34	National and Broad	City of Memphis #17	Replace Structure	--	--	281,000	75-90	281,000
35	Barclair and Powell	City of Memphis #24	--	--	--	--	--	--
36	Vicinity of Whitten Rd. and Mullins Station Rd.	--	Future Urban Site	40,000	72-90	281,000	75-90	321,000
37	Cordova Community	--	Future Urban Site	40,000	72-90	281,000	75-90	321,000
38	Pisgah Community	--	Future Rural Site	20,000	75-90	281,000	75-90	301,000
39	Second and Adams	City of Memphis #1	Relocate in Vicinity of St. Jude	100,000	69-70	460,000	70-71	560,000
40	Front and Union	City of Memphis #5	--	--	--	--	--	--
41	Jefferson and Pauline	City of Memphis #7	--	--	--	--	--	--
42	Union and McLean	City of Memphis #11	--	--	--	--	--	--
43	Flicker and Avery	City of Memphis Armour Center	--	--	--	--	--	--
44	Vicinity of Walnut Grove Rd. and Brierview	City of Memphis #44	Annex-12-31-69	75,000	70-71	281,000	70-71	356,000
45	Walnut Grove Rd. and future north/south major road	--	Future Urban Site	40,000	72-90	281,000	75-90	321,000
46	Vicinity of Raleigh-LaGrange Rd. and Sycamore Rd.	--	Future Urban Site	40,000	75-90	281,000	75-90	321,000
47	Third and Linden	City of Memphis #3	Relocate-Danny Thomas and Linden	39,000	69-70	281,000	69-70	320,000

Table 9

Fire Protection Inventory
Facilities and Equipment
(Shelby County, May 1968)

Location	Structure Age	Structure No. of Bays	No. of Men Housed	Area of Site	Pumpers Age	Pumpers GPM	Other Mobile Equipment Age	Other Mobile Equipment Type	Other Mobile Equipment Age	Other Mobile Equipment Type
Arlington - Mott St.	20	1	1	1 acre	19	500	23	Jeep	17	Panel Truck
Bartlett - Woodlawn & Shelby	3	4	2		19	500	19	Emergency Truck		
					4	1,000				
Capleville - 4972 Lamar	3	1	0	2 acres	3	500	3	Pick-up with pump		
Chickasaw Vill. -5158 Hwy. 61 S.	1	1	4	9,000	26	500				
Chickasaw Vill. -4268 McCain	4	1	2	12,000	new	400	8	Tank truck	16	Jeep
Chickasaw Vill. -Rochester & Mitchell	2	2	1	10,000	2	400				
Cloverhaven -Millington-Arl. Rd. & Krosp Rd.	6	1	4	4 acres	6	500				
Collierville - 124 Main	2	3	0	1/3 acres	5	750	8	3/4 ton truck		
					18	500				
Forest Hill - 9156 Hwy. 72	1	4	8	4 acres	18	1,007	15	Jeep	23	Rescue Truck
					22	650				
Germantown - Poplar Pike	20	2	0		4	1,000	3	Bronco		
					25	750				
					12	500				
Millington - Navy & Nelson	14	1	4	2 acres	14	750				
					23	500				
Millington - Navy Hospital	25	1	4		9	750				
Millington - Navy, Millington-Arlington Rd.	25	4	24	½ acre	9	750	3	Pick-up	3	Pick-up
					6	500				
Millington - Navy, North	25	2	18		9	750	13	Crash truck		
Raleigh - 5350 Egypt Central Rd.	1	2	8	3 acres	1	1,000	1	Bronco		
					1	1,000				
Raleigh - 4184 James Rd.	13	2	6	1 acre	1½	1,000		Jeep		
					1½	500				
Whitehaven -Holmes & Whitworth	9	2	12	4 acres	8	1,000				
					6	1,000*	6	Jeep		
Whitehaven - Raines & Auburn	4	2	7	4 acres	12	1,000	3	Tank truck (1,000 gal.)		
					2	750				
Whitehaven - Winchester & I-55	7	2	4	4 acres	10	1,000	1	Jeep		

*Pumper with 75' ladder equipment.

Source: Same as Table 13.

Table 10

FUTURE WATER REQUIREMENTS

SHELBY COUNTY, TENNESSEE

		TOTAL SHELBY COUNTY REQUIREMENTS (1)				RESIDENTIAL REQUIREMENTS				COMMERCIAL REQUIREMENTS				FIRE FLOW REQUIREMENTS		
Year	Shelby County Population	Avg. Daily Flow (GCD)	Ratio Max. Day To Avg. Day	Max. Daily Flow (GCD)	Max. Daily Flow (MGD)	Avg. Daily Flow (GCD)	Ratio Max. Day To Avg. Day	Max. Daily Flow (GCD)	Max. Daily Flow (MGD)	Avg. Daily Flow (MGD)	Max. Daily Flow (MGD)	Developed Land Area (ACRES)	Max. Daily Flow (GALS./AC)	Flow (GPM)	Duration (HOURS)	Total (MGD)
1965	710,000	121	1.45	176	125	70	1.70	119	84	36	41	24,600	1640	15,000	10	9
1970	816,700	126	1.45	183	149	75	1.70	128	104	42	45	26,000	1731	15,000	10	9
1975	919,000	132	1.45	192	176	80	1.70	136	125	48	51	28,000	1821	20,000	10	12
1980	1,032,600	137	1.45	198	204	86	1.70	146	151	53	53	29,000	1828	20,000	10	12
1985	1,158,700	142	1.45	206	239	91	1.70	155	180	59	59	31,000	1900	20,000	10	12
1990	1,304,300	148	1.45	215	280	96	1.70	163	212	68	68	33,000	2060	20,000	10	12

(1) FIRE FLOW REQUIREMENTS NOT INCLUDED

Source: Same as Table 13.

Chapter II

POPULATION DENSITY, INCOME, AND UNEMPLOYMENT

Population Density

The density of the population is a relatively simple measurement to describe the distribution of people in some given bounded geographic area. For the most part, census tracts have provided easily accessible and easily comparable geographic units. In addition, a great deal of information is reported by the U. S. Census to correspond to the census tracts. These are two distinct advantages.

A disadvantage which is inherent in census tract data is that the tracts do not necessarily coincide with any other socio-political boundaries. In this case the tracts were selected to roughly approximate the Nonconnah River Basin. No part of the Basin was omitted. However, additional territory was included, especially in the northern and western peripheral tracts.

It was also necessary to interpolate data due to an arbitrary division of some of the larger tracts in the eastern rural section of Shelby County. The assumption made was that the social characteristic was distributed in direct relation to the geographic area. The economists commonly call this assumption the smooth plain.

A second disadvantage of depending upon census tract materials is that many areas are not tracted. In small area statistical reports, a variety of other units are frequently found--counties, places, districts and townships, to mention a few examples.

In this section the information about Fayette County, Tennessee, was extrapolated from the county aggregate level. The information about both DeSoto County and Marshall County in Mississippi were taken from the district aggregate level.

Map(3) is provided as a key to determine the physical location of the census tracts. It should be cautioned for later reference that the tract numbers in 1960 were not identical to those in 1970. This was due to the unusually rapid growth of certain suburban tracts to the south and east of the 1960 Memphis city limits. In general, the large tracts of 1960 were subdivided and given new numbers for 1970. One portion of the 1960 area was given the same number in 1970 to help reduce confusion in locating comparable areas.

The range of the density is from a low of 46 to a high of 12,000 persons per square mile. As might be expected, the lowest density is a rural area relatively isolated. The high density area is an urban tract much closer to the city's center. There is a cline of density that gradually decreases from the high in the northwestern portion of the Basin to a low in the southeastern portion. Table 11, gives the densities for each tract.

There are several ecological barriers and artificial enclaves that are worth noting. The limited access of Interstate 240 tends to block the flow of population from Memphis' urban area into the lower levels of the Basin.

Large areas of publicly owned land produce enclaves of very low density. For example, in census tract 104 the Airport Commission holds 3,337 acres. The result is a density in that tract of only 89 persons per square mile. A sizeable amount of land is held by utility districts producing low densities in the central and southeastern portions of the Basin. Finally, low density enclaves are also produced by land already dedicated to recreational activities. The A. Arthur Halle Football Stadium located near Mt. Moriah Road in tract 217 is one example.

Income

The measure of income used here is total family income. It is the sum of all money earned by any

