Environmental Statement: Wyoming Valley Flood Control
Revised Draft: 1973 October

Revised Draft

Environmental Statement

Wyoming Valley Flood Control • Susquehanna River, Pennsylvania



Office of the Chief of Engineers • Department of the Army October 1973

REVISED

DRAFT

ENVIRONMENTAL STATEMENT

WYOMING VALLEY FLOOD CONTROL
SUSQUEHANNA RIVER, PENNSYLVANIA

OFFICE OF THE CHIEF OF ENGINEERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. 20314

OCTOBER 1973

WYOMING VALLEY FLOOD CONTROL
SUSQUEHANNA RIVER, PENNSYLVANIA

(X) Draft ( ) Final Environmental Statement
Responsible Office: U.S. Army Engineer District, Baltimore, Maryland

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

2. Description of Action: The recommended Flood Control Project is a modification of the existing flood control features in the Wyoming Valley of Luzerne County, Pennsylvania. Basic elements of the improvements consist of raising approximately 64,000 linear feet of levees and steel sheet pile wall to varying heights dictated by the requirement that adequate flood protection constitutes levee raising to the June 1972 Hurricane "Agnes" flood height. Exact height increases and the type of construction to be used will be determined during the project preliminary design phase. Height increases will be obtained by either placing additional fill material on top of existing levees and expanding the levee toe to the landside or riverside, or in both directions; or through sheet pile construction.

3a. Environmental Impacts: The proposed project will directly and indirectly benefit the Wyoming Valley by providing improved flood protection during periods of high water; by increasing possible drainage and sewer discharge control and stabilization of ground water discharges; and through possible aesthetic improvements to existing facilities.

3b. Adverse Environmental Effects: Adverse impacts of the Program include the omission of flood control protection for communities not previously protected in the valley; additional costs for ancillary flood control facilities; specific local area impacts on aesthetics, ecological habitats and patterns, existing and proposed development, access, historic resources, and property values due to land acquisition and other characteristics of the project; and the short-term disruptive effects of project construction.

4. Alternatives: Seven alternatives to the project were considered, including raising of all the Susquehanna River bridge crossings, dredging of the river channel, channel widening, upstream impounding basins, river diversion, obstruction removal, and "no project".

5a. Comments Received (District Review):
U.S. Atomic Energy Commission
Federal Power Commission
U.S. Department of Commerce, Economic Development Administration
U.S. Department of Agriculture, Forest Service
U.S. Department of Interior, Bureau of Mines
Susquehanna River Basin Commission
Borough of Kingston
Borough of Forty Fort
Commonwealth of Pennsylvania, Department of Environmental Resources
U.S. Department of Agriculture, Soil Conservation Service
U.S. Office of Economic Opportunity
U.S. Department of Health, Education, and Welfare
U.S. Environmental Protection Agency, Region III
U.S. Department of Interior, Northeast Region
Mr. Donald Charles
Economic Development Council of Northeastern Pennsylvania

5b. Comments Requested (Departmental Review):
U.S. Department of the Interior
U.S. Department of Agriculture
U.S. Department of Transportation
U.S. Department of Health, Education and Welfare
U.S. Environmental Protection Agency
Commonwealth of Pennsylvania

6. Draft Statement to CEQ: 9 July 1973 .
Revised Draft Statement to CEQ: _____ .

This report was prepared for the Department of the Army, Corps of Engineers, under contract number DACW-31-73-M-0472 by Parsons, Brinckerhoff, Quade & Douglas, Inc., New York, N.Y.

October 1973

WYOMING VALLEY FLOOD CONTROL
SUSQUEHANNA RIVER, PENNSYLVANIA
REVISED DRAFT ENVIRONMENTAL
IMPACT STATEMENT

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WYOMING VALLEY FLOOD CONTROL
SUSQUEHANNA RIVER, PENNSYLVANIA

I. PROJECT DESCRIPTION

A. Responsible Office:

Baltimore District, Corps of Engineers, U. S. Army.

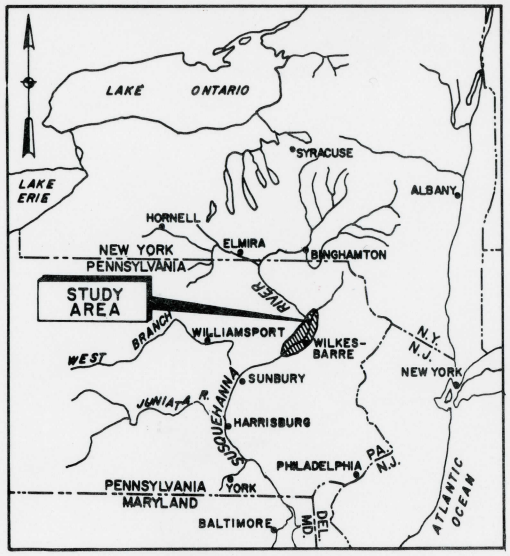
B. Project Location:

As shown in Figures 1 and 2, the project area is located in Northeastern Pennsylvania on the Susquehanna River and includes the City of Wilkes-Barre and the seven neighboring communities of Edwardsville Borough, Exeter Borough, Forty Fort Borough, Hanover Township, Kingston Borough, Plymouth Borough, and Wyoming Borough, all of which are located in Luzerne County.

C. Project Description:

This statement is a summary of possible environmental impacts associated with modifying the existing flood control facilities in the Wyoming Valley of Pennsylvania. The basic elements of the improvement consist of raising approximately 64,000 linear feet (12.1 miles) of levees and steel sheet pile wall to varying heights. Existing levee locations are shown on the map, Figure 3. The estimated height increases will be dictated by the requirement that adequate flood protection constituted levee raising to the storm "Agnes" flood height. Exact height increases and the type of construction to be used will be determined during the preliminary design project phase. Height increases will be obtained by either placing additional fill material on top of existing levees and expanding the levee toe to the landside or riverside, or in both directions; or through sheet pile construction. For purposes of this evaluation, it was assumed that each foot of height increase by landfill construction would require a base expansion of approximately five feet. The impacts of all reasonable expansion alternatives were identified and evaluated for each levee section and these studies will constitute the primary basis for future project decision making. It is presently assumed that bridge replacement and/or relocation in conjunction with the proposed project will not be necessary. This will be discussed further in the section, "Alternatives to the Proposed Action."

