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DISTRICT 1986

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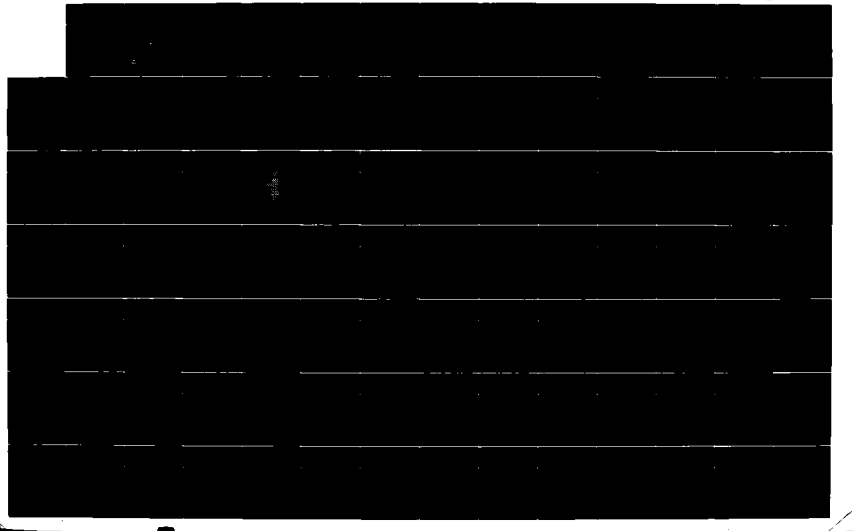

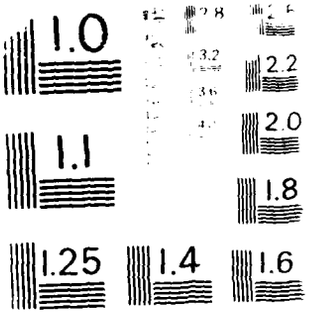
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Reconnaissance Report

(4)

Genesee River Basin Study

Volume 1
Main Report

US Army Corps of Engineers
Buffalo District

August 1986
Revised
December 1986

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Genesee River
Flood Control
Water Quality
Hydroelectric power
Water Supply

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

In terms of existing and projected supply and demand, the basin has important needs in the areas of flood control, municipal and industrial water supply, and general outdoor and fish and wildlife recreation. Other important needs are supplemental irrigation, protection from streambank and agricultural land erosion, and hydroelectric power generation.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

As possible solutions to the basin water resource needs, 12 preliminary plans were formulated and assessed. The assessment indicated that four plans warranted further, detailed analysis in the feasibility study phase, whereas eight others warranted no further consideration because of lack of economic justification or failure to achieve the primary water resource needs considered.

Hydropower development opportunities are realistic in view of the interests expressed by non-Federal entities in economically viable hydroelectric power projects.

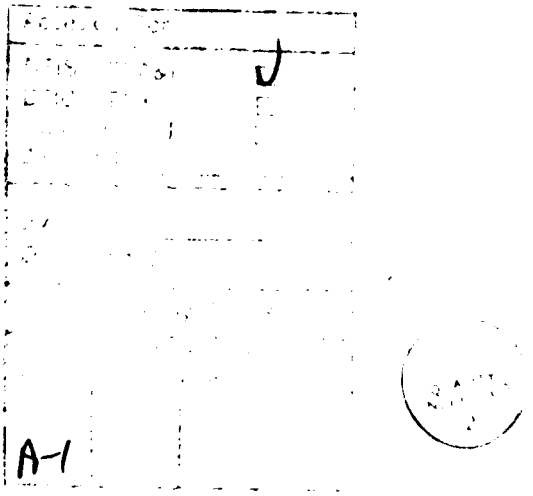
The Canaseraga Creek Valley has adequate protection from the more frequent or highly probable floods. This protection is provided by levees and other flood measures built by local farmers with Governmental assistance. However, residual damages along the valley are significantly meaningful to justify some form of additional protection. Therefore, a small scale local flood protection project will be incorporated, as a component, into those plans that will be studied further in the feasibility phase.

The authorized flood control projects for Spring Creek in Caledonia, New York, and Red Creek in Monroe County, New York, should be deauthorized. These projects are no longer economically viable because of increased costs, changed conditions, and/or lack of local support.

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

GENESEE RIVER BASIN
NEW YORK



GENESEE RIVER BASIN STUDY
NEW YORK

RECONNAISSANCE REPORT

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ACKNOWLEDGEMENT

Several people on the Buffalo District technical staff, other Federal and non-Federal agencies, and individuals have contributed to the preparation of this Reconnaissance Report on the Genesee River Basin study. Their efforts, contributions, and cooperation are greatly appreciated. The following are Corps personnel who were instrumental in conducting this investigation and preparing the text herein presented.

Wiener Cadet	Study Manager
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Ambrose Andre	Chief, Design Section
Robert Nicaise	Chief, General Engineering
James Wheeler	Civil Engineer Technician

The report itself was produced through the efforts of many other Corps personnel, namely the following, who contributed significantly to its preparation.

Paul Iwanski	Chief, Drafting Section
John Acker	Draftsman
Mary Ann Schultz	Word Processor
Linda Sauberan	Word Processor

Special acknowledgement is given to Mr. Robert Nicaise, Chief, General Engineering, whose timely input was critical to the timely preparation of the text and report.

The Buffalo District conducted this investigation under the general supervision of Colonel Daniel R. Clark, District Commander; Kenneth R. Hallock, Chief, Engineering Division; Charles E. Gilbert, Assistant Chief, Engineering Division; John Zorich, Chief, Planning Division; and Daniel T. Kelly, Chief Plan Formulation Branch, Planning Division.

We further extend our acknowledgement to all those who in some respect have contributed to the production of this document.

SECTION 1

INTRODUCTION

The Genesee River Basin, located in Western New York, constitutes the eastern portion of the Great Lakes Region. It drains an area of 2,479 square miles including 96 square miles in northern Pennsylvania (See Figure 1). The river rises in the physiographic area known as the Allegany Plateau, a few miles south of the New York - Pennsylvania border. It flows in a generally northerly direction passing through the city of Rochester and empties in Lake Ontario.

The Basin has experienced extensive floodings throughout its history. The record of floods on the Genesee River dates back to the 1800's, with the most destructive flood being the tropical storm Agnes of 1972. The contiguous counties of the basin have expressed concerns over these floodings and other water-related problems. This prompted public officials in the early 1960's to pass legislation calling for improvement works to remedy the situation. Of the many water resource projects authorized over the years to satisfy these concerns, several have not been implemented, and may never be implemented today due to changed conditions.

The Genesee River Basin Study Coordinating Committee created in 1962, identified the need for multi-purpose water resources development to include flood control, hydroelectric power, recreation, water quality, increased irrigation water, and refinement of municipal and industrial water supply. These identified needs have not been satisfactorily met to date.

This report presents a systematized approach to the functional and developmental requirements of the Basin, and formulates alternative multi-purpose plans. It further identifies the problems, potential solutions to these problems, and recommends whether detailed feasibility studies are warranted.

STUDY AUTHORITY.

The Genesee River Basin comprehensive study was authorized by the Committee on Public Works of the United State Senate in a resolution adapted 1 February 1962. The authorizing resolution was sponsored by the late Senator Jacob K. Javits at the request of the New York State Water Resources Commission. The authorizing resolution reads:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors created under Section 3 of the River and Harbor Act approved 13 June 1902, be and is hereby requested to review the reports of the Genesee River, New York contained in House Document 615, 78th Congress, 2nd Session, and other reports, with a view to determining whether any modification of the basin-wide plans should be made at this time with respect to improvements for flood control, navigation, and other related water and land resources. In making this study the Corps of Engineers shall coordinate fully with the State of New York and Commonwealth

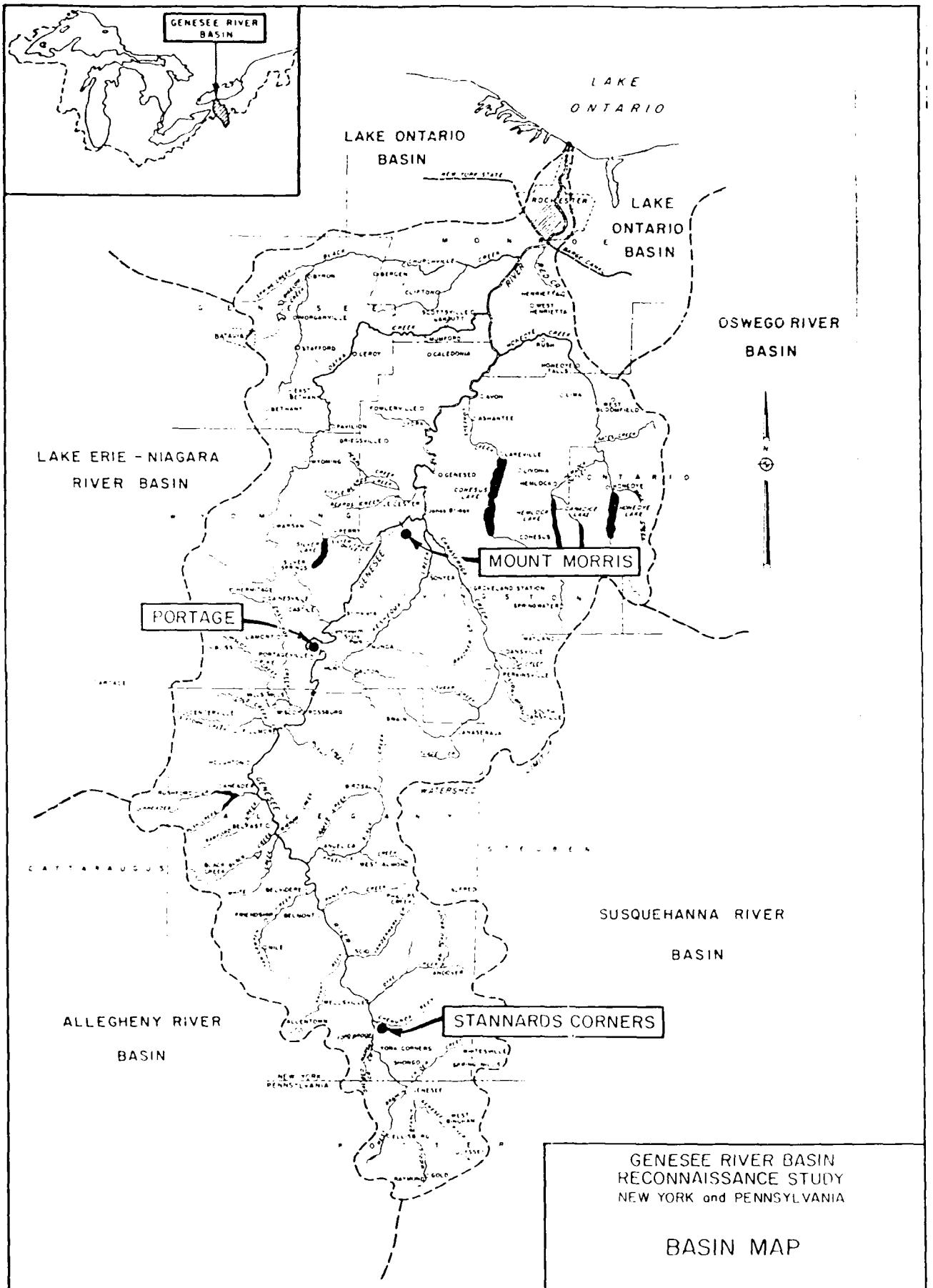

GENESEE RIVER BASIN
LAKE ONTARIO
LAKE ONTARIO BASIN
LAKE ONTARIO BASIN
OSWEGO RIVER BASIN
LAKE ERIE - NIAGARA RIVER BASIN
MOUNT MORRIS
PORTAGE
SUSQUEHANNA RIVER BASIN
ALLEGHENY RIVER BASIN
STANNARDS CORNERS
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA
BASIN MAP
U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

FIGURE 1

MAIN STEM PROFILE
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA
ELEVATION IN FEET ABOVE M.S.L.
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
MILES ABOVE MOUTH
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1102 FT./MI.
12 FT./MI.
6.3 FT./MI.
0.75 FT./MI.
PENNSYLVANIA
NEW YORK
MARSH CREEK
CHENUNDA CREEK
OYKE CREEK
VAN CAMPEN CREEK
ANGELICA CREEK
CANEADEA CREEK
WISCOY CREEK
PORTAGEVILLE
LETCHWORTH STATE PARK
MOUNT MORRIS DAM
CANASERAGA CREEK CONFLUENCE
CONESUS CREEK CONFLUENCE
HONEOYE CREEK CONFLUENCE
OATKA CREEK CONFLUENCE
BLACK CREEK CONFLUENCE
BARGE CANAL CROSSING AND RED CREEK CONFLUENCE
ROCHESTER
LAKE ONTARIO

FIGURE

of Pennsylvania and other Federal agencies concerned to insure full consideration of all views and requirements of all interrelated programs, which those agencies may develop with respect to flood prevention, water supply, stream pollution abatement, recreation, fish and wildlife management, irrigation, soil conservation, hydroelectric power and related water and land resources."

PURPOSE OF STUDY.

The Corps initiated the Genesee River Basin Study in November 1962 in accordance with the aforementioned resolution. Special task groups were formed in 1965 to identify the Basin's problems and needs and formulate plans to address these problems and needs. As a result, an early-action plan was recommended in 1969 and reevaluated in the early 1970's (See Plate 1). The most significant outcome from these studies were recommendations to construct a local flood protection project in Canaseraga Creek and a pump-storage reservoir near Portageville for hydropower generation. In Fiscal Year 1985, funds were provided to resume the studies, that is, perform a Reconnaissance study and prepare a Reconnaissance Report to document the results of the study. The primary purpose of this Reconnaissance study is to review prior reports, studies and projects, identify problems and problem areas, and define potential solutions to these problems with respect to flood prevention, water supply hydroelectric power, recreation and fish and wildlife opportunities. The second purpose of this Reconnaissance study is to develop a plan of action to complete the feasibility phase of the study, assuming an economically viable plan is identified.

SCOPE OF THE STUDY.

The study area extends from Potter County in Northern Pennsylvania through the city of Rochester in New York; and covers the entire 157 miles of the Genesee River, and its tributaries. It was scoped to review, formulate, assess and evaluate alternative measures and plans to primarily reduce flood damages. These plans included regional dam/reservoir projects and authorized local protection projects. In addition to the dam/reservoir plans that were developed, hydroelectric power-generating facilities, recreation, and agriculture were also considered to maximize the economic efficiency of the basic flood control plans. A broader range of water resource problems including water quality, water supply, and navigation were also considered. The existing Corps project at Mt. Morris was also studied to determine its potential for hydropower development.

STUDY PROCESS.

The framework established for multi-objective planning for water and related resources problems and opportunities calls for the preparation of a Reconnaissance Report in which the District Commander will recommend whether further detailed study is warranted. If the Reconnaissance Report identifies likely potential Federal involvement and local support, the study will proceed and a Draft Feasibility Report and Draft Environmental Impact Statement will be prepared. Following public review and comment, a Final Feasibility Report and Final Environmental Impact Statement will be published. This final report will document the study findings and present

the recommendations of the District Commander. The final report is then reviewed by the District's headquarters in Chicago and forwarded to the Office, Chief of Engineers for further review, and approval. This action leads to project authorization by Congress, and initiation of pre-construction planning and design, and ultimate construction.

STUDY PARTICIPANTS AND COORDINATION.

The public involvement program is a two-way form of communication by which the Corps receives information from, and provides information to, the public during the study process. Information on study status, report findings and recommendations, are disseminated to the public in an ongoing fashion. This is achieved through letters, news media, workshops, public meetings, and hearings.

Regarding this study, the first action accomplished was to send letters to United States Senators, and Congressmen; States and local representatives; and other Federal, State and local agencies to inform then of the resumption of the study. This action was immediately followed by a "News Release" issued on 28 November 1984 to inform the general public of same. Coordination was also initiated with the aforementioned agencies to obtain and identify water resource problems and needs in the basin. This coordination was achieved through correspondence, telephone conversation, and workshop meetings. The latest meeting was the Allegany County, New York, Planning Board meeting, held on 21 May 1986. See Public Involvement Section for further details on Study Participants and Coordination.

PRIOR PROJECTS, REPORTS, AND INVESTIGATIONS. (1)

While the records of floods on the Genesee River date back to the 1800's, no study of remedial measures was undertaken until after the extensive damage in 1865. Following the great flood of 1865, a series of studies and reports on flood control measures were made by Governmental agencies and by private interests.

In 1826, a dam for hydropower generation was constructed across the Genesee River at Mt. Morris just upstream of the present Route 36 bridge. The dam is still operated by Rochester Gas and Electric Company for run-of-the-river hydropower generation.

In 1836, the New York State Legislative authorized construction of a canal along the Genesee River. Construction began in 1837 and lasted 21 years before it was completed. The Genesee Valley Canal stretched from the Erie Canal to the Allegheny River at Millgrove Road and required 106 locks. Railroads were soon to replace the canal and it was closed in 1877.

(1) The projects, reports, and investigations described here were undertaken by the Corps of Engineers unless otherwise noted.

In 1889-1893, the State of New York investigated the possibility of reservoirs on the Genesee River for water supply for the Erie Canal. The first sites studied included several of these reservoirs in the Mount Morris Gorge, but owing to the development of other water supply sources for the canal the State of New York did not proceed with development of reservoirs on the Genesee River. These investigations are described in the "Annual Report of the New York State Engineer and Surveyor" for 1890 and 1893.

In 1905, a special committee was appointed by the Mayor of Rochester, and another committee by the Chamber of Commerce to investigate and report on flood conditions. A report was submitted covering the history of previous floods and suggesting remedies. In 1928, the City Manager of Rochester enlarged the scope of an investigation for a Civic Center for the city of Rochester to include the general subject of flood protection. A detailed report referred to as the "Fisher Report" on flood conditions was published in 1937.

In 1906, a dam for run-of-the-river hydropower generation, Station 172, was constructed across Wiscoy Creek at Mills and is operated by Rochester Gas and Electric Company.

The Water Supply Commission of the State of New York, between the years 1907-1910 made a study of the Genesee River for flood control and power. Two sites were found for multiple-purpose reservoirs, one near Mount Morris, and the other near Portageville.

Floodwalls at Rochester, NY were constructed in 1916 for the State of New York as a part of Barge Canal contracts. They extend about 7,000 feet along the east bank of the river upstream from the Court Street dam and about 8,000 feet on the west bank. In 1945, some of the failing and deteriorated sections of wall were replaced by the State of New York. Since that time, no appreciable maintenance has been done on these floodwalls; however, in 1973 a portion of the walls near the Rochester Convention Center were reconstructed as a part of that project.

In 1917, a dam for run-of-the-river hydropower generation, Station No. 5, was constructed across the Genesee River in Rochester below the lower falls which is operated by Rochester Gas and Electric Company.

In the 1920's, Mt. Morris Water Power Company developed a plan for a dam across the Genesee River upstream of the earlier constructed facility at Mt. Morris. The Power Company had acquired the necessary lands for a dam and reservoir with hydropower capability. Lands owned by the Power Company adjacent to the proposed works but in excess of their needs were conveyed to the State of New York on 12 July 1926 in accordance with Chapter 379 of the Laws of the State of New York. The lands were conveyed to the State for use as parkland in perpetuity in return for the right to vary and control flow in the Genesee subject to the condition that the water level maintained not exceed a 760-foot elevation for a mile upstream of the dam. Rochester Gas and Electric Corporation subsequently purchased the assets of the Mt. Morris Water Power Company and maintained interest in the Mt. Morris site for hydropower.

In 1922, a dam for run-of-the-river hydro generation, Station No. 170, was constructed across Wiscoy Creek at Wiscoy and is operated by Rochester Gas and Electric Company.

In 1927, the Commonwealth Power Company applied to the Conservation Department of the State of New York for a license to develop power on the Genesee River in the vicinity of Portageville. This application was rejected, as a clause in the grant of Letchworth Park lands to the State stipulated that these lands were to be used for park purposes in perpetuity.

A preliminary examination and survey for flood control on the Genesee River was authorized under Section 6 of the Flood Control Act, Public Law 738, 74th Congress, approved 22 June 1936. The preliminary examination report dated 23 November 1936 recommended a survey be made on the Genesee River. A report entitled "Survey Report on the Genesee River, NY, for Flood Control" was completed 16 May 1941 covering Dyke Creek at Wellsville, NY; Canaseraga Creek between the Genesee River and Dansville, NY; the Genesee River downstream from Mount Morris, and through Rochester, NY. This survey report was published in 1944 in House Document No. 615, 78th congress, 2nd Session with the only recommended improvement being construction of an earthfill dam in the Genesee River near Mount Morris.

A proposed plan for development of the Genesee River Basin involving a number of multipurpose reservoirs for power, flood control, recreation, and other purposes was prepared by the Federal Power Commission in February 1943.

Mount Morris Dam and Reservoir was authorized by Section 10 of the Flood Control Act, Public Law 534, 78th Congress, approved 22 December 1944. A definite Project Report was approved 21 February 1946 and construction was initiated in March 1948 and completed in May 1952.

A survey report entitled "Review of Report on Genesee River, NY, Vicinity of Dansville" dated 30 July 1945 and published in House Document No. 206, 80th Congress, 1st Session, recommended channel improvements in Canaseraga Creek for flood control in the vicinity of Dansville, New York. The report also found flood control, by reservoirs either alone or in combination with power production or river regulation, was not economically favorable.

A flood control project at Dansville and Vicinity, New York was authorized by the Flood Control Act of 1948, Public Law 858, 80th Congress, approved 30 June 1948. Plans and Specifications were completed in February 1982 and funding last received in FY 83. If innovative financing is not resolved and construction funds received the project will be recommended for deauthorization in FY 90.

A survey report dated 12 March 1948 and published in House Document No. 232, 81st Congress, 1st Session, recommended channel improvements for flood control at Wellsville and Caledonia, New York.

A Review of Reports on the Genesee River with particular reference to Angelica Creek, Allegany County, New York, was authorized by resolution adopted by the Committee on Public Works, House of Representatives, 27 May 1949. The report submitted 18 March 1955 recommended that improvements were not considered justified.

A flood control project at Wellsville, New York, was authorized by the Flood Control Act of 1950, Public Law 516, 81st Congress, approved 17 May 1950. The "Design Memorandum on Local Flood Protection, Wellsville and Vicinity, Genesee River and Dyke Creek, New York" was completed in August 1955 and construction was initiated in July 1956 and substantially completed in November 1957.

A flood control project at Caledonia, New York, was authorized by the Flood Control Act of 1950, Public Law 516, 81st Congress, approved 17 May 1950. This project has been classified as deferred. The project is being reconsidered under the authority of this Study Resumption, and will be discussed later in this report.

A comprehensive study of the Genesse River Basin was completed by the New England - New York Interagency Committee, conducted under the general authority of Section 205 of the Flood Control Act of 1950, Public Law 516, 81st Congress, and other acts. Chapter XXXIII of this report was a detailed study of the Genesee River and was completed in 1954.

A snagging and clearing project on the Genesee River and Dyke Creek at Wellsville, New York was completed in 1951.

In 1952, a dam for run-of-the-river hydropower generation was constructed across the Genesee River at Rochester.

An unfavorable preliminary examination of the Allegheny-Genesee waterway barge navigation, was submitted to Congress 12 April 1953.

A snagging and clearing project in Canaseraga Creek from Groveland Station to the Genesee River, was completed in 1954.

A snagging and clearing project in Keshequa Creek, in the vicinity of Nunda, New York, was completed in 1955.

The former New York State Water Pollution Control Board published Survey Report No. 1 and No. 2 entitled the "Upper" and "Lower Genesee River Drainage Basin," in 1955 and 1961 respectively. These reports recommended classification and assigned standards of quality and purity for various reaches of the tributaries and main stem of the Genesee River.

A study of flood problems at Honeoye Lake and Honeoye Creek, was initiated by the Soil Conservation Review in 1958 under Public Law 566, 83rd Congress.

A Review of Reports on the Genesse River, in the vicinity of Dansville, New York with respect to Canaseraga Creek, was authorized by resolution adopted by the Committee on Public Works, House of Representatives, 3 June 1959. This Corps study was concurrent with a study by the Soil Conservation Service under public Law 566, 83rd Congress. The Canaseraga Creek study by both agencies was later combined with this Genesee River Comprehensive Study.

A reconnaissance report on Oatka Creek at Warsaw, New York for flood control was completed under Public Law 685, 84th Congress and dated 27 September 1960. A Detailed Project Report was authorized by the Chief of Engineers, 6

January 1961. Construction of the project was started in October 1966 and was completed 24 July 1968.

A design memorandum for rectification of deficiencies in the completed local flood protection project at Wellsville, New York was authorized by Office, Chief of Engineers, 22 March 1962. The report was submitted to higher authority 22 April 1966. In 1973 and 1974, the channels in the Genesee River and Dyke Creek were widened and deepened, 3,500 feet of levees were constructed, and alterations made to two weirs to correct deficiencies in the project. In 1976, channel clearing and bank protection work was done on the upstream areas of Dyke Creek and the Genesee River. Also, levees and a steel sheet pile energy dissipator were constructed on the Genesee River section.

The New York State Water Resources Commission in November 1963, performed a preliminary investigation of the Conesus Lake Basin.

The "Primary Requirements for Drainage Planning, Rochester - Monroe County Metropolitan Area Drainage Study - Stage II" was completed in March 1964. The report contained considerable hydrologic information, flood plain mapping and drainage design information dealing with the Genesee River and its tributaries in the county.

A report entitled "Summary of Water Resources Records at Principal Measurement Sites in the Genesee River Basin through 1963" was completed in 1965. The report was prepared by the United States Department of Interior, Geological Survey in cooperation with the New York Conservation Department, Water Resources Commission.

A flood control project for Red Creek, Monroe County, New York was authorized by the Flood Control Act of 1966, Public Law 89-789, approved 7 November 1966. This project was initiated by the Soil Conservation Service in 1961 under authority of Public Law 566, 83rd Congress, and the Corps of Engineers was requested to participate in October 1961 under authority of Public Law 685, 84th Congress. As the study developed, the scope of the project exceeded the limitations of Public Law 685, 84th Congress, and the study was transferred by authority Office, Chief of Engineers, 20 March 1963 to the Genesee River Basin Comprehensive Study. A review report on Red Creek for flood control was submitted to Congress on 23 August 1966 in partial response to the comprehensive study authorization and served as the basis for the project authorization. This project is being reconsidered under the authority of this Study Resumption and will be discussed later is this report.

A joint Federal-State pollution study that included the Genesee River Basin was the Great Lakes-Illinois River Basins Project. Tnis project began studying the Lake Ontario Basin in 1964 under authority of Section 3(a) of Public Law 84-660, as amended. The project report is "Lake Ontario and St. Lawrence River Basins, Water Pollution Problems and Improvement Needs, June 1968."

"A Flood Plain Information report on Black Creek and Genesee River in the Towns of Chili and Riga, Monroe County, New York" was prepared in September 1969. The report gives a history of flooding and outlines the extent of

possible future floods including the Intermediate Regional Flood and Standard Project Floods.

A "Report of Development of Water Resources in Appalachia" was completed in September 1969. The report emphasized the need for water supply and water quality improvements. The Stannard Reservoir Project was included in the Appalachia report. It was recommended that the project be considered for authorization after additional studies.