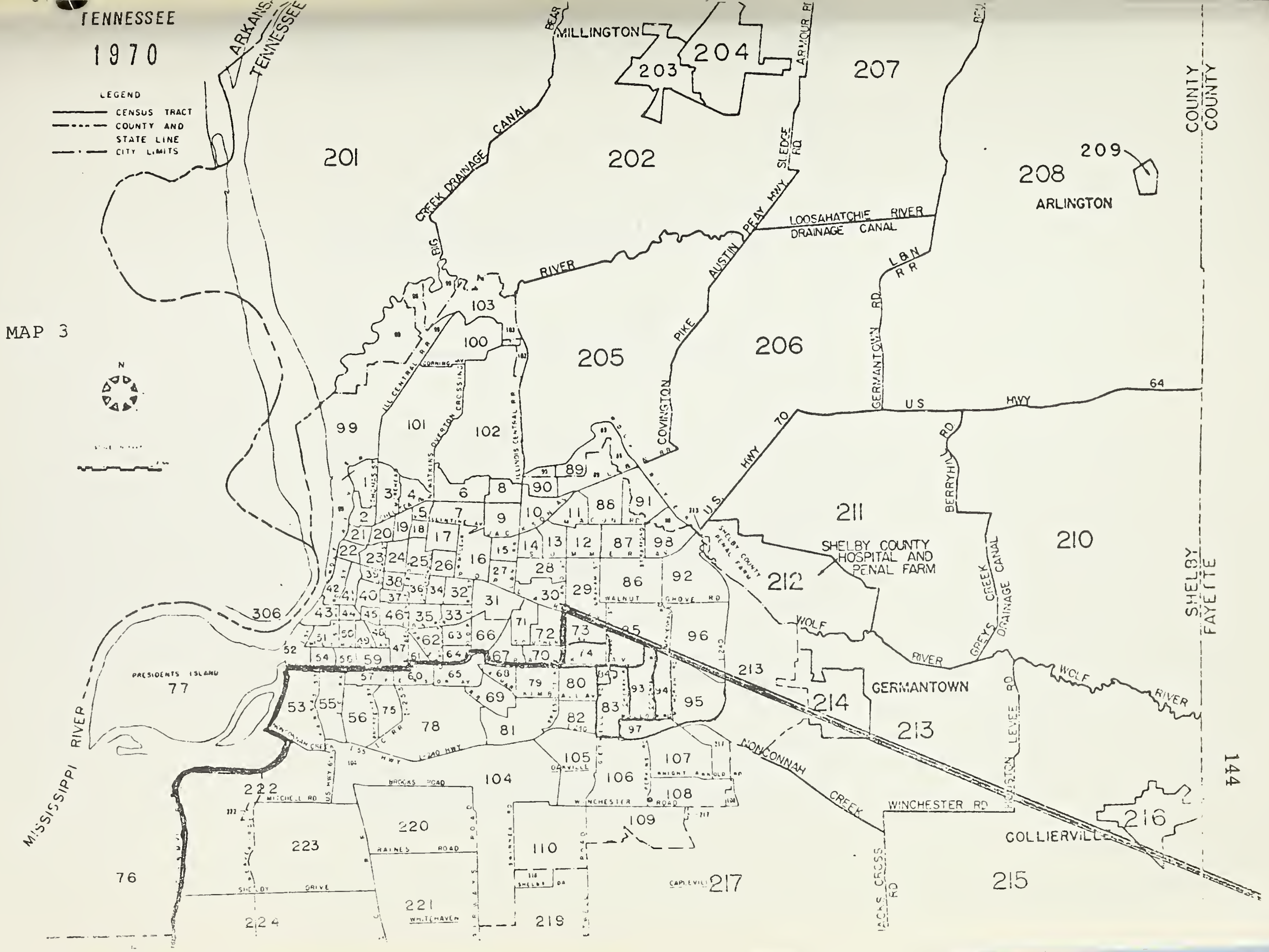

TENNESSEE
1970
LEGEND
CENSUS TRACT
COUNTY AND
STATE LINE
CITY LIMITS
MAP 3
N
ARKANSAS
TENNESSEE
MILLINGTON
ARLINGTON
GERMANTOWN
COLLIERVILLE
SHELBY COUNTY
HOSPITAL AND
PENAL FARM
SHELBY COUNTY PENAL FARM
PRESIDENTS ISLAND
MISSISSIPPI RIVER
LOOSAHATCHIE RIVER
DRAINAGE CANAL
BIG CREEK DRAINAGE CANAL
WOLF RIVER
GREYS CREEK DRAINAGE CANAL
NONCONNAH CREEK
US HWY 64
US HWY 70
AUSTIN PEAY HWY
COVINGTON PIKE
SLEDGE RD
ARMOUR RD
GERMANTOWN RD
BERRYHILL RD
HOUSTON LEVEE RD
WINCHESTER RD
JACKS CROSS RD
L&N RR
ILLINOIS CENTRAL RR
ILL CENTRAL RR
WALNUT GROVE RD
BROOKS ROAD
RAINES ROAD
SHELBY DRIVE
MITCHELL RD
WHITEHAVEN
SHELBY
FAYETTE
COUNTY
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Table 11

POPULATION BY RACE AND DENSITY FOR NONCONNAH RIVER BASIN, 1970

Shelby County Census Tract Number	Density	Population				
		White	Percent	Non-White	Percent	Total
53	7,666	22	--[a]	10,787	99	10,809
55	5,294	849	11	6,562	89	7,411
56	4,640	449	6	6,836	94	7,285
57	11,337	178	3	6,511	97	6,689
60	7,665	32	1	4,184	99	4,216
65	10,637	340	6	5,191	94	5,531
68	12,237	428	7	5,201	93	5,629
69	4,591	2,586	61	1,684	39	4,270
73	3,716	2,496	97	68	3	2,564
74	7,846	4,789	97	154	3	4,943
75	6,642	137	4	3,383	96	3,520
78	8,860	1,839	10	15,970	90	17,809
79	7,813	5,835	73	2,134	27	7,969
80	5,916	5,901	97	193	3	6,094
81	4,646	10,211	94	614	6	10,825
82	6,281	5,585	99	5	--[a]	5,590
83	5,501	6,744	99	22	--[a]	6,766
84	244	51	91	5	9	56
85 (Pt.)	2,264	1,609	94	95	6	1,704
93	5,361	5,936	99	15	--[a]	5,951
94	6,048	5,184	99	17	--[a]	5,201
95	6,282	9,485	96	441	4	9,926
97	4,816	3,512	99	4	--[a]	3,516
104	89	901	94	55	6	956
105	1,251	2,463	89	302	11	2,765
106	3,830	10,944	99	158	1	11,102

(Continued)

Table 11 (continued)

Shelby County Census Tract Number	Density	Population				
		White	Percent	Non-White	Percent	Total
107	4,097	8,631	99	11	--[a]	8,642
108	5,384	7,420	99	46	1	7,466
109	650	1,707	97	54	3	1,761
110	2,116	6,489	98	109	2	6,598
213 (Pt.)	907	3,275	94	202	6	3,477
214 (Pt.)	569	1,331	96	62	4	1,393
215 (Pt.)	46	402	36	719	64	1,121
217	93	1,498	50	1,524	50	3,022
219	80	111	30	263	70	374
220	2,983	17,084	99	159	1	17,243
221	2,300	22,164	99	193	1	22,357
223	2,970	17,152	78	4,965	22	22,117
224	1,969	7,718	52	6,996	48	14,714
Fayette County (Pt.)	127	48	38	79	62	127
Mississippi						
DeSoto County						
District 1 (Pt.)	249	647	65	349	35	996
District 2 (Pt.)	304	1,605	88	219	12	1,824
Marshall County						
District 3 (Pt.)	190	752	66	388	34	1,140
Total		186,540	68	86,929	32	273,469

[a]Percentages rounded to less than 1 percent.

Source: U. S. Bureau of Census, Census of Population, 1970, General Population Characteristics, Final Report PC (1)-B26 Mississippi; U. S. Bureau of the Census, Census of Population, 1970, General Population Characteristics, Final Report PC (1)-B44 Tennessee.

member of the family. The median was reported for each tract in Table 12 in order to give a simple summary statistic that is not sensitive to extreme values of family income.

In general, family incomes in the area north of Interstate 240 tend to be higher than any other area. South of the Interstate, the high income areas are located in the crescive housing developments such as Oakhaven and Whitehaven. Family income tends to decrease from north to south and also from west to east so that the lowest family incomes are found in the southeastern portion of the Nonconnah River Basin.

Unemployment

Figures on unemployment are given in Table 13 as a percent of the civilian labor force who are seeking work but unable to find a job.

The highest rates of unemployment are found in denser, more urbanized sections of the region. There is also some association of high unemployment with a high percentage of Negro residents.

Table 12

MEDIAN FAMILY INCOME 1970 FOR NEGRO, WHITE AND TOTAL FAMILIES IN NONCONNAH RIVER BASIN

Shelby County Tract Number	Median Family Income		
	Negro	White	Total
53	5,621	9,000	5,619
55	4,705	7,265	5,050
56	7,481	6,071	7,274
57	5,497	5,960	5,553
60	7,671	25,000	7,703
65	5,979	8,500	6,186
68	5,088	6,587	5,257
69	6,600	8,200	7,654
73	6,500	11,413	11,373
74	2,029	8,242	8,242
75	8,480	5,750	8,348
78	7,038	7,719	7,156
79	7,860	9,301	8,830
80	4,562	10,733	10,587
81	13,985	8,688	8,832
82	--[a]	9,195	9,195
83	--[b]	10,660	10,638
84	--[b]	5,222	5,222
85	5,929	23,227	22,736
93	--[a]	12,240	12,199
94	--[b]	10,930	10,884
95	5,635	12,909	12,680
97	--[a]	11,262	11,262
104	6,321	8,194	7,833
105	4,056	9,028	8,710
106	5,556	10,234	10,154
107	--[b]	13,457	13,438
108	--[b]	12,946	12,960
109	3,500	11,540	11,496
110	2,100	10,692	10,661
213	2,333	19,305	18,630
214	6,571	17,286	17,000
215	3,806	7,450	5,000
217	4,191	8,941	6,788
219	3,125	7,500	5,550
220	--[b]	11,806	11,811
221	--[b]	12,289	12,269
222	6,135	9,895	6,955
223	6,977	10,620	10,027
224	5,489	9,881	8,383

(Continued)

Table 12 (continued)

	Median Family Income		
	Negro	White	Total
Fayette County	2,714	n.a.	4,205[c]
Mississippi			
DeSoto County	3,246	n.a.	7,704
District 1	n.a.	n.a.	n.a.
District 2	n.a.	n.a.	n.a.
Marshall County	2,939	n.a.	4,671
District 3	n.a.	n.a.	n.a.

[a]No negro residents reported in area.

[b]Numbers were suppressed by Bureau of the Census to protect identity of small number of respondents.

[c]Based upon county totals. Detailed income data not available for districts in either Tennessee or Mississippi.

Source: U. S. Bureau of the Census, U. S. Census of Population and Housing, 1970, Fourth Count Summary Tapes; U. S. Bureau of the Census, Census of Population, 1970, General Social and Economic Characteristics, Final Report PC(1)-C26, Mississippi; U. S. Bureau of the Census, Census of Population, 1970, General Social and Economic Characteristics, Final Report PC(1)-C44, Tennessee.

Table 13

UNEMPLOYMENT FOR 1960 IN NONCONNAH RIVER BASIN

Shelby County Tract Number	Per Cent of Civilian Labor Force Female	Male	Total
53	8.9	7.8	8.3[a]
55	10.1	5.4	7.7
56	4.8	2.9	3.8
57	9.3	8.0	8.6
60	3.7	7.4	5.6
65	6.5	4.5	5.5
68	5.5	5.6	5.6
69	2.8	2.9	2.9
73	3.6	1.7	2.6
74	2.5	3.9	3.2
75	3.5	4.1	3.8
78	7.3	4.1	5.7
79	7.4	2.7	5.0
80	4.6	3.3	3.9
81	5.6	2.7	4.1
82	3.1	4.8	3.9
83	5.3	1.2	3.2
84	0.0	0.0	0.0
85 (Pt)	2.0	2.0	2.0
93	0.6	1.4	1.0
94	1.2	1.3	1.3
97	1.6	0.0	0.8
104	--[b]	--	--
105	--	--	--
106	--	--	--
107	--	--	--
108	--	--	--
109	--	--	--
110	--	--	--
213 (Pt)	2.3	0.5	1.4
214 (Pt)	0.0	0.0	0.0
215 (Pt)	4.4	1.6	3.0
217	2.6	3.1	2.8
219	7.0	3.7	5.3
220	4.6	1.7	3.1
221	1.6	0.6	1.1
222	10.0	7.7	8.8
223	3.5	2.4	2.9
224	6.0	4.2	5.1

Continued

Table 13 (continued)

	Per Cent of Civilian Labor Force		
	Female	Male	Total
Fayette	4.9	2.8	3.8[c]
Mississippi			
DeSoto	5.9	2.6	4.2
District 1			
District 2			
Marshall	4.2	2.4	3.3
District 3			

[a]Total unemployed is an unweighted average of male and female unemployment.

[b]Census tracts numbered 104 through 110 were not enumerated in 1960 census.

[c]Based upon rural county totals. Detailed unemployment rates not available for districts either in Tennessee or Mississippi.

Source: U. S. Bureau of the Census, U. S. Census of Population and Housing, 1960. Census Tracts. Final Report PHC(1)-89; U. S. Bureau of the Census, U. S. Census of Population, 1960. General Social and Economic Characteristics, Tennessee. Final Report PC(1)-44C; U. S. Bureau of the Census, U. S. Census of Population, 1960. General Social and Economic Characteristics, Mississippi. Final Report PC(1)-26C.