CORPS OF ENGINEERS



VICINITY MAP

SCALE OF MILES

50 0 50 100



SCALE OF FEET

2000 0 2000 4000

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND

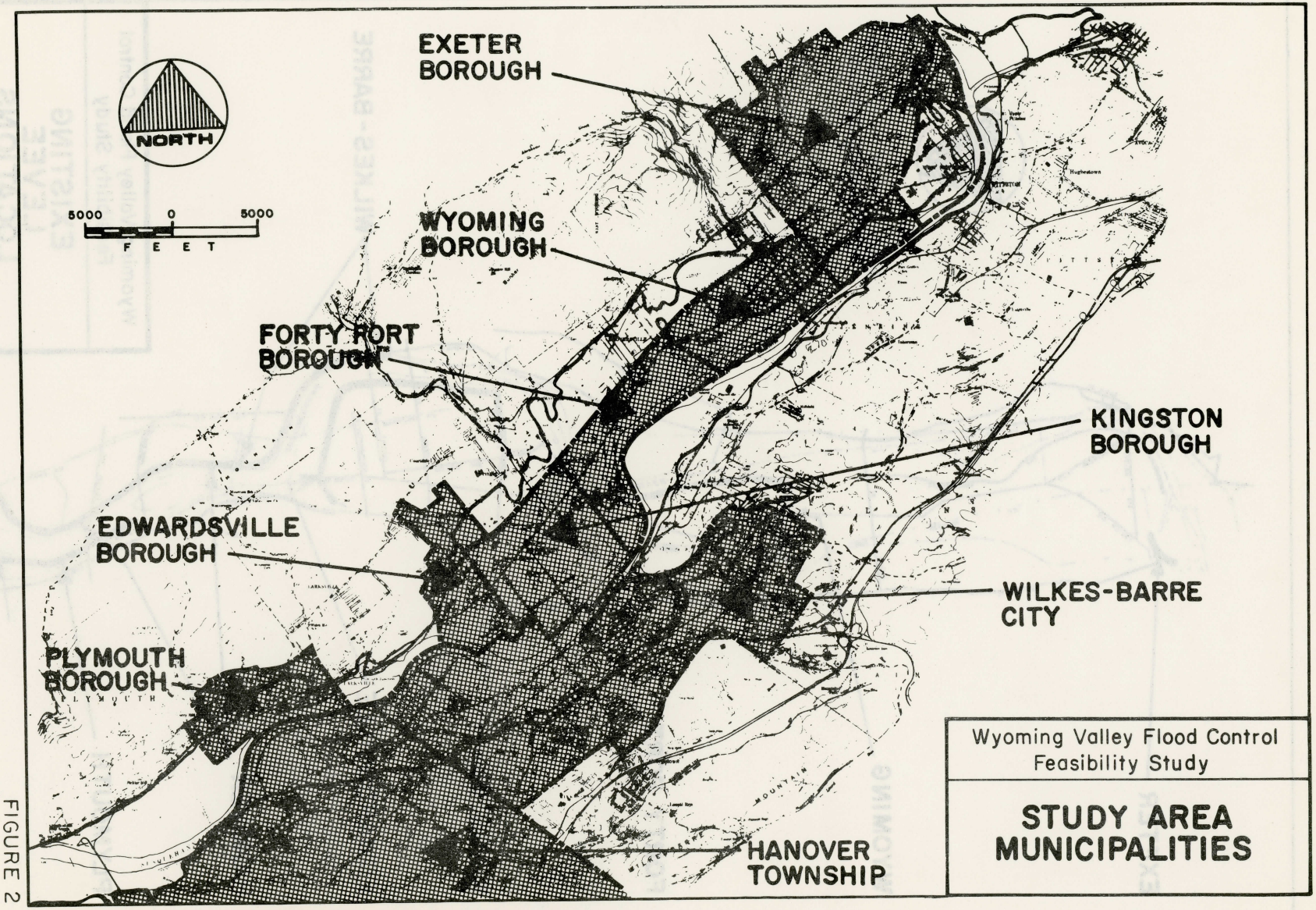
SUSQUEHANNA RIVER FLOOD CONTROL PROJECT

WYOMING VALLEY LEVEE REPAIRS

WYOMING VALLEY

	DRAWING NUMBER	PLATE
SCALE:	DATE:	SHEET OF

PLATE I


NORTH
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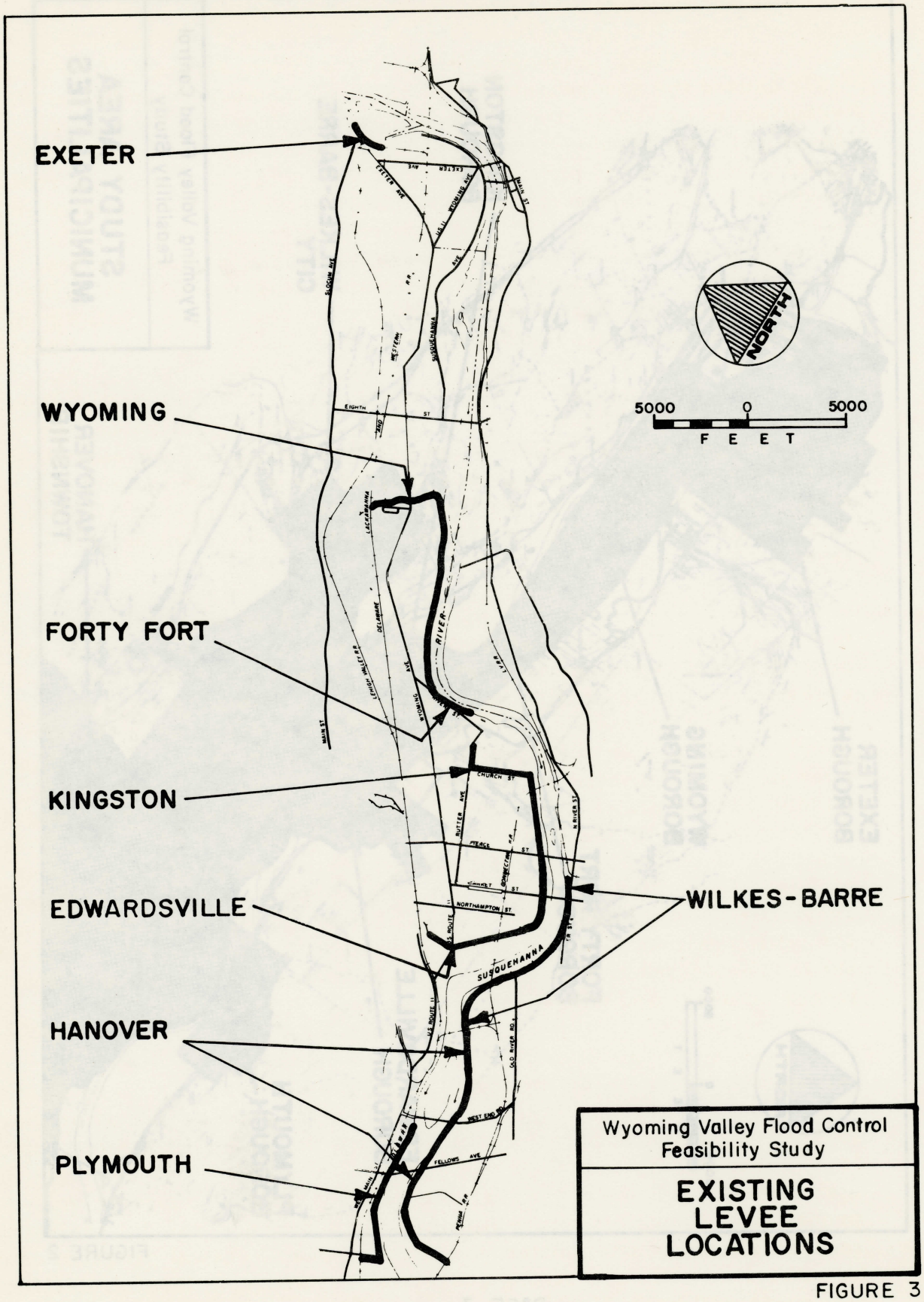
F E E T
EXETER BOROUGH
WYOMING BOROUGH
FORTY FORT BOROUGH
KINGSTON BOROUGH