The "Mount Morris Storage Allocation Study" authorized by Section 214 of the 1965 Flood Control Act and completed in September 1971 concluded that Mt. Morris Reservoir had storage in excess of flood control requirements which could be used to supply conservation purposes without measurably reducing its level of flood protection. It recommended further study to consider plans for allocation of storage for conservation purposes.

A "Flood Plain Information report on Red Creek and the Genesee River in the Towns of Brighton and Henrietta, Monroe County, New York" was prepared in June 1972. The report gives a history of flooding and outlines the Intermediate Regional Flood and Standard Project Flood.

In late 1972, a contract was awarded for removal of debris and shoals with the authorization of the Office of Emergency Preparedness under Public Law 91-606 from Beards Creek from the confluence with the Genesee through the village of Leicester, NY.

A "Flood Plain Information report on Oatka Creek and Genesee River, Town of Wheatland, Monroe County, New York" was prepared in April 1973. The report gives a history of flooding and outlines the Intermediate Regional Flood and Standard Project Flood.

A snagging and clearing project on Canaserage Creek from Gloveland Station to its mouth was completed in the winter of 1972-1973 following Tropical Storm Agnes.

In August 1973, the "Report of Flood, Tropical Storm Agnes, Genesee River Basin, 21-23 June 1972" was published. The report summarized the extent and character of flooding from the major storm of record for the Basin.

A "Section 14 Report for Bank Stabilization, Genesee River at Avon, NY" was prepared in November 1973. The report recommended rebuilding of the Avon sewage treatment plant access road bank, protection of the toe of slope and protection of a sewer outfall with riprap. In 1975, during preconstruction engineering and design the bank failure problem was found to be related to seepage, surface runoff, bank overloading and traffic overloading and not bank erosion or flooding. No further Federal action was taken.

A "Letter Report on Stannard Reservoir, New York" was prepared in April 1974 in cooperation with the State of New York under the authorization of Section 214 of the 1965 Flood Control Act. The report evaluated the use of Stannard Reservoir for flood control with the resultant analysis yielding a benefit-cost ratio of less than unity.

A report entitled "Flood Recovery Planning Program - Preliminary Evaluation of Stony Brook and Mill Creek, Van Campen Creek, Plum Bottom Creek Watersheds" by the U.S. Department of Agriculture, Soil Conservation Service, was prepared in June and October 1974.

The report entitled "Dyke Creek Watershed Preliminary Evaluation" by the U.S. Department of Agriculture, Soil Conservation Service, was prepared in December 1974. The report recommended two small flood retarding structures, channel modification on Hanover Brook, and floodplain management to reduce floodings along with land treatment to reduce erosion in the vicinity of Wellsville, NY.

The "Reconnaissance Report on Dyke Creek at Wellsville, NY for Flood Control under Section 205" was prepared in April 1975 and it found that an economically and engineeringly justifiable flood control project could be designed and that further study was justified. A "Detailed Project Report for Flood Control, Dyke Creek, NY was completed in January 1978 which recommended discontinuing the study in favor of a watershed study conducted by SCS. SCS began the Dyke Creek Watershed Study in January 1980 under authorization of Public Law 566.

A General Design Memorandum entitled "Red Creek, Local Flood Protection Project, Monroe County, NY" was completed in May 1975. The memorandum discussed modification of the original project authorized in 1966. Due to the lack of economic justification, the project was classified as inactive and preconstruction planning terminated in September 1975.

A report entitled "Flood Plain Information, Little Black Creek, Town of Gates, Chili, and Ogden, Monroe County, New York," was prepared in August 1975. The report presents a brief history of flooding and identifies areas which may be subject to possible future floods.

In November 1976, New York State Department of Environmental Conservation prepared a report entitled "Water Quality Management Plan for the Genesee River Basin" pursuant to Section 303(e) of the Federal Water Pollution Control Act Amendments of 1972. The report identified pollution problems, treatment needs, priorities, and schedules for pollution abatement.

A "Section 205, Flood Control Reconnaissance Report, Genesee River, Genesee Township, Potter County, Pennsylvania" was completed in October 1977. The associated study examined use of impoundments, levees, floodproofing, and relocation to protect Genesee and Hickox, PA. No economically justified plan was identified.

In November 1977, NYS Department of Environmental Conservation and the Genesee River Basin Regional Water Resources Planning Board published the "Comprehensive Water Resources Plan for the Genesee River Basin." Basic elements of the plan placed emphasis on existing needs and problems and proposals included improvement of water quality, an accelerated flood plain management program, and improved multi-purpose management of lakes, the Barge Canal, and Mt. Morris Reservoir.

A Section 14 Streambank Protection Project in Friendship, New York upstream of State Route 408 Bridge consisting of repairing 180 feet of the right bank along with placement of gabions was completed in April 1978.

A report on "Streambank Erosion on the Genesee River Along Ballard Road, Hume, New York" was prepared in June 1978. The report was prepared under the authority of Section 14 of the 1946 Flood Control Act, and identified the problem as one of inadequate storm drainage rather than steambank erosion. No Federal action was recommended.

A "Section 14 Reconnaissance Report on Streambank Erosion along Rush Creek at Bottsford Hollow Road, Allen-Home, NY" was completed in June 1978. No economically feasible plans for protection of two bridges along Bottsford Hollow Road were identified and no further Federal action was taken.

The "Section 205 Reconnaissance Report on Flooding of Ewart Creek, Swain, New York" was completed in July 1978. Engineering solutions investigated, including floodwalls and levees, were found cost prohibitive.

A letter report on "Streambank Erosion on Houghton Creek at Houghton College, Houghton, NY", was completed in August 1978 under the authority of Section 14 of the 1946 Flood Control Act. No plans of improvement considered for Houghton Creek were found economically justified.

A report on "Streambank Erosion on Van Campen Creek at Wellman Athletic Field, Friendship, NY" was completed in August 1978 under the authority of Section 14 of 1946 Flood Control Act. No measures evaluated were found economically justified and no further Federal action was taken.

A letter report on "Streambank Erosion on Unnamed Tributary of Caneadea Creek at Rushford, NY" was prepared in September 1978 under the authority of Section 14 of the 1946 Flood Control Act. The report concluded that the feasibility of providing protection to West Branch Road Bridge and Hardy Corners Road Bridge was not economically justified.

A letter report on "Streambank Erosion on Forked Brook Along McCurdy Road, Town of Willing, NY" was completed in September 1978. The report was prepared under the authority of Section 14 of the 1946 Flood Control Act. The findings were that no structural alternative was justifiable, however, a nonstructural alternative which was economically justified, was not within Federal authority to implement.

A "Section 205 Reconnaissance Report on Flooding of Plumbottom Creek, Belmont, NY" was completed in September 1978. Plans of improvement evaluated, including channel improvements and modifications, were not found economically justified; and no further Federal action was taken.

A Section 14 Streambank Protection Project in Amity, NY at Rogers Cemetery consisting of bank repair and gabion revetment to protect 500 feet of the Genesee River bank was completed in September 1978. Progressive failure of gabions threatened a 250-foot section of the cemetery and remedial work consisting of placement of stone riprap was completed in December of 1984.

The "Reservoir Regulation Manual, Mount Morris Dam and Reservoir, Genesee River Basin, Mount Morris, New York", was prepared in September 1978. The report contains reservoir regulation procedures along with a description of the project and hydrometerology information.

A report on "Streambank Erosion on the Genesee River Along Lattice Bridge Road, Caneadea, NY" was completed in October 1978. The report, which was prepared under the authority of Section 14 of the 1946 Flood Control Act indicated that there was no Federal interest in the proposed drainage improvement measures.

A "Section 205 Reconnaissance Report on the Flooding Problems within the Town of Scio, NY" was completed in December 1978. The report indicated that the cost of structural improvements evaluated exceeded benefits and that no further Federal investigation was warranted.

A Section 14 Streambank Protection Project in Houghton, NY, near the sewage treatment plant consisting of 300 feet of stone revetment along the Genesee River was completed in November 1979.

A Section 14 Streambank Protection Project in Geneseo, NY, along Route 20A consisting of 1,600 feet of stone revetment along the Genesee River was completed in November 1979.

The "State Water Plan" prepared by the Department of Environmental Resources, Office of Resources Management addressed the land and water resource needs of the Commonwealth of Pennsylvania in a series of reports covering various subbasins. Subbasin 14, the Genesee River, was included with Subbasin 16 the Upper Allegheny River in a report completed in December 1980. The report identified water resource goals and objectives, physical features and resources, social-economic features and water resource problems and solution alternatives.

A "Stage III Detailed Project Report and Environmental Impact Statement, Conesus Lake, New York" was prepared in September 1981 under the authority of Section 205 of the 1948 Flood Control Act, as amended. The report recommended implementation of a plan consisting of channelization, construction of a new control structure, and lake level regulation for control of the 25-year flood generated in the Conesus Lake Basin.

A Section 14 Streambank Protection Project in Nunda, NY, at the School Garage consisting of 315 feet of stone revetment along the southbank and an additional 60 feet on the north bank of Keshequa Creek was completed in November 1981.

A "Section 14 Reconnaissance Report on Streambank Erosion Along Crawford Creek, Towns of Belfast and Caneadea, New York" was prepared in November 1981. The report identified inadequate drainage, a local responsibility; and therefore recommended no Federal action.

The Monroe County Comprehensive Development Plan was prepared in the late 1970's and published in 1982. The plan addressed those objectives related to county development, such as wastewater management, floodplain management, and land use.

The "State of the Environmental and Annual Report 1982" prepared by the Monroe County Environmental Management Council addressed the condition of county surface waters, drinking water supply, and wetlands.

A Section 14 Streambank Protection Project in Amity, NY, at Back River Road consisting of 208 feet of stone revetment and 70 feet of bank rebuilding along the Genesee River was completed in October 1982.

A "Section 14 Reconnaissance Report on Erosion Along the Genesee River at East River Road, Caneadea, NY" was prepared in March 1983. The only economically feasible plan evaluated was relocation of East River Road by local interests. No Federal action was warranted.

A "Section 14 Reconnaissance Report on Erosion Along the Genesee County Road 48, Amity, NY" was prepared in March 1983. No Federal plans were found feasible but road relocation by locals was identified as a possible solution.

Several draft technical reports on the Genesee River Pilot Watershed Study were completed in 1983 for the Environmental Protection Agency as a part of the Task C - Pilot Watershed Program for the International Joint Commission's Reference Group on Pollution from Land Use Activities. The reports concentrated on water quality and transport of pollutants. One report briefly discussed streambank erosion.

The "National Hydroelectric Power Resources Study" conducted under authority of the Water Resources Development Act of 1976 (Public Law 94-587), was completed in May 1983. Volumes IV and XIV of the final report dealt with specific needs and potential hydroelectric sites in New York State. Two undeveloped sites at Portageville and the New York State Barge Canal on the Genesee River were found with favorable hydroelectric power potential.

The document entitled "Report of Sedimentation, 1983 Resurvey, Mt. Morris Dam, Genesee River, New York" was prepared in October 1983 and revised in June 1984. The resurvey results indicated that the storage capacity of the Mt. Morris Dam Reservoir had been reduced by 11 percent since initial survey in 1952, the year the project was completed. The document recommended a resurvey within 10 years.

The Soil Conservation Service prepared the draft report "Dyke Creek, P.L. 566 Watershed Project, Watershed Plan and Environmental Assessment" in June 1984. The draft report proposed a levee system along Dyke Creek just upstream of Wellsville to reduce flooding along the creek which would consist of Federal and non-Federal expenditures.

The "Annual Report of the Monroe County Water Quality Management Agency" prepared in September 1984 outline needs and plans for improvement related to water quality in the county. The report indicated the most significant water problem affecting Monroe County concerned the effect of natural turbitity on the city of Rochester's Hemlock/Canadice Lake water supply.

An "Interagency Flood Hazard Mitigation Report" was prepared in October 1984 in response to the 25 September 1984 Disaster Declaration in Allegheny, Steuben, and Yates County, New York which was a result of severe flooding caused by the 11-14 August 1984 storm. The Federal Emergency Management

Agency along with other Federal, State, and local Governments provided input to the report which addressed hazard mitigation during the recovery period and reduction of the potential of future flood losses. Further study, under Section 14 of the 1946 Flood Control Act administered by the U.S. Army Corps of Engineers, was recommended regarding streambank protection at Centerville, Hume, Allen (2 sites) and Angelica in Allegheny County, NY.

THE REPORT.

This Reconnaissance Report consists of a main report and supporting documentation. The main report summarizes the socio-economic resources of the basin, along with its environmental, hydraulic, hydrologic, and geotechnical characteristics. It identifies the water resource and other-related problems, needs and opportunities. It also provides an assessment and evaluation of plans considered in this Reconnaissance study. The main report is intended to provide the reader with a clear understanding of the study development, its results, conclusions, and recommendations. The supporting documentation generally consists of detailed technical information. It also includes copies of pertinent correspondence with interested agencies, individuals, and the general public.

SECTION II

ENVIRONMENTAL SETTING AND NATURAL RESOURCES

1. NATURAL ENVIRONMENT

The Genesee River Basin.

The basin is bordered on the north by Lake Ontario, on the west by the Lake Erie-Niagara River Basins, on the east by the Oswego River Basin, and on the south by the Allegheny and Susquehanna River Basins. The basin includes parts of Allegany, Cattaraugus, Genesee, Livingston, Monroe, Ontario, Orleans, Steuben, and Wyoming Counties in New York; and Potter County, Pennsylvania. (Refer to Figure 1)

The Genesee River Basin is roughly elliptical in shape, with a north-south major axis of approximately 100 miles and a maximum width of about 40 miles. The basin lies generally between 41°45' and 43°15' North Latitude and between 77°25' and 78°25' West Longitude. The total drainage area of the basin is about 2479 square miles of which about 1077 square miles lie upstream of Mount Morris Dam, built and operated for flood control by the Corps of Engineers. The river is one of few north flowing rivers in northeast United States, and the only river in New York that traverses the state. (See Figure 2.1)

The river drops rapidly in its first few miles from origin to the New York-Pennsylvania state line, then moderates somewhat until it reaches an attractive series of three falls at Letchworth State Park where it drops abruptly more than 300 feet. From the foot of the lower falls, the river becomes nearly quiescent through the scenic Genesee gorge as a result of the Federal flood control dam at Mount Morris. Immediately below the dam, the "tamed" Genesee nudges gently over a small structure of the Rochester Gas and Electric Company. From this point to near Avon the river resembles a serpent twisting northward in a series of oxbow loops. The River then meanders rather slowly through the gently rolling pastoral countryside of the broad Genesee Valley. On the outskirts of Rochester, the river flows through the New York State Barge Canal and on through the city. Within the urban corridor of Rochester, the Genesee River regains some of its former torrent by suddenly dropping about 250 feet over three successive falls before it is enveloped within Lake Ontario. Through Rochester, the once beautiful Genesee Falls are no longer the scenic attraction of years ago. Although recent attempts have been made to improve selected areas, industrialization has had its adverse effects on scenic values. The profile of the Genesee River is portrayed in Figure 2.2.

The topography of the southern portion of the basin (hereafter referred to as the Upper Basin), upstream of Mount Morris Dam, is steep and rugged, while the northern portion of the basin (the Lower Basin) is gently rolling. Geologically, the Upper Basin is in a stage of young maturity, while the Lower Basin has reached a geologically old stage with much meandering, a wide flood plain, and numerous oxbows. In Letchworth State Park, just upstream of Mount Morris Dam, the river drops from an elevation of about 1080 feet to 768 feet, over three successive falls, flowing through a deep gorge cut in rock.

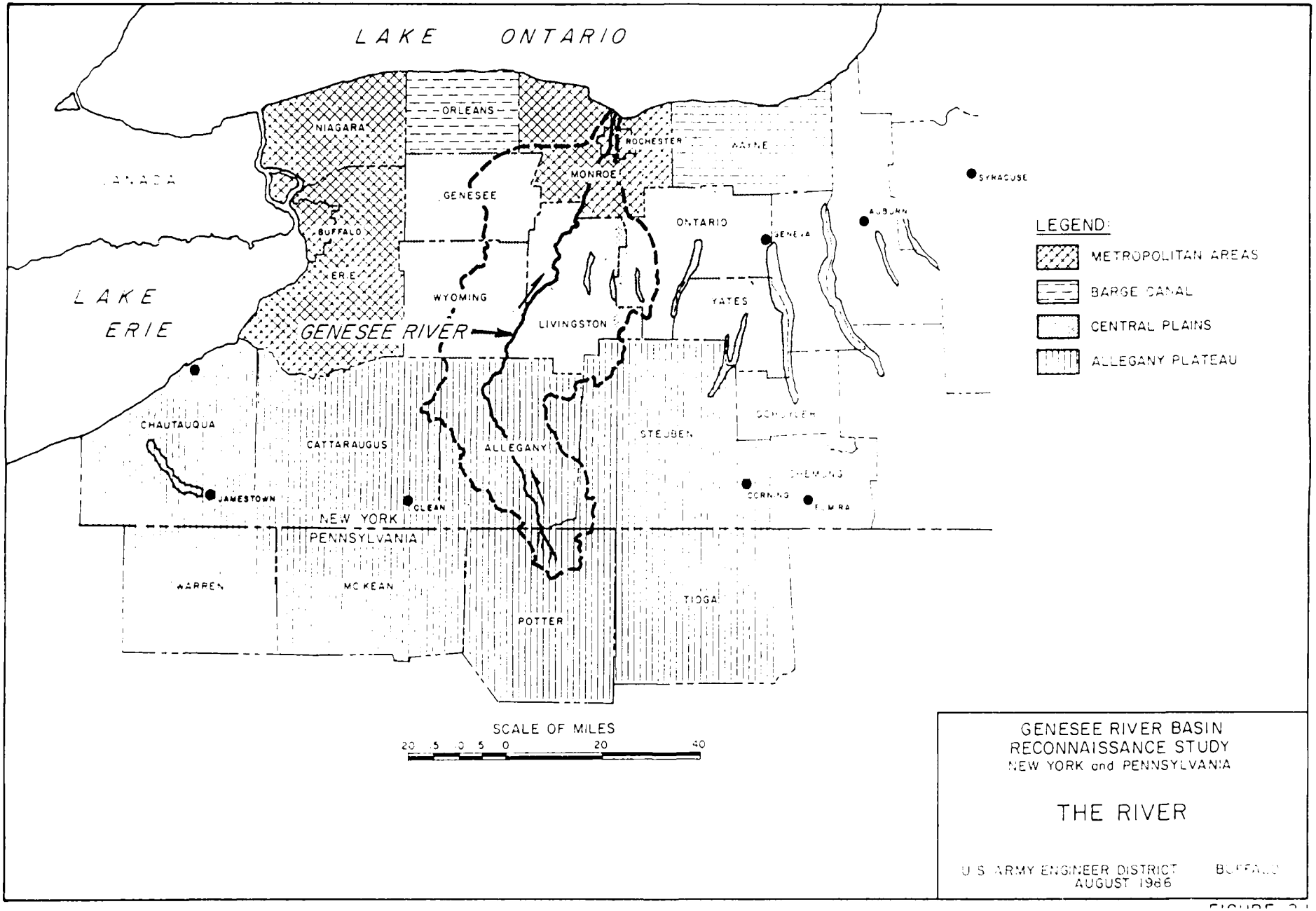

LAKE ONTARIO
LAKE ERIE
CANADA
NIAGARA
ORLEANS
GENESEE
MONROE
ROCHESTER
WAYNE
ONTARIO
SYRACUSE
AUBURN
GENEVA
BUFFALO
ERIE
WYOMING
LIVINGSTON
YATES
GENESEE RIVER
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
CHEMUNG
JAMESTOWN
OLEAN
CORNING
ELMIRA
NEW YORK
PENNSYLVANIA
WARREN
MC KEAN
POTTER
TIOGA
LEGEND:
METROPOLITAN AREAS
BARGE CANAL
CENTRAL PLAINS
ALLEGANY PLATEAU
SCALE OF MILES
20 5 0 5 0 20 40
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA
THE RIVER
U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1966

FIGURE 2-1

It then flows through narrow valleys and gorges to enter the broad Lower Genesee Valley at the village of Mount Morris. From this point to Rochester, the valleys are flat alluvial plains up to three miles wide and were subject to frequent flooding before the construction of Mount Morris Dam. At Rochester, the river drops over three falls from elevation 513 to 247 feet, the elevation of Lake Ontario. Between Letchworth State Park and the headwaters, the average stream slope is 8.9 feet per mile, while between Rochester and Mount Morris, the average stream slope is 0.8 feet per mile.

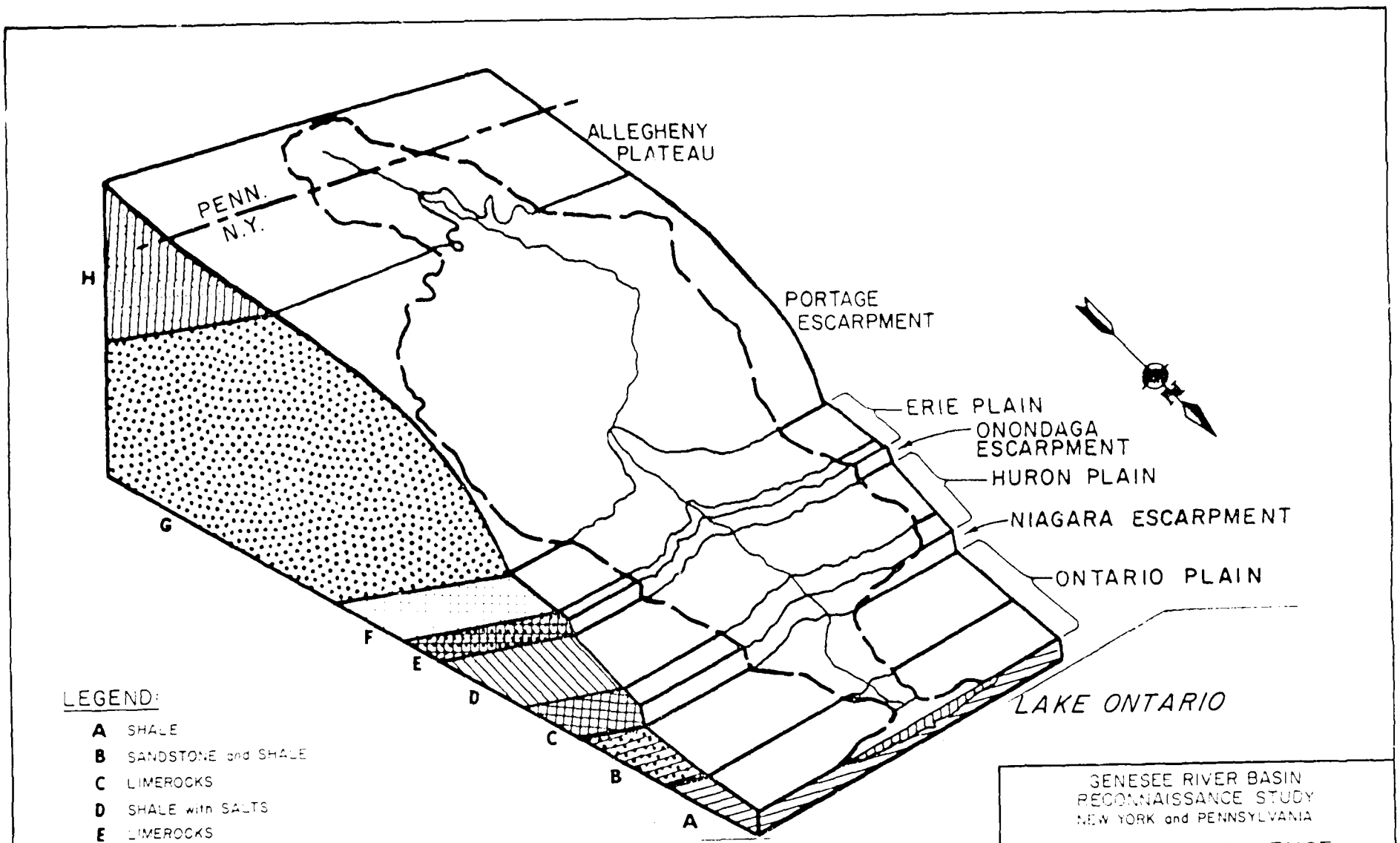
The largest tributary of the Genesee River is Canaseraga Creek. It has a drainage area of 334 square miles and joins the Genesee River near Jones Bridge, just downstream of Mount Morris. In may respects, it is a miniature duplicate of the larger Genesee Basin, in that its upper reaches, above the village of Dansville, are steep and rugged, while its lower valley is a flat alluvial plain which is frequently flooded for durations of several months at a time. Above Dansville, the main stem has a slope of about 40 feet per mile while from Dansville to its mouth, it has a slope of about 3 feet per mile. The Canaseraga Creek Basin is roughly square in shape, about 20 miles on a side. The main stem, which rises at about elevation 1900, has a length of 42 river miles and joins the Genesee River downstream of Mount Morris at river mile 62, at an elevation of about 548 feet.

Other tributaries of the Genesee have a wide range in size and topographic characteristics. For example, Angelica Creek, in the Upper Basin, has a drainage area of 85 square miles and is topographically rugged, with a main stream slope of 38 feet per mile. Black Creek, in the Lower Basin, has a drainage area of 214 square miles. Its basin is relatively level and marshy with a main stream slope of 6.5 feet per mile.

Geology.

The geologic structure of the Genesee River basin is characterized by a bedrock "foundation" mainly of Devonian and Silurian age, some thousands of feet in thickness. The bedrock is composed of layers of shale, limestone, dolomite, and sandstone. These formations are shown in board groups in Figure 2.3. Groups A through D are mainly of Silurian age; and groups E through H of Devonian age. These layers dip gently to the south at an average of 40 to 60 feet per mile. On top of the bedrock are glacial (Pleistocene) deposits of clay, sand, and gravel. These deposits are thin on the uplands, generally less than 50 feet in thickness, and at some places less than 10 feet. On the other hand, in the valleys of the Genesee River and its principal tributaries, the glacial deposits are commonly between 100 and 300 feet in thickness; maximum recorded thickness is about 500 feet. The principal exceptions to such thicknesses in the valleys are the Genesee River gorges between Portageville and Mount Morris and at Rochester where bedrock is at or close to the land surface.

Each layer of bedrock was deposited as clay, lime, or sand on the bottom of the sea which covered the entire Genesee region several hundred million years ago. With deep burial these sediments were compacted and cemented into shale, limestone, and sandstone. About 200 to 300 million years ago, the region rose above the sea. Since that time the uplifted land has been almost constantly subjected to erosion except for periods of resubmergence.



GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

BEDROCK INFLUENCE
and DISTRIBUTION

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

FIGURE 2-7

Just prior to glaciation, some of the major topographic features of the Genesee River basin resembled their present forms, but with several important differences. The hilltops were steeper and rockier, and bare rock was probably visible in many more places than it is now. It has been suggested that the Genesee River system was much larger than it is today, and included a major east branch which flowed in what is now the wide valley of Canaseraga Creek.