Chapter III

HEALTH AND SAFETY PROBLEMS

Information about health hazards or safety conditions in the Nonconnah Basin is difficult to obtain. Since the Basin crosses the political jurisdiction of four counties and two states, there is no one agency, public or private, that has the responsibility for data collection. Despite the problems of interpretation, some valuable insights can be garnered from the material taken from the Memphis-Shelby County Health Department.

The first item in this section is a summary of an interview with a representative of the Health Department which highlights the Nonconnah area specifically.

Following that are excerpts taken from the Health Department Annual Report which cover a variety of health problems for all of Shelby County. In some excerpts, such as the material on rodent control, more exact inputations to Nonconnah can be made.

The last item is taken from a special report that was the consequence of a number of agencies and individuals who expressed concern about the deplorable living conditions in some areas of the city. Their concern in this report was focused upon the control of rodents.

Health Hazards in Nonconnah River Basin*

The Shelby County Health Department operates rodent and vector control units which are actively

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*Information summarized from interview with Memphis-Shelby County Health Department representative, 5/24/72.

involved in continuous programs designed to eliminate pest and disease associated with them.

Two problem areas which are of significance, both located in the Nonconnah River Basin, are the Chapman and Jackson Pit garbage dumps. The Chapman Dump, located on Brooks Road between Highways 51 and 61, is a flood-prone area, and frequently high water from Nonconnah constitutes a problem at this location. This dump is not a sanitary landfill project but will soon be brought to compliance with a "dump and cover" program currently under implementation. Flies and rodents are a problem at this dump due to exposed solid waste. In the southeast portion of the Nonconnah River Basin in the Jackson Pit Dump poses many of the same problems. This dump, located on East Shelby Drive in the vicinity of Memphis International Airport, is quite susceptible to fires. Chemical wastes are dumped here, and many find their way into tributaries of Nonconnah. Due to the presence of petroleum waste and solvents, this is a particularly hazardous area for humans.

The Health Department identified numerous polluters in the Nonconnah River Basin, the most significant of which is the Thomas Allen Steam Plant at the mouth of the River. This plant is a major contributor of air pollution. Also, near the source of the River in East Shelby County there are several gravel washes which are responsible for soil and sedimentary pollution in Nonconnah.

A systematic program for mosquito control is accomplished through an annual program which includes periodic fogging of problem areas as well as coating the surface of standing water with oil. Fogging and spraying are done where serious infestation of mosquitoes exists.

Table 14

RABIES CONTROL ACTIVITIES

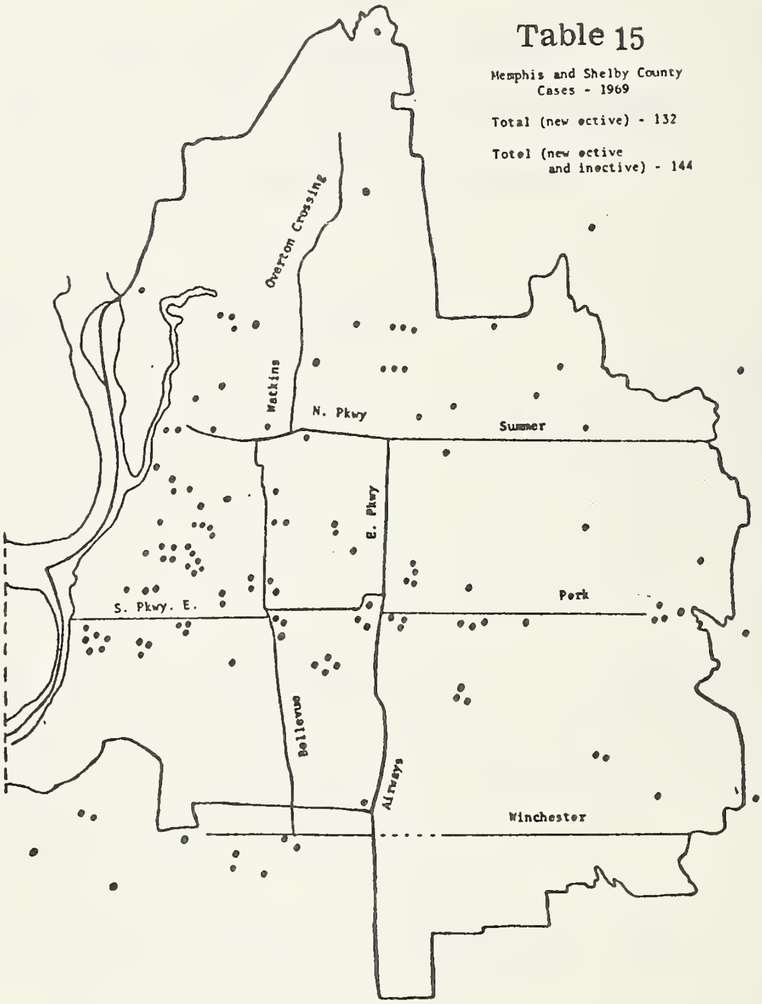
Memphis-Shelby County Health Department
in
Cooperation with the Memphis Humane Shelter

	1968 COUNTY AND CITY	1969 COUNTY AND CITY
Dogs Licensed	76,107	77,373
Dogs Picked Up	19,695	21,143
Dogs Redeemed by Owners	7,120	7,041
Dogs Disposed of at Humane Shelter	12,575	14,102
Rabid Animals	4*	2*
Animal Heads Examined	382	323
Human Anti-Rabic Treatments	57	60
Dogs Protected by Vaccination	90,597**	93,146**
Operating Expense	$159,985.	$181,684.
Revenue from License and Humane Shelter Fees	$162,917.	$169,425.

*Two Bats.
**Includes current and three year vaccination performed during the two previous years.

Source: Memphis-Shelby County Health Department Annual Report, 1969, Public Health Moves into the Age of Aquarius.

New Cases of Tuberculosis



Tuberculosis Control Activities

	1965	1966	1967	1968	1969
X-rays	78,544	78,656	77,455	78,838	85,125
Tuberculin tests	16,034	12,592	29,273	34,132	29,856
New reported cases	242	199	189	182	144
Hospital admissions (Tuberculosis and other chest diseases)	542	484	493	461	537
Active and Inactive New Case Rate/1000	34.7	27.8	26.1	24.8	19.2
Mortality rate/1000	5.1	2.8	3.0	3.6	1.9

Table 16

POLLUTION CONTROL

STATISTICAL REPORT

1969

Air Pollution	
Laboratory Analyses:	
Lead candle	130
Dustfall	24
HiVol filter	271
Gas samples	100
Pollen count	128
Tape sampler	4,380
Industrial stack sampling	1
Other:	
Complaints investigated	179
Burning permits investigated	53
Environmental inventories	11
Incinerator applications reviewed	7
Air Pollution Control plans reviewed	5
Water Quality	
City and County bacteriological water samples	1,054
Wells filled, City & County	28
Well and water system inspections	1,498
Interstate inspections	36
Complaints	27
Environmental lab analyses:	
Chemical, physicsl & biological	214
Stream Pollution Control	
Inspections, field visits, & wastewater treatment plans & specifications reviewed	485
Stream Pollution complaints	32
Planning	
Subdivision plans reviewed	161
Board of Adjustment plans reviewed	221

Table 16
(Continued)

Zoning cases reviewed	1,575
<u>Solid Waste</u>	
Landfill inspections & complaints	121

INSECT & ENTOMOLOGICAL SERVICES

Harold Carver, B.S., M.S.
Director
Insect & Entomological Services

Threat of several insect-borne diseases and public demand for greater environmental nuisance control have led to the development of programs for comprehensive mosquito control, general insect surveillance, and entomological services.

Ten mosquito thermal fog generators are utilized in the control of adult floodwater mosquitoes that invade Memphis and Shelby County each year. Efforts have been intensified in the areas of general insect surveillance, including: mosquito population density analysis, routine sampling of the mosquito population for presence of St. Louis Encephalitis virus, sampling of domestic bird flocks for the presence of St. Louis Encephalitis antibodies, Enterovirus isolation studies on the domestic fly population, and conducting routine grid counts to monitor the domestic fly population.

A complete arthropod identification service is available to the community through Health Department resources.

Mosquito Surveillance. Adult mosquito hibernating-resting stations have been established in 75 locations across the city for inspections each 10 day period. These inspections are essential to estimating the population density of various disease transmitting mosquitoes. In 1969, thirty-five New Jersey type light traps were used in collecting mosquitoes for population density analysis during the months of April through September.

Some 40,146 adult mosquitoes were collected and identified to species. An additional 8,328 female mosquitoes were forwarded to the Communicable Disease Center Arbovirus Ecology Lab, Atlanta, Georgia, for St. Louis Encephalitis virus isolation studies.

Approximately 516 domestic birds were collected for serological studies employing Hemagglutination Inhibition Screening for St. Louis Encephalitis virus antibodies. Four hundred and fifty-two soil samples were collected for mosquito egg density studies designed as a possible index to the potential floodwater mosquito population.

Fly Surveillance. A comprehensive survey of relative domestic fly densities in 28 selected areas in greater Memphis and 23 areas in Shelby County was conducted during the seven month period of April through October, 1969. In addition to the grid counts, flies were routinely collected during this period for Enterovirus isolation studies conducted in cooperation with the Tennessee State Health Department, Laboratory Division.

General Inspections. Approximately 810 insect related complaints were received and investigated. Garden pools, fish pools, industrial plants, junk yards, drainage ditches, and impounded water are routinely inspected during the mosquito breeding season.

On file are 422 garden and fish pools, 680 junk yards and industrial plants, and 512 lakes which require inspection on a weekly basis. There were 7,877 inspections conducted and 1,303 mosquito breeding sources eliminated during the 1969 season.

Mosquito Adulticide Program. The mosquito adulticide program is carried out through the use of 10 thermal fog generators. The adulticide program is activated when large mosquito populations are produced as a result of lowland flooding. Some 28,033 gallons of mosquito fogging insecticide were utilized in this activity. While this activity was cut back during the summer period, it was still employed as specific needs arose.

Mosquito Larvicide Program. A comprehensive mosquito larvicide program was carried out in Memphis and the adjacent mosquito breeding areas. This activity utilized 34,512 gallons of #2 fuel oil plus surfactant to treat 42,986 acres of water surface area.

<u>Miscellaneous Insect Control</u>. On request public institutions are treated for insects. City of Memphis school cafeteria facilities and the Mid-South Fair buildings and grounds are treated as the need arises. Chemicals used in this control consists of Diazinon, D.D.V.P., Baygon, Malathion, and Pyrotox contact spray.

RODENT CONTROL

I.K. Moseley, R.P.S.
Director, Rodent Control

During the latter part of 1968 the Rodent Control Division initiated a rodent extermination and control program in two rodent infested areas of Memphis comprising approximately fifty city blocks and involving approximately 1,680 private premises.

This program was begun as a result of a buildup in the domestic rodent population in the City of Memphis in general and these two areas in particular. Selection of areas was based on incidence of reported rat bite, rodent density, surveys, and other factors.

This program served as a pilot project for the development of an operational rodent control program in anticipation of a grant from the Department of Health, Education and Welfare under the Rodent Control Act of 1968.