EDWARDSVILLE BOROUGH
WILKES-BARRE CITY
PLYMOUTH BOROUGH
HANOVER TOWNSHIP
Wyoming Valley Flood Control Feasibility Study
STUDY AREA MUNICIPALITIES

FIGURE 2


EXETER
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KINGSTON
EDWARDSVILLE
HANOVER
PLYMOUTH
WILKES-BARRE
NORTH
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F E E T
SUSQUEHANNA RIVER
Wyoming Valley Flood Control
Feasibility Study
EXISTING
LEVEE
LOCATIONS

FIGURE 3

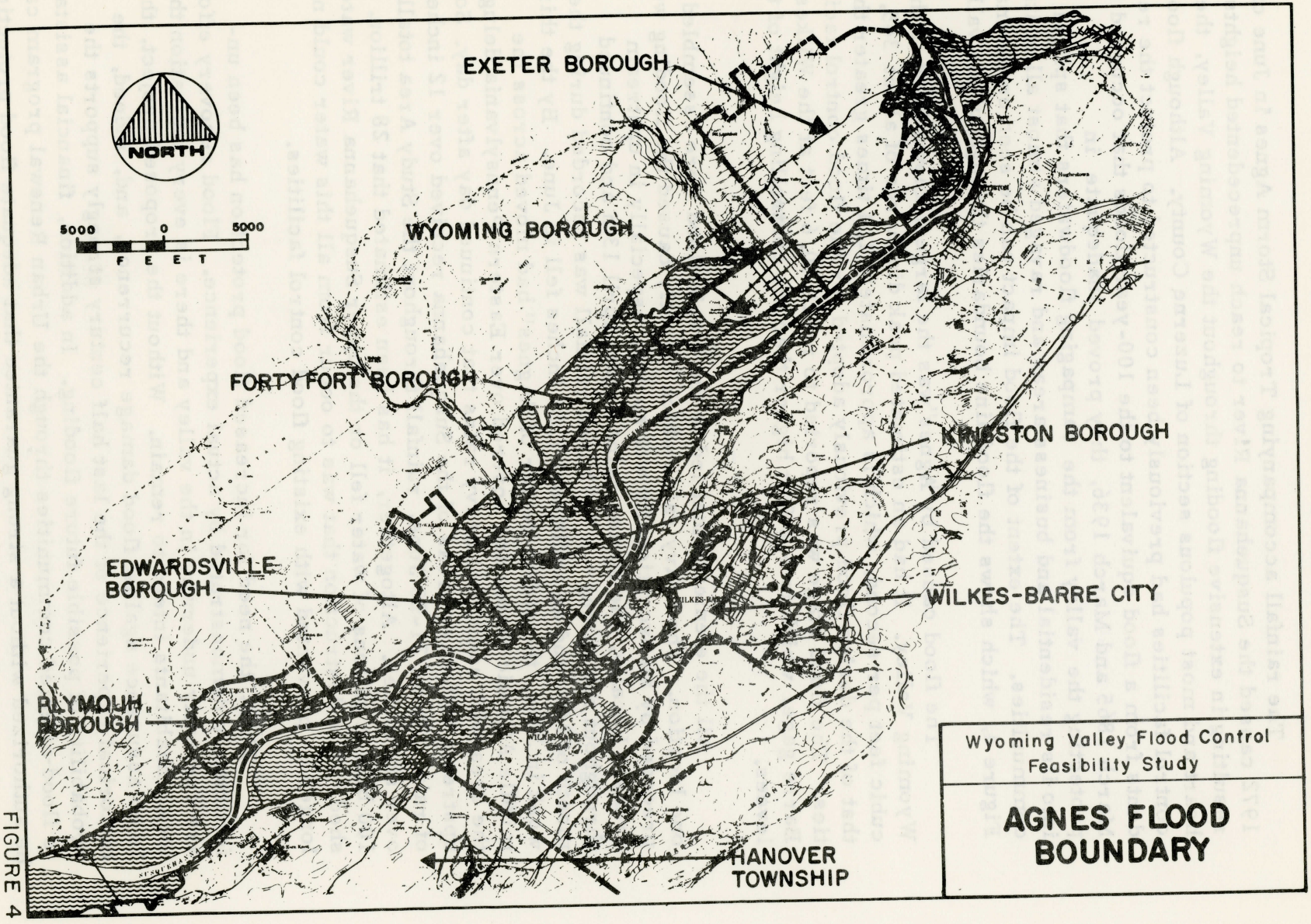
D. Project Purpose and Need:

The rainfall accompanying Tropical Storm Agnes in June of 1972 caused the Susquehanna River to reach unprecedented heights, resulting in extensive flooding throughout the Wyoming Valley, the heart and most populous section of Luzerne County. Although flood control facilities had previously been constructed to protect the residents from a flood equivalent to the 100-year floods that occurred in March 1865 and March 1936, they proved inadequate in protecting the valley from the rampaging floodwaters that spilled into its residential and business areas and ravaged almost all of its communities. The extent of the flood impact can be seen on the map, Figure 4, which shows the flood line boundaries throughout the valley.

The flood caused by "Agnes" was the largest known flood in the Wyoming Valley. It had an estimated peak discharge of about 345,000 cubic feet per second, which is approximately 1.4 times greater than that of the design flood previously adopted for the flood control facilities. The flood stage was reported to reach 40.6 feet at the Wilkes-Barre gage, which is 3.6 feet higher than the controlling height of the levees.

All the elements that led to the tragic flood were assembled in one location. The heavy rains which directly caused the flooding were preceded by an exceptionally wet spring, especially in upstream areas. Locally, the spring rains began April 13th and continued throughout the spring — a 7.93 inch rainfall was recorded during the month of May and an additional 7.55 inches fell in June. By the third week in June, the storm center of "Agnes" had moved across the middle Atlantic States and hovered over Eastern Pennsylvania deluging the area with additional heavy rains that continued day after day. Some upstream tributary areas of the Susquehanna received over 12 inches of rain. From 21-23 June, rainfall throughout the Study Area totalled over six inches. Altogether, it has been estimated that 28 trillion, 100 billion gallons of water fell on the upper Susquehanna River watershed. The destruction that was to occur from all this water could no longer be prevented with existing flood control facilities.

Thus, the need for increased flood protection has been unfortunately demonstrated by actual experience. Flood recovery efforts are currently underway in the valley and there is every indication that local inhabitants intend to remain. Without the proposed project, there is no assurance against flood damage recurrence, and, indeed, the historical experience of the last half century strongly supports the probability of possible future flooding. In addition, financial assistance to flood-affected communities through the Urban Renewal program cannot be authorized without a strong guarantee that adequate flood protection measures will be implemented.


EXETER BOROUGH
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WYOMING BOROUGH
FORTY FORT BOROUGH
KINGSTON BOROUGH
EDWARDSVILLE BOROUGH
WILKES-BARRE CITY
PLYMOUH BOROUGH
HANOVER TOWNSHIP
Wyoming Valley Flood Control Feasibility Study
AGNES FLOOD BOUNDARY

FIGURE 4

II. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

The following is a description of pre-flood conditions, post-flood (after Hurricane "Agnes") or existing conditions, and projected conditions without the proposed project for each major element in the study area.

ENVIRONMENTAL CONDITIONS

A. Geology and Soils

1. Major Land Features

a. Pre-Flood Conditions

The project study area is located in Northeastern Pennsylvania in an area known as the Wyoming Valley of Luzerne County. The Susquehanna River flows through the central portion of the valley which extends for approximately 25 miles from Pittston to Nanticoke. The valley is densely populated and highly developed.

Topographically the valley is a broad feature of low relief, oriented in a northeast to southwest direction, encompassing the Susquehanna River flood plain, gently rolling low lands and the moderately steep slopes of adjacent mountains. North Mountain, 18 miles to the northwest, at an elevation of 2,464 feet, is the highest point in the county. The valley is part of the Allegheny Plateau formation which extends in a southwesterly direction through Pennsylvania. East of the Wyoming Valley is a heavily wooded mountainous area which eventually becomes part of the Pocono Mountain Region. Bordering Wilkes-Barre on the east are the two highest local mountains, each rising to a height of 2,160 feet above mean sea level (msl). The Susquehanna River has a low water mark of approximately 512.07 feet msl at Wilkes-Barre. The Lackawanna River joins the Susquehanna River north of Pittston City, runs on a gentle slope through the valley and ultimately flows into the Chesapeake Bay. For all areas of the county, the river is important as a collector and transporter of surface run-off water.

Major subsurface geologic features include bedrock formations with many anthracite coal beds. Bedrock predominately consists of sandstone, shale, and conglomorate. In the Wyoming Valley Region, this has been folded into a northeast-southwest elongated and structured downwarp formation. An extensive anthracite coal bed in the valley extends through a range of elevations, cropping out at 1,200 feet above mean sea level on the surrounding mountain slopes and dipping into a trough located as much as 1,500 feet below sea level under the flood

plain of the Susquehanna River. Locally, within the structural downwarp, the coal-bearing strata are folded and faulted. Bedrock in the Wyoming Valley is sporadically exposed. Much of the surface is covered by glacial deposits, refuse dumps from underground coal mines, and overburden dumps from strip mines.

Beneath the surface, the Susquehanna River Valley was overdeepened through glaciation in its early period of development. As the glacial activity receded, the variably deep channel was filled with clay, silt, sand, gravel and boulders. This unconsolidated material filled the buried valley with amounts up to 300 feet deep underneath the present river bottom. The buried valley is considered a unique relic of the Wisconsin Glacier, the last glacier to cover the Wilkes-Barre region. The unusual canoe shape of the basin, formed in the early geologic periods, is about 65 miles long and extends from Forest City in Susquehanna County to Shickshinny in Luzerne County. As the glacier moved southward through the general area, it carried millions of tons of debris. The weight of this mass as it passed down through the valley wore away the soft surface of the anthracite coal beds, creating a series of depressions on the valley floor. As the glacier retreated it deposited glacial fill which shaped the present-day Wyoming Valley.