The landscape was again subjected to major changes during Pleistocene times. Most of the unconsolidated deposits were formed when a continental glacier spread southward from Canada as a result of climatic conditions that caused ice and snow to accumulate each year at a faster rate than they were melting. The massive ice sheet, hundreds of feet in thickness, ground its way into and over most of New York State. Hilltops were rounded, some valleys were widened or deepened, and the glacier by its crushing and abrasive action on the land surface, produced tremendous quantities of rock debris, much of it the dense clay-sand-gravel mixture known as "till." Finally the climate became warmer, melting began to predominate over freezing, and the glacier began its slow retreat northward, interrupted occasionally by substantial periods of time when the ice front was relatively stationary.

When the glacier first began its southward advance, the outlets of north-flowing streams such as the Genesee were blocked, and temporary lakes formed in front of the glacier while the streams were forced to find new outlets to the east, west, and south. Erosion was the predominant geologic process. Then, as the glacier retreated, several kinds of clay, sand, and gravel deposits were formed. These include a mantle of till on most of the uplands, outwash deposits of sand and gravel in glacier-fed streams, extensive clay deposits in glacier-blocked lakes, and layers of till, clay, sand, and gravel in various proportions in places where the glacier halted for a long period of time (moraine deposits). Many of the deeper valleys were filled with rock debris from the melting glacier, sometimes as till and at other times as sorted deposits of clay or sand and gravel. This valley filling was so extensive in some cases that a former stream course was blocked entirely. Thus, much of the former "East Branch" of the Genesee River was permanently blocked off, and the main river carved a new course northward at Portageville and Avon resulting in the present gorges of the Genesee River through Letchworth Park and at Rochester.

One of the most extensive types of deposits resulting from glacial action in the Genesee River basin is fine-grained sediment, mostly clay and silt, which is thick and extensive, especially in the central part of the basin. These sediments were deposited in a series of glacial lakes that extended completely across the present valley of the Genesee River. As the glacier retreated northward, successively lower melt-water outlets across the divides of the valley were uncovered and lakes were formed at successively lower altitudes. After the lakes were drained, many of the lake deposits were removed by erosion, especially in the central parts of the valleys.

The most permeable deposits of glacial origin are sand and gravel. As the ice sheet receded, the melt-water streams which issued from the glacier deposited large quantities of sand and gravel, especially at the foot of the glacier in the glacier-blocked lakes and in fans and floodplains on top of

the drained lake deposits of finer grained materials. Some upland streams deposited sand and gravel at the edges of glacial lakes. These deposits indentify with finer grained, lakelaid deposits of silt and clay.

The preceding discussion of glacial history, even though brief and simplified, indicates the great extent and sometimes complex nature of the glacial deposits and geology in the Genesee River basin.

Lakes.

There are six major lakes in the basin and numerous ponds. The four lakes in the lower basin are natural and considered a part of the Finger Lake chain. They are Honeoye Lake, Canadice Lake, Hemlock Lake, and Conesus Lake. In the upper basin, above Mount Morris Dam, there is one natural lake, Silver Lake and one artificial impoundment, Rushford Lake. Table 2.1 gives a brief description of the above lakes.

Table 2.1 - Description of Lakes in Genesee Basin

Name	Surface Area (sq.mi.)	Drainage Area (sq.mi.)	Feeder Streams	Outlet Streams
Honeoye	2.61	35	Honeoye Inlet	Honeoye Creek
Canadice	0.97	12	-	Canadice Outlet
Hemlock	2.90	50	Springwater Creek, Reynolds Gully Creek	Hemlock Outlet
Conesus	5.08	60	Wilkins Creek, N. McMillan Creek, Conesus Inlet, S. McMillan Creek	Conesus Creek
Silver	1.19	16	Silver Lake Inlet	Silver Lake Outlet
Rushford	0.91	61	Canadea Creek, Rush Creek	Canadea Creek

Climate.

The climate of the Genesee Valley is generally that of the humid or forest climate which prevails over most of the United States east of the Mississippi River. Despite the relatively small size of the Genesee Valley, rather large temperature and precipitation differences exist from one community to another. The basin has cold winters and mild summers. The average freeze-free period is 140 to 160 days for the Ontario Plain area and 110 to 150 days for the Allegheny Plateau.

Precipitation.

a. General.

Precipitation distribution was studied for periods of May-October and November-April, on a monthly basis. These periods make possible a separation of precipitation into rain and snow regimes, and also relate precipitation to the recharge runoff cycle of winter, and the period of deficient rainfall and dryness in summer. Also, the separation of precipitation into these two periods provides some opportunity of examining the contribution of Lake Erie snowfall to the Genesee Valley precipitation pattern.

b. Annual Precipitation.

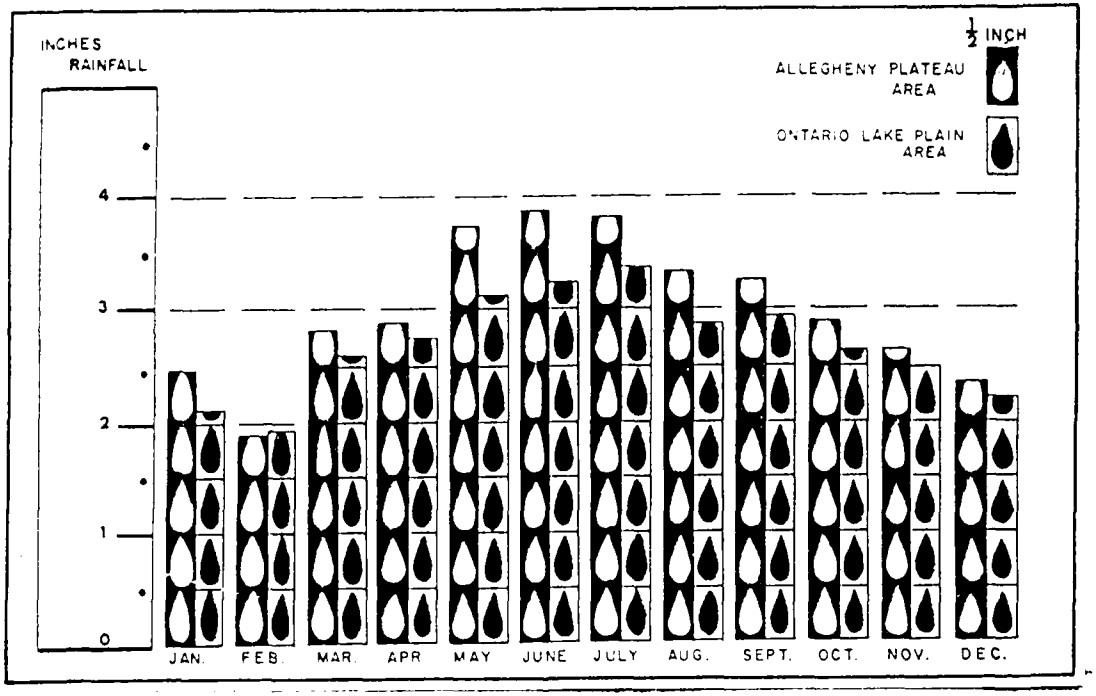
The Genesee Valley region has annual precipitation varying from approximately 25 to 40 inches, with sharp differences between the western rim of the basin and the central area. The sharp differences in precipitation from one area of the valley to another can be seen quite readily in Plate 2.1. On the western rim, at Warsaw, total precipitation approximates 40 inches a year, as opposed to only 26 inches, 15 miles to the east, near Mount Morris.

Similarly, reduced values are seen at other points in the central and northern part of the valley. Thus, much of the Genesee Valley represents one of the driest parts of New York State, receiving only about half the precipitation falling in the area east of Lake Ontario, and less than half that normally available to the Catskills. Although amounts are not the same, the general pattern of distribution of precipitation is similar in both the winter and summer periods.

The average monthly distribution of rainfall is shown in Figure 2.4 for the two major agricultural regions of the basin. The rainfall is fairly well distributed throughout the year with the months of May, June, and July normally having the greatest total monthly amounts.

GENESEE RIVER BASIN

AVERAGE MONTHLY RAINFALL



GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

AVERAGE
MONTHLY RAINFALL

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

FIGURE 2.4

The Ontario Lake Plain Area represents the driest portion of the valley, and the Allegheny Plateau area is representative of heaviest wintertime precipitation.

The pattern for the stations in the interior of the valley displays the characteristic summertime maximum, while the stations near the western rim show a more uniform pattern with seasons, with snowfall from Lake Erie bolstering the wintertime amount. For the western stations there is a range of about two-thirds of an inch in monthly amounts, while the interior stations show a range of about an inch and a half.

c. Wintertime Precipitation.

Although most of the wintertime precipitation occurs as snow, the Genesee Valley also receives a significant amount from cold-season rain, resulting from vigorous northward movements of warm air into the Lower Lakes and northern Alleghenies. In most cases, this precipitation results from the interaction of cold and warm air at some distance from storm centers. The primary and secondary storm tracts for the month of January for the eastern portion of the United States are shown in Figure 2.5. Storm centers moving through the valley are considerably less numerous than in these two areas, and average about one storm center per month. As mentioned earlier, another significant source of wintertime moisture is snow showers generated over Lake Erie which then move over the western plateau area of Western New York and then across the Genesee Valley. The next most probable wind trajectory to result in snow showers for the northern end of the valley passes across upper Michigan, near Sault Ste. Marie, and then across the western end of Lake Ontario and into the Valley. Heavy snowfall from lake-effect storms usually diminishes rather abruptly as it reaches the western edge of the Genesee Valley, where the terrain slopes downward to the east. Thus, heavy snowfall can usually occur eastward from Lake Erie to near Batavia and Warsaw, then diminish sharply in amount from there eastward. On rare occasions, however, radar has shown narrow streaks of heavy snow extending eastward across the valley in the vicinity of Mount Morris and as far east as Syracuse. The phenomenon of lake-effect snowfall has not been studied closely, and reasons for the sudden decrease in snow amounts are not well known.

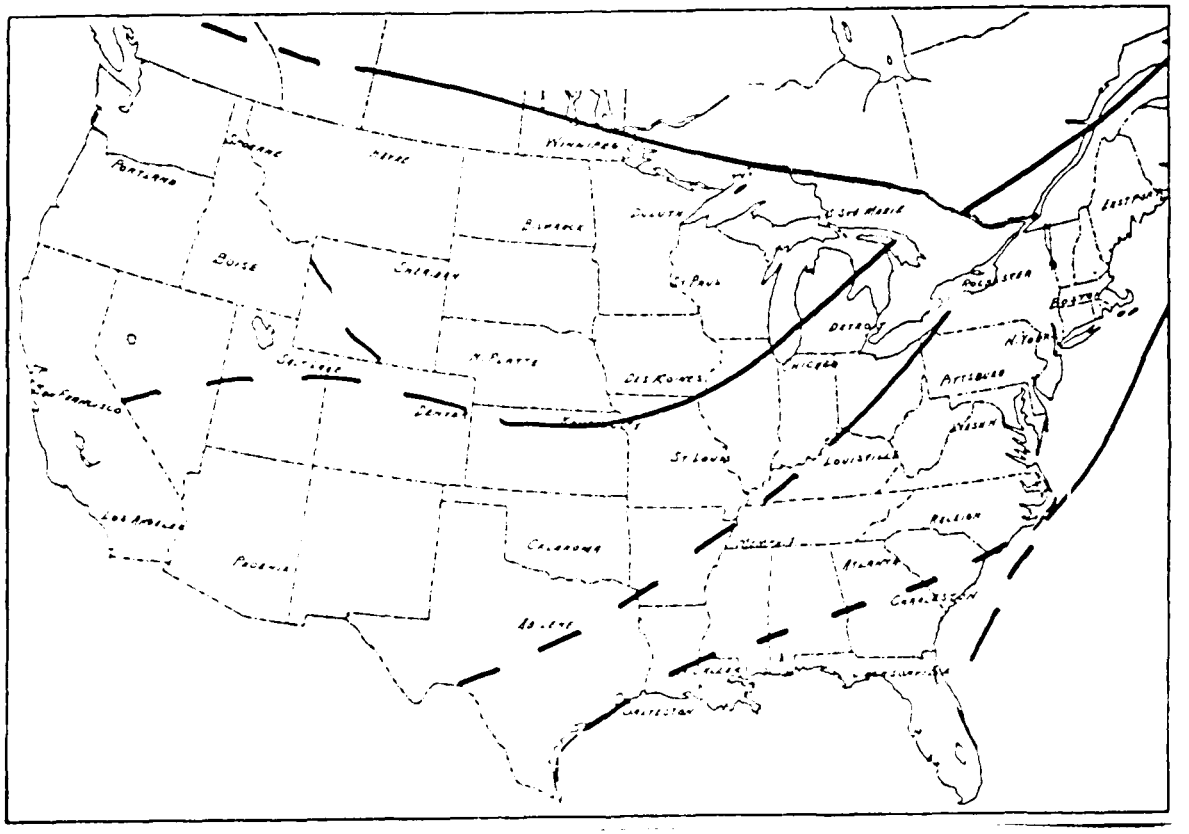
d. Summertime Precipitation.

Averages for the period May through October are the largest amounts in the high ground to the west of the Valley, and at the stations on the western edge of the Valley itself. Although no specific study has been made, work done with 24-hour totals and storm totals collected during the movement of general storms through the northeast indicate little difference that can be attributed to topography. It is thought, then that the differences come about mainly in shower-thunderstorm type situations.

Groundwater Resources.

The groundwater resources of the Basin are moderate in total quantity and variable in quantity and quality from place to place. Their principal usefulness is for villages, farms, and commercial and industrial establishments with small or moderate water needs. The principal sources of groundwater are

STORM TRACKS - MONTH OF JANUARY



LEGEND

GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

STORM TRACKS
MONTH of JANUARY

U.S. ARMY ENGINEER DISTRICT, BUFFALO
AUGUST 1986

FIGURE 2-1

unconsolidated deposits of sand and gravel which occur in the valleys of the Genesee River and many of its larger tributaries and the bedrock of various kinds which underlies the entire basin. Maximum continuous yields from sand and gravel aquifers are estimated to range from 0.2 to 18 mgd with a total estimated yield from 53 aquifers of about 200 mgd. Yields from wells penetrating the bedrock generally range from 2 to 190 gpm and often are less than 50 gpm. The chemical quality of the groundwater ranges from good to poor with the better quality water generally available in the southern and central parts of the basin.

Water Quality.

Correspondence dated August 1985 with the New York State Department of Environmental Conservation regarding stream water classification of the Genesee River Basin and major tributaries indicate that water quality for the watershed ranges from "A" through "C". "A" classification indicates that the water is suitable for drinking, culinary or food processing purposes and other uses. A "C" classification indicates that the stream is best suited for fishing and all other uses except as a source of drinking and food processing. Most of the lower and upper reaches are classified as "A" or "B" some "C" ratings are found in the upper as well as the lower reaches. For more information on Water Quality, refer to Supporting Document, Environmental Assessment.

Air Quality.

The ambient air quality data for the basin meet or exceed the allowable maximum Federal and State standard for various levels.

The land uses associated with NYSDEC air quality classification levels 1, 2, and 3 are predominantly used for:

1. timber, agricultural crops
2. single or two-family residences
3. commercial office building, department store, etc., light industrial complexes or suburban areas of limited commercial and industrial development near large metropolitan complexes.

Habitat, Vegetation, Wetlands.

The diversity of natural resource areas of importance range from cold-water sources to wild trout spawning habitat, deer, and waterfowl habitats. The natural and planted terrestrial vegetation is as diverse as the natural resource areas. It is characterized by planted corn, wheat, beans, and vegetables. A variety of shrubs and vines also naturally occur along field and woodland boarders. They include raspberry, dogwood, wild grape, etc. Natural grass and forb weed species have also established throughout the watershed. Some vegetation relates to wetlands that provide valuable habitats for wildlife such as song birds, waterfowls, as well as winter cover for some species of mammals and birds.

Fish and Wildlife Resources.

Fish and wildlife of most kinds common to northern United States are present in the Genesee River Basin. About 18 species of fish are found within Pennsylvania, which include Salmonids (rainbow, brown, and brook trout). The remaining species comprise a forage base of minnows, darters, shiners, and suckers. Access to fish and wildlife habitat is not severely restricted. There are extensive lake-type fisheries in the lower subbasin although there is a definite lack of such habitat in the upper basin. Six lakes - Honeoye, Hemlock, Canadice, Conesus, Silver, and Rushford (Caneadea) - range in size from 580 to 3,251 acres, and in addition to panfish, contain most of the important warm-water game species, including the pikes, pike-perches, and basses. In addition, lake and rainbow trout are present in Hemlock, Canadice, and Rushford Lakes.

Stream fisheries in the Basin are populated with both warm-water and cold-water species, according to the type of habitat available. Lake runs of silver bass, smallmouth bass, and walleyes ascend upriver a short distance from Lake Ontario. The Court Street Dam in Rochester, backs water up to the mouth of Honeoye Creek creating a float-fishing reach in which there is good fishing for bass, walleyes, and panfish.

Table 2.2 developed by the Office of Parks and Recreation, presents demand and supply data for fishing. The demand figures represent the total number of county residents and non-residents that recreate in these counties. Supplies are not projected to increase between 1970 and 1990 during which period no major projects are scheduled for construction.

Table 2.2 - Demands for Fishing in the Genesee River Basin, Fishermen on an Average Weekend Day

County	1970			1990		
	Demand	Supply	Need	Demand	Supply	Need
Allegany	1,190	1,704	-	1,389	1,704	-
Cattaraugus	765	1,080	-	976	1,080	-
Genesee	240	159	81	295	159	136
Livingston	1,173	1,386	-	1,562	1,386	176
Monroe	2,085	1,488	597	2,592	1,488	1,104
Ontario	466	429	37	582	429	153
Steiben	592	780	-	742	780	-
Wyoming	972	1,107	-	1,262	1,107	155
Total	7,483	8,133		9,400	8,133	

Wildlife resources in the basin are abundant and varied. The northern part of the basin provides some of the finest pheasant hunting in New York State. Waterfowl historically used the flood plains of the Genesee River and its tributaries during spring migration. In Groveland Flats many thousands of ducks and Canadian geese and a growing number of swans stop to feed and rest

en route to their more northern nesting grounds. This large concentration of waterfowl draws thousands of interested observers to the Groveland Flats each spring. In the southern portion of the basin there are abundant quantities of Whitetail deer and a scarce number of blackbear. The southern portion also is inhabited by various populations of wild turkeys.

Of prime concern is the preservation and enhancement of wetlands in the basin. In addition to supporting various species of wildlife, wetlands have other important environmental values.

The Freshwater Wetlands Act of 1975 provides for protection of all freshwater wetlands of 12.4 acres or larger including an area within 100 feet of the boundary of any freshwater wetlands. An inventory of wetland areas is presently being made.

MAN-MADE ENVIRONMENT

General Development Pattern.

The first permanent colonial settlement in the Genesee Valley was established in 1779. From then until 1840 the basin was settled rapidly and changed from a wilderness area to a mix of small communities and farms. However, the initial settlements were mainly in the lower basin between Avon and Mount Morris. People moved into the upstream counties along the southern border of New York at a slower rate because of the colder climate and lack of transportation. As a result, agriculture developed slowly in the upper part of the basin, even when the population growth was at its highest level in the 1820's.

Agricultural activities were initially directed toward an unsuccessful search for a cash product that could be shipped easily on the Erie Canal which opened in 1825 and provided access to eastern markets. Production of wheat for export was expanded greatly. However, the basin could not compete with the more productive wheat growing areas in the Midwest. Wheat production declined gradually, and livestock production increased reaching a peak during the Civil War. Dairy farming has predominated in the basin since 1920. Recent increases in mild, vegetable and fruit production can be attributed largely to improvements in transportation, progress in rural electrification and mechanization of farms.

The basin now has adequate transportation facilities that provide ready access to regional markets. These include the New York State Thruway in the northern sector and the Southern Tier Expressway in the southern sector. The proposed Genesee Expressway which will connect the Thruway and Expressway will accelerate growth in the Rochester-Dansville corridor and improve Rochester's access to downstate areas. The Barge Canal carries some commercial traffic but is used increasingly for recreational purposes.

Rail transportation is provided by several cross-state lines as well as local feeder lines. At Rochester airline service is available to major northeast and midwest cities. The transportation network, particularly in the Rochester area assures its continuing position as a major commercial and industrial center.

Rochester is the center for manufacturing, trade and service activities. The major manufacturing companies are Eastman Kodak, Xerox, Taylor Instrument, and Bausch & Lomb. Food processing is the largest non-durable goods industry, with operations in widely dispersed locations throughout the basin.

Labor Force and Employment.

The population and economic center of the Genesee River Basin is the city of Rochester in Monroe County, and its surrounding area. Monroe County, the area's leader in value added by manufacture, is internationally known for its manufactured products. From 1967 to 1972 the area's manufacturing industries were among the fastest growing in upstate New York, with the value added by manufacture increasing by 40 percent, or $1.3 billion. This yields a total value added by manufacturing of $4 billion in Monroe County. Largely because of this industrial concentration in the city of Rochester, the entire SMSA is expected to flourish through the end of the century. Rochester accounted for nearly 48 percent of the total basin population in 1930, 55 percent in 1970, 58 percent in 1980, and is projected to contain almost 60 percent by year 2000. Historical and projected populations by County within the Genesee River Basin are shown in Table 2.3.

The manufacturing sector of the Genesee economic area is projected to continue to grow. This is reflected by estimated increases in employment of almost 190,000 workers in the next 30 years in the Rochester SMSA. Employment in the Southern Tier is expected to lag somewhat during the period although some slight gains are expected.

Recently the most vigorous sector of the basin economy has been non-manufacturing with a concentration in retail and wholesale trade and the service industries. In every county in the basin non-manufacturing employment is expected to grow at a more rapid rate than total employment and population.

The employment forecast for agriculture is for a continuation of the historical trend away from farming. Although the total number of acres in farms is decreasing, the average form size is increasing, indicating that the less profitable farms are going out of business. Even so, the remaining farms are producing a more valuable product as sales of farm products have steadily increased. These trends should continue.

The employment projections for agriculture, manufacturing and non-manufacturing industries are shown in Table 2.4 for each county in the basin.

Personal income in the basin has increased by more than 75 percent during the 15-year period, 1956-1971. This increase adjusted to 1967 constant dollars, represents a value of more than $1.5 billion. During the same period the

State registered a smaller gain of only 57.8 percent. The State personal income total is influenced to a large degree by the downstate counties. If these counties are removed from the total, the basin's share of total personal income in upstate New York approaches 20 percent in 1956 and over 21 percent in 1971. If historical trends continue the residents of the basin should continue to enjoy this relatively favorable standing with regard to personal income in the State.

Among the forces that may strongly affect the Genesee River Basin are: (1) the nuclear research and nuclear fuels servicing capabilities in and near the basin; (2) the ultimate design and scheduling of state and Federal expressway construction projects; (3) government plans for major capital construction outlays in the area; (4) the amounts and types of defense spending in the area; (5) the future course of international trade, particularly trade with Canada; and (6) national trends with respect to plant location.

Notwithstanding the usual caveats regarding an even distribution of water resources and other assets, some parts of the country will continue to enjoy locational advantages that cannot be offset.

As transportation improves in the economic area of the Genesee River Basin, and as industry becomes less and less dependent on proximity to natural resources or even to markets, there will be an ever-widening range of choices for locating office or plant. Decision makers will more and more select those areas that have pleasant climates, good school systems, attractive recreational facilities, and a host of other advantages that may be loosely lumped together as the "amenities." This trend should help the Genesee River Basin with its proximity to Lake Ontario, good schools, cultural institutions and attractive countryside not to mention traditional economic resources such as a skilled labor supply, good transportation and the rest. On the other hand, winters can be severe, and cultural institutions are limited as compared with New York City and San Francisco, for example.

Traffic problems, polluted water and air plus urban social problems may strangle the big cities and the smaller cities such as Rochester with their more accessible hinterlands may prosper and grow as industry decentralizes.

Transportation.

The Genesee River Basin is adequately served by the present road system which is shown on . The Basin in the northern portion is traversed from east to west by the New York State Thruway (Interstate 90), and the Southern Tier Expressway which crosses the southern portion. The Basin is traversed in the north-south direction by U.S. Highway 15. An expressway, the Genesee, has been constructed to connect the New York State Thruway with the Southern Tier Expressway. This expressway should meet the future requirements of the Basin.

Railroad passenger service in the Basin has declined rapidly in recent years as it has in most of the northeastern portion of the United States. Rochester is the main city served by passenger service. The Basin does have sufficient freight service supplied by the following major railroads, Penn-Central, Erie-Lackawanna, Baltimore and Ohio, Lehigh Valley and a local railroad, the Wellsville, Addison and Galeton.

Table 2.3 - Historical and Projected Populations by County Areas within the Genesee River Basin

County	1940	1950	1960	1970	1980	1990	2000	2020
Allegany	28,222	30,657	30,078	31,403	33,913	35,953	37,615	43,240
Cattaraugus	261	255	254	284	298	298	291	290
Genesee	22,960	24,399	27,418	30,435	34,175	38,480	41,380	47,571
Livingston	37,256	38,585	42,010	52,561	58,650	67,650	73,350	84,313
Monroe	228,230	250,973	279,511	334,382	362,767	407,699	439,082	504,736
Ontario	3,646	3,909	5,100	7,386	9,748	12,391	14,313	16,450
Steuben	1,134	1,363	1,297	1,651	1,926	2,081	2,166	2,487
Wyoming	18,874	19,687	21,484	21,392	23,135	26,115	28,370	32,607
TOTALS	340,583	370,125	417,225	483,416	524,605	583,667	636,567	731,694

Table 2.4 - Historical and Projected Employment by Major Industry [1]

	1940	1950	1960	1970	1980	1990	2000	2020
Allegany								
Total Employment	12,625	14,941	14,651	16,515	17,800	19,300	21,200	23,600
Agriculture	3,438	2,829	1,812	1,151	700	500	400	400
Manufacturing	1,895	3,656	3,954	4,446	5,000	5,500	6,200	6,400
Non-manufacturing	7,292	8,456	8,885	10,918	12,100	13,300	14,600	16,800
Cattaraugus								
Total Employment	24,396	29,065	28,881	29,541	30,800	32,700	35,200	35,200
Agriculture	4,728	4,071	2,482	1,650	1,100	800	700	600
Manufacturing	6,027	9,178	9,672	9,688	10,000	10,600	11,400	11,300
Non-manufacturing	13,641	15,816	16,727	18,203	19,700	21,300	23,100	23,300
Genesee								
Total Employment	15,747	18,247	19,634	22,794	24,800	27,400	31,600	35,300
Agriculture	3,473	2,643	2,082	1,412	1,000	800	700	600
Manufacturing	4,689	6,089	6,614	8,239	9,100	10,100	11,400	12,300
Non-manufacturing	7,585	9,515	11,018	13,143	14,700	16,500	19,500	22,400
Livingston								
Total Employment	12,322	13,741	15,612	21,007	24,400	28,500	33,100	40,400
Agriculture	3,435	2,754	2,004	1,435	1,000	900	900	800
Manufacturing	2,374	3,193	4,410	5,238	6,000	6,900	7,900	9,200
Non-manufacturing	6,513	7,794	9,198	14,334	17,400	20,700	24,300	30,400

[1] Includes portions of counties outside basin

Table 2.4 - Historical and Projected Employment by Major Industry [1] (Cont'd)

	1940	1950	1960	1970	1980	1990	2000	2020
Monroe								
Total Employment	166,642	202,197	231,201	294,579	329,100	374,300	423,400	484,800
Agriculture	5,911	4,413	3,186	2,184	1,500	1,200	1,100	1,000
Manufacturing	70,471	91,269	103,108	117,834	128,900	141,100	154,500	169,300
Non-manufacturing	90,260	106,515	124,907	174,561	198,700	232,000	267,800	314,500
Ontario								
Total Employment	19,295	22,230	24,406	30,703	36,000	42,400	50,500	59,400
Agriculture	4,675	3,392	2,440	1,710	1,200	1,000	900	800
Manufacturing	4,371	5,423	6,744	8,415	9,800	11,400	13,200	15,000
Non-manufacturing	10,249	13,415	15,222	20,578	25,000	30,000	36,400	43,600
Steuben								
Total Employment	28,629	32,700	35,063	37,087	38,400	40,200	42,500	42,800
Agriculture	5,803	4,536	2,911	2,247	1,700	1,500	1,400	1,200
Manufacturing	7,310	10,745	13,420	12,902	13,200	13,600	14,100	14,200
Non-manufacturing	15,516	17,419	18,732	21,938	23,500	25,100	27,000	27,400
Wyoming								
Total Employment	11,098	11,687	12,227	13,639	15,400	17,300	19,400	24,000
Agriculture	3,689	2,893	2,049	1,596	1,300	1,100	1,100	1,100
Manufacturing	2,884	3,383	3,883	4,369	4,800	5,300	5,900	6,800
Non-manufacturing	4,525	5,411	6,295	7,674	9,300	10,900	12,400	16,100

SOURCE: U.S. Census of Population
N.Y.S. Department of Environmental Conservation

[1] Includes portions of counties outside basin

Commercial passenger and air freight transport are available at the Rochester-Monroe County airport. The airport is served by the following airlines, American, United, and Peoples Express.