Although the Department failed to receive a grant, the Department entered into an agreement with the City of Memphis, Division of Housing Improvement, to conduct a rodent extermination and control program in three urban renewal areas: Kansas Street - Manassas Street - LeMoyne Gardens.

The agreement provided the Rodent Control Division funds for a twelve month period beginning August 1, 1969, under a grant awarded to the Division of Housing Improvement by the United States Department of Housing and Urban Development. This grant is designed to provide services and facilities such as rodent control, cleanup, street lights, etc., to these areas until such time as they may be acquired by Memphis Housing Authority for urban renewal purposes.

Beginning in November, 1969, rodent control services were initiated on a complaint basis to all

Table 17

RODENT CONTROL
STATISTICAL DATA 1969

Combined Total Interim Assistance & Locally Funded Activities

Number Rodent Complaints Investigated	134
Number Premises Inspections	18,742
Number of Individual Premises Involved	4,623
Number City Blocks Treated for Rodent Control	157
Number Lbs. Anti-coagulant Bait Distributed	8,628
Number Lbs. Red Squill Bait Distributed	858
Number Regulation Garbage Cans Obtained	1,874
Number Loads of Harborage Removed	546

areas of the City and County. This was made possible through the utilization of mosquito control personnel during the winter months. All complaints received in regard to rodent infestation are investigated by inspectors and complete surveys of the areas are conducted to determine the extent of the infestation.

Environmental factors contributing to infestation are located and appropriate action taken by the inspectors to insure that the factors causing the infestations are corrected.

In situations involving public property this service assumes responsibility for control and carries out necessary eradication measures. Where infestations are widespread, block by block eradication methods are employed.

RODENT CONTROL IN MEMPHIS AND SHELBY COUNTY

The Problem

There has been an increase in the rodent population in Memphis in recent months. The recent prolonged strike of the City sanitation workers has no doubt contributed to the rodent increase, but it is too soon, if not impossible, to analyze just how much the strike may have increased the rodent problem. It may be sometime in the future before the effect of the strike is indicated. The increase is evidenced primarily by statements of knowledgeable persons in the Health Department, a resolution of the Memphis City Council, statements and letters of local organizations (See Appendix B), and personal interviews with various other individuals including those in the private pest control industry.

Statements and opinions are not the only evidence of an increasing rodent population. The Health Department reports a definite increase in the number of complaints involving rats. There has also been an increase in the number of cases of rat bite reported to the Health Department. In 1966 there were 26 reported cases of rat bite, or an average of one rat bite every two weeks. In the 63 weeks from January 1, 1967 through March 18, 1968, there were 63 reported cases of rat bites, an average of one per week.

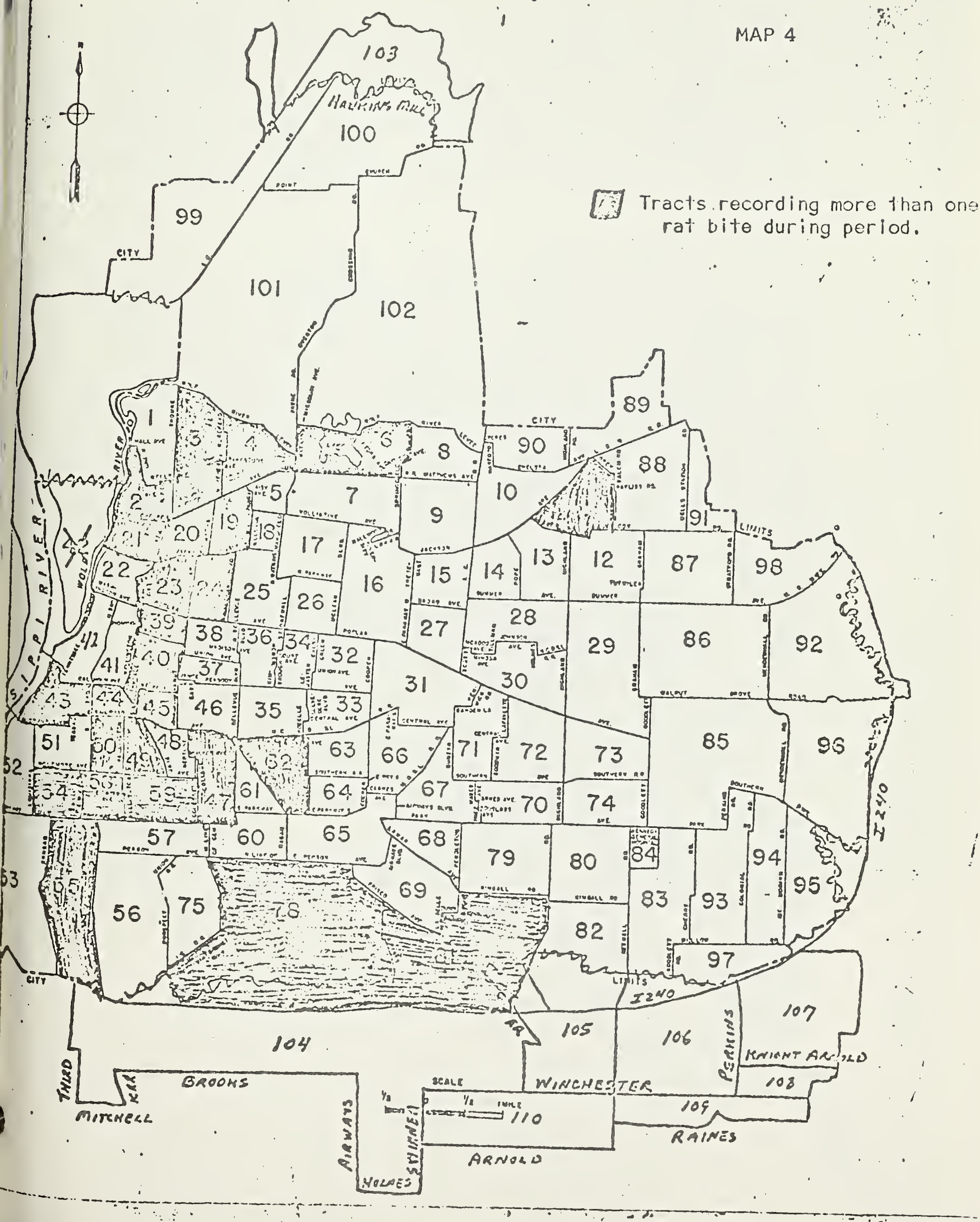
The list on the following two pages is a tabulation of the 63 cases of rat bite reported to the Health Department. The most disturbing fact contained in this list is that there were 17 cases of rat bite occurring in infants of 2 years of age or under. This is equal to 27 percent of all cases. Of these 17 cases, 14 were nonwhite. A total of 50 cases, or 79 percent, of the rat bites involved children age 12 and under.

Map 4 on Page 164 shows the incidence of rat bites for the period January 1, 1965 through March, 1968.

MEMPHIS CENSUS TRACTS
WITH HIGHEST INCIDENCE
OF RAT BITES, 1965-1968

MAP 4

Tracts recording more than one rat bite during period.



Those census tracts which had reported cases higher than one are shaded. These census tracts may be compared to the tracts on Map 5 which are shaded. The 37 shaded census tracts on Map 5 are those which were designated as "lowest" in socioeconomic level by the MMCC staff and the Health Department as found in the study on the Feasibility of Establishing Neighborhood Health Centers for Memphis and Shelby County.

Priority Target Areas

It is widely known in the health field that a rodent control program must be a community-wide effort to prevent chasing rats from one area to another. However, there are certain identifiable areas which can be designated as priority areas. Map 5 on Page 66 shows three priority areas: I, II, and III. The numerical assignments are only significant insofar as total population in the areas are concerned. It can be seen that these areas were derived primarily from the Map showing the incidence of rat bite. In addition, the Map showing low socioeconomic factors was considered important.

Source: The Mid-South Medical Center Council for Comprehensive Health Planning, Inc., A Study of Rodent Control in Memphis and Shelby County, May 1968.