Water percolating through upper layers of this soil was retained above the bedrock, saturating the glacial fill at the bottom with water which could not escape except through faults in the underlying formations. Mining operations have weakened the supporting rock in places, and at times the fluid mass of water has entered the mines below carrying with it large quantities of sand and gravel. This movement obstructed underground coal mining, disturbed surface areas through subsidence and at times resulted in losses of property and lives.

b. Post-flood/Existing Conditions

Since most of the topographic and geologic features of the Wyoming Valley are the result of long evolutionary processes relatively immune to short-term disturbances such as the flood, pre- and post-flood conditions of these features are considered to be the same. Changes which have occurred in ground water due to inundation of the mines during the flood are described in the section on Water Resources.

c. Projected Conditions Without Project

Projected conditions without the project will remain essentially the same with possibly some alteration of the ground water situation. This is described in detail in the section on Water Resources.

2. Mines

a. Pre-Flood Conditions

For many years the prosperity of Luzerne County was based on the anthracite coal industry. Coal eventually declined as the region's economic base and mining activity decreased from the delivery of a maximum of 100 million tons in 1917 to a low of 8.7 million tons in 1971.

In Luzerne County coal occurs in two general fields – one located along the Susquehanna River from Shickshinny to the northern limits of the county, the other stretching along the southern portion of the county. Throughout these two areas, coal seams occur at various levels separated by layers of other material. Coal crops out both sides near the bottom of the mountain slopes and can be easily strip mined in the Wyoming Valley.

Much of the coal in the underground veins has been mined leaving voids where water can collect. Holes left by the strip mines also collect water, much of which seeps into the voids left by the deep mining operations. In the Wyoming Valley area, many of the mines were accidentally connected so that water travelled from one mine to another. When a mine is abandoned, it generally floods and the water then seeps into the next mine. Most of the coal mines in Luzerne County have been closed and flooded for a number of years.

Operating mines have required pumping of excess water to prevent the flooding of certain sections of the mines. Pumping water from the deep mines added substantial quantities of acid mine water into the area's streams. In the process of mining, sulfurous materials such as iron pyrites are uncovered and exposed to air and moisture. An acid condition occurs during the oxidation process with the liberation of hydrogen ions. When present in sufficient quantities in a stream, this acid water can render it unfit for recreational, industrial or agricultural uses. This process and related problems are discussed in detail in the section on Water Resources.

Although mining activity has decreased markedly over the years, the results of mining which continue to affect the local topography still remain. Abandoned mine refuse banks and stip mine areas have a major effect. During the more active mining years, coal was mined in parallel planes or layers. Deeper coalbeds were mined below coalbeds that had been previously mined and pillars or columns of existing coal were left in place to serve as supports for the material above. Lateral strength for some of the pillars was obtained by backfilling the mined layers with

various materials. This practice tended to act as a deterrent to surface subsidence in the few areas where it was used, while the principal causes of subsidence were the caving of the overburden above wide roof spans and the squeezing of inadequate mine pillars. Pillar robbing, or mining of anthracite support columns, has also contributed to subsidence.

Subsidence, or sinking of the land surface in the Wyoming Valley ranged from holes several feet across and tens of feet deep that have appeared almost instantaneously, to areas covering many acres that have sunk from a few inches to several feet at an almost imperceptible rate. The area, amount, and rate of surface subsidence that might occur at a particular locality depended upon the following conditions: 1) the type, depth, intensity, and number of levels of mining; 2) the type, thickness, attitudes, and strength of the rocks both at the surface and underground; 3) the geologic structure of the locality; and 4) the hydrologic conditions involved. Subsidence has been difficult to predict because each locality was unique in that these conditions were individually variable and may have occurred in various combinations. Investigations indicated that most of the valley area was susceptible to additional subsidence. Saturated rocks, especially clay and shale, tended to become soft, lose compressive strength, and become less resistant to loading. Water has lubricated bedding, fracture, and fault planes thus increasing the probability of failure along these planes of weakness. Supersaturation of the unconsolidated deposits increased their tendency to flow through breaches into the mine voids. Subsidence that has resulted in an average loss of 1-1/2 feet of freeboard along some of the flood control structures in the Wyoming Valley probably was due in part to water saturation of the rocks during the steady rise in mine water pool levels during the last two decades.

Past strip mining of anthracite in the Susquehanna River Valley has left the area with numerous abandoned pits of various dimensions, and piles of spoil and cleaning plant refuse. The pits constitute a safety hazard by increasing the likelihood of underground coal fires, and by causing the ponding of surface water which promotes the formation of acid drainage. The waste piles are not only aesthetically displeasing but may contain combustible material. Of the four notable underground mine fires in the county, one is located in Wilkes-Barre Township.

b. Post-Flood/Existing Conditions

Changes which occurred with regard to mining following the June 1972 Hurricane "Agnes" flood were mostly related to the rising

mine-water pools to levels that were above the valley flood plain. In essence, these included increased flooding and discharges into surface waters, a situation which has since stabilized to essentially pre-flood conditions. A fuller discussion of existing mine water conditions and the related problem of subsidence is presented in the section on Water Resources.

c. Projected Conditions Without Project

Because of the economics of the coal industry and underground flooding, at present underground coal resources in the Wyoming Valley are considered primarily as potential reserves and plans for more deep mining do not exist. The problems associated with past strip mining are likely to exist in the future, though efforts to minimize seepage and promote reuse of the land will probably take place. It is expected that with better controls, the problems of mine water discharges will become less severe in the future. Because of the complexity of the situation, no sure projections can be made regarding mine fires.

3. Land Resources

a. Pre-Flood Conditions

About three-quarters of Luzerne County has been covered by forests and brush lands which coincided with the mountain ranges in the county. The rocky, poorly drained plateaus were unable to support extensive agriculture. Other forest lands occurred in the more rugged stream valleys and in farm wood-lots. A high percentage of the commercial timber was of cordwood sizes due to the heavy use of pole timber in the anthracite mines.