Commercial navigation, both shallow draft and deep draft, is available at Rochester, but was not considered as related to basin development in the present study. Shallow draft navigation is provided by the New York State Barge Canal which transverses the northern portion of the basin from west to east. Terminal facilities are maintained on the Genesee River just south of Court Street Dam in Rochester. In the past, the Barge Canal was a major economic factor in the growth of Rochester and the Lake Plain area. Today commercial traffic is rapidly declining although pleasure craft traffic is steadily increasing. Deep draft commercial navigation is maintained in the last three miles of the Genesee River for the Port of Rochester. The port facilities serve both lake and ocean vessels with the principal products being coal, salt, and newsprint.

SECTION III

PROBLEM IDENTIFICATION

The major water resource problem of the Genesee River Basin is flooding. This section of the report will identify the problem areas along with other significant water-related problems and needs for which this Reconnaissance study seeks to identify potential solutions. This section will also address specific Planning and National objectives of the overall feasibility study and its impact on the without project conditions.

PROBLEMS, NEEDS, AND OPPORTUNITIES.

Flooding

Flooding, a common occurrence in the basin, has caused severe flood damages along the Genesee River and its major tributaries. In the upper basin, serious flooding occurs in the village of Wellsville in Allegany County and is of concern to communities downstream as far as the towns of Henrietta and Chili in Monroe County. For example, as a result of the June 1972 storm, "Agnes," which produced widespread rainfall (13.72 inches maximum), Dyke Creek and the towns of Wellsville and Fillmore sustained severe damages estimated at approximately $15,000,000 (1972 price levels).

Tributary flooding occurs along Dike Creek, Canaseraga Creek, Red Creek, and Black Creek. The lower basin, protected by the existing Mt. Morris Dam, continues to sustain residual inundation damages, namely in the city of Rochester. Residual inundation flood damages below Mt. Morris are estimated at approximately $5,367,100 (May 1986 price levels).

Other areas in the lower basin had demonstrated a need for flood damage prevention. Since construction of this dam, downstream land use has intensified adding to the potential for more residual flood damages. The city of Rochester, and the towns of Brighton and Henrietta have experienced commercial and residential growth typical of suburban areas. Poor natural drainage is also a major problem in some of the areas that have been developed.

Another flooding problem plaguing the lower basin is stream overflow caused by the uninterrupted release of water through the Mt. Morris Dam. For example, Mt. Morris does not have any storage capacity for purposes other than flooding; all inflow is instantly released to continuously avail the total storage capacity to flood control. The downstream channels are currently running at almost bankful condition. The problem is further complicated by the very flat gradients that cause ponding that lasts for several months. The Canaseraga Creek Valley, which has been improved over the years, can still be flooded by Standard Probable Floods despite the levee-work improvements implemented by some local farmers. Expected total annual flood damages in the Canaseraga Valley are estimated at $496,000 (May 1986 price levels).

The June 1972 flood inundation damages and other post flood damages demonstrated a need for flood plain management measures to regulate land use consistent with the existing and potential flood hazards in the basin.

In addition to urban flood damages, agricultural damages are also a major problem for farmers and farm authorities in the basin. For example, the June 1972 flooding has caused extensive agricultural damages on the main stem between Wellsville and Portageville, and downstream from Mt. Morris in Livingston County.

A substantial acreage of high value vegetable crops was inundated in the Canaseraga Creek Valley with losses estimated at over $1,000,000. Table 3.1 shows detailed damages for the 1972 flood in the basin. This flood is compared with past record flows in the upper and lower portions of the Genesee River Basin in Tables 3.2 and 3.3.

Streambank Erosion and Agricultural Land Loss.

Streambank erosion is also a significant problem in the Genesee River Basin in that it restrains agricultural development and increases high costs of sedimentation dredging.

Bank erosion in the upper reaches of the basin consists of occasional eroding of the soft underlying shale causing localized rockfalls. Between Rochester and Mt. Morris (the lower basin), dynamic erosion of valuable agricultural land in the area of Avon and south of Geneseo has resulted in fairly rapid bank migration and cutoffs. The river does redistribute alluvium deposits within the Letchworth State Park-Mt. Morris gorge where erosion is considered insignificant. However, in several places, the course of the river extends to the valley walls resulting in the erosion of high till bluffs. About 3,500 miles of streambank are eroding, resulting in an average soil loss of almost a million tons per year.

Although streambank erosion is obvious, no local agricultural authority has been able to provide an estimate of the quantity of land loss to this process. In the Genesee River Basin Study of Sedimentation published in 1968, it was estimated that 220 acres of agricultural land along the river, excluding all tributaries, were lost in a 9-year period prior to 1967. Thus, an average of 24.4 acres of agricultural land have been estimated to be lost annually to streambank erosion. This estimate excludes land loss from more severe but less frequent events. For example, Tropical Storm Agnes in June 1972 removed a 75-acre plot of farmland near the village of Mt. Morris. The Corps of Engineers has no authority to build single-purpose streambank erosion control projects, except for small, emergency projects to protect public land and facilities. However, considerations will be given to reduction in channel flows, wherever possible, to minimize streambank erosion.

Irrigation.

The 1969 report on agricultural studies of the Genesee River Basin documented the need to irrigate vegetable crops grown on the Lake Ontario plain. This report evaluated 23 feasible structural plans which were designed to irrigate one localized area. As a result, several State, local agricultural authorities including State universities were contracted to determine the need for irrigation on the lake plain, possible means of distributing

Table 3.1 - Summary of Flood Damages in the Genesee River Basin
Estimated June 1972 Flood Damage (dollars)

Reach	Residential	Commercial	Public & Other	Agricultural	Total	Estimated Average Annual Damages-Dollars
Genesee River						
1. Genesee River at Rochester	-	-	224,000(1)	-	224,000	N/A
2. Chili/Henrietta	170,000	65,000	380,000	40,000	665,000	170,000
3. Avon	42,000	275,000	123,000	294,000	734,000	49,000
4. Geneseo	56,000	238,000	232,000	747,000	1,273,000	59,000
5. Mt. Morris	(2)	(2)	1,476,000	(2)	1,476,000	-
6. Portageville	187,000	178,000	1,201,000	197,000	1,736,000	7,900
7. Fillmore	301,000	17,000	1,137,000	443,000	4,898,000	29,200
8. Belfast	25,000	94,000	1,627,000	465,000	1,911,000	36,500
9. Belvidere	(3)	(3)	101,000	60,000	161,000	4,900
10. Belmont	177,000	169,000	1,305,000	48,000	1,699,000	33,600
11. Scio	602,000	77,000	456,000	50,000	1,185,000	37,500
12. Wellsville (4)	492,000	1,499,000	5,660,000	5,000	7,656,000	248,300
13. Stannard Corners	8,000	(3)	44,000	9,000	61,000	16,500
14. Shongo	47,000	(3)	113,000	29,000	189,000	27,000
Tributaries						
1. Dyke Creek	1,051,000	3,260,000	638,000	-	49,000(4)	-
2. Canaseraga Creek	27,000	37,000	421,000	1,177,000	2,262,000	207,000

(1) Damage was not due to overland flooding, damage to existing river structures, or sediment deposits.
(2) Reach 5 is located in Mt. Morris Reservoir. Damage is due to deposits of debris and sediment.
(3) Negligible.
(4) All in Wellsville, and includes damages up to Miller Street.

Table 3.2 - Summary of Peak Stages and Discharges in the Upper Genesee River Basin

Stream and Place of Termination	Drainage Area (sq. miles)	Period of Record	Maximum Flood Previously Known			Maximum During June 1972 Flood		
			Date	Gage Height (feet)	Discharge (cfs)	Day	Gage Height (feet)	Discharge
Dyke Creek at Wellsville	71.4	1955-60 & 64-69	6-15-60	16.10	5,230			12,000
Genesee River at Wellsville	288.0	1955-58	3-8-56	17.65	15,800	23	14-12	38,500
Genesee River at Scio (1)	308.0	1916-72	11-25-50	11.22	23,300	23		41,300 (2)
Van Campen Creek at Friendship	45.8	1964-68	9-28-67	13.10	13,400		10.92	9,400
Angelica Creek at Transit Br.	86.5	1964-68	9-28-67	10.28	9,560			8,400
Genesee River at Portage-ville (1)	982.0	1908-72	5-17-16	21.70	44,000	23		(3) 90,000 83,900 (2)

(1) Recording gage destroyed during June 1972 flood.
(2) Corps of Engineers estimate.
(3) USGS estimate.

Table 3.3 - Summary of Peak Stages and Discharges in the Lower Genesee River Basin (1)

Stream and Place of Determination	Drainage Area (sq. miles)	Period of Record	Maximum Flood Previously Known: Date	Gage Height (feet)	Discharge (cfs)	Maximum During June 1972 Flood: Day	Gage Height (feet)	Discharge
Canaseraga Cr. near Canaseraga	58.2	1964-68	9-28-67	11.10	5,480			12,400
Canaseraga Cr. near Dansville	153.0	1910-12 1915-70	8-23-40	9.93	9,110	23	14.66	9,600
Canaseraga Cr. at Shakers Crossing	333.0	1915-22 1958-70	4-26-61	12.07	4,430	23		11,200(3)
Genesee River at Jones Br.	1,419.0	1903-06 1908-14 1915-72	5-17-16 4-28-54	25.44 17.75	55,100(6) 13,800	25	24.50	17,500
Conesus Lake - Lakeville	69.7	1930-72	3-9-56	11.93 (2)		24	12.44 (2)	
Genesee River at Avon	1,666.0	1955-72	3-7-56	37.2	15,600	25	40.63	16,360(3)
Honeoye Creek at Honeoye	41.1	1963-72	4-19-71	4.72		23	6.94	
Honeoye Cr. at Honeoye Falls	145.0	1945-72	4-28-50	6.42	4,630		6.50	4,500
Oatka Creek at Warsaw	41.4	1963-72	9-28-67	7.28	1,760	23	9.75	4,010
Oatka Creek at Garbutt	204.0	1945-72	3-31-60	8.64	6,920	24	6.80	3,830
Genesee River at Rochester	2,457.0	1904-72	3-30-16 3-31-60	15.30 14.91	48,300(6) 25,800	25	15.89	31,300(4) 25,500(5)
Black Creek at Churchville	123.0	1945-70	3-31-60	9.44	4,980			

(1) Unless otherwise noted, all flows on the lower Genesee River are subsequent to the construction of Mt. Morris Dam.
(2) Corps of Engineers estimate.
(3) Reflects temporary shift in stage-discharge relationship.
(4) Affected by fluctuations in the regulation of Court Street Dam.
(5) Estimated flow assuming no influence from Court Street Dam regulation.
(6) Prior to construction of Mt. Morris Dam.

irrigation water, and potential benefits to be obtained from providing irrigation water to the lake plain. The need remains for more water to irrigate vegetables and selected fruits currently grown on the lake plain. The primary advantage would be to improve the quality of the crops grown and increase the consistency and yield of these crops.

Recreation.

Water oriented recreation in the state has increased significantly in recent years. This is attributed to the greater demand for outdoor recreation because of increases in population, urbanization, leisure time, income, and mobility.

A 1972 survey of recreational activities conducted by the State of New York Office of Parks and Recreation identified swimming, picnicking, neighborhood activities, and bicycling as recreational activities with the highest ranking in popularity. However, emphasis has shifted a bit in the 1980's, and shows boating, camping, picnicking, and swimming as the four major recreational activities in the basin and adjacent communities. The relative steep gradients of the river above Mt. Morris and in several of its main tributaries provided attractive conditions and excellent scenery for canoeists and other outdoor recreation enthusiasts. The lower basin, from Mt. Morris to the outskirts of Rochester, which is largely farmland with gentle topography, offers a pastoral setting from many diversified recreational pursuits. A supply and demand study (table 3.8) for recreation in the Standard Metropolitan statistical area (SMSA, broken into four subareas: Metropolitan, Barge, Central plains, and Allegany) shows a lack of boating and swimming facilities in the years 1980 through 2000.

Hydropower.

Three private utilities and the Power Authority of the State of New York supply virtually all electric energy for the basin power market area. These utilities are interconnected among themselves and neighboring utilities in highly coordinated New York Power Pool which currently has estimated peak loads for winter and summer of 27,660 MW and 26,020 MW, respectively (See table 3.9). Only Rochester Gas and Electric Corporation has generating facilities located in the basin. The other power utilities supply their respective portions of the market area from distant sources of power. For example, the Power Authority of the State of New York has plants at Niagara Falls and Massena, NY; and provides all power requirements for the municipal systems and sells power to other utilities in the State. Power sources outside the area also supply the Tri-County Rural Electric Cooperative in the Pennsylvania portion of the basin. Annual use of electric energy in the basin had doubled in each decade from 1940 to 1960 and continues to grow at an accelerated rate. Although this rate is not now available to us, a report of the Planning Committee of the New York Power Pool published in April 1985 forecasts summer peak demands for 1985-2001 which average annual growth rate of 1.3 percent. However, the new peak forecast for the year 2000 is 470 MW higher than forecast in 1984. The NYPP Planning Committee is reviewing the adequacy of installed generating capacity, starting in the mid-1990's, recognizing the uncertainties inherent in load forecasts and future system capacity conditions. The scheduled Major Generating Capacity Additions are estimated at 3189 MW.

Table 3.4 - Annual Activity Days Balance Year - 1980

	Boating	Camping	Picnicking	Swimming
Metropolitan				
Supply	992,100	710,600	8,573,900	13,865,900
Demand	3,822,020	954,287	7,177,286	16,905,700
+/- Supply	-2,829,920	-243,687	+1,396,614	-3,039,800
Barge				
Supply	291,900	192,000	601,300	1,086,600
Demand	241,844	60,384	454,154	1,069,735
+/- Supply	+50,056	+131,616	+147,146	+16,865
Central Plains				
Supply	170,100	604,000	2,118,000	1,969,100
Demand	524,000	130,833	984,009	2,317,778
+/- Supply	-353,900	+473,167	+1,133,991	-348,678
Allegany				
Supply	350,700	889,700	2,617,300	4,644,400
Demand	1,061,807	265,113	1,993,943	4,696,623
+/- Supply	-711,107	+624,587	+623,357	-52,223

Annual Activity Days Balance Year - 2000

	Boating	Camping	Picnicking	Swimming
Metropolitan				
Supply	1,240,100	888,200	10,717,400	17,332,300
Demand	5,221,650	1,741,248	8,727,769	22,344,040
+/- Supply	-3,981,550	-853,048	+1,989,631	-5,011,740
Barge				
Supply	364,900	240,000	751,500	1,358,200
Demand	391,458	130,538	654,305	1,675,092
+/- Supply	-26,558	+109,462	+97,195	-316,892
Central Plains				
Supply	212,700	755,000	2,647,500	2,461,500
Demand	837,282	279,206	1,399,482	3,582,827
+/- Supply	-624,582	+475,794	+1,248,018	-1,121,327
Allegany				
Supply	438,300	1,112,100	3,271,500	5,805,500
Demand	1,619,798	540,149	2,707,424	6,931,302
+/- Supply	-1,181,498	+571,951	+564,074	-1,125,802

Table [illegible] - Summer and Winter Peak Loads (MW)

SUMMER

Year	CHG&E	CONED	LILCO	NYSE&G	NMPC	O&R	NYPA	RG&E	NYS(1)
				ACTUAL					
1975	597	8051	2933	1565	4601	646	929	925	20001
1976	535	7579	2719	1578	4696	609	1585	925	19262
1977	622	7193	3107	1700	4878	706	2257	987	21205
1978	614	6714	2997	1729	5002	662	2348	983	20418
1979	620	6702	2919	1700	4880	662	2351	942	20402
1980	640	7276	3143	1829	4960	736	2403	1003	21845
1981	626	7063	3132	1815	5030	704	2337	1048	21437
1982	666	7326	3045	1771	4708	726	2377	996	21252
1983	663	7388	3108	1829	4901	722	2404	1037	21874
1984	689	7515	3096	1828	5020	767	2365	1075	21870
				FORECAST					
1985	705	7625	3300	1890	5080	760	2442	1067	22530
1986	735	7765	3340	1890	5130	773	2553	1085	22920
1987	770	7850	3385	1900	5110	791	2640	1100	23180
1988	800	7925	3425	1920	5120	808	2688	1110	23430
1989	830	7975	3455	1940	5120	825	2722	1120	23620
1990	855	8025	3505	1960	5140	835	2758	1130	23830
1991	880	8075	3565	1990	5170	850	2788	1160	24110
1992	905	8150	3620	2030	5240	870	2816	1200	24450
1993	930	8225	3665	2080	5290	885	2845	1230	24760
1994	950	8300	3715	2130	5350	900	3077	1260	25100
1995	975	8375	3755	2180	5410	920	3110	1300	25430
1996	1000	8425	3815	2240	5480	935	3144	1330	25770
1997	1025	8475	3885	2310	5540	950	3178	1370	26130
1998	1050	8550	3960	2370	5610	965	3212	1410	26520
1999	1075	8625	4040	2440	5680	985	3248	1450	26920
2000	1100	8700	4110	2510	5750	995	3284	1490	27310
2001	1125	8755	4170	2560	5820	1010	3321	1530	27660

(1) Total New York State.

Table 3.3 Summer and Winter [illegible] Loads (MW) (Coincident)

WINTER

Year	CHG&E	CONED	LILCO	NYSEG	NMPC	O&R	NYPA	RG&E	NYS(1)
				ACTUAL					
1975-76	588	6056	2360	1993	5018	498	1000	862	18181
1976-77	608	5438	2494	2070	5264	514	2020	934	19065
1977-78	618	4851	2456	2034	5284	517	2474	925	18921
1978-79	623	4901	2442	2118	5500	515	2554	941	19184
1979-80	633	4833	2445	2072	5403	523	2557	950	19311
1980-81	641	5005	2504	2170	5475	519	2606	958	19792
1981-82	623	5152	2537	2193	5363	536	2544	966	19711
1982-83	602	5020	2471	2090	5223	509	2494	945	19142
1983-84	647	5032	2503	2175	5477	535	2576	1010	19887
1984-85	683	5105	2719	2254	5530	570	2460	1006	20381
				FORECAST					
1985-86	700	5170	2630	2280	5680	558	2758	1016	20690
1986-87	715	5260	2700	2300	5640	566	2852	1030	20940
1987-88	735	5340	2770	2320	5630	580	2924	1050	21230
1988-89	765	5395	2840	2340	5630	593	2975	1070	21490
1989-90	795	5425	2915	2380	5640	605	3028	1080	21750
1990-91	820	5455	2970	2420	5680	610	3072	1100	22010
1991-92	840	5485	3030	2470	5750	615	3109	1130	22310
1992-93	865	5540	3090	2530	5790	625	3147	1160	22630
1993-94	890	5595	3145	2600	5850	635	3393	1200	23000
1994-95	915	5650	3210	2670	5900	650	3438	1230	23350
1995-96	935	5705	3265	2750	5980	665	3479	1260	23720
1996-97	960	5735	3230	2830	6040	680	3522	1300	23980
1997-98	985	5765	3395	2910	6120	700	3565	1340	24450
1998-99	1010	5795	3475	3000	6200	715	3610	1380	24860
1999-2000	1035	5825	3550	3090	6270	730	3656	1420	25240
2000-2001	1060	5855	3620	3180	6350	750	3702	1460	25640
2001-2002	1085	5890	3690	3250	6430	765	3750	1500	26020

SOURCE: NY Power Pool Planning Committee's report on Long Range Electric Supply and Demand (1985-2001); April 1985.

Water Supply.

Water resources in the Genesee River Basin and Lake Ontario are adequate to meet existing and projected municipal and industrial water supply needs through 2020 which are estimated at 290 mgd.

The major water supply systems in the lower part of the basin, the city of Rochester and the Monroe County Water Authority, use Lake Ontario as a source of supply. The city of Rochester also uses Hemlock and Canadice Lakes for water supply, and Conesus Lake supplies water for several communities in Livingston County. Silver Lake serves as a source of water for the villages of Mt. Morris and Leicester in Livingston County and for the village of Perry in Wyoming County.

The ground water yield in the basin is estimated to be about 200 mgd and groundwater is the source for more than half of the municipal water supplies as well as most farms and rural homes. However, the total withdrawal is only about 12 mgd.

In general, regionalization does not offer a practical solution to the water supply problems of most municipalities in the upper part of the basin because of their scattered location and the great distances between the systems. In the lower part of the basin, consolidation of existing systems is a feasible and economical solution for meeting projected demands. These types of measures like consolidation of existing system are non-Federal responsibility, therefore no further consideration was given to this aspect under this study authority.

Water Quality.

Water varies in quality throughout the basin. The Environmental Protection Agency, however, has issued nationwide discharge standards with the expressed purposes of establishing and maintaining the highest practical water quality in the affected streams. In the Genesee Basin, under the New York State Pure Waters Program, many collection and sewage treatment facilities have been installed with State and Federal assistance. To avoid duplication of effort therefore, no further consideration was given to the water quality aspect of this study.

Summary.

In terms of existing supply and, existing and projected demands on water and related land resources, Genesee River basin has the greatest needs in the areas of general outdoor and fish and wildlife recreation, supplemental irrigation, municipal, and industrial water. There are also other important needs such as flood control, control of streambank erosion, and agricultural lands, and development of hydroelectric power generation. In developing the basin's water resources, all plans capable of meeting these identified needs will be analyzed for economic feasibility.

Planning Constraints.

Below Portage, the river plunges over three falls of rare scenic beauty. The late William Pryor Letchworth, a private citizen, purchased these falls and about 1,000 acres of land adjoining them on the west bank of the river. Mr. Letchworth converted the land into a park. In the late 1890's or the first decade of the 1900's, the Genesee River Company was being given the right to divert the water from these falls. Alarmed of this broad grant, Mr. Letchworth offered to convey this land to the State, subject to his life tenancy, upon condition that the State should forever maintain it as a park. The State accepted the gift by Chapter 1, Laws of 1907. The lower fall is only a few feet above the crest elevation of the existing Mt. Morris Dam spillway section. This limits our ability to increase the height of the dam, as adverse impacts should be kept to a minimum.

National Objectives.

Current Federal policy, as developed by the President's Water Resources Council, requires that alternative water and related resoruce plans be formulated in accordance with the national objective of NATIONAL ECONOMIC DEVELOPMENT (NED). For the Genesee River Basin Study, National Economic Development will be achieved through construction of projects where benefits are greater than costs. This will also increase the value of the nation's output of goods and services and improve economic efficiency consistent with protecting the Nation's environment. Therefore, in accordance with the guidance established in Engineering Regulation 1105-2-30, "General Planning Principles," dated 18 October 1985, this study was consistent with the planning requirements of the Water Resources Council "Principles and Guidelines" (G&G) and related policies.

Specific Planning Objectives.

Specific planning objectives are the national, State, and local water and related land resources management needs (opportunities and problems) specific to a study area that can be addressed to enhance National Economic Development. Based on a review of the authorizing legislation for the Genesee River Basin Study, previous reports for the area, statements by individuals in the private sector, input from officials at many levels of Government, and an analysis of the problems and needs of the study area, the specific planning objectives for this reconnaissance study have been identified as follows:

a. Enhance National Economic Development by reducing flood damages in the Genesee River Basin during the period 1995-2095.

b. Promote the region's ability to meet its need for inexpensive hydroelectrical power during the period 1995-2095.

c. Promote the development of outdoor water recreation and fish and wildlife opportunities for the region to meet its unfulfilled needs for additional recreational boating, fishing, and whitewater rafting/boating facilities during the period 1995-2095.

d. Preserve natural beauty, green space, lakes and historical interests for the enjoyment and education of the people during the period 1995-2095.

Conditions if no Federal Action Taken (Without Project Conditions).

The conditions that would exist if no Federal action were taken was investigated for this study. As a result, a justified need for change was identified.

Under a no-action plan, flooding in the Genesee River Basin would continue, with average annual damages totaling about $1,916,000. As a result of no Federal action, the trauma and inconvenience experienced by flood victims in the basin would also continue. Further, the opportunity to reduce the cost of electricity in the basin would be foregone; and the demand for additional recreational boating, fishing, and whitewater rafting/boating facilities would not be met.

New industrial and commercial developments in the downtown area of the city of Rochester have caused substantial increase in the residual flood damages. This trend will continue, and will reduce the effectiveness of the existing project at Mt. Morris. Farm lands throughout the basin will continue to suffer from adverse impacts caused by floodings and erosion.

SECTION IV
FORMULATION OF PRELIMINARY ALTERNATIVE PLANS

This section of the Reconnaissance Report discusses:

a. Alternative plans that were addressed in previous studies, and are applicable to this study;

b. The formulation methodology used in this reconnaissance study; and

c. The development of preliminary alternative plans.

PLAN FORMULATION RATIONALE

a. Alternative Plans Addressed in Previous Studies.

Past studies for the Genesee River Basin that are of particular interest to this current reconnaissance study include the 1950 flood control project at Caledonia, New York; the 1962 Genesee River Basin Comprehensive Study; and the 1966 flood control project for Red Creek in Monroe County, New York.

The project on Spring Creek, Caledonia, New York, authorized in 1950, provides for a diversion channel with a capacity of 400 cubic feet per second, to start at Spring Creek, just south of the New York Central Railroad through a new bridge at Main Street to an area west of Spring Road. Our current investigation has revealed that improvement work performed in 1979 by local interests, have reduced local flooding problems and rendered the project less economical (.2 to 1) . The project, which was classified as deferred since 1954, is now recommended for deauthorization. The final decision on the deauthorization recommendation rests with Congress.