MAP 5

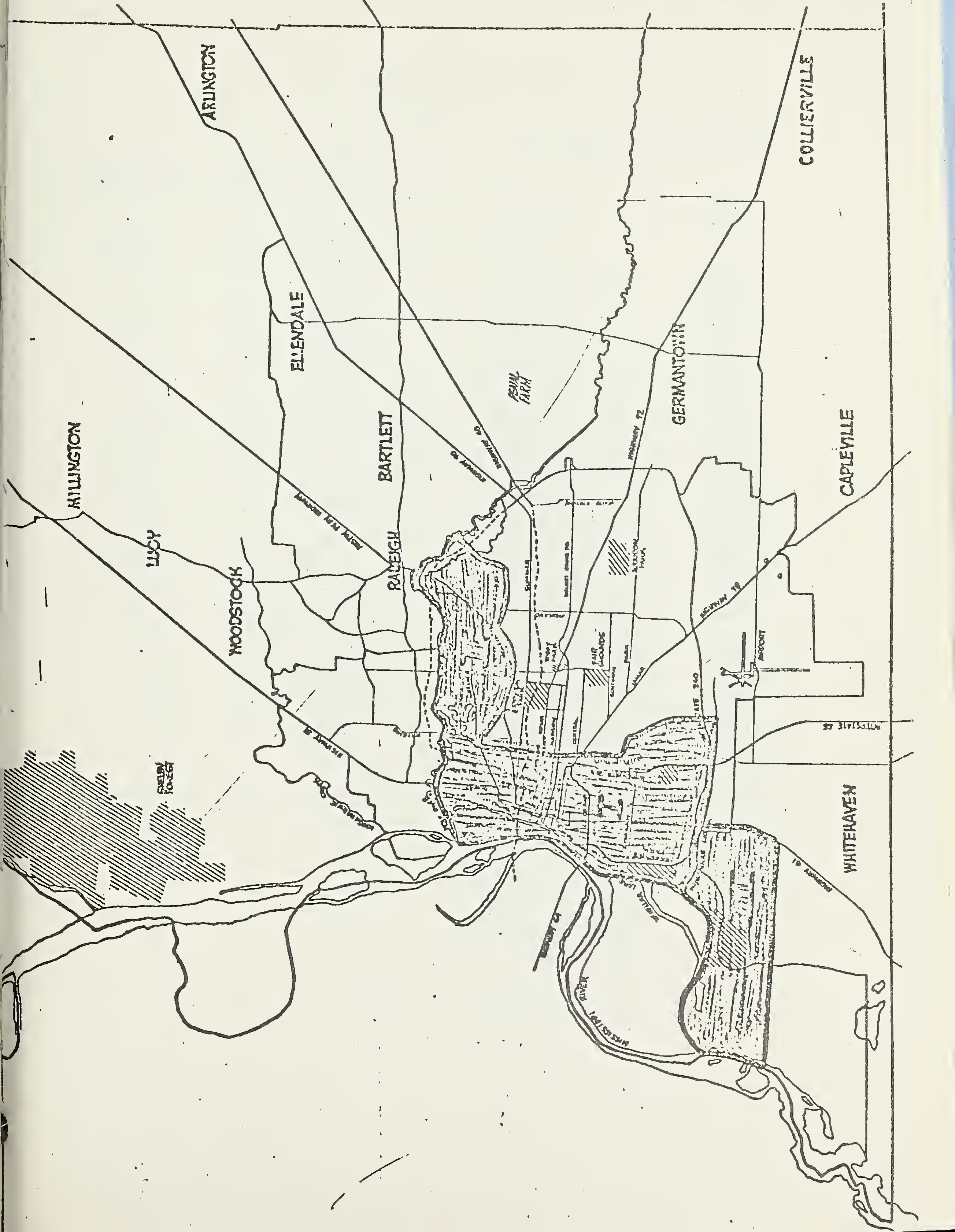

ARLINGTON
COLLIERVILLE
ELLENDALE
GERMANTOWN
MILLINGTON
BARTLETT
CAPLEVILLE
LUCY
WOODSTOCK
RALEIGH
WHITEHAVEN

Table 18

RAT BITES

REPORTED TO MEMPHIS AND SHELBY COUNTY HEALTH DEPARTMENT

DATE	ADDRESS	AGE	SEX	RACE
1-23-67	827 Breedlove	7 mos.	M	W
1-21-67	778 Porter	76	M	NW
1-24-67	689 E. McLemore	2	M	NW
2-22-67	2559 Autumn	7	M	W
3-15-67	1729 Overton	11	M	W
3-9-67	1372 Jefferson	13	M	W
3-16-67	1414 So. Main	11 mos.	M	NW
3-14-67	2215 Shannon	8	F	*NW
4-6-67	2248 Eldridge	12	M	NW
4-16-67	340 Webster	2	M	NW
4-13-67	261 Bickford	67	F	NW
4-19-67	340 Webster	20	F	NW
5-24-67	262 Saffarans	8	F	NW
5-28-67	743 Roberson	7	F	NW
6-3-67	625 N. 5th	5	F	NW
6-9-67	1342 N. McNeil	4	M	NW
6-13-67	1123 Vollintine	9	M	NW
6-26-67	640 Leath	43	M	W
7-3-67	788 King Alley	32	F	NW
7-17-67	941 E. Trigg	6	M	NW
7-22-67	693 So. 5th St.	Adult	M	NW
7-21-67	7733 Martin Rd.	3 weeks	F	W
8-2-67	594 Bethel	2	M	NW
8-2-67	3909 Raines Rd.	8 mos.	F	NW
7-30-67	3909 Raines Rd.	2	M	NW
8-8-67	1316 W. Holmes	11	M	W
8-10-67	26 W. Crump	7 weeks	M	NW
8-14-67	26 W. Crump	2	M	NW
7-13-67	713 Tate	12	M	NW
8-24-67	1285 William	11	F	NW
8-26-67	961 Ford Place	4	F	NW
8-29-67	1600 Ozan	9	M	W
9-4-67	1484 Brookins	6	M	NW
9-4-67	882 Jackson	69	F	W
9-4-67	668 N. 5th	4 mos.	M	NW
9-15-67	1118 Beachwood	50	F	NW
9-28-67	1334 Dovecrest	8	F	W

RAT BITES - Continued

DATE	ADDRESS	AGE	SEX	RACE
9-29-67	3521 Democrat Rd.	20	F	W
9-30-67	3110 Beaumont	5	F	W
9-28-67	2652 Elmo Park Rd.	10	F	W
10-7-67	2601 Kenner	4	F	W
10-16-67	690 Stevens Circle	20	M	W
10-25-67	1048 N. Manassas	2	M	NW
10-31-67	1300 Norris	15	M	NW
11-2-67	Rt. 3 (Arlington)	8 mos.	M	NW
11-4-67	3508 Boxdale	5	M	W
11-7-67	1842 Coventry	5	M	W
11-12-67	945 N. 6th	6	F	NW
12-3-67	1470 Standridge	7	F	NW
12-11-67	2021 Worchester	10	F	*W
12-1-67	2998 Shannon	6 mos.	F	NW
12-16-67	4369 Knight Arnold	9	M	W
12-23-67	679 Mosby	6½ mos.	M	W
12-28-67	Rt. 3 (Millington)	6	M	W
2-5-68	945 N. 6th	37	F	NW
2-5-68	945 N. 6th	4	M	NW
2-23-68	1461 Robinhood Lane	3	F	*W
2-27-68	4720 Kaye Rd.	10	M	W
3-2-68	11991 Walker (Arlington)	8	M	W
3-13-68	443 Webster	2	M	NW
3-13-68	443 Webster	9	F	NW
3-16-68	1036 Roland	11	M	W
3-18-68	937 Kney	3 mos.	F	NW

TOTAL - 63 Bites in 63 weeks

2 yr. old or under	- 17
W	- 25
3 to 5 yrs.	- 9
NW	- 38
6 to 12 yrs.	- 24
13 to 21 yrs.	- 5
21 to 64 yrs.	- 5
65 and over	- 3

*Mouse

Chapter IV

RECREATION

This section contains an inventory of recreational spaces as well as preliminary estimates of usage for various outdoor activities. Table 19 lists 38 public and private parks that lie within the perimeter of Nonconnah River Basin. The parks are relatively well distributed within the area. They vary in size, however, so that the acreage is not as well scattered as the number of parks. Tables 20, 21, and 22 give the size of each of the parks along with information about the type of facilties and the number of people served. Map 6 is included in order to picture the location of the private recreational facilities.

The Planning Commission data, given in Tables 23 through 25, and Map 7, are useful in providing an overall summary of the types and owndership of park lands within their planning districts.

Tables 26 through 28 are inferentially related to Nonconnah, since the basic counting unit is the Southern Region of the United States and the Wolf River Area. Nevertheless, the general patterns of participation can be applied to Nonconnah as well.

Table 19

PUBLIC PARKS IN NONCONNAH BASIN

Name	Location
Chickasaw Park	Raines Road and Warbonnet
Roosevelt Park	Mitchell Road and Sax Road
Walker Park	Rochester Road
Mississippi Park	Horn Lake Road
Sidney Lanier Park	Auburn Road
Polly Williams Park	Birchleaf and Whitaker
Raines B. Finley Park	Graceland and Whitman
McKellar Park	Airways Road and Shelby Drive
Oakhaven Park	Bishops Bridge Road and Christine Road
Medal of Honor Park	Tchulahoma Road
McFarland Park	Clearbrook and Colewood
Wooddale Park	Castleman Street
Wilson Park	Clarke Road and Cottonwood
Fox Meadows Golf Course	Clarke Road
Un-named Park	Helene and Vera Cruz
Willow Park	Willow Road
Sea Isle Park	Wellsville Road
Marquette Park	Park and Ivy
Audubon Park	Park and Goodlett
Jr. Godwin Park	Cherry and Mallory
Sherwood Park	Prescott and Vanuys
Cherokee Park	Gulf Avenue
Pendleton and Deadrick Park	Pendleton and Deadrick
Brentwood Park	Josephine and Spottswood
O'Brien Park	Prescott Road

Orange Mound Park	Whittington and Spottswood
Wagner Park	Browning and Hugenott
Charjean Park	Ketchum Road
Glenview Park	Waverly and Kyle
Bellevue Park	South Parkway and South Bellevue
Pine Hills Municipal Golf Course	Benton and Mallory
South Side Park	Lauderdale and South Parkway
Belz Park	Florida and Rosie Drive
Booth Park	Florida and South Parkway
Riverview Park	Kansas and Joubert
Dr. Martin Luther King Park	Mallory to South Parkway West

PRIVATE PARKS IN NONCONNAH BASIN

Name	Location
Whitehaven Country Club	Tulane Road
Bella Vista Country Club	Holmes Road

CEMETERIES IN NONCONNAH BASIN

Name	Location
Beth El Emeth Cemetery	Horn Lake Road
New Park Cemetery	Horn Lake Road
Oak Forest Memorial Gardens	Swinnea Road and Holmes Road
Zion Cemetery	South Parkway and Severson
Baron Hirsch Cemetery	Rozelle and Ethlyn
Calvary Cemetery	Barnes and Person
Forest Hill Cemetery	Hernando Road and Elliston

Table 20

- Owned by Memphis Park Commission

	ACREAGE
Alberson, George Park	10.00
Alcy Property	13.06
Alcy-Samuels Park	6.20
Army Park	.54
Ashburn Park	2.26
Auction and Main Property	.50
Avon Park	4.40
Barksdale Boys Club	.48
Bellevue Park	16.95
Belvedere Triangle	.13
Bela Park	10.92
Bethel LaBelle C/C	.35
Bickford Park	3.01
Bickford and Fifth Property	.21
Booths, B. P. Park	3.50
Brennan Park	18.54
Brentwood Park	2.17
Brinkley Park	.97
Brown, L. E. Park	6.10
Byrnes, Martha C/C	5.50
Carver School Property	.26
Chandler Park	2.31
Chandler, Walter Park	.16
Charjean Park	18.96
Cherokee Park	16.30
Chickasaw Park	7.78
Colonial Park	.51
Columbus Park	.11
Confederate Park	2.75
Court Square	2.08
Crump, E.H. Park	5.60
Davis, C. W. & C/C	7.83
Davis, Jefferson	2.46
Denver Road Park	10.43
Dlugach Park	1.15
East High Property	1.00
Emerald & Newberry	7.10

	ACREAGE
Forrest Park	8.07
Frayser High School Park	1.94
Galloway Entrance	2.69
Gaston Park & C/C	8.29
Georgian Hills Park	18.76
Godwin, J. R. Park	10.00
Gooch Park	10.28
Gregg Park	6.65
Grandview Park	12.33
Gutheria Property	.36
Handy Park	.43
Highland Park	2.04
Hobby Center	2.00
Hollywood Park & C/C	3.34
Jackson Park	8.30
Klondyke Park	6.34
Lanier, Sidney Park	10.17
Lee, Tom Park	10.28
Lee, Tom Swimming Pool	.69
Lewis - Davis Park	10.00
Lincoln Park	18.68
Lincoln School Park	1.10
Madison and Orleans Property	.51
Magavney Home	.26
Magnolia C/C	.46
Malone Park	1.88
Martyr's Park	6.14
McFarland, L. B. Park	11.04
Mooney, C.P.J. Park	17.16
Morris Park	4.85
Navy Park	.45
New Chicago Park	6.99
O'Brian Park	9.12
Orange Mound Park	3.50
Patton St. Park	.42
Peabody Park & C/C	3.43
Pan Marmatte Park	10.18

	ACREAGE
Pershing Park	9.74
Pickett Park	11.35
Quince & Lynnfield Property (#1)	11.46
Red Bud Triangle Park	.35
Redding, Otis Park	18.45
Rogers, John Tennis Court	4.94
Roosevelt Park	13.06
Sea Isle Park	12.14
Senior Citizens Center (1)	.31
Senior Citizens Center (2)	.91
Sherwood Park	5.79
Singleton, Walter K. Park	10.00
South Side Park	3.39
Spanish War Memorial Park	1.03
Tower Park	.38
Treadwell	1.55
Treasvant Property	4.00
University Park	8.93
Wagner, Minnie M. Park	3.07
Walker School Park	3.05
Washington Park	7.80
Wallies, Oeva C/C	.51
Westview Park	10.08
Williams, Polly Park	8.03
Williamson Park	4.55
Willingham, J. T. Park	10.00
Wilson Park	12.02
Winchester Park	8.36