Agricultural development has been limited by topography and soil capacity. In locations other than the urbanized areas, soil capacity has been limited due to the existence of a hardpan 12 to 15 inches below the surface. With the exception of a few vegetable and dairy farms, the county's cropping operations were confined primarily to grassland farming. Overall the number and size of all farming activities have been small.

The bulk of the mineral production in Luzerne County consisted of anthracite coal; there have been very few other natural resources which were spread widely throughout the Region. Sand and gravel supplies, however, were more than adequate to support construction demands. Peat, clay and lime were also present. Some of these minerals occurred in very small deposits and were of very little importance to the local economy.

Soil genesis occurs through the modification of parent materials by climate, vegetation, topography and drainage. Soils in the Wyoming Valley were of a silty loam variety over terrain that varied from level to approximately 30 percent in slope. All the soils had basically developed in the loamy glacial deposits from mixed gray and red shale and sandstone bedrock. Specific soil types in any area were variable and tended to be related to the local topography. Percolation characteristics varied according to the water table which occurred primarily between 18 inches and 3 feet below the surface depending on the time of year and location. The soils tended to be acidic and contained many stone fragments.

These qualities and characteristics of the soils were significant when determining the suitability of various types of land use. Most of the valley's soils were considered poor for farming, except in areas adjacent to the river. Although the soil was not ideal for the absorption of rainfall and drainage, overall drainage was considered satisfactory.

The major water courses of the area have not been drawn upon for consumptive or industrial purposes due to the readily accessible water from the upland slopes of the Wyoming Valley. The supply and convenience system has not experienced any difficulty in meeting consumer needs since the population has declined during recent decades and demand has increased only gradually.

The main developed areas in the county extend on both sides of the Susquehanna River from Nanticoke to Pittston. The area below Nanticoke was more sparsely developed. The Back Mountain area to the west had been the fastest growing residential area, and the hilly sections to the east contained the principal industrial as well as a number of residential areas. Development of the land on a regional basis is further discussed in the section on Wyoming Valley Development.

b. Post-Flood/Existing Conditions

Very little alteration of the surface land resources and use on a regional scale occurred as a result of the June 1972 flood. Hence, existing conditions at this level are essentially the same as pre-flood conditions. At a more local level, some areas used for agriculture adjacent to the Susquehanna River were affected by bank erosion, the loss of topsoil, and siltation. Within the study area, this occurred primarily adjacent to the river in Wyoming Borough and in south Wilkes-Barre. The existing condition of developed land uses within the valley is discussed in detail in the secion on Land Use.

c. Projected Conditions Without Project

Future new development in the Wyoming Valley will gradually diminish the extent of forested, agricultural and mining areas, except where protective zoning or other controls and unsuitable conditions for development exist. This trend of development is primarily a function of suitability and economic viability, and it is controlled by a wide variety of complex factors. Long-term trends of land use succession in addition to the infusion of flood-recovery funds and migration outward from the cities and flood-prone areas appear to guarantee that such new development will occur. More specifically, agricultural areas in municipalities closer to the river are likely to be subdivided, surface mining of all types either diminished or better controlled, and demands on water resources increased.

B. Water Resources

An assessment of water resources in the study area includes consideration of natural features which have significance primarily at a regional rather than local level. Because of the extent of these resources and the multitude of interrelated factors controlling their existence and viability, assessment of changes in condition over time tends to focus on changes in causative factors rather than prediction of probable end results. This section considers the following aspects of water resources in the study area: surface and ground water resources including drainage and basic hydrological information, water quality, flood control, and water use.

1. Surface Water — Drainage

a. Pre-Flood Conditions

The study area was drained by the Susquehanna River which bisected the region from northeast to southwest. Overall, the Susquehanna drained a very large watershed which was largely mountainous, heavily forested and sparsely populated. The river extended from the Southern Tier region of New York State through northeastern Pennsylvania, draining over 10,000 square miles. It joined with the west branch of the river at Sunbury, and then continued downstream past Harrisburg and into Maryland and the Chesapeake Bay north of Baltimore at Havre de Grace.

The Susquehanna River flowed 42 miles through Luzerne County, dropping 40 feet over this distance for an average gradient of .95 feet per mile. At Wilkes-Barre, the river low water mark was computed at 512.07 msl, and the flood stage was 22 feet. Total discharge of the river system through Luzerne County has been substantial — available data

indicated a range of average annual discharge of the Susquehanna at Wilkes-Barre between 21,100 cubic feet per second (cfs) in 1928 to 6,186 cfs in 1965. The average annual discharge for a 67-year period of record (prior to 1968) was 13,040 cfs or approximately 8,500 million gallons per day. By comparison, this was roughly equivalent to river rates of flow through regions of considerably greater population concentrations in the eastern seaboard states. At a normal average breadth of nearly 1,000 feet, the Susquehanna River meandered about 16 miles and occupied about three square miles in its course through the Wyoming Valley.

The Lackawanna River, which confluenced with the Susquehanna at the lower end of Scovell Island off Exeter and West Pittston, was the largest tributary of the Susquehanna in the vicinity of the study area, draining 350 square miles to the northeast of the Wyoming Valley. Average annual discharge of this river for the 21-year period of record from 1945 to 1965 was 514 cfs, measured at Old Forge in Lackawanna County. The Lackawanna has exerted a great influence on the quality of the Susquehanna's water due to the high acid concentrations.