As a result of the Comprehensive study authorized in 1962, the Final Level B Study Report, completed in 1970, recommended an early-action plan which included a multipurpose reservoir at the Stannard site, located in the Genesee River Basin, south of Wellsville and a local flood protection plan for Canaseraga along the Canaseraga Creek Valley. The Level B Study examined the multipurpose Portage Reservoir which would have served hydropower and other needs, but was deferred because of local opposition. Because of the devastation of Tropical Storm "Agnes" in June 1972, a modified Stannard reservoir project was considered with reservoir storage, previously intended for water supply and water quality, to be reallocated to flood control.

Regarding Canaseraga Valley, the Buffalo District essentially completed a Preliminary Feasibility Report in 1975. Improvements considered for flood management in the Canaseraga Valley incorporated channel realignment and enlargement for floods of low magnitude, and levees and retention structures. These improvements called for the removal and replacement of several bridges over the Canaseraga, State Canal, and Bradner Creeks to accommodate design flows. The Genesee River Basin study has been inactive since 1975. However, the farmers in the Canaseraga Creek Valley have undertaken several flood management measures and completed some improvement works that are currently

providing adequate flood protection to the farmlands and residents of the valley. They had experienced substantial loss during the 1972 Agnes flood. During this reconnaissance study, the District found that local farmers aided by the Soil Conservation Service, under Technical Assistance and Federal Emergency Funds, have upgraded and built new levees between 1974-1975 to protect their crops. The farmers have also built a pump station equipped with a 20-inch pump, working together with the levees and gates to provide flood protection and occasional irrigation of farmlands. However, about 500 acres of crop lands used for "cash crop" (corn, potatoes, etc.) are still affected by spring floods. One of the plans formulated in this reconnaissance study calls for construction of a dam/reservoir at Poag's Hole to alleviate residual damages.

The economic feasibility of constructing this dam/reservoir to primarily provide flood protection for the lower Canaseraga Valley (Scenario C, Table 4.1) has proved infeasible as costs ($13.5 million) outweighed the benefits to be realized. Nevertheless, total agricultural inundation damages in the valley at May 1986 price levels were estimated at $414,746. These damages, although not alarming, are significantly meaningful to justify a small scale local protection project. Therefore, some viable local flood control measures will be studied for economic feasibility and incorporated into the plans that will be selected in the feasibility phase.

The Red Creek project in Monroe County, New York, authorized by the 1960 Flood Control Act, Section 203, provides for improvement of 13,405 feet of the main stem of Red Creek and a total of 24,540 feet of channel improvements on tributaries within the towns of Brighton and Henrietta, New York. The project consisted of construction of two sections of levees totaling approximately 8,590 feet in length, modification of obstructive bridges, culverts, conduits, and modification of utilities to fit enlarged stream channels. Based on a General Design Memorandum submitted to the North Central Division on 30 May 1975, the Buffalo District recommended and Division approved that the project be considered for reclassification to the inactive category. In July 1983, the Buffalo District reviewed the project and found a lack of economic justification and local support. The project was submitted and recommended for deauthorization in 1983. The final decision on the deauthorization recommendation rests with Congress.

b. Reconnaissance Phase Analysis.

The objective of this reconnaissance phase is to formulate and assess plans in the interest of flood management and allied purposes in the Genesee River Basin with a view towards determining if such plans warrant further, detailed analysis in the feasibility phase of the study. Plans considered are formulated based on physical constraints, the desires and preferences of local interests, and being consistent with sound engineering, economic, and environmental principles. In this process, an iterative procedure that provided for increased levels of refinement and critique was used to narrow the range of alternatives to carry forward. The procedure also allows for review and comment by the general public at informal meetings and workshops. Investigation of other water resource problems, such as water quality, water

supply and streambank erosion was limited to a level of refinement necessary to adequately assess potential impacts on each by the alternatives considered.

GENERAL FORMULATION AND EVALUATION CRITERIA

Federal policy on multiobjective planning, derived from both legislative and executive authorities, establishes and defines the national objective for water resources planning, specifies the range of impacts that must be assessed, and sets forth the conditions and criteria which must be applied when evaluating plans. Plans must be formulated to meet the needs of the area with regard to benefits and costs, both tangible and intangible and effects on the ecology and social well-being.

Within the structure of the overall planning framework, other more specific criteria relative to general policies, technical engineering, economic principles, social and environmental values, and local conditions must be established. These criteria, noted as "Technical," "Economic," and "Socioeconomic and Environmental" are as follows:

a. Technical Criteria.

(1) Assume for this reconnaissance study that sideslopes of 2.5:1 are adequate for functional design of levees, berms, and riprapped creek banks.

(2) For levee plans considered, assume that: (a) an acceptable borrow area that contains suitable semi-impervious material is within a 10-mile radius of the construction site; (b) foundation material at the proposed levee site will not present underseepage problems; (c) no consideration will be given to internal drainage; and (d) no consideration will be given to diverting overland flow originating outside the site. These facets will be investigated in detail during the feasibility phase of the study, as required.

b. Economic Criteria.

(1) Tangible benefits should exceed project economic costs.

(2) Each separable unit of improvement or purpose should provide benefits at least equal to its cost unless justifiable on a noneconomic basis.

(3) Each plan, as ultimately formulated, should provide the maximum net benefits possible within the formulation framework.

(4) The costs for preliminary alternative plans of development should be based on preliminary layouts, estimates of quantities, and May 1986 unit prices.

(5) The benefits and costs should be in comparable economic terms to the fullest extent possible.

(6) A 100-year economic life and 8-5/8 percent interest rate are used for the economic evaluation of dam/reservoir plans.

(7) The base case for comparison of alternative plans is the do-nothing (no-action) plan.

c. Socioeconomic and Environmental Criteria.

The criteria for socioeconomic and environmental considerations in water resources planning are prescribed by the National Environmental Policy Act of 1969 (PL 91-190) and Section 12 of the River and Harbor Act of 1970, (PL 91-611). These criteria prescribe that all significant adverse and beneficial economic, social, and environmental effects of planned developments be considered and evaluated during plan formulation.

d. Design and Other Considerations.

(1) The procedures and data presented in the report entitled "Hydropower Cost Estimating Manual" (May 1979) prepared by the Portland District, Corps of Engineers, will be used to size and cost hydroelectric power generating facilities considered as an add-on feature to the basic dam/reservoir projects for flood control at Stannard, Portageville, and Poag's Hole. These facets will be addressed in greater detail during the feasibility phase of the study if dam/reservoir plans are carried forward.

(2) Mitigation - There is insufficient environmental data at this time to determine the precise need for mitigation or the type of mitigation that might be required. Therefore, plans and associated costs for mitigation are not included in the estimates for this Reconnaissance Report. Mitigation will be evaluated in the feasibility phase, as appropriate.

(3) Cost Sharing - The Secretary of the Army is reviewing project cost-sharing and financing across the entire spectrum of water resources development functions. The basic principle governing the development of specific cost-sharing policies is that whenever possible, the cost of services produced by water projects should be paid for by their direct beneficiaries. Although only the traditional cost-sharing is presented here, the reader should be aware that other ratios may be required by the Secretary of the Army before approving construction.

(a) Local Protection (Structural) - Federal responsibilities include 100 percent of the construction costs for the flood control project. Non-Federal interests are required to provide all lands, easements, and rights-of-way; relocate all utilities; and maintain the completed project.

(b) Major Reservoirs - Federal responsibilities include 100 percent of the construction costs (including lands, easements, rights-of-way, and utility relocations) for the flood control project. The Federal Government would also operate and maintain the project.

(c) Recreation at Major Reservoirs - Federal responsibilities include 100 percent of the joint construction costs (including lands, easements, rights-of-way, and utility relocations) and 50 percent of the construction costs of separable project features. The Federal Government would also maintain the joint features of the project. Non-Federal interests are

responsible for providing 50 percent of the construction costs of separable project features; providing all lands, easements, and rights-of-way for the separable project features; relocating all utilities associated with the separable project features; and operating and maintaining the separable project features.

(d) Hydroelectric Power - Local interests are required to repay 100 percent of the construction costs of the joint and separable project features and operate and maintain the completed project or reimburse the Federal Government for such costs.

(4) Local Sponsor - Formal assurances of local cooperation must be furnished by a municipality or other public agency fully authorized under State laws to give such assurances and financially capable of fulfilling all items of local cooperation. The New York State Department of Environmental Conservation is the local sponsor for Corps-built flood control projects in New York State. Continual coordination will be maintained with the State during the feasibility phase.

DEVELOPMENT OF PRELIMINARY ALTERNATIVE PLANS (POSSIBLE SOLUTIONS)

Within the prescribed planning framework and established criteria, possible solutions were identified and will be evaluated in a two-stage iterative process to address the needs of the study area and the overall planning objectives. Each stage includes the four functional planning tasks of problem identification, formulation of alternatives, impact assessment, and evaluation shifts as the process proceeds.

This document reports the results of the reconnaissance phase evaluation. The level of study performed is consistent with the reconnaissance phase objective of evaluating a broad range of possible solutions and identifying the best general plan (or plans) for satisfying the flood control needs of the Genesee River Basin.

The primary water resources need for which a solution is sought under this authority is to reduce flood damages in the Genesee River Basin. As possible solutions to addressing this need, 18 scenarios in addition to the "no-action" option, were formulated and assessed. These scenarios were formulated to mainly assess the possibility of meeting the flood control and hydropower needs of this basin using the reservoir sites at Stannard, Portage, Poags, and Mt. Morris either independently or in combination with each other. These scenarios fall into two broad categories: local protection measures in areas where a high concentration of flood damages exist or would be induced, and dam/reservoir at the four sites mentioned above, including hydroelectric power generating facilities and recreation facilities to maximize the economic efficiency of the basic flood control measures. Out of these 18 scenarios (Table 4.1), 12 were selected for further and complete evaluation. To address the overall basin water resource problem, components of scenarios, and/or scenarios only became alternative plans which appear close to achieving the specific planning objectives. for instance, Plan 11 is a combination of Scenarios D1, A1, and D8.a (See Table 4.0 for components of other plans). These plans will be better defined in the feasibility study phase to include broad range water resource needs and opportunities. A description and evaluation of each individual plan is presented in Section 5 of the Main Report (Volume 1.).

Table 4.0 - Components of Plans

Plans	Component(s)
1	Scenario D1
2	No Action Plan
3	Scenario D3
4	Scenario D4
5	Scenario D5
6	Scenarios P1, A1
7	Scenarios D1, D7
8	Scenarios D1, D8
9	Scenarios D1, D5
10	Scenarios D1, D8a
11	Scenarios D1, A1, D8a
12	Scenarios D1, D12

Table No. 1 - Assessment and Evaluation of Scenarios

Name and Description of Scenario	Purposes: Flood Control	Irrigation	Agricultural Flood Damage Reduction	Recreation	Fish & Wildlife	Water Quality	Annual Benefits: Flood Control	Agricultural Flood Damage Reduction	Recreation	Fish & Wildlife	Water Quality	Hydropower	Annual Irrigation	Total Annual Benefits	Total Comparative Benefits (Amortized)	Comparative B/C Ratio	Remarks
A (Stannard) This scenario considers construction of a multipurpose reservoir at the Stannard site for flood control, recreation, hydropower, and irrigation in the upper reaches of the basin from Mt. Morris to the Stannard Corners. The power plant would be equipped with 1-2600 KW Tube Turbine.	+	+	+	+	+	+	[illegible]	[illegible]	[illegible] A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$1,176	.81	This scenario assumes that R&E power plant at Rochester, NY, would continue to receive 375 cfs for hydropower production.
A1 (Standard) This scenario calls for a reduced size dam/reservoir for flood control and other uses. No hydropower is contemplated under this scenario, although it can be added. The dam/reservoir size was reduced by eliminating the conservation pool of 39,500 acre-feet, and replacing it with a flood control pool and summer conservation pool of 54,000 acre-feet. This scenario also provides for headwater improvements to existing power generating facilities downstream of the dam site. These plants *would operate for longer periods of time* at full capacity under regulated flows as opposed to the current practice of unregulated releases.	+	+		+			[illegible]		[illegible]				[illegible]	[illegible]	[illegible]	1.04	This scenario considers flood protection for the upper reaches of the basin and has a B/C ratio of 1.04.
B1 (Portage) This scenario considers construction of a multipurpose dam/reservoir at the Portageville site for flood control, recreation, and hydropower operation. Power plant would be located below lower falls at Letchworth State Park, and equipped with 10-6500 KW Tube Turbine.		+		+			[illegible]	[illegible]	[illegible]			[illegible] 121,198	[illegible]	[illegible]	[illegible]	.78	This cost is total first cost only. Therefore, the B/C ratio shown here would be less if investment cost was used. Preliminary hydropower analysis shown that annual firm energy is constant between 2,000-6,000 cfs. Therefore, only one case is presented here.
B2 (Portage) This scenario considers construction of a multipurpose dam/reservoir at the Portageville site for flood control, recreation, and hydropower production. The power plant would be located at the base of the dam, and equipped with 10-6500 KW Tube Turbines.		+		+			[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	.15	Hydropower analysis is same as B1 above.

Name and Description of Scenario														Remarks
C (Poag's Hole)														
This scenario considers construction of a multipurpose dam/reservoir at Poag's Hole site to provide for recreation, hydropower . . ., and flood control downstream of the reservoir site including the Genesee Valley. Power plant would be located at base of the dam and equipped with 1-1100 KW Francis Unit.	+	+	+	+		+	[illegible]	21.0	5.0	[illegible]	7,910	169,000	24,487	.14	Recreation benefits were not included. They would not change the results of this analysis.
D1 (Mt. Morris)														
This scenario considers re-regulation of the existing inflow-outflow operation of the Mt. Morris reservoir. This re-regulation plan would be such that 375 cfs would be released to generate hydroelectric power at Rochester gas and electric hydro-power plant. This additional flow would be used to irrigate part of the Ontario Lake Plain, and result in agricultural intensification benefits.		x	+	x	x		[illegible]	6.0	1,735	[illegible]	[illegible]	Not available	18.5	Not available	It was found that about 42 percent of the total flood storage capacity at Mt. Morris would be needed to meet the 375 cfs requirements. This would increase flood damage downstream from Mt. Morris, and result in highly significant environmental and social impacts. It would be too high a cost to pay for these irrigation benefits to be realized. Further, it would be more a reallocation plan - for which we would need Congressional approval - rather than a re-regulation plan. Re-regulating the outflow at Mt. Morris would help reduce erosion downstream of the dam by keeping the channels running at less than bankful capacity.
D2 (Mt. Morris)						+	[illegible]	6.0	1,735	[illegible]	11,534	2,000	6,605	3.3	In this Run-of-the-River scenario, plant would generate no Annual Firm Energy. However, the Average Annual Energy generated would make this scenario economically viable. Therefore, it can be considered as a potential add on to any of the plans to be studied.
D3 (Mt. Morris)		+		+	+	+	[illegible]	12.8	1,735	[illegible]	107,029	15,000	79,827	5.32	Total cost does not include the costs of building Stannard and Portage Dams. Focus is on feasibility of hydropower project at Mt. Morris only assuming water supply needed is available from upstream.

Table 4.1 Abbreviated Evaluation of Scenarios (Cont'd)

Name and Description of Scenario	Purposes: FLOOD CONTROL	Purposes: [illegible]	Purposes: AGRICULTURAL FLOOD [illegible]	Purposes: RECREATION	Purposes: [illegible]	Purposes: HYDROPOWER	Storage: Flood control AF x 1,000	Storage: Water power AF x 1,000	Storage: Conservation Pool AF	Annual Energy: Firm MWH x 1,000	Annual Energy: Avg. [illegible] x 1,000	Total First Cost x 1,000 $	Total Comparative Benefits x 1,000 $	Comparative B/C	Remarks
D4 (Mt. Morris)															
This scenario considers construction of hydropower plants at existing Mt. Morris and Portage sites. The water supply for generation of hydropower at Mt. Morris would equal the flood control storage at Portage. Installed capacity is 1-10,200 KW Tube Turbine.		+		+	+	+	229.	108.	1,735	41.8	71,172	8,200	59,179	7.24	Scenario evaluates feasibility of generating hydroelectric power at Mt. Morris only.
D5 (Mt. Morris)															
This scenario considers construction of hydropower plants at existing Mt. Morris, Portage, and Stannard sites. Water supply for generation of hydropower at Mt. Morris would equal the flood control storage at Stannard and Portage. Installed capacity is 21,733 KW.		+		+	+	+	229.	108.	1,735	57.4	[illegible]	16,500	75,780	4.6	This scenario evaluates feasibility of generating hydroelectric power at Mt. Morris only.
D6 (Mt. Morris)															
This scenario considers construction of a new dam which would rise 100 feet above the existing dam. All increase in storage would be used to generate hydropower. Installed capacity is 28,500 KW.		+		+	+	+	337.	128.	1,735	60.7	119,168.	142,300	86,751	.61	Significant adverse environmental impact on Letchworth State Park expected.
D7 (Mt. Morris)															
This scenario considers addition of a 15-foot high gate on top of existing Mt. Morris spillway dam. All increase in storage would be used to generate hydropower. Installed capacity is 6,500 KW.		+		+	+	+	337.	47.5	1,735	[illegible]	34,158.	8,500	38,181	4.49	The power plant generates no Annual Firm Energy. Benefits are realized through Average Annual Energy. Hydropower is also economically feasible through addition of 15-foot spillway gates.

Table [illegible] Assessment of Alternative Plans of Scenario [illegible]

Name and Description of Scenario	Purposes: Flood Control	Navigation	Agricultural Flow Augmentation	Recreation	Fish & Wildlife	Water Supply	Storage: Flood Control (Ac Ft x 1,000)	Hydro-power (MWH x 1,000)	Conservation Pool (Ac Ft x 1,000)	Annual Charge: Firm (MWH x 1,000)	Avg. (MWH x 1,000)	Total First Cost ($ x 1,000)	Total Comparative Benefits ($ x 1,000)	Comparative B/C	Remarks
D8 (Mt. Morris, 27-foot gate)															
This scenario considers addition of spillway gates at Mt. Morris to increase the existing spillway crest to elevation 787 (+27 feet). All increase in storage would be used to generate hydropower. Installed capacity at Mt. Morris would be 8,300 KW.		+		+	+	+	337.	104.4	1,735	21.4	51,761	12,500	48,148	3.85	Hydropower is also economically feasible through addition of 27-foot spillway gates.
D8.a (Mt. Morris)															
This scenario calls for addition of 27-foot high spillway gates to the existing Mt. Morris Dam. The top of the spillway gates would be at elevation 787 feet. This increase in storage capacity will be used for hydropower generation and seasonal increase in flood control capacity at Mt. Morris. This plan includes an operating policy that has a winter drawdown of the conservation pool which will be filled up by spring runoffs. A power plant would be built and equipped with 1-8300 KW tube turbine to generate 21400 MWH in Average Annual Energy. This scenario also provides adequate releases downstream for irrigation purposes.	+	+	+	+	+	+	441.	104.4				14,445	71,849	4.97	Flood control and hydropower are economically feasible through addition of 27-foot gate to the existing Mt. Morris Dam.
D9 (Mt. Morris, 27-foot gate)															
This scenario considers addition of spillway gate which would increase the existing spillway crest at Mt. Morris to elevation 787'. It also considers the construction of power plants at Stannard and Portage sites. Hydropower storage at Portage and Stannard would also be used to generate power at Mt. Morris. All increase in storage at Mt. Morris would be used for hydropower generation. Installed capacity at Mt. Morris is 28,100 KW.		+		+	+	+	337.	119.4	1,735	87.5	134,634	41,400	95,608	2.31	This B/C ratio does not reflect costs of constructing the Portage and Stannard Dams nor the benefits incurred to these features. Only feasibility of generating hydropower at Mt. Morris was evaluated.

Table 4.1 - Assessment and Evaluation of Scenarios (Cont'd)

Name and Description of Scenario	Purposes: FLOOD CONTROL	IRRIGATION	AGRICULTURAL FLOODING	RECREATION	EROSION	HYDROPOWER	Storage: Flood Control AC/FT X 1,000	Storage: Hydro-power AC/FT X 1,000	Storage: Conservation Pool AC	Annual Energy: Firm MWH X 1,000	Annual Energy: Avg. MWH X 1,000	Total First Cost X 1,000 $	Total Comparative Benefits X 1,000 $	Comparative B/C	Remarks
D10 (Mt. Morris, 27-foot gate)															
This scenario considers adding spillway gates at Mt. Morris to increase the existing spillway crest to elevation 787' (27 feet). All increase in storage would be used to prevent existing residual flood damages in the reaches below the dam, namely the city of Rochester. This scenario also considers operating a Run-of-the-River power plant. Installed capacity would be 4,700 KW.	+			+	+		+	337.+	0.0	1,735	0.0	19,678	19,900	5,446	0.27	Main purposes of this scenario are flood control and hydropower.
D11 (Mt. Morris)															
This scenario considers constructing hydropower plants at existing Mt. Morris Dam and Stannard Dam sites. Water supply for generation of hydropower at Mt. Morris would come from hydrostorage at the Stannard's reservoir. Installed capacity at Mt. Morris would be 7,100 KW.		+			+	+	+	337.	32.0	1,735	0.0	32,143	6,200	36,907	5.95	Note that Annual Firm Energy is 0. Flows from Stannard are reduced from evaporation, bank storage, and infiltration before reaching Mt. Morris. However, generation of hydropower at Mt. Morris is economically viable.
D12 (Mt. Morris)															
This scenario considers constructing hydropower plants at existing Mt. Morris Dam, and Poag's Hole Dam sites. Water supply for generation of hydropower at Mt. Morris would come from hydrostorage at Poag's Hole reservoir. Installed capacity at Mt. Morris would be 5,400 KW.		+			+	+	+	337.	21	1,735	0.0	23,000	4,330	31,716	7.32	Generation of hydropower at Mt. Morris is economically viable.

SECTION V
ASSESSMENT, EVALUATION, AND COMPARISON OF PRELIMINARY PLANS

This section provides a general but brief description of the 12 preliminary alternative plans formulated in the interest of flood management and allied purposes in the Genesee River Basin. It also compares their economic and environmental impacts, and discusses the rationale for rejecting from or selecting preliminary plans for further detailed study in the feasibility phase.

PLAN DESCRIPTION

The alternative plans which will be evaluated in this section are all based on the dam/reservoir plans proposed in the earlier Genesee River Basin Comprehensive Study. The features of these plans are common to most of the alternative plans being studied. A description of the basic features as developed for the Stannard, Portage, and Poag's Hole reservoir sites is presented below.

a. Stannard Dam and Reservoir.

(1) Flood Control and Hydropower

The Stannard Dam site is located on the Genesee River in Allegany County, New York, about 2 miles upstream from Stannards Corners, New York. An area of 178 square miles would be drained by the reservoir.

This alternative consists of constructing a 90-foot high and 2,300-foot long dam located about 4-1/2 miles upstream of the village of Wellsville, New York. A 20-foot high, 1,600-foot long dike will be built across the Marsh Creek area near Readwater Creek, in order to protect the headwaters of Honeoye Creek and the town of Alma southwest and upstream of the dam site. The project purposes would be flood control, hydropower, erosion control, agricultural flood protection, and recreation. Maximum spillway design pool elevation would be 1,625 feet, and would inundate about 1,924 acres of upland area. Relocation of about 3.7 miles of medium-duty road, 4.4 miles of light-duty road, and 0.15 miles of unimproved dirt road would be required, along with 8 miles of railroad tracks and 0.5 miles of high power gas and electric lines. Along the aforementioned roads, approximately 40 houses, one church, and one cemetery would require relocation. The towns of Shongo, Stone Dam, and York Corners would be impacted in that 28 houses and one church would need to be relocated. A plan view of the dam and reservoir along with typical dam section, views, and details are shown on Plates 5.1 and 5.2.

(2) Flood Control

This alternative consists of a reduced size dam/reservoir for flood control and other uses. No hydropower generation is contemplated. The top of the dam would be at elevation 1618 ft. NGVD, and the spillway crest at 1600 ft. NGVD. The reservoir size was reduced by eliminating the conservation pool of 39,500 acre-ft and replacing it with a flood control pool and summer conservation pool (54,000 acre-ft). The Target Rule Curves below (Curve 5.1) show a winter drawdown of the conservation pool which will be filled up by spring runoffs. This operating policy would provide adequate releases downstream for irrigation purposes.

b. Portage Dam and Reservoir.

The proposed Portage Dam site is located on the Genesee River near Portageville, New York, and is approximately 2,000 feet downstream from the Route 245 highway bridge. At this point, the Genesee River is the boundary between Wyoming County and Livingston County. The reservoir would drain 982 square miles.

This alternative consists of construction of an 800-foot long, 110-foot high dam about 1/2 mile downstream of Portageville, New York. The project purposes are flood control, hydropower, erosion control, agricultural flood protection, and recreation. The maximum spillway design pool elevation would be 1,196. At this elevation, about 7,200 acres of upland area would be inundated. Relocation of Portageville would be required, including 1/4 mile of medium duty highway, 1-1/2 miles of light-duty road and 77 structures (3 of which would be churches). In addition to the relocation of Portageville, the town of Rossburg and a large portion of the town of Wiscoy - which together consists of 59 structures, would have to be relocated. The Fillmore town area would be protected by a levee 10,000 feet in length, with a 3,800-foot long tie-back levee at the crossing of Route 19 at Cold Creek. The top of the levee would be at the 1,200-foot elevation contour. Throughout the reservoir area, an additional 11-1/2 miles of medium duty road would have to be relocated and approximately 14 miles of light-duty and unimproved dirt road would need to be relocated or lost. There are also 100 structures located along these roads that require relocation. In addition, about 1 mile of high-power gas and electric transmission lines would require relocation. A plan view of the dam and reservoir along with typical section and views are shown on Plates 5.3 and 5.4.

c. Poag's Hole Dam and Reservoir.

Poag's Hole Dam site is located on Canaseraga Creek in Steuben County, New York, approximately 4 miles upstream from Dansville, and about 1 mile west of Stony Brook State Park.

This alternative consists of constructing a 225-foot high dam with a crest length of approximately 1,700 feet. The dam would rise about 210 feet above the valley floor and would be located about 1-1/4 miles upstream of Dansville, New York. Spillway design pool elevation would be 800 feet, and the reservoir would inundate approximately 300 to 400 acres of upland area. Relocation of about 1 mile of light-duty highway and about 10 structures would be required. The project purposes would be flood control, hydropower, agriculture flood protection, and recreation.

A plan view of the dam and reservoir along with typical section and views are shown on Plate 5.5.

d. Existing Mt. Morris Dam and Reservoir.

(1) Condition Prior to Proposed Modification - The Mt. Morris Dam and Reservoir project is located in west-central New York State, on the Genesee River, a tributary of Lake Ontario. The concrete gravity dam is located on the Genesee River about 66.9 river miles above its mouth. The dam and reservoir site is an attractive scenic area, the Mt. Morris High Banks Gorge of the River.

The dam has central overflow spillway anchored at each end of the walls of the gorge by nonoverflow abutment sections. The spillway is 550 feet long and the two abutments 223 and 230 feet, right and left, respectively, making a total dam surface length of 1,003 feet. Height of the dam at spillway crest is 216 feet and 246 at the abutment sections. The total height from foundation to top of operations tower is 282 feet.

Flood protection for the lower Genesee River Basin, including the city of Rochester, is provided by the dam which controls 1,077 square miles, about 40 percent of the drainage area of the Genesee River Basin. Total storage in the reservoir is 337,000 acre-feet, equivalent to 6 inches of runoff. Under the present system of operation, the reservoir is used only for flood control purposes. There is no storage provided during summer months when the need is greatest for irrigation water, for improved fisheries and water quality management, power generation, and aesthetics.