- Owned by Shelby County Conservation Board

Arlington Property	10.05
Bartlett Meadows	8.00
Bridgewater Property	10.00
Carver Heights	1.01
Circle Road Property	12.61
Collierville West	17.76
Egypt-Central	22.42
Ellendale	11.35

- Owned by Shelby County Conservation Board

	ACREAGE
Fairley Road	15.00
Gardenview Park	10.00
Geeter Park	9.91
Gwynne, Stewart Property	20.00
Horn Lake and Silver Maple Property	6.80
James, George R.	10.00
Lucy	14.43
Memphis Industrial Gardens	9.83
Quince & Kirby Roads	10.73
Riverdale Park	10.08
Shadowlawn	15.06
Westwood Park	10.03
Whitehaven Lane Park	9.30
Whitten Heights	10.04

- Memphis Board of Education

161 schools with playgrounds and related facilities

- Shelby County Board of Education

41 schools with playgrounds and related facilities (Playgrounds supervised by Shelby County Conservation Board)

GREENBELTS

- Owned by Shelby County Conservation Board and Memphis Park Commission

Fletcher Creek	117.63
Loosahatchie River	544.93
Mississippi River	36.78
Nonconnah Creek	56.46
Wolf River	55.00

- Leased to or supervised by Memphis Park Commission

	ACREAGE		ACREAGE
Dixie Homes Park	3.10	Loosahatchie Boat Ramp	6.20
Foote Homes Park	4.10	Louisiana St. Park	2.80
Fowler Homes	-	May Street Park	8.50
Fuller Golf Course	116.50	Oates Manor	3.00
Lamar Terrace	3.40	Sunnyside Park	2.30
Lemoyne	2.30		

- Owned by City of Millington

	ACREAGE
Aycock Park	10.00
Eastwood Park	27.00
Millington South Park	3.00
Oak Park Community Center	2.00

- Owned by Germantown

	ACREAGE
Germantown Community Center	16.00

- Owned by Collierville

	ACREAGE
Collierville Square	1.00

DISTRICT PARKS

- Owned by Memphis Park Commission

	ACREAGE		ACREAGE
Baber, Rodney Park	77.83	Holmes, Judge Andrew Park	20.16
Buckingham, Nash	53.68	Litty Park	21.00
Cash, O. L. Park	20.11	Medal of Honor Park	53.00
Chickasaw Gardens Property (Memphis Museum)	39.81	Oakhaven Park	20.00
Douglas Park & C/C	39.20	Quince and Lynnfield (#2)	52.50
Prayser Park & C/C	40.54	Tobey Park	30.30
Galeman Park	23.46	Vish Park	26.00
Glenview Park	23.69	Willow Park and C/C	57.18
Halle, A. Arthur Park	39.10		

LARGE URBAN PARKS

- Owned by Memphis Park Commission

	ACREAGE		ACREAGE
Audubon Park	358.06	John F. Kennedy Park	261.68
Chandler, Walter	148.33	Overton Park	319.30
Davy Crockett	290.45	Pine Hill Park	160.32
Fairgrounds	136.11	Riverside Park	388.54
Firestone Park	316.84		

- Owned by Shelby County Conservation Board

Bartlett Park	156.04

REGIONAL PARKS

- Owned by Memphis Park Commission

	ACREAGE
McKellar Park	590.00

- Owned by Shelby County Conservation Board

	ACREAGE
Casper Creek Park	437.05

- Owned by State of Tennessee

	ACREAGE	
Meeman-Shelby Forest	12.711	(3,711 pertain to this study)
T. O. Fuller State Park	1.000	(150 acres used by the Corps of Engineers)

GOLF COURSES

- Owned or leased by Memphis Park Commission

Audubon	- 18 holes	McKellar Park (proposed)	- 18 holes
Davy Crockett	- 18 holes	Overton Park	- 9 holes
Fox Meadows	- 18 holes	Pine Hill	- 18 holes
Fuller Golf Course	- 18 holes	Riverside Park	- 9 holes
Galloway	- 18 holes		

- Owned or leased by Shelby County Conservation Board

Casper Creek	- 18 holes

PARKWAYS

- Owned by City of Memphis

34 acres on North, South, and East Parkways

NEUTRAL STRIPS

52 neutral strips throughout the City totaling 70.5 acres

Table 21

COMPLETE LISTING OF PUBLIC PARKS

LOCAL SERVING PARKS

- Owned by Memphis Park Commission

	ACREAGE		ACREAGE
Aley Property	12.64	Court Square	2.07
Army Park	.54	Crump, E. H. Park	4.50
Ashburn Park	2.24	Crump Stadium	7.90
Avon Park	4.309	Davis, C.W. & C/C	7.93
Barksdale Boys Club	.44	DeSoto Park	23.42
Bellevue Park	18.28	Denver Road Park	16.00
Belvedere Triangle	.163	Dlugach Park	1.17
Bele Park	10.50	Dave Wells C/C	.36
Bethel LaSalle C/C	1.20	Douglas Park & C/C	43.43
Bickford Park	2.01	Edison Park	1.44
B. F. Booth Park	3.50	Forrest Park	8.03
Brentwood Park	8.22	Frayser Park & C/C	40.54
Brinkley Park	1.07	Frayser High School Park	1.80
Brennan Park	28.34	Coleman Park	24.00
Brown, L. B. Park	8.13	Galloway Entrance	2.22
Church Park	2.76	Gaston Park & C/C	8.44
Carver School Property	.28	Georgian Hills Park	18.70
Charjean Park	33.40	Glenview Park	24.50
Cherokee Park	12.60	Gragg Park	8.43
Chandler Park	2.58	Grandview Park	23.50
Columbus Park	.412	Godwin, J.D. Park	10.00
Colonial Park	.31	Gooch Park	10.28
Confederate Park	2.68	Handy Park	.402
Highland Park	2.38	Red Bud Triangle	.38
Hollywood Park & C/C	3.82	Rivermont Park	0.80
Holmes Park	20.00	Riverview Park	17.72
Howze, Robert Park	4.87	Riverview Area (3) &	2.10
Jackson Ave. Urban Renewal	.98	Sea Isle Park	22.40
Jackson Park	8.30	Senior Citizen's Park	.309
Jefferson Davis Park	7.48	Sherwood Jr. High	8.82
Klondyke Park	22.83	South Side Park	3.43
Lincoln Park	34.11	Spanish War Memorial Park	2.17
Lincoln School Park	2.80	Tobey Park	44.50
Lisey Park	21.00	Tom Lee Park	8.00
Magevny Home	.28	Tom Lee Swimming Pool	.73
L. Arthur Hale Memorial Stadium	31.38	Treadwell	2.34
Malone Park	1.67	University Park	17.64
Memphis Museum & Lake	37.88	Vick Property	28.50
Morris Park	4.80	Wagner, Minnie M. Park	3.07
McFarland, L.D. Park	11.00	Washington Park	7.80
Navy Park	.42	Westview Park	9.99
New Chicago Park	8.43	Whitney Road Property	10.00
O'Brien Park	9.00	Williamson Park	4.50
Orange Mound Park	4.31	Willow Park	10.00
Oakhaven Park	29.50	Willow Park	12.00
Peabody Park & C/C	3.38	Wilson Park	12.00
Pop Marquette Park	9.50	Winchester Park	8.88
Pershing Park	10.00	Allen Road	10.00
Pickett Park	11.28	James Road Property	3.71

- Owned by Memphis Park Commission

	ACREAGE
Chickasaw Park	7.78
Lanier Sidney Park	10.17
Nelson & Finley	10.00
Roosevelt Park	11.00
Walker School	2.03
Williams, Polly Park	0.18

- Leased to or supervised by Memphis Park Commission

		ACREAGE
	Fuller Park	118.50
	Loosahatchie Boat Ramp	4.17
3.	Sunnyside Park	2.30
4.	May Street Park	8.50
5.	Evergreen Presbyterian	
6.	Little Flower	
7.	St. Louis	
8.	St. Michael	
9.	Dixie Homes Park	
10.	Lamar Terrace	
11.	LeMoyne	
12.	Foot Homes Park	
13.	Oates Manor	

TOTAL ACREAGE--------874

- Memphis Board of Education Playgrounds

Administration Office	Longview
Bercleir	Macon Road
Bethel Grove	Magnolia
Fowler	Morris
Guthrie	Prospect
Hanley	Shannon
Roosse St.	Sherwood Elementary
Knight Road	Vollentine
Lawler	Oakhaven Stadium

TOTAL ACREAGE-----105

- Owned by Shelby County Conservation Board

	ACREAGE		ACREAGE
Bridgewater Park	10.0	George B. James Park	10.0
Collierville Property	17.7	Leslie Oaks Park	9.3
Egypt Central Park	13.0	Lucy Park	24.0
Ellendale Park	10.1	Meadow Park	10.0
Fairley Road Property	20.0	Quince & Kirby Rd. Property	10.7
Gardenview Park	10.0	Shadowland Park	13.1
Gaston Park	10.0	Westwood Park	10.0

TOTAL ACREAGE------137

- Owned by Shelby County Board of Education: every Shelby County School has a playground. TOTAL ACREAGE: 162

- Owned by City of Millington

	ACREAGE
Aycock Park	10.0
Eastwood Park	27.0
Millington South Park	8.7
Oak Park Community Center	3.3

TOTAL ACREAGE------47

- Owned by Germantown

Germantown Community Center 16 acres

- Owned by Collierville

Collierville Square 1 acre

TOTAL LOCAL-SERVING PARK ACREAGE:---------1,275

LARGE URBAN PARKS

	ACREAGE		ACREAGE
Audubon Park	372.00	Overton Park	347.30
Davy Crockett Park	290.43	Pine Hill Park & C/C	160.76
Fairgrounds	150.92	Riverside Park	379.32
Firestone Park	316.57	Kennedy Park	320.00
Galloway Park	104.20	Mississippi Park	147.04
McKellar Park	234.00		

TOTAL ACREAGE-------3,212

LARGE EXTRAURBAN PARKS

- Owned by Shelby County Conservation Board

Casper Creek Park 442.9

- Owned by State of Tennessee

Meeman-Shelby Forest 12,711 (2,711 acres pertain to this study)

T. O. Fuller State Park 1,000 (110 acres used by Corps of Engineers)

TOTAL ACREAGE 19,464
Acreage pertaining to this study 3,064

GREENBELTS

- Owned by Shelby County Conservation Board
a total of 162 acres on Wolf River, Loosahatchie River, and Nonconnah Creek.

PARKWAY

- Owned by City of Memphis
34 acres on North, South and East Parkways

OTHER AREAS

- Owned by the Memphis Park Commission

	ACREAGE
Costume and Craft Bldg.	1.0
John Rogers Tennis Center	4.9
32 Neutral strips (throughout city)	70.3

TOTAL ACREAGE--------77.4

Source: Memphis and Shelby County Planning Commission, Community Facilities Study: Parks, Recreation, and Conservation, June, 1968.