Main tributary streams of the Susquehanna River terminating in the Study Area included Abrahams Creek at Forty Fort with a drainage area of 18 square miles, Mill Creek at the northern limits of Wilkes-Barre with a drainage area of 37 square miles, and Solomon Creek in Hanover Township with a drainage area of 18 square miles. Other significant tributary streams included Hicks Creek (Exeter), Toby Creek (Edwardsville), and Brown, Wadham and Coal Creeks (Plymouth). Altogether 59 tributaries drained about 169 square miles in the entire Wyoming Valley watershed.

b. Post-Flood/Existing Conditions

Overall, the present conditions of surface water resources are not substantially different from those existing prior to the flood of June 1972. The tremendous discharge of water which surged through the Wyoming Valley during the flood with an estimated peak discharge of 345,000 cubic feet per second and covering an additional 19 square miles in the valley, gradually subsided with no apparent significant or permanent changes in long-term drainage or discharge patterns. Localized effects of the flood did occur, however, and included some alteration of Susquehanna River channel features such as sandbars, banks where erosion occurred, accumulation of debris, the ponding of water in areas not located in the former flood plain, and siltation of drainage ways in some locations. All of the 13 flood control pumping stations in the valley were damaged in the flood.

c. Projected Conditions Without Project

Without the proposed flood control project, baseline drainage and hydrological conditions in the Wyoming Valley are likely to follow the same trends of long-term change as they have in the past. These changes would include the provision of proposed flood control features (such as impounding reservoirs) elsewhere in the river basin, the increased development of upstream and tributary areas with corresponding increases in surface runoff, and an increase in drainage problems at local tributary streams and ground water discharges.

Because of increased runoff flows, alteration of the pre-flood channel and levees due to erosion, and possibly changing weather conditions, the probability of more damaging river flows through the Wyoming Valley may exist in the future without the proposed flood control project. Complete substantiation of this projection is not possible on the basis of available information, but the likelihood of its accuracy seems greater in light of the occurrence of Tropical Storm "Agnes". One possible control to prevent this result is increased regulation of upstream land use development by an agency such as the Susquehanna River Basin Commission.

2. Ground Water

a. Pre-Flood Conditions

Ground water resources in the vicinity of the study area were less well delineated than the surface hydrology, mainly due to local geologic characteristics and the extent of subsurface coal mining.

Natural subsurface water supplies were neither very extensive nor abundant. Geologic studies by the Commonwealth of Pennsylvania report only "small" to "moderate" yield from formations underlying Lackawanna and Luzerne Counties. The geology of the Wyoming Valley imposed a severe restriction upon natural subsurface water supplies in the areas of greatest existing and potential uses, and the valley's mining past has rendered almost totally unusable much of the subsurface supply that is known to exist at lower elevations.

Since the decline of the anthracite industry, ground water problems related to water quality, subsidence and flooding have been major issues in the Wyoming Valley area. As a result, the relationship of ground water to former coal mining activities has been the subject of many studies and proposals over the years. These problems are further considered in the discussions on water quality and flood protection.

Extensive pools of mine water were formed in the Wyoming Valley area when exhausted deep mines were abandoned and dewatering operations terminated. Water filled the mines in many ways; through seepage from strip mining operations, waste water disposal, and the Susquehanna River itself. Flooding occurred especially during the Knox mine disaster of 1959 when the roof of a mine collapsed under the bed of the river. The 40 foot diameter hole created a whirlpool with a flow of 30,000 cfs into the mine, causing an extensive loss of life and property.

Many of the mines are interconnected so that water from these several sources is able to travel from one mine to the other. Due to a downhill slope, water has generally tended to flow from north to south in the underground mines, sometimes overflowing one mine before proceeding to flood another. Records of mine pool levels under the west side of the Wyoming Valley since the mines became flooded about 10 years ago indicate that the pools normally fluctuated plus or minus a few feet depending upon rainfall variations. Excess water has been discharging from the mines on the west side of the valley to Solomon Creek at Buttonwood located on the east side, since 1968 when the Commonwealth provided a gravity outlet at this location. A "normal" (pre-flood) pool level has been 528 feet msl at Kingston. Water that has collected in the large number of abandoned and interconnected mines on the east side of the valley from Pittston to south Wilkes-Barre has been controlled during recent years at an acceptable level by deepwell pumping operations located at Mill Creek. This level has been stabilized at about 500 feet msl.

b. Post-Flood/Existing Conditions

The effects of the June 1972 flood were the disruption of ground water levels and the system of discharge controls in the Wyoming Valley. Shortly after the valley was inundated, the underground pool level at Kingston, for example, rose from an elevation of 528 feet msl to 542 feet msl and the discharge at Buttonwood increased to about 100,000 gpm, about 12 times normal. After a period of about 60 days the pool levels and the Buttonwood discharge approached normal, indicating that the outlet capacity is adequate to stabilize mine pools on the west side of the river. The pumping system controlling pool levels on the east side of the river was rendered ineffective during the flood, and levels of the various pools rose rapidly reaching a peak level of 555 feet msl in the Delaware-Pine Ridge Mine and 549 feet msl in the south Wilkes-Barre pool. Water from the south Wilkes-Barre pool erupted to the surface in large quantities through existing bore holes, but this and other pools on the east side have returned to near normal levels with reactivation of the pumps. Supplies of drinking water were not significantly affected by the flood.

c. Projected Conditions Without Project

The projected condition of the ground water resources without the proposed flood control project depends upon efforts to further stabilize and control the subsurface mine pools. It is anticipated that the existing discharge system for pools on the west side of the river will be adequate in the future. For pools on the east side, an acceptable mine drainage system will probably depend upon the provision of new gravity outlets. Severe flooding of the valley sufficient to overtop the existing levee system is likely, however, to again render the mine drainage and discharge system ineffective for a short time.

There is no significant relationship between the project and potable water supply to the Wyoming Valley, hence the projection that this supply will be adequate in the future is not likely to change with or without the proposed project.

3. Water Quality

a. Pre-Flood Conditions

Quality of the surface waters in the Wyoming Valley has been directly related to two main sources of pollution in the past, sewage disposal and acid mine drainage. The waters of the Susquehanna — some 8 billion gallons per day on the average — entered the Wyoming Valley at West Pittston in relatively pure form. But until recently, communities within the valley's watershed have been discharging raw untreated sewage effluent into the tributaries and main channels of the Lackawanna and Susquehanna Rivers. This problem still persisted in some areas but has been rapidly decreasing in importance. Of much greater relevance to the pollution problem has been the introduction of mine drainage water, with its varying content of acid, iron and manganese, into the river system, although steps have also been taken to solve this problem.