For information, a plan view of the dam and reservoir along with typical section, views, and details are shown on Plates 5.6-5.8.

(2) Re-regulation.

The Genesee River Basin Regional Water Resources Planning Board, in their comprehensive water resources plan for the basin published in 1976, identified the need for a planning study to determine the exact quantity of diversions for irrigation which are available and the economic feasibility of using barge canal water for irrigation.

Presently, the canal is used as a source of irrigation water along the southern shore of Lake Ontario between Lockport and Rochester. This area, known as the Lake Ontario Lake Plain Service area, includes 482,000 acres with soil types, slopes, and drainage conditions, making it adaptable to irrigation.

It is estimated that, in the section of the canal between Lockport and Rochester, about 239,000 acres would respond well to irrigation. The number of acres irrigated has substantially increased from 600 acres in 1950 to 3,200 acres in 1955 and 5,450 acres in 1964 and remained approximately the same in 1969. Although growth has occurred, the acreage irrigated is a small percentage of the total irrigable land. The lack of sufficient quantities of water, the uncertainty of future supplies, and restrictions related to riparian or other water rights all have an effect on limiting the development of irrigation facilities.

The Board study also indicated that additional 225 cfs presently diverted for power at Medina may be available for irrigation should the power facility be abandoned some time in the future.

In light of the above, the need for re-regulating Mt. Morris to supply the necessary water for irrigating the Ontario Lake Plain is justified. The question is: Can there be any storage of water behind the dam without reducing the level of flood protection that the dam is providing? Preliminary evaluations made in 1976 indicated that it is feasible to maintain a conservation storage of 60,000 acre-feet or about 17 percent of the total storage and provide protection for a flood comparable to the June 1972 flood. The Target Rule Curves (Curves 2) below show that an increase in

storage, caused by addition of 27-ft. high spillway gates, would be used for additional flood control, and for hydropower generation. This implies an operating policy that would have a drawdown of the conservation pool which will be filled up by spring runoffs. Further study is required for a detailed reassessment of storage requirements and the conservation uses for which the storage would be allocated.

Assessment, Evaluation, and Comparison of Preliminary Alternative Plans.

Table 5.1 provides a brief description of the 12 preliminary alternative plans formulated to reduce flood damages and allied purposes in the Genesee River Basin along with their estimated Cost, Benefits, and significant environmental impacts. A comparative analysis of these alternative plans was made for the selection of those that warrant further detailed study. The basis of comparison is the No-Action (do nothing) Plan.

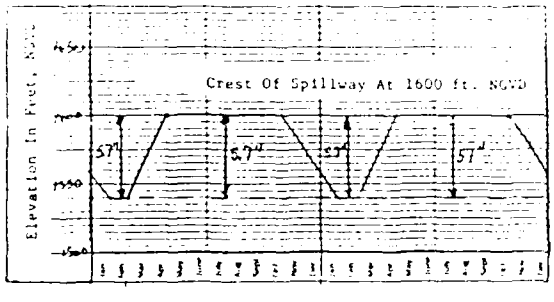
Rationale for Selecting Plans for Further Detailed Study.

The primary consideration used in selecting those plans to carry forward into the feasibility phase of the study is economic viability. Other factors of importance were which ones among those with preliminary B/C ratio less than 1 appear well fit to achieve the National and Specific Planning Objectives. These plans also were selected for further detailed studies as their economic efficiency may improve with better costs and benefit analyses. A total of five plans, including the No-Action Plan, were selected for further studies. These plans are: Plans 1, 2, 6, 8, 10, and 11.

Rationale for Eliminating Plans from Further Consideration.

The primary consideration used for eliminating plans from further consideration is economic viability. As such, all plans with benefit-to-cost ratios less than 1.0 were eliminated from further consideration. In addition, Plan 7 with B/C ratio greater than 1.0 was also eliminated because its components are included in Plan 8. Those plans eliminated are: 3, 4, 5, 7, 9, and 12.

Target Rule Curve [illegible]



Target Rule Curve [illegible]

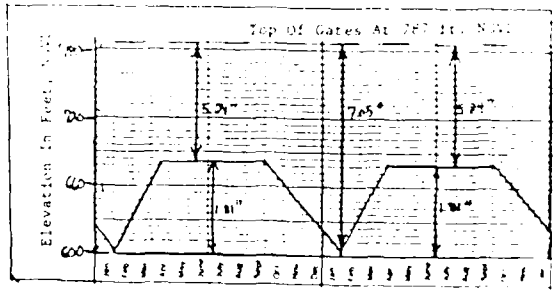


Table 5.1 - Assessment, Evaluation, and Comparison of Alternative [illegible]

Item	Plan 1 Re-regulation	[illegible]
1. Plan Description	This plan consists of re-regulating the existing Mt. Morris dam/reservoir inflow outflow. This would reduce the [illegible] of full channel flow downstream of the dam and thereby reduce the rate of erosion and agricultural flooding.	[illegible]

Plan 3
[illegible] - Portage - Mt. Morris w Hydro.

This plan calls for the construction of [illegible] and Portage Dam/Reservoirs to operate in combination with the existing Mt. Morris Dam. They would operate as a system to generate hydropower and provide for flood control on the upper reaches of the basin. No additional urban flooding [illegible] of the reaches below Mt. Morris is [illegible]. Hydropower storage available to Mt. Morris is projected to [illegible] storage at [illegible]. This system's available [illegible] will be [illegible] MWH.

Plan 4
Portage - Mt. Morris (hydro)

This plan calls for the construction of a Dam/Reservoir at the Portageville site and construction of a power plant at the existing Mt. Morris Dam/Reservoir. The hydropower storage at Mt. Morris would be equal to flood control storage at Portageville Dam/Reservoir. The system's available Average Annual Energy is 392,760 MWH. This energy will be generated through installation of 1-10200 KW tube turbine at Mt. Morris and [illegible] KW tube turbine at Portageville. A description of the [illegible] for Reservoir [illegible] provided [illegible] earlier.

Table 5.1 - Assessment, Evaluation, and Comparison of Alternative Plans (Cont'd)

Item	Plan 5 Stannard-Portage-Mt. Morris	Plan 6 Stannard-Mt. Morris (Flood Control)
. Plan Description	This plan calls for the construction of Stannard and Portage Dam/Reservoirs to operate with the existing Mt. Morris Dam/Reservoir as a system. The system will generate hydropower at all three sites, and provide for flood control only in the reaches above Mt. Morris. No additional urban flooding protection in the reaches below Mt. Morris is contemplated. The hydropower storage available to Mt. Morris is projected to equal the sum of flood control storages at Stannard and Portage Dams. This system's available Average Annual Energy would be 432,495 MWH. This energy would be generated through installation of 1-2600 KW tube turbine at Stannard; 10-6500 KW tube turbine at Portage and 1-21700 KW tube turbine at Mt. Morris. A description of the Stannard and Portage Dam/Reservoir components precedes this table.	This plan calls for construction of a dam/reservoir at Stannard for flood control and other uses. A flood control pool and summer conservation pool of 54,000 acre-ft, in combination with Mt. Morris, would provide for increased flood control, water supply, and recreation throughout the basin. This plan, under operating policies consistent with target curves 5.1 (page 59) would also provide for headwater improvements to existing power plants downstream of the dam site. These plants would operate for longer periods of time at full capacity under regulated flows as opposed to the current practice of unregulated releases. It would also provide steadier releases downstream for irrigation purposes.
. Investment Cost Federal Non-Federal Total	Not estimated Not estimated 561,838,400.0	Not estimated Not estimated 48,000,000
. Annual Charges Interest Amortization Operation, Maintenance & Replacement Total	48,458,600.0 11,200.0 1,200,000.0 49,669,800.0	4,140,000 1,000 62,000 4,203,000
. Average Annual Benefits Flood Damage Reduction (2) Other Hydropower Recreation Irrigation Total	291,200.0 5,300.0 21,367,600.0 29,500.0 - 22,193,600.0	1,220,600 5,300 0 1,744,900 1,460,600 4,430,200
. Benefit to Cost Ratio	0.45	1.0+
. Average Annual Net Benefits	-27,476,000.0	177,200
. Significant Environmental Impacts	Significant impacts are similar to those described for Plan 3. Additionally, some wetlands would probably be adversely impacted within the conservation pool upstream of the Mt. Morris Dam and Reservoir. Social effects and impacts upon community cohesion would also be similar to those of Plan 3.	Impacts are lesser than those of Plan 3.
. Carry Forward Into Feasibility Phase	No.	Yes.

(1) Includes Interest During Construction (IDC).
(2) Includes Agriculture and Nonagriculture flood damages.

Table 5.1 - Assessment, Evaluation, and Comparison of Alternative Plans (Cont'd)

Item	Plan 7 15-Foot Spillway Gate (hydro)	Plan 8 27-Foot Spillway Gate (hydro)
1. Plan Description	This plan calls for addition of 15-foot high spillway gates onto the existing Mt. Morris Dam/Reservoir. The top of the spillway gates would be at elevation 775 ft. This increased storage will be allocated to generate hydropower at Mt. Morris. No change in existing level of flood protection to downstream of Mt. Morris is considered. The powerplant would be equipped with 1-6400 KW tube turbine to generate 34,358 MWH in Average Annual Energy. This plan would also require that 375 cfs be released downstream to irrigate the Ontario Lake plains as described in Plan 1.	This plan calls for addition of 27-foot high spillway gates onto the existing Mt. Morris Dam/Reservoir. The top of the spillway gates would be at elevation 787 ft. This increased storage capacity will be allocated to hydropower generation at Mt. Morris. The plan calls for no additional flood control to the existing flood control levels provided by the dam. A power plant would be built and equipped with 1-8300 KW tube turbine to generate 21400 MWH in Average Annual Energy. Under this plan 375 cfs would be released for irrigation purposes as described in Plan 2.
2. Investment Cost, (1)		
Federal	Not estimated	Not estimated
Non-Federal	Not estimated	Not estimated
Total	9,823,000.0	14,445,475.0
3. Annual Costs		
Interest	947,233.0	1,245,922.0
Amortization	2[illegible]	28[illegible]
Annual O&M	[illegible]	430,000.0
Total	[illegible]	1,676,210.0
4. Average Annual Benefits		
Flood Damage Reduction (2)	0.0	0.0
Erosion	1,500.0	1,800.0
Hydropower	1,697,500.0	2,557,300.0
Recreation	0.0	0.0
Irrigation (2)	1,594,600.0	1,594,600.0
Total	3,293,700.0	4,153,700.0
5. Benefit-Cost Ratio	2.09	2.48
6. Average Annual Net Benefits	2,446,107.0	2,477,490.0
7. Significant Environmental Impacts	If gates were added to elevation 775 feet, the conservation pool elevation of 692 feet would inundate (long-term) about 1,600 acres, much of which would be riparian terrestrial wildlife habitat at the bottom and on the sides of the gorge. Some water level fluctuation due to evaporation and partial drawdown within the pool would be anticipated, which could affect warmwater fish spawning to some degree. Approximately 13 wetlands (involving about six wetland types) may be adversely impacted upstream of the dam on a short or long-term basis. Some adverse impacts on fish in the forms of turbine mortality, entrainment, or impingement may occur.	If gates were added to elevation 787 feet, the conservation pool elevation of 692 feet would inundate (long-term) about 2,100 acres, much of which would be riparian terrestrial wildlife habitat at the bottom and on the sides of the gorge. At the maximum water surface elevation for the flood control pool of 807 feet, up to 2,300 acres more could be temporarily inundated for short-term periods. Otherwise, significant impacts would be similar to those described for Plan 7.
8. Carry Forward Into Feasibility Phase	Yes. (3)	Yes. (3)

(1) Includes Interest During Construction (IDC).
(2) Includes Agriculture and Nonagriculture flood damages.
(3) The concept of adding gates to the existing Mt. Morris Dam spillway section is a viable concept contained in Plans 7 and 8. For all practical purposes, Plans 7 and 8 will be carried into the feasibility phase as one plan (b). Further studies will determine the most efficient and/or practical height.

Table 5.1 - Assessment, Evaluation, and Comparison of Alternative Plans (Cont'd)

Item	Plan 9 Stannard - Portage - Mt. Morris w/27-foot spillway gates	Plan 10 Mt. Morris 27-foot gate (Flood Control and Hydro)
1. Plan Description	This plan calls for the construction of Stannard and Portageville Dam/Reservoirs and addition of 27-foot high spillway gates onto the existing Mt. Morris dam. These Dam/Reservoirs will operate as a system to generate hydroelectric power at all three sites. All increased storage at Mt. Morris would be allocated to hydropower generation. Allocation of flood storage behind the Stannard Dam/Reservoir would protect the reaches above Mt. Morris through to Scottsville. The total hydrostorage available at Mt. Morris is projected to equal the sum of hydrostorage at Stannard, Portage and the increased storage at Mt. Morris. The [illegible] available Average Annual Energy would be [illegible] MWH. This energy would be generated with installation of [illegible] KW tube turbine at the Stannard power plant, [illegible] KW tube turbine at the Portageville, and [illegible] KW tube turbine at Mt. Morris. A [illegible] of the plan components provides [illegible]	This plan calls for the addition of 27-foot high spillway gates onto the existing Mt. Morris dam. The increased storage at Mt. Morris will be allocated to both hydropower generation, and additional flood control for the reaches below the Mt. Morris dam as per target rule curve 5.2 on page 59. This plan would also call for release of 325 cfs for irrigation use on the Ontario Lake Plain as described in Plan 1. The available Average Annual Energy would approximately be 51,[illegible] MWH with implementation of an operating policy that has a winter drawdown of the conservation pool which will be filled up by spring runoff, and [illegible] of a power plant rated at [illegible] KW tube turbine.
2. Investment Cost (1) Federal Non-Federal Total	Not estimated Not estimated $[illegible]	Not estimated Not estimated [illegible]
3. Annual Charges Interest Amortization Annual O&M Total	$4,[illegible] 11,[illegible] 1,[illegible] $[illegible]	[illegible] [illegible] [illegible] [illegible]
4. Average Annual Benefits Flood Damage Reduction Erosion Hydropower Recreation Irrigation Total	991,220.0 5,100.0 24,[illegible].0 24,500.0 1,[illegible].0 25,[illegible].0	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
5. Benefit to Cost Ratio	0.42	[illegible]
6. Average Annual Net Benefits	-25,010,300.0	[illegible]
7. Significant Positive or Adverse Impacts	Significant impacts are similar to those of Plan 1. Regarding Mt. Morris, if gates were added to elevation 787 feet, the conservation pool elevation of 683 feet would [illegible] date (long-term) about 2,100 acres, much of which would be riparian terrestrial habitat at the bottom and on the sides of the gorge. Also, about 13 wetlands would be adversely impacted upstream of the Mt. Morris Dam on a short or long term basis.	There would be similar significant impacts for Mt. Morris as described in Plan 9. Also, about 13 wetlands (involving about six wetland types) may be adversely impacted upstream of the Mt. Morris Dam on a short or long term basis. Some adverse impacts to fish in the forms of turbine mortality, entrainment, or impingement may occur. Social and economic impacts would be the same as Plan 1.
8. Carry Forward into Feasibility Phase	No	Yes

(1) Includes Interest During [illegible]
(2) Includes Agriculture and [illegible] Damages

Table 5.1 - Assessment, Evaluation, and Comparison of Alternative Plans (Cont'd)

Item	Plan 11 Stannard-Mt. Morris 27-foot gate (Hydro & FC)	Plan 12 Poag's Hole - Mt. Morris (hydro)
1. Plan Description	This plan, a combination of Plans 1,6, and 10, calls for the construction of a Dam/Reservoir at Stannard (Plan 6), and addition of 27-foot high spillway gates onto the existing Mt. Morris dam (Plan 10). The dam at Stannard will provide flood protection to the reaches between Mt. Morris and Stannard. The increased storage at Mt. Morris will be allocated to both [illegible] generation, and additional flood control for the reaches below the Mt. Morris [illegible]. This plan would also call for release [illegible] 375 cfs for irrigation use [illegible] Lake Plain as described in [illegible]. The available Average Annual [illegible] approximately [illegible] MWh	This plan calls for the construction of a Dam/Reservoir at the Poags' hole site, and construction of a power plant at the existing Mt. Morris Dam/Reservoir. The hydropower storage at Mt. Morris would [illegible] to the flood control storage at Poags' [illegible]. The power plant at Mt. Morris would be equipped with a 1-11[illegible] KW Francis [illegible] and 1-[illegible] KW Francis [illegible] at Mt. Morris to generate 2[illegible],976 MWh in Average Annual Energy. This plan would also [illegible] for irrigation of the lake plain [illegible] and flood damage [illegible]. A description of [illegible]
[illegible]	[illegible]	[illegible]

SECTION VI

STUDY MANAGEMENT

The purposes of this section are to: discuss the feasibility phase methodologies for the Genesee River Basin Study; provide an outline of the principle activities needed to complete the feasibility phase of the study; describe the contemplated public involvement and coordination activities, and; to provide information on the schedule for the remainder of the study. The primary goal in the reconnaissance phase has been to evaluate a wide range of alternative plans that would satisfy the National and Planning Objectives with the purpose of reducing the number of alternatives for further consideration. The evaluation to this point in time indicates that there are few preliminary improvement plans that warrant further, detailed study in the feasibility phase: Plans 1 (Mt. Morris Re-regulation); 6 (Mt. Morris with 15-Foot Spillway Gate Addition); 8 (Mt. Morris with 27-Foot Spillway Gate Addition); 10 (Stannards, Mt. Morris with 27-Foot Spillway Gate Addition); and the No-Action Plan (Plan 2). The management plan presented herein assumes that these four preliminary improvement plans, or some variation therot, and the "No-Action" Plan warrant further consideration.

FEASIBILITY PHASE METHODOLOGY

The emphasis in the feasibility phase will be placed on refining the designs, quantities, and costs estimates for the above plans and/or variations thereof; refining the benefit analysis and economic evaluation for these plans; preparing an environmental impact statement for these plans; and developing mitigation plans to mitigate for unavoidable adverse environmental impacts. In addition, a Coastal Zone Management, a 6049b)(1) Evaluation will be prepared.

The Flow Network (CPM) showing the activities involved in the feasibility phase is presented in Figure 6.1. With reference to the CPM, the future level of the interdisciplinary team in the feasibility phase is as follows:

[illegible]

Contract work consists of a contract with the U.S. Fish and Wildlife Service to complete the Fish and Wildlife coordination Act activities and the one season biological survey, and a contract to conduct a cultural resource reconnaissance study. The in-house effort involves about 1 man-year to prepare the Draft and Final EIS and 6049b)(1) Evaluation, and 4 months to monitor contracts and provide input for the Draft and Final Feasibility Reports.

[illegible]

Economics work includes refining the benefit analysis and economic evaluation for Plans [illegible] management, and preparation of the [illegible].

c. Real Estate.

The real estate appraisal for Plans 6, 8, and 10 will be conducted by North Central Division.

d. Hydrology and Hydraulics.

H&H work includes developing discharge-frequency, stage-frequency, stage-discharge, and damage-frequency curves (5-1/2 man-months); analyzing the impacts of the Standard Project Flood for preselected Plans (3 man-months); refining plan designs (1-1/4 man-months); and preparation of the Draft and Final Feasibility Reports (3-1/4 man-months). Contract work consists of a contract with the Hydroelectric Design Center, North Pacific Division, to assist in the design of the hydropower plant, and intake and outlet structures.

e. Geotechnical.

Contract work includes a subsurface exploration contract and a contract with the Ohio River Division Laboratory to analyze soil samples. In-house work includes: preparation of Scope of Work and supervision of contracts (1-1/2 man-months); a sedimentation analysis (1-1/4 man-months); a foundation analysis (1/2 man-month); geotechnical design and preparation of the Draft and Final Feasibility Reports (1 man-month).

f. Engineering Design.

Design work includes the design of dam and levees (3/4 man-month).

g. General Engineering.

The work involved includes preparation of the final cost estimates for preselected Plans (1 man-month).

h. Drafting.

About 2 man-months of in-house effort will be required to prepare visual aids for public meetings and graphic displays for the Draft and Final Feasibility Reports.

i. Word Processing.

Word Processing will be required to type information packets for workshops, public meetings, and the Draft and Final Feasibility Reports.

j. Reproduction.

Contract work consists of contracts to print the Reconnaissance Report and the Draft and Final Feasibility Reports.

k. Program Development.

About 1 man-months of in-house effort will be required to prepare budget-ary documents.

1. Project Management and Planning.

The study manager is expected to spend approximately 50 percent of his time on feasibility phase activities primarily in coordinating efforts of the interdisciplinary team, preparation of materials for workshops, public meetings, coordination with other agencies and local interests, costs and other analyses, and report preparation. This in-house effort totals 10-1/2 man-months including planning supervision.

PUBLIC INVOLVEMENT AND COORDINATION

Close coordination will be maintained with principal study interests (i.e., USF&WS, NYSDEC, local government officials, and local interests) throughout the feasibility phase to obtain their input as the study progresses. Further, two public meetings will be held to keep the general public informed on the study progress and to solicit public comment. The first meeting will be held in the 2nd Quarter of FY 88 to review the results of this reconnaissance study. The final public meeting will be held in the 4th Quarter of FY 89 to present the final findings of the feasibility study.

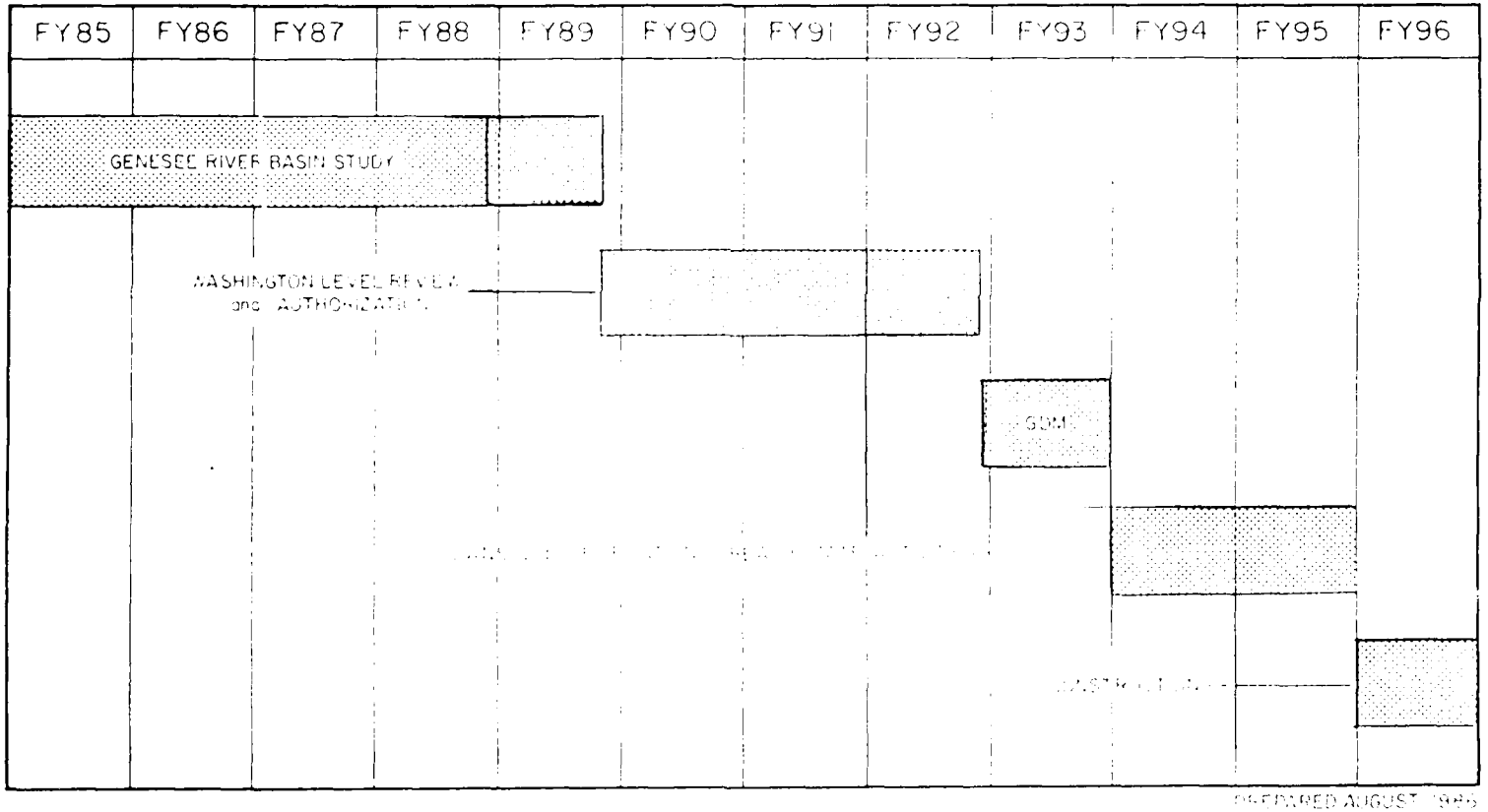
STUDY SCHEDULE

The milestone dates shown on the CPM are the same as the latest approved study schedule. From the CPM, the Draft Report, including Draft EIS, is scheduled for submittal to North Central Division in December 1988 (MS-6) and the Final Report, including Final EIS, in August 1989 (MS-10).

SCHEDULE OF MAJOR ACTIVITIES THROUGH CONSTRUCTION

The schedule for the major activities, assuming the final recommendation of this study is to implement a flood control plan, is shown in Figure 6.1. As indicated, following completion of the Feasibility Study in FY 89, the report would be sent forward for Washington level review and authorization. The General Design Memorandum (final design document) would then be initiated and is currently scheduled for completion by the end of FY 93. Plans and Specifications and Real Estate activities would follow, with initiation of construction projected to start in FY 96.

PROPOSED SCHEDULE OF MAJOR ACTIVITIES
FLOOD CONTROL PROJECT - GENESEE RIVER BASIN



PREPARED AUGUST 1986
Rev. 12/86

FIGURE 1

SECTION VII

CONCLUSIONS

The primary purpose of this section is to provide a summary of the significant conclusions reached during the reconnaissance phase of the Genesee River Basin study. The study findings, analyses, and results are preliminary in nature, but conform with the study purpose and authority. Based on these results, the following conclusions were reached:

a. In terms of existing and projected supply and demand, the basin has important needs in the areas of flood control, municipal and industrial water supply, and general outdoor and fish and wildlife recreation. Other important needs are supplemental irrigation, protection from streambank and agricultural land erosion, and hydroelectric power generation.

b. As possible solutions to the basin water resource needs, 12 preliminary plans were formulated and assessed. The assessment indicated that four plans warranted further, detailed analysis in the feasibility study phase, whereas eight others warranted no further consideration because of lack of economic justification or failure to achieve the primary water resource needs considered.

c. Hydropower development opportunities are realistic in view of the interests expressed by non-federal entities in economically viable hydroelectric power projects.

d. The Canaseraga Creek Valley has adequate protection from the more frequent or highly probable floods. This protection is provided by levees and other flood measures built by local farmers with Governmental assistance. However, residual damages along the valley are significantly meaningful to justify some form of additional protection. Therefore, a small scale local flood protection project will be incorporated, as a component, into those plans that will be studied further in the feasibility phase.

e. The authorized flood control projects for Spring Creek in Caledonia, New York, and Red Creek in Monroe County, New York, should be deauthorized. These projects are no longer economically viable because of increased costs, changed conditions, and/or lack of local support.