Table 22

YMCA'S, YWCA'S, Country Clubs, and Other Recreation Clubs

YMCA's, YWCA's, Country Clubs, and Other Recreation Clubs

Name	Facilities (Available & Planned)	Number of People Served	Acres
YMCA (5 branches)	6 gymnasiums; 5 swimming pools; 1 lighted soft-ball field; other meeting, club and health facilities	9,200	12
YWCA (3 branches)	meeting and club rooms	4,000	small
Bella Vista Country Club	18-hole golf course; swimming pool, club house	2,100	125
Chickasaw Country Club	18-hole golf course; 4 tennis courts; swimming pool and club house	3,000	107
Colonial Country Club	18-hole golf course; 2 tennis courts; swimming pool, club house	2,300	95
Fox Meadows Country Club	18-hole golf course; swimming pool - currently operated by Memphis Park Commission	presently serves public	150
Memphis Country Club	18-hole golf course; swimming pool; 1 tennis court, club house	2,100	114
Quail Crest Athletic and Country Club	Planned-2 18-hole golf courses; tennis courts; swimming pool, club house	3,500 projected	600
Ridgeway Country Club	18-hole golf course; 4 tennis courts; swimming pool; day camp	1,600	154
Top-of-the-Hundred Club (Memphis pool and health club)	health club; indoor swimming pool; Planned-3 18-hole golf courses; outdoor swimming pool; wading pool; 8 tennis courts; stables and riding facilities; 4 handball courts	10,000	360
Whitehaven Country Club	18-hole golf course; 2 tennis courts; swimming pool, club house	1,200	105
Wyndyke Country Club	2 18-hole golf courses; 1 18-hole par-3 golf course; swimming pool, club house: Planned - tennis courts	3,500	475
Bethlehem Center (Neighborhood Center)	playground; basketball-tennis court; club and meeting rooms	open to public	2
Girls' Clubs of Memphis	gymnasium; game and meeting rooms	400	1
Graceland Recreation Club	swimming pool; 2 tennis courts; playground	800	4
Jewish Community Center	indoor and outdoor swimming pools; double basketball gymnasium; 3 handball courts; health club; 4 baseball diamonds; football field; picnic facilities; day camp; game and meeting rooms	5,400	21
Lakeland Fun and Recreation Club	fishing, sailing, and boating facilities; camping area; swimming pool; riding facilities; stockcar racing; amusement park	50,000	1,250
Memphis Athletic Club	6 tennis courts, (2 lighted); gymnasium; indoor and outdoor swimming pools; 2 handball courts; exercise room; steam room	1,100	10
Memphis Hunt and Polo Club	4 tennis courts; swimming pool	600	20
Neighborhood House	meeting and play rooms; senior citizens' club	open to public	small
Southmoor Recreation Park	tennis court; swimming pool; fishing lake; baseball diamond; riding facilities	Baptist Hospital student nurses only	40
University Club	6 tennis courts; swimming pool; health club; Planned-6 more tennis courts	1,000	10

Source: Same as Table 27.

PRIVATE RECREATION FACILITIES

LEGEND

YMCA'S

YWCA'S

CLUBS & NEIGHBORHOOD CENTERS

Map 6

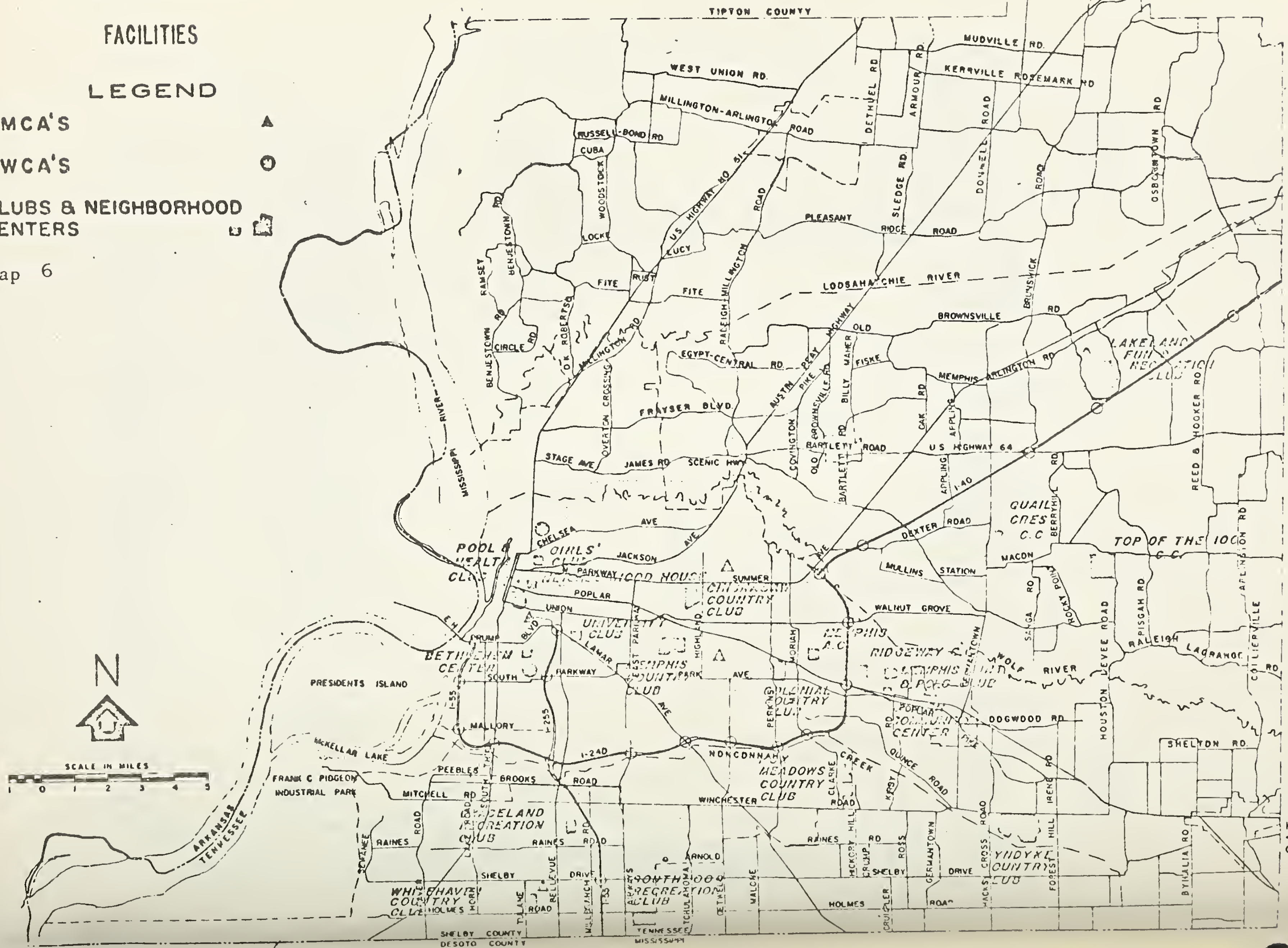


Table 23

ACREAGE OF NEIGHBORHOOD AND DISTRICT PARKS
IN PLANNING DISTRICTS FOR NONCONNAH AREA

Planning District	Neighborhood Park	District Park	Total
Depot	101	0	101
McKellar Lake	0	0	0
Oakhaven-Parkway Village	57	166	223
Quince	47	57	104
Shelby Farms-Germantown[1]	44	36	80
South Memphis	68	0	68
Whitehaven-Levi	141	20	161
Acres	458	279	737
Nonconnah Creek Greenbelt			54
T. O. Fuller State Park			1,000
Total Acreage			1,791

[1]Total Acreas for Shelby Farms-Germantown is 88 and 73 respectively.

Source: Memphis and Shelby County Planning Commission, Parks, Recreation and Conservation Plan, April, 1972.

Table 24

EXISTING PARK COMMISSION LAND BY TYPE

Type	City	County	Total	Number
Playground (primary use)	22.5	3.0	25.5	9
Neighborhoold Park and Playground	699.0	120.2	819.2	69
Playfield	77.1	--	77.1	5
Large Golf and/or Golf Course	1,527.6	1,404.8	2,932.3	11
Ornamental Parks	106.2	--	106.2	24
Special Purpose	105.9	--	105.9	6
Greenbelt	--	35.2	35.2	1
	2,538.3	1,563.2	4,101.4	125

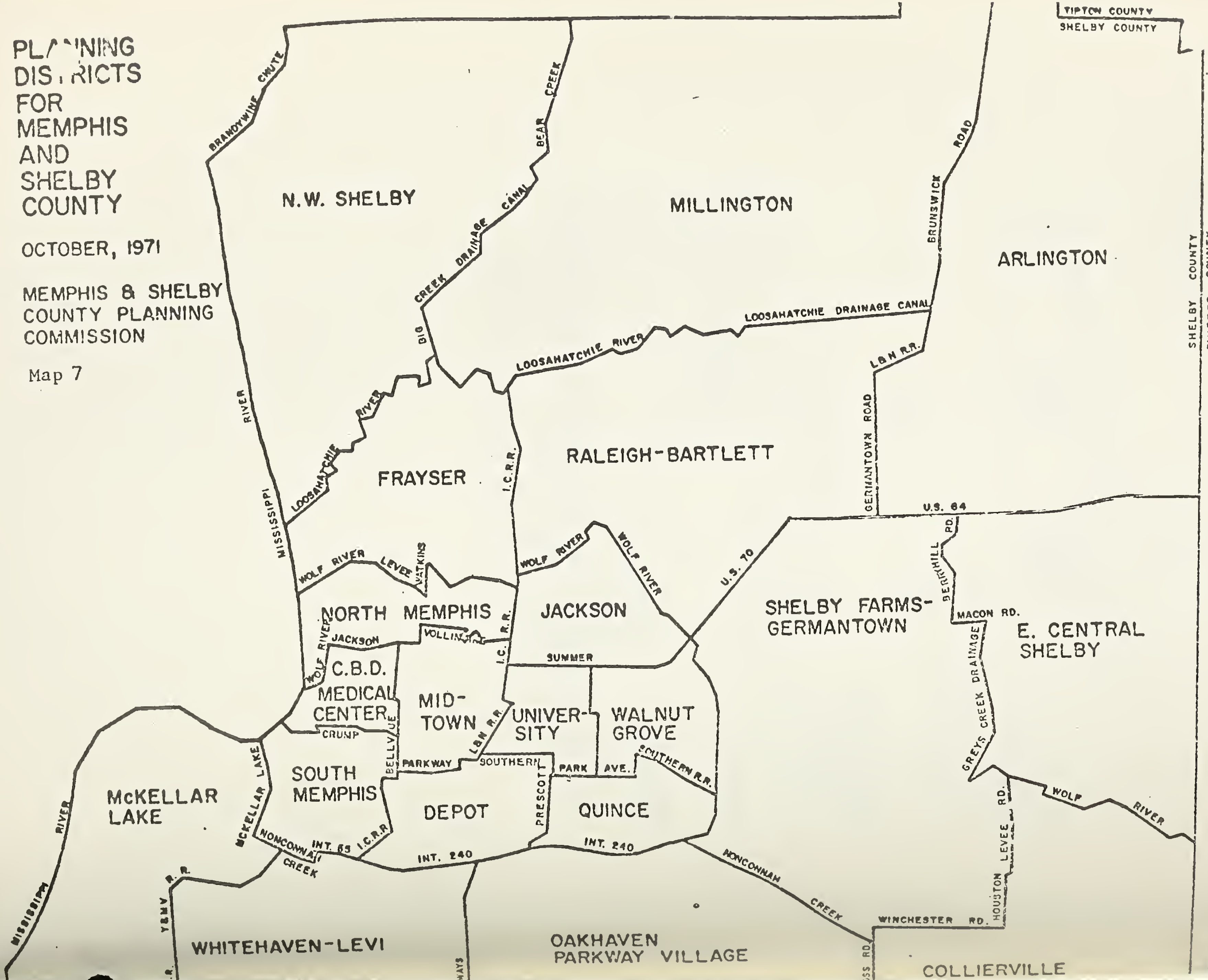
Source: Memphis and Shelby County Planning Commission, Park, Recreation and Conservation Plan, May, 1963.