SECTION VIII

RECOMMENDATIONS

Based on the results, and conclusions reached, I recommend that the District proceed with the feasibility phase of the Genesee River Basin study and prepare a Final Feasibility Report.

Daniel R. Clark

DANIEL R. CLARK
Colonel, Corps of Engineers
District Commander

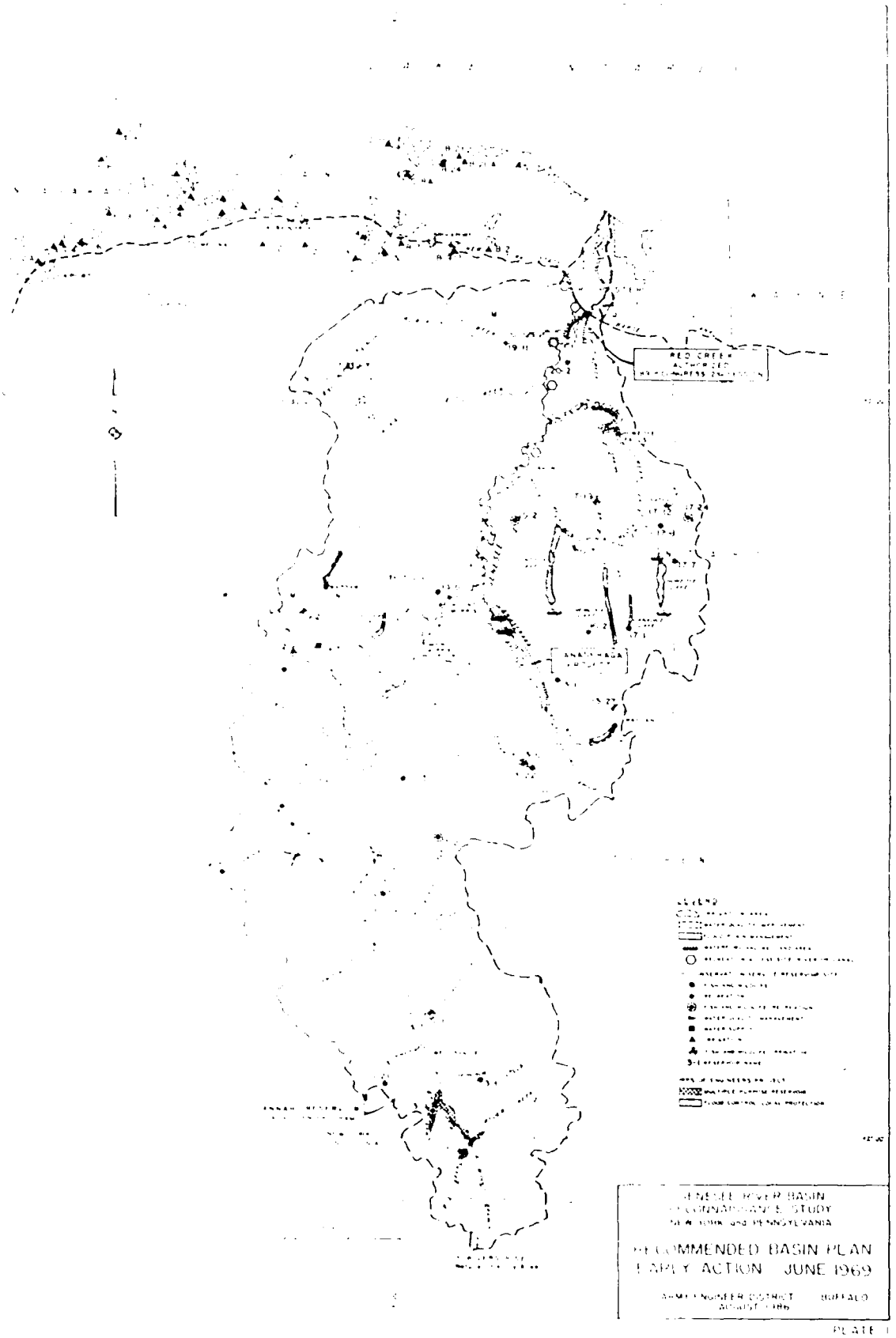
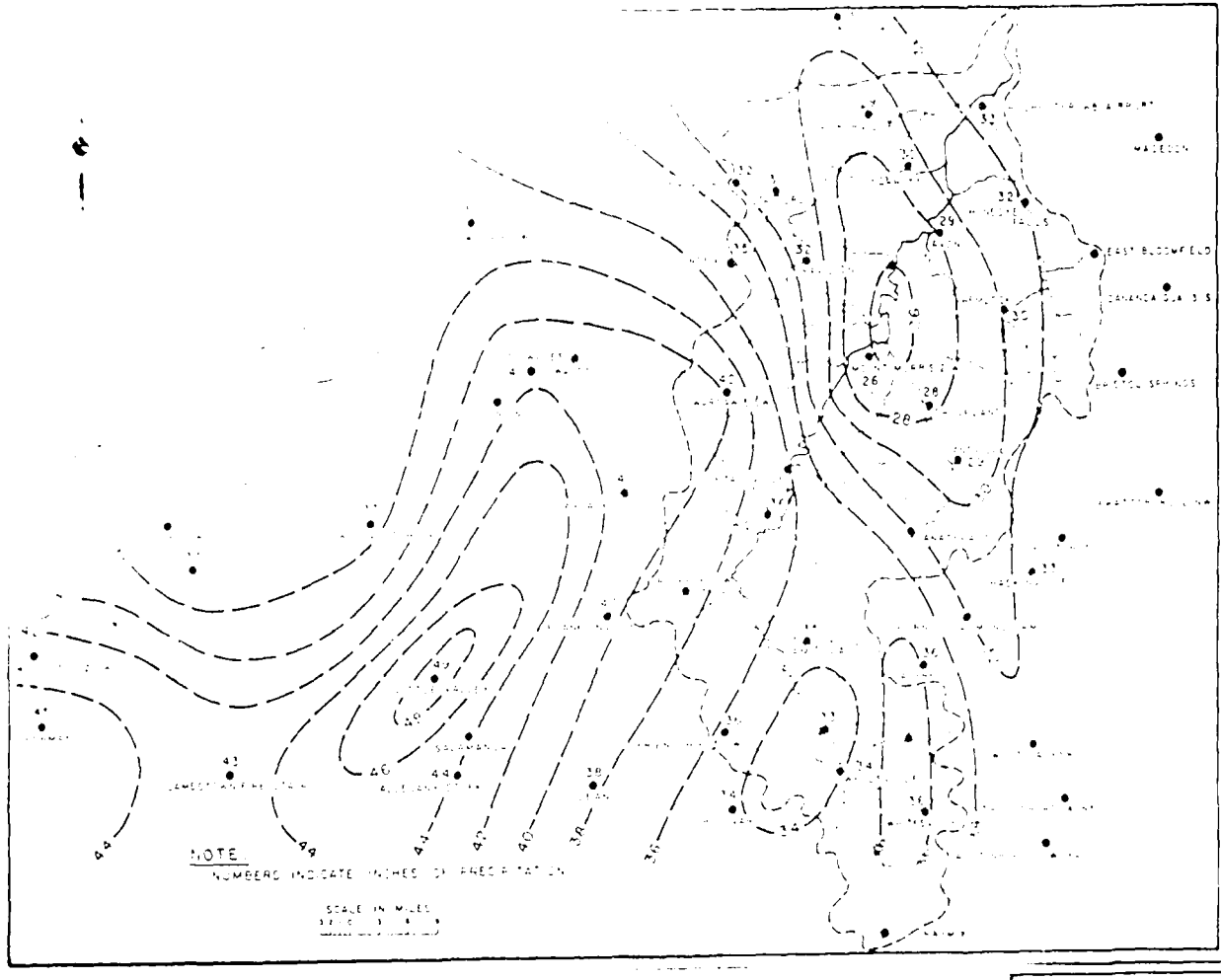
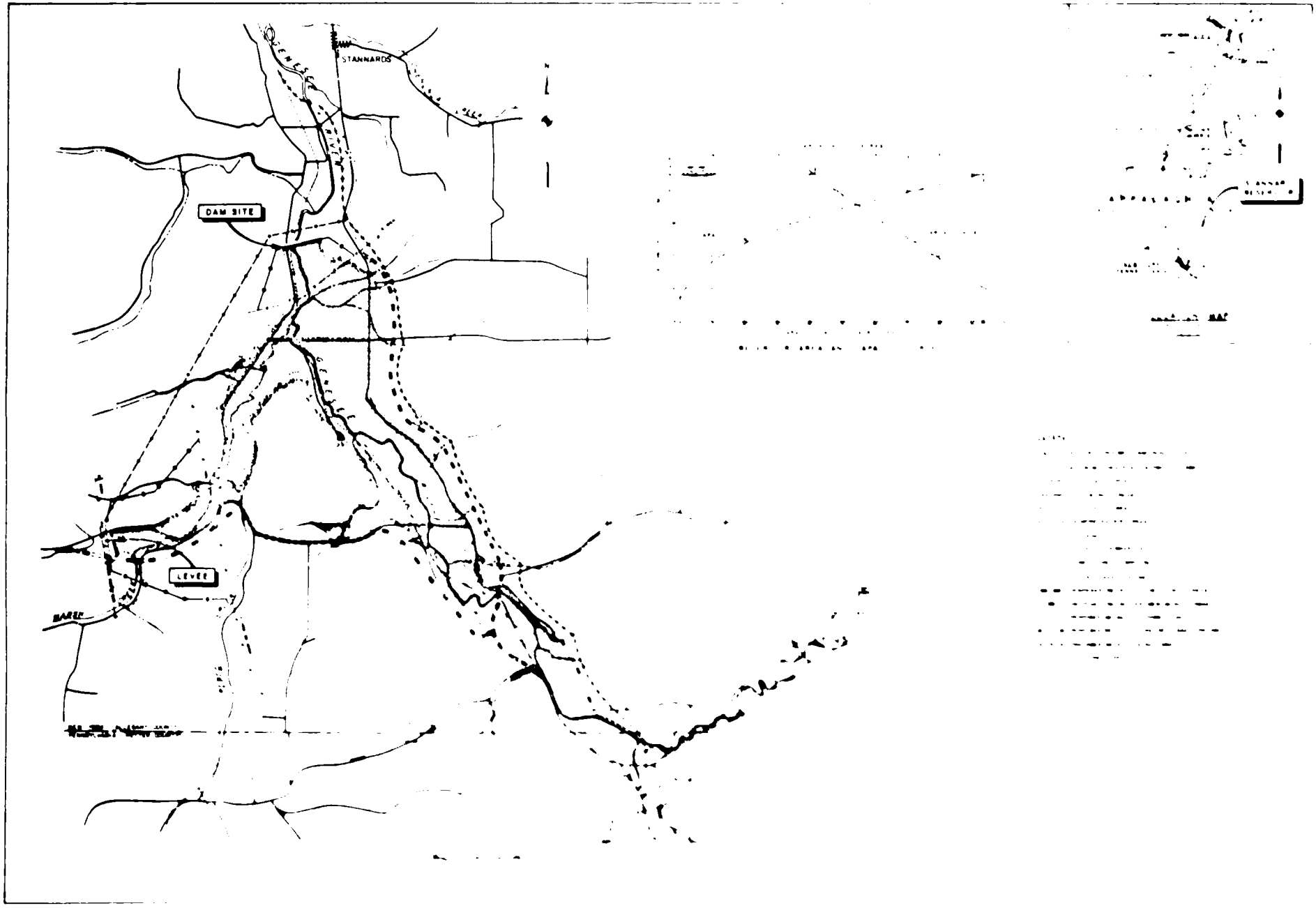
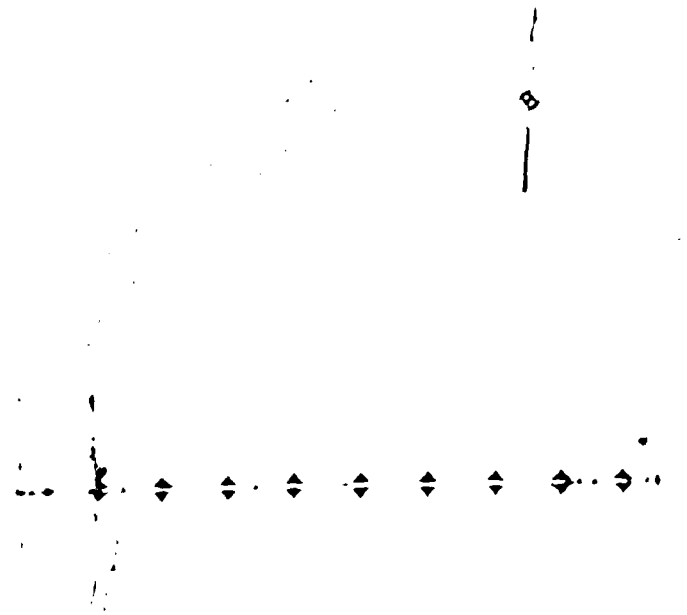
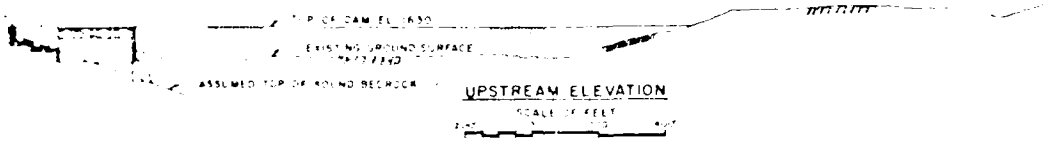

RED CREEK
LEGEND
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK AND PENNSYLVANIA
RECOMMENDED BASIN PLAN
EARLY ACTION JUNE 1969
BUFFALO

PLATE 1


NOTE
NUMBERS INDICATE INCHES OF PRECIPITATION
SCALE IN MILES

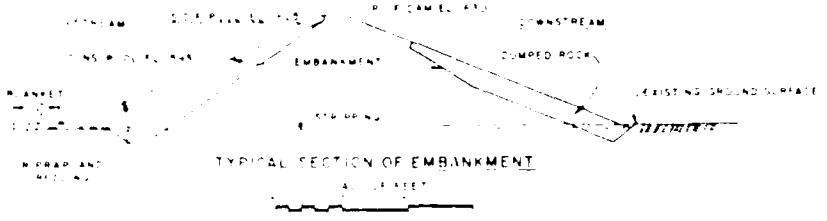

STANNARDS
DAM SITE
LEVEE





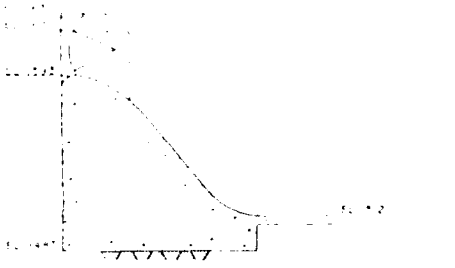
UPSTREAM ELEVATION

SCALE OF FEET



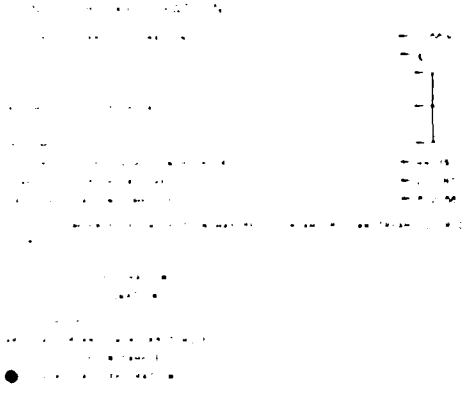
TYPICAL SECTION OF EMBANKMENT

SCALE OF FEET



CONCRETE SPILLWAY SECTION

SCALE OF FEET

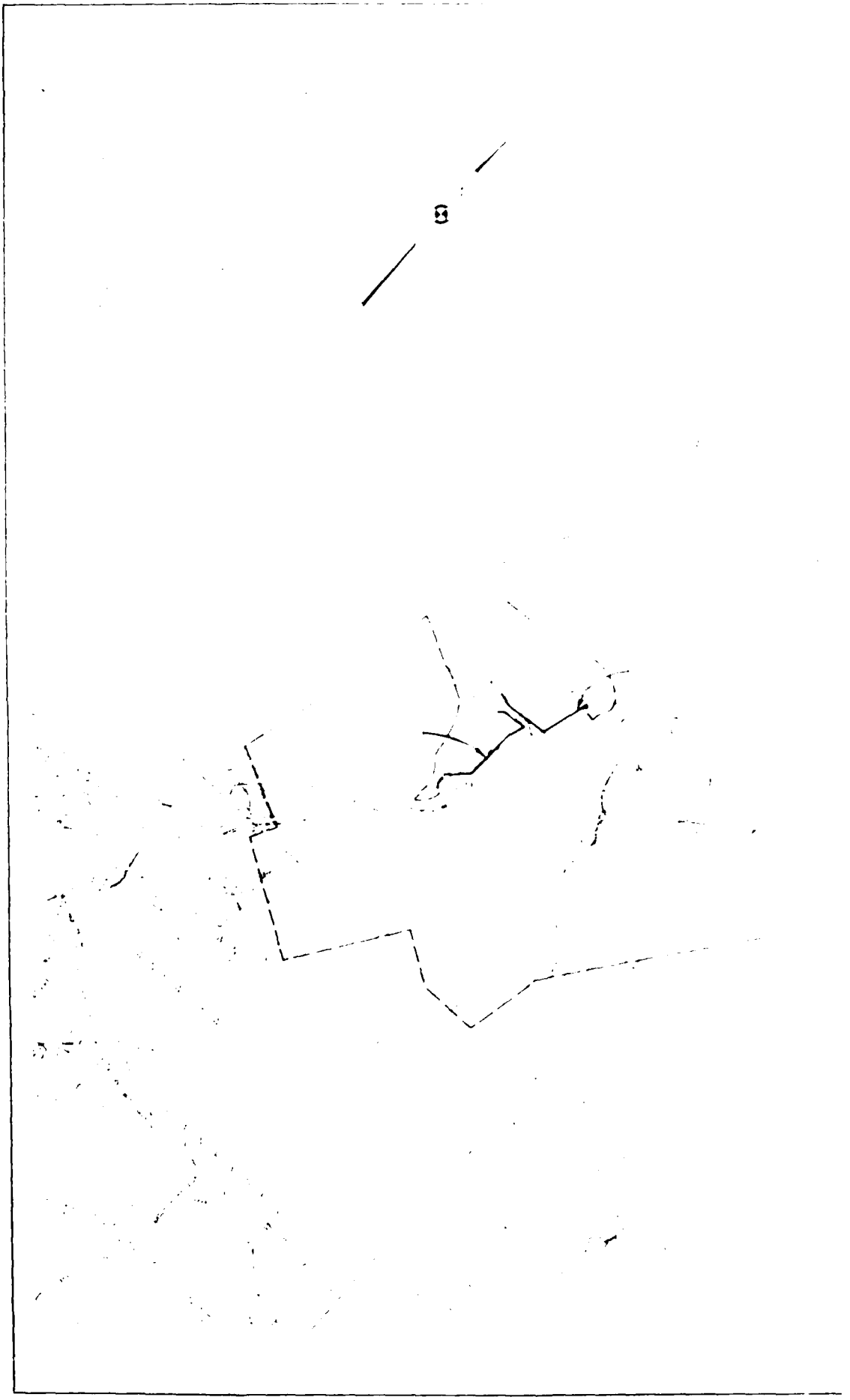


GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

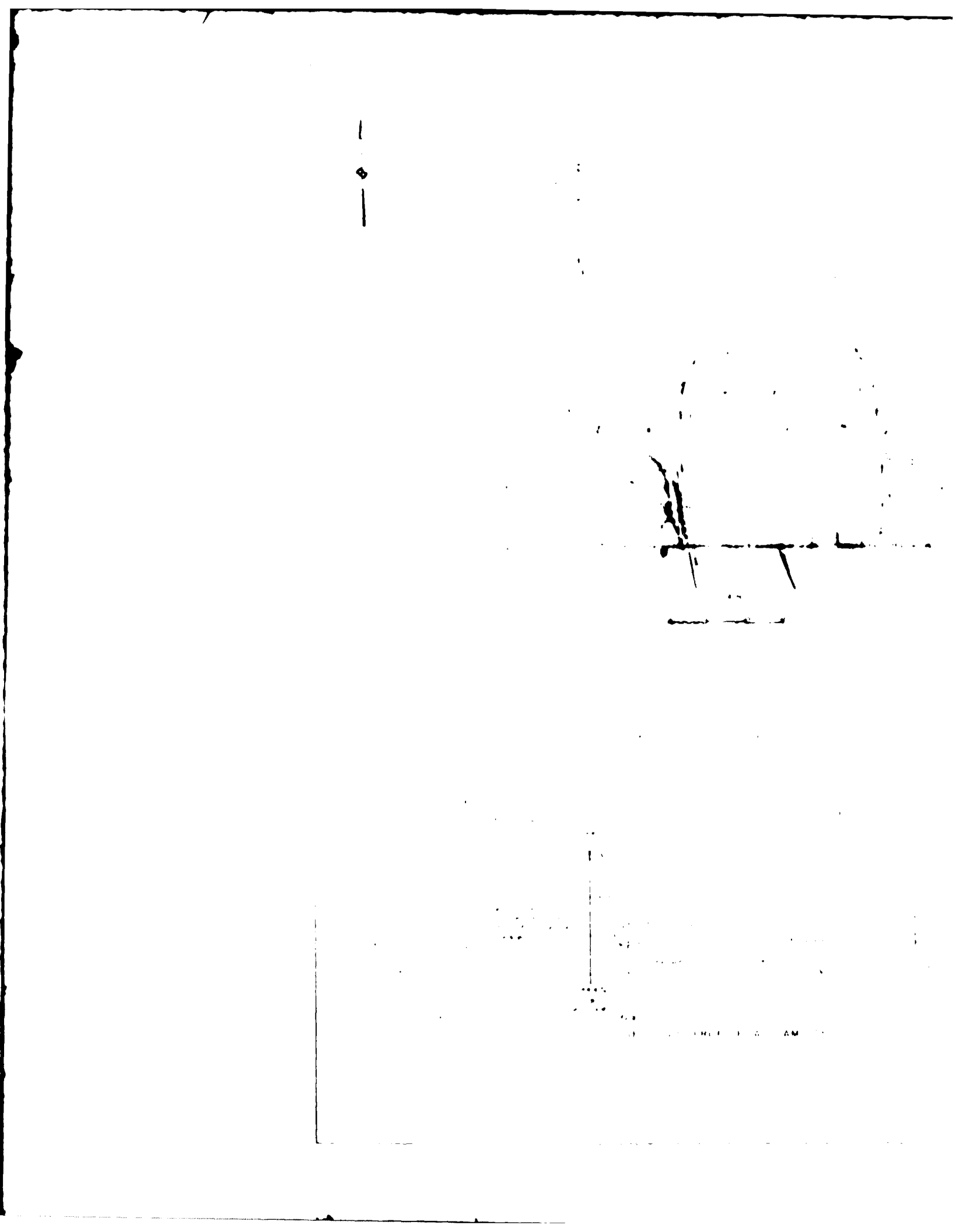
STANNARD DAM
PLAN and DETAILS

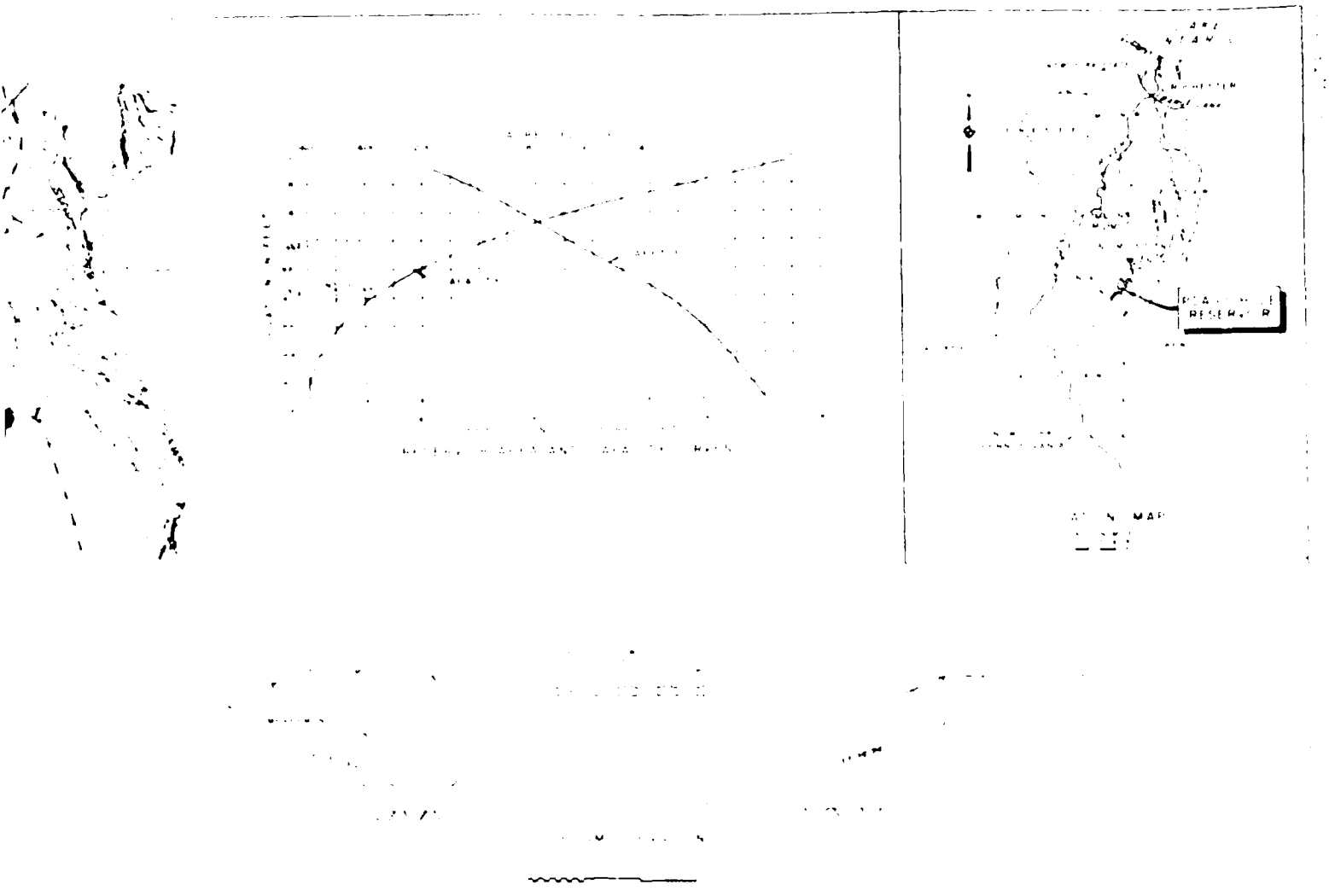
U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