Table 25

EXISTING PARK AND RECREATIONAL LAND BY USE

Type of Facility	Approximate Usable Acreage	Number of Sites Considered	Acres/100 persons
Playgrounds			
Parks	435	62	
School sites in summer recreation program	115	25	
Other school sites	160	33	
Total	710	120	0.11
Neighborhood Parks			
Owned by Park Commission	820	69	
Owned by School Board	70	7	
Total	890	76	0.14
Large Parks	2,932	11 (10 excluding Fuller Golf Course)	0.47
Reservations			
Shelby Forest	12,395		
T. O. Fuller	1,000 (approx.)	2	
Total	13,395		2.13

Source: Memphis and Shelby County Planning Commission, Park, Recreation and Conservation Plan, May, 1963.



PLANNING DISTRICTS FOR MEMPHIS AND SHELBY COUNTY

OCTOBER, 1971

MEMPHIS & SHELBY COUNTY PLANNING COMMISSION

Map 7

Table 26

ANNUAL RATES OF PARTICIPATION[1], SELECTED RECREATION ACTIVITIES, 1960, 1976, AND 2000

Activity	1960	1976	2000
Driving for Pleasure	19.63	22.54	24.73
Swimming	5.54	7.41	9.71
Walking for Pleasure	14.65	16.45	19.22
Sightseeing	5.09	6.35	7.82
Picnicking	2.77	3.16	3.54
Fishing	5.30	5.42	5.44
Bicycling	5.32	5.80	6.47
Boating other than Sailing and Canoeing	1.86	2.53	3.33
Nature Walks	2.65	3.02	3.36
Hunting	2.58	2.49	2.33
Camping	.79	1.14	1.58
Horseback Riding	1.50	1.70	2.01
Water Skiing	.54	.88	1.34
Hiking	.35	.50	.66

[1]Rates are number of occasions of participation per person 12 years and over for Southern region.

Source: National Recreation Survey, ORRRC Study Report and ORRRC Study Report 26; Bureau of Business and Economic Research, Memphis State University, A Preliminary Engineering Study and Economic Analysis for a Reservoir and Recreation Area on the Wolf River, September, 1964.

Table 27

TOTAL RECREATION OCCASIONS OF POPULATION 12 YEARS OF AGE AND OVER IN TOTAL DEMAND AREA BY SELECTED ACTIVITIES 1960, 1976, AND 2000

	Occasions (Millions)			Per Cent Increase	
Activity	1960	1976	2000	1960-1976	1960-2000
Driving for Pleasure	26.6	35.3	51.1	32.7	92.1
Swimming	7.5	11.6	20.1	54.7	168.0
Walking for Pleasure	19.8	25.8	39.7	30.3	100.5
Sightseeing	6.9	10.0	16.1	44.9	133.3
Picnicking	3.7	5.0	7.3	35.1	97.3
Fishing	7.2	8.5	11.2	18.1	55.6
Bicycling	7.2	9.1	13.4	25.0	86.1
Boating other than Sailing or Canoeing	2.5	4.0	6.9	60.0	176.0
Nature Walks	3.6	4.7	6.9	30.6	91.7
Hunting	3.5	3.9	4.8	11.4	37.1
Camping	1.1	1.8	3.3	27.3	200.0
Horseback Riding	2.0	2.7	4.2	35.0	110.0
Water Skiing	0.7	1.4	2.8	200.0	300.0
Hiking	0.5	0.8	1.4	60.0	180.0

Note: Population 12 years and over obtained by application of proportion of National population of this age group to present and projected population in the demand area.

Source: Derived by multiplication of rates in Table 26 by estimates of population 12 years and over of 1,353,000 for 1960, 1,567,000 for 1976 and 2,065,000 for 2000; Bureau of Business and Economic Research, Memphis State University, A Preliminary Engineering Study and Economic Analysis for a Reservoir and Recreation Area on the Wolf River, September, 1964.

Table 28

PER CENT AND NUMBER OF PERSONS 12 YEARS AND OVER IN SHELBY COUNTY PARTICIPATING IN SELECTED RECREATION ACTIVITIES DURING JUNE-AUGUST 1960, 1976, AND 2000

	Participants (Per Cent)			Participants (Thousands)		
Activity	1960	1976	2000	1960	1976	2000
Swimming	45	55	63	205,411	369,673	606,068
Fishing	29	32	36	132,376	215,082	346,325
Boating	22	28	38	100,423	188,197	365,565
Picnicking	53	57	61	241,929	383,115	586,828
Hunting[1]	13	14	14	59,341	94,098	134,682
Camping	8	11	14	36,518	73,935	134,682
Water Skiing	6	9	12	27,388	60,492	115,442
Hiking	6	8	12	27,388	53,771	115,442
Walking for Pleasure	33	37	43	150,635	248,689	413,666
Nature Walks	14	16	19	63,906	107,541	182,782

[1]September-November is used for hunting.

Source: Derived from Table 10, ORRRC Study Report 26, and Population Shelby County by Bureau of Business Research, Memphis State University; Bureau of Business and Economic Research, Memphis State University, A Preliminary Engineering Study and Economic Analysis for a Reservoir and Recreation Area on the Wolf River, September, 1964.

SECTION IV

ARCHEOLOGICAL ELEMENTS

ARCHEOLOGICAL SITES
LOCATED IN SITE 3 RESERVOIR AREA

Eighteen archeological sites are now known to exist within the reservoir area proper and four others are close enough that they would probably be affected by wave action at peak reservoir capacity and/or recreational development. Effective archeological survey could not be carried out in a major portion of the reservoir area because of current land use practices and seasonal factors affecting the agricultural cycle. This work must be carried out where raw soil is exposed for direct visual inspection and if disturbed, such as occurs in plowing, must have received sufficient rainfall to wash soil from the cultural remains and make them visible. All wooded areas, pastureland, and land in cover crops such as winter wheat, oats, or rye are thus unavailable for survey work and will remain so unless plowed.

Two other areas became unavailable for effective work before they could be covered this spring. These sectors were plowed, then immediately planted in row crops and kept cultivated after each shower. Included in this category are the sector bounded by Irene Road, Shelby Drive, and Nonconnah Creek, and the portion of the reservoir east of the creek branch east of Reynolds Road and south of Shelby Drive and Shelby Drive as projected due east to the west end of Mann Road. Some portions of these areas may become available after the crops are beyond need of frequent cultivation; the remainder will be checked for sites after fall harvest.

Only two known sites in the reservoir are of significant size, 125 and 128. The latter of these sites has been effectively destroyed by constant digging activity incidental to its use in raising shrubbery by Cartwright Nursery. 125 is a large hunting camp with at least two occupations sometime during the last 1000 years BC. This site should be tested extensively prior to flooding or any earthmoving operations, but does not appear to warrant preservation beyond that necessary to permit excavation. 256 is a small single-component Late Woodland hunting camp which may or may not

have remaining midden. This site should be completely excavated to provide data on Late Woodland hunting practices in the area; total excavation should not be a prohibitive undertaking since the site is only about forty feet in diameter and probably is only a few inches deep. 272 yielded one specimen which is probably on the order of 8,000 to 12,000 years old. The site was collected under extremely poor field conditions and will require closer inspection to determine whether an occupation exists here or the specimen was simply a stray item dropped by someone passing through. Should an occupation exist, excavation of the site would be of major scientific importance.

The remaining known sites in and adjacent to the reservoir consist of hunting camps, gathering camps, or overnight camps with only a trace of occupation. The occupation zones in all these remaining sites appear to have been destroyed by a combination of erosion and cultivation. No sites are known to exist within the 600' greenway zone, an area which was covered in 1969. No survey work could be carried out in the proposed siltation reservoirs, nor has any been done at those localities in the past. One site was found upstream from the main reservoir on Nonconnah Creek, five on a small tributary creek just east of Germantown Road, and one on the west fork of Johns Creek, all in fields plowed before the primary survey area was in condition to check effectively. A short description of each Site is presented in Table I.

MAP SHOWING ARCHEOLOGICAL SITES
NOT REPRODUCED IN REPORT

MAP IS ON FILE IN MEMPHIS
DISTRICT OFFICE

CORPS OF ENGINEERS

TABLE I

SUMMARY DESCRIPTIONS OF ARCHEOLOGICAL SITES ON NONCONNAH CREEK

Sites in Reservoir 3 or at Edge

Sy 124		Small campsite with Poverty Point Period and Woodland Period occupations
125		Campsite about 50 ft. in diameter with Poverty Point and Woodland occupations
126		Campsite with little material present
127		Campsite with little material present
128		Late Woodland village 200 ft. in diameter; site severely damaged
129		Woodland campsite
131		Small campsite with little material present
132		Gathering camp with little material present
256		Woodland hunting camp 40 ft. in diameter
257		Woodland hunting camp 40 ft. in diameter
258	(E)	Woodland hunting camp; little material present and badly scattered
259	(E)	Possible hunting camp, little material present
267		Gathering camp without datable remains
268	(E)	Woodland hunting camp 40 ft. in diameter, severely eroded
270		Small hunting camp with little material present
272		Location of single artifact of Paleo-Indian or Early Archaic Period
273		Small hunting camp with little material present
274		Small poverty Point Period campsite
275	(E)	Large Poverty Point and Woodland village, severely damaged
276		Woodland hunting camp, severely damaged
277	(E)	Woodland hunting camp, severely eroded and scattered

Sites in Flood Plain or at Edge (sites still in existence)

23	(e)	Archaic Period campsite, with Dalton material reported
24	(E)	Archaic and Woodland Period campsite
34		Small Woodland village
35		Small Woodland village
40	(E)	Village 120 ft. in diameter with Dalton, Poverty Point, and Late Woodland occupations
51		Small Archaic campsite
54	(E)	Poverty Point Period campsite
58	(E)	Woodland village site
118		Woodland camp; very little material present
122	(E)	Small campsite (20 ft. diameter); no datable remains present
123		Probable Woodland burial mound
296	(E)	

REFERENCED LITERATURE

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Soil Conservation Service, "Watershed Work Plan - Nonconnah Creek Watershed", U.S. Department of Agriculture, April 1972.

Tennessee Agricultural Statistics Booklet.

"List of Tennessee Certified Nurseries", Tennessee Department of Agriculture.