PLATE 5.2



PROPOSED
PORTAGE RESERVOIR



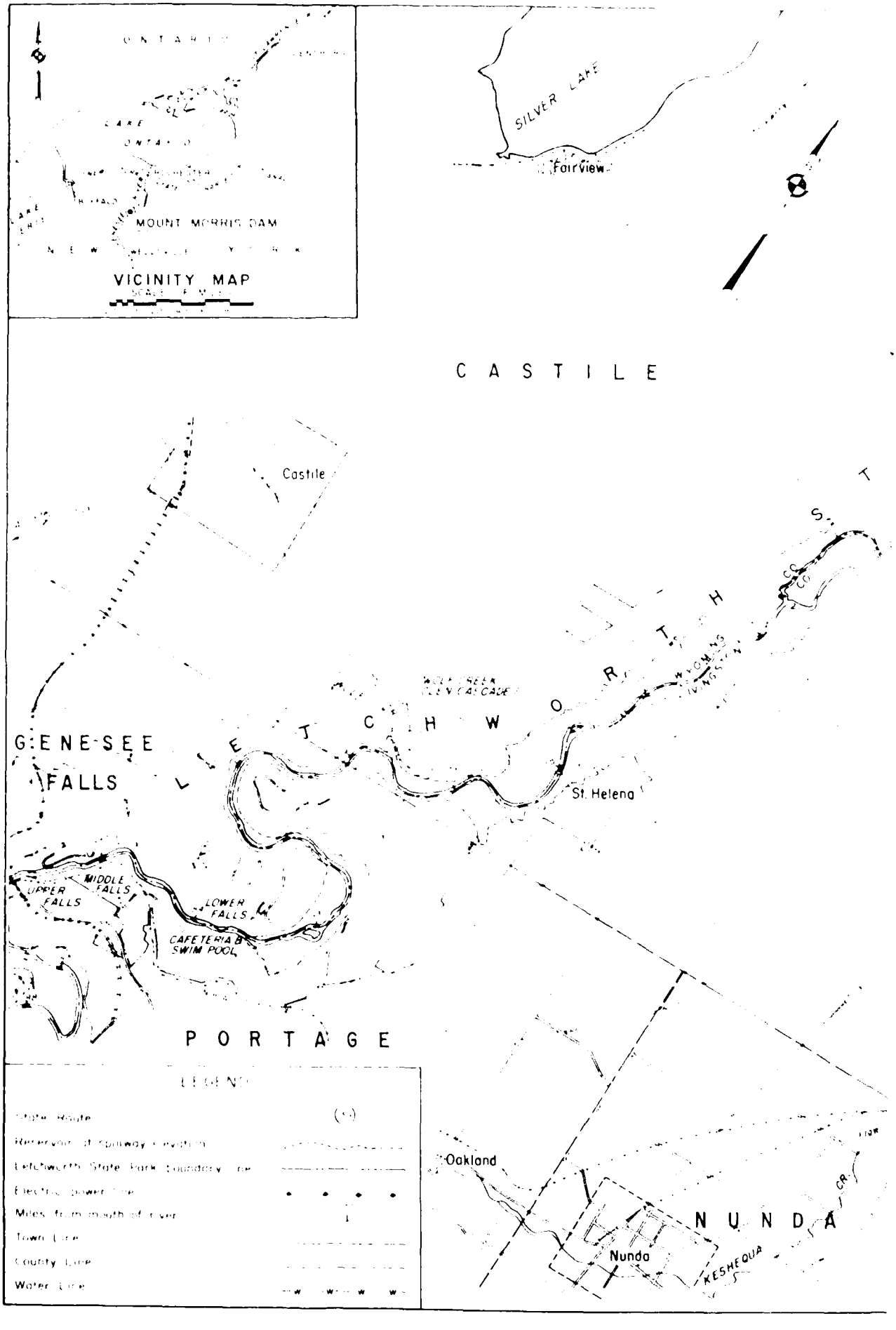


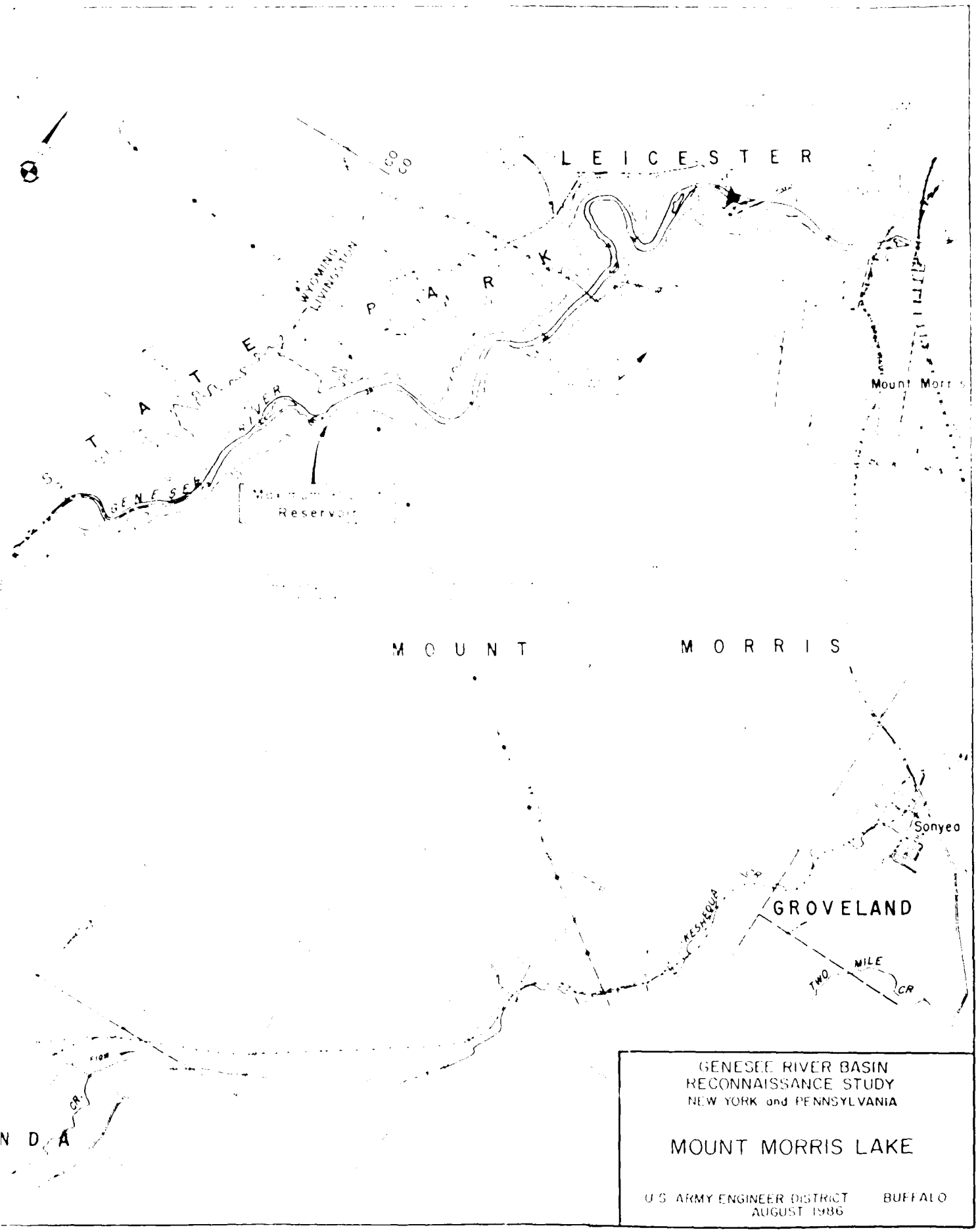
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

POAGS HOLE
DAM and RESERVOIR

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

PLATE


ONTARIO
LAKE ONTARIO
MOUNT MORRIS DAM
NEW YORK
VICINITY MAP
SILVER LAKE
Fairview
CASTILE
Castile
GENESEE FALLS
LETCHWORTH
WYOMING
NORTH
St. Helena
UPPER FALLS
MIDDLE FALLS
LOWER FALLS
CAFETERIA & SWIM POOL
PORTAGE
Oakland
NUNDA
Nunda
KESHEQUA
LEGEND
State Route
Reservoir at Spillway Elevation
Letchworth State Park Boundary
Electric power line
Miles from mouth of river
Town Line
County Line
Water Line

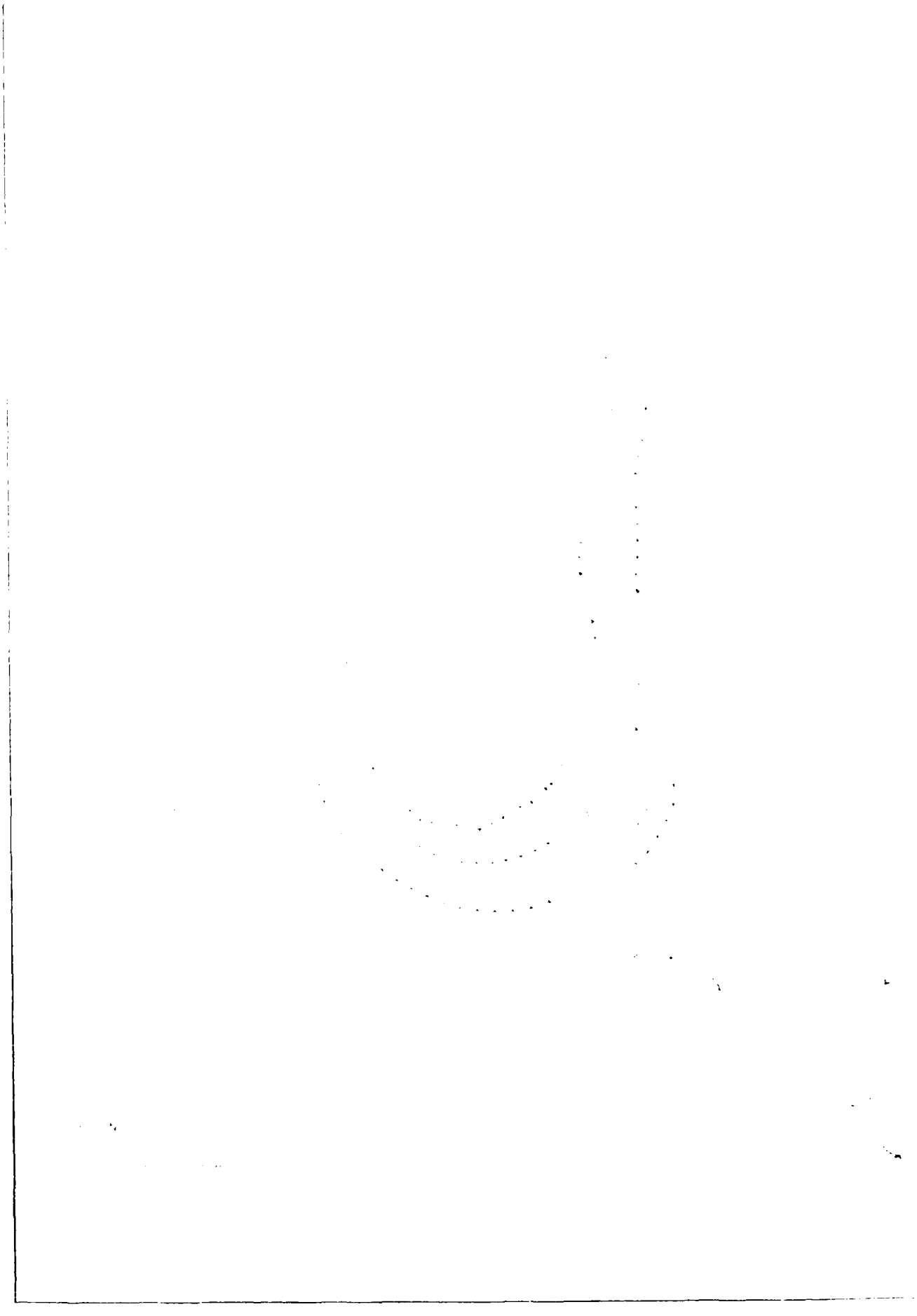


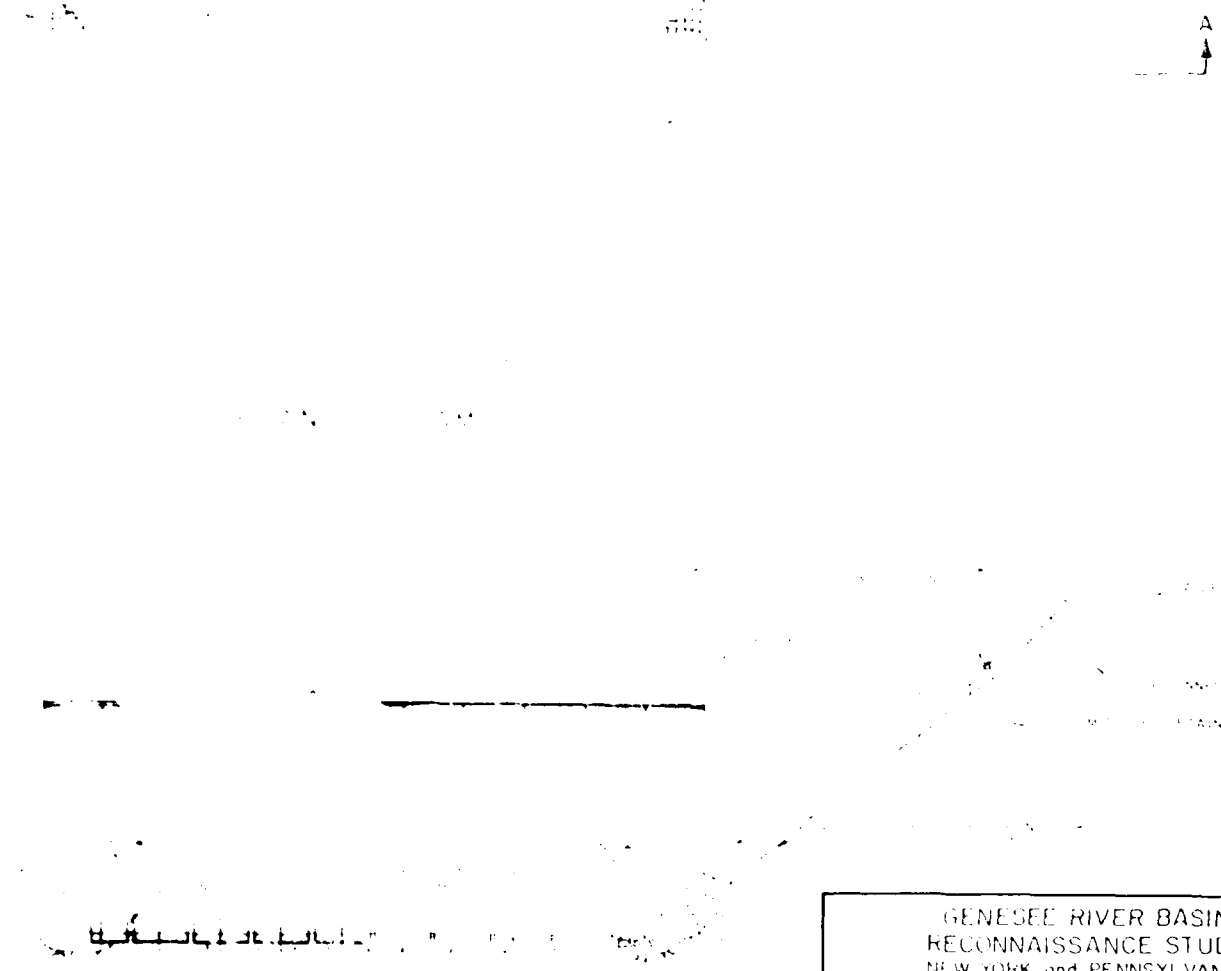
GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

MOUNT MORRIS LAKE

U S ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

PLATE 5-5





SECTIONAL ELEVATION A-A

GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

MOUNT MORRIS DAM
PLAN and DETAILS

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

AD-A190 138 GENESEE RIVER BASIN STUDY; RECONNAISSANCE REPORT VOLUME 2/2
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DISTRICT 1986

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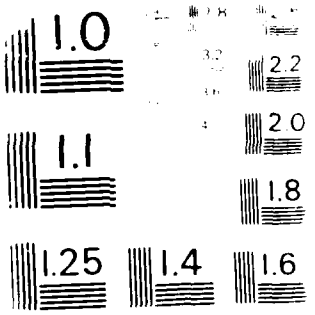
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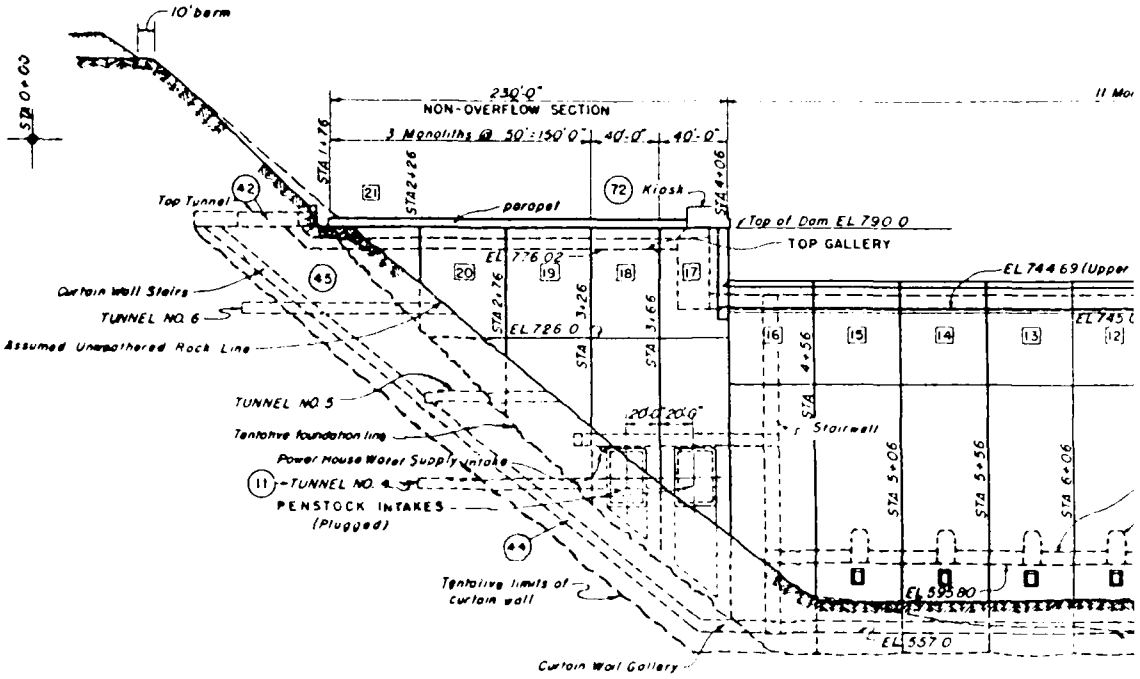
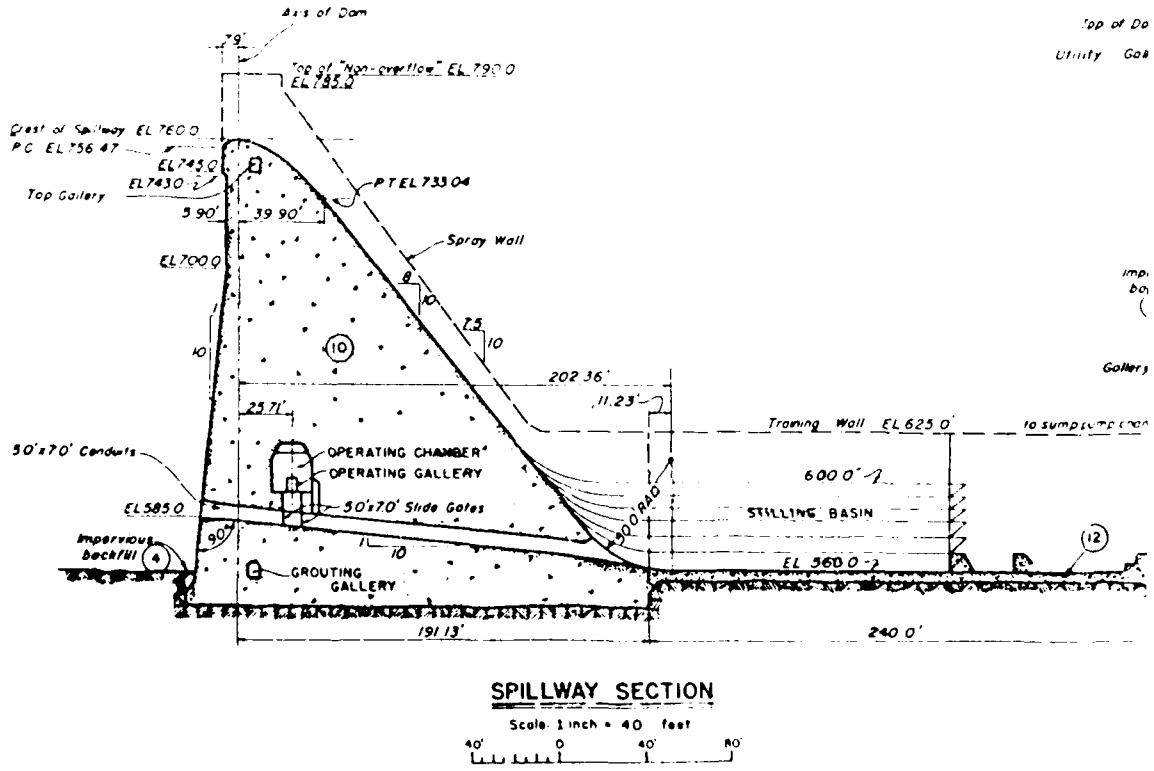


UPSTRE

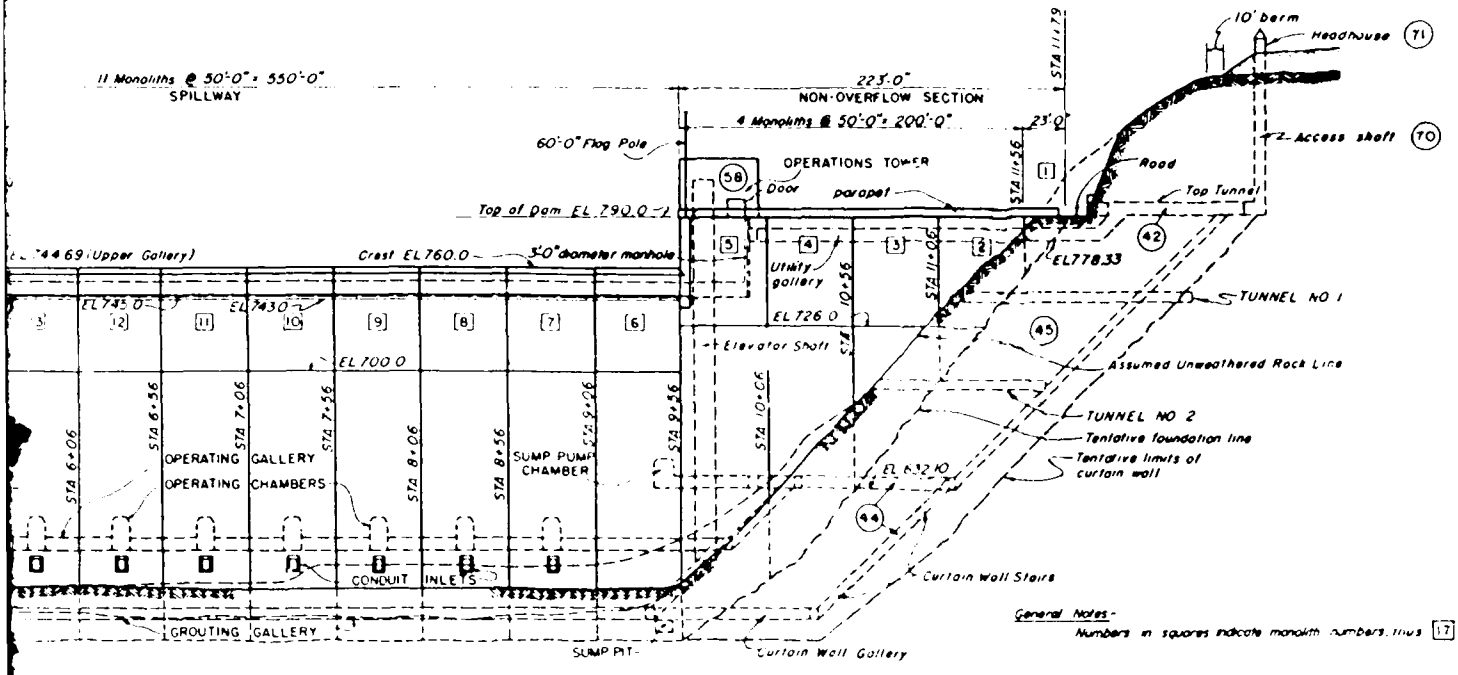
Scal



SPILLWAY SECTION

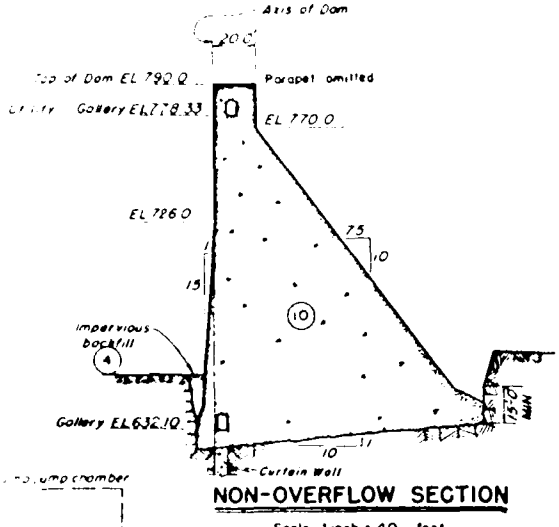
Scale: 1 inch = 40 feet

40' 0 40' 80'



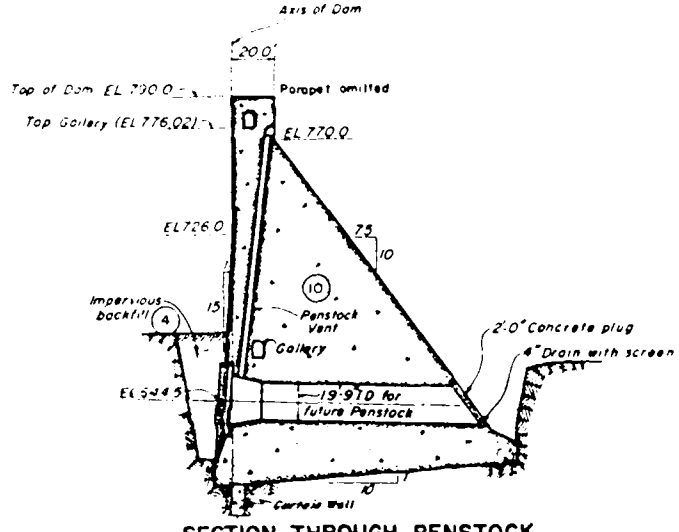
UPSTREAM ELEVATION

Scale: 1 inch = 50 feet



NON-OVERFLOW SECTION

Scale: 1 inch = 40 feet



SECTION THROUGH PENSTOCK

Scale: 1 inch = 40 feet

GENESEE RIVER BASIN
RECONNAISSANCE STUDY
NEW YORK and PENNSYLVANIA

DAM
UPSTREAM ELEVATION and TYPICAL SECTIONS

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986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