The prior organic pollution problem was markedly improved in the valley after the construction of a single collection and treatment system, the Wyoming Valley Sanitary Authority which provided primary treatment for 14 communities from West Pittston to Nanticoke in 1967. The Authority maintained 30 miles of interceptors, 50 diversion chambers and 20 pumping stations as part of the system. Provisions were made for the addition of secondary treatment and design capacity was sufficient to take on at least six additional communities that would logically connect into the system.

Besides the primary treated effluent from the sewerage system, the only other known organic discharges into the Susquehanna prior to Tropical Storm "Agnes" were a flow of secondary effluents entering into the Toby Creek pressure conduit in the vicinity of Luzerne Borough, an outfall of raw sewage from the Wilkes-Barre Ross Street pick-up station (a location where residents took legal action to prevent construction of a pumping station), and minor discharges from municipalities in the valley with inadequate sewage systems, or from small "package" treatment plants on the local tributary streams. Although the Sanitary Authority collected and treated effluent from throughout the valley, local municipalities were responsible for their own distribution systems which, in some cases, were inadequate and contributed to pollution of the river.

The mine acid drainage problem has been a vastly more complex pollution problem, and no single technically or economically feasible solution has been found. With the decline of mining activity in the valley and deliberate control measures, however, this too has become less of a problem.

In essence, entry of surface water into mine cavities greatly increased over the years as mining operations were abandoned and as disturbance of the surface terrain occurred by strip mining and through subsidence. With the termination of mine pumping operations, the character of the watercourses in the Wyoming Valley temporarily changed from acid to alkaline until rising mine water pools again began discharging at natural outfalls. (The main discharges were located at the Old Forge Borehole and the Duryea Outfall on the Lackawanna River.) Deliberate pumping to stabilize the pools was reinstituted in the valley at selected locations, but again caused discharges of acid and iron laden water with some adverse effects until they could be regulated. Subsequent control of the pumped discharges in addition to neutralization and dilution has contributed to the alkaline rather than acid condition of the river in recent years.

In recent years, thermal discharges (hot water) primarily from power generation, and pollution from the use of detergents have also become areas of concern, but these problems appeared to be clearly subordinate to the issues of mine water drainage and sewage disposal.

The State Sanitary Water Board classified a waterway as acid impregnated if it had a pH of 4.0 or lower at practically all times during the year and throughout the waterway. The Commonwealth has established standards for all waterways as quality goals to be achieved.*

*Commonwealth of Pennsylvania, Title 25. Rules and Regulations, Part I. Department of Environmental Resources, Subpart C. Protection of Natural Resources, Article II. Water Resources, Chapter 93. Water Quality Criteria (adopted September 2, 1971).

The river has been classified on the basis of future Standard Water Uses and Specific Water Quality Criteria for the future as follows:

Standard Water Uses:

Aquatic Life — Warm Water Fish

Water Supply — Domestic, Industrial, Livestock, Wildlife, Irrigation

Recreation — Boating, Fishing

Specific Water Quality Criteria:

pH — Not less than 6.0 and not more than 8.5.

Dissolved Oxygen — Minimum daily average 5.0 mg./l.; no value less than 4.0 mg./l.; for lakes, ponds and impoundments only, no value less than 4.0 mg./l, in the epilimnion.

Iron — Total iron not more than 1.5 mg./l.

Temperature — Not more than a 5° F. rise above ambient temperature or a maximum of 87° F., whichever is less; not to be changed by more than 2° F. during any one-hour period.

Dissolved Solids — Not more than 500 mg./l. as a monthly average value; not more than 750 mg./l. at any time.

Bacteria (Coliforms/100 ml) — For the period 5/15-9/15 of any year, not more than 1,000/100 ml as an arithmetic average value; not more than 1,000/100 ml in more than two consecutive samples; not more than 2,400/100 ml in more than one sample. For the period 9/16-5/14 of any year, not more than 5,000/100 ml as a monthly average value, nor more than this number in more than 20% of the samples collected during any month, nor more than 20,000/100 ml in more than 5% of the samples.

Total Manganese — Not more than 1.0 mg./l.

Pollution of the Susquehanna River in the Wyoming Valley was a common problem which required a long-term solution. As a result, recreational use of the river, its banks and levees had been generally restricted to

formal park areas. There is no evidence, however, that this condition restricted overall regional economic growth or proved a detriment to the location of business firms in the area.

The following table is an indication of the Susquehanna River water quality in the study area vicinity. The data was based on field samples collected near the confluence of Hemlock Creek with the river approximately ten miles downstream from Wilkes-Barre.

WATER QUALITY DATA IN THE SUSQUEHANNA RIVER
NEAR HEMLOCK CREEK, WYOMING VALLEY

	June 20, 1972	September 25, 1972
Time of Day	(12:45)	--
Total Discharge	15,400 cfs	2,520 cfs
Temperature °C	21.0°C	10.5°C
Dissolved Oxygen	7.8 p.p.m.	9.4 p.p.m.
pH	7.2	7.3
Iron	1600 mg./l	*
Manganese	380 mg./l.	*
Sulphates	43 mg./l.	*
Total Organic Carbon	5.5 mg./l.	*
Conductance	194 Micromhos	520 Micromhos

*Field data not available in summary form.

Source: U.S. Geological Survey, Harrisburg, Pennsylvania

b. Post-Flood/Existing Conditions

Existing conditions of water quality in the Wyoming Valley are not substantially different from the pre-flood conditions, with the exception of the amount of raw sewage discharged into the river. The June 1972 flood caused the closing of the treatment plant and sewerage system of the Wyoming Valley Sanitary Authority, but this was reactivated to less than full capacity by 10 October 1972. Other outfalls of sewage existing prior to the flood are still active, and it is possible that due to damage throughout the Authority's distribution system and other systems in the valley, untreated effluent from a variety of smaller sources is still flowing into the river.

The tremendous mine water discharges which resulted from the flood have apparently subsided, and there is no evidence that acid pollution of the river at this time is greater than before the flood.

Other pollution of the river and tributary streams as a result of the flood included pollutants from surface runoff, particularly from the vicinity of strip mines and mining refuse areas, from debris and siltation. It is likely that polluting effects from these sources still occur, but not to a significant degree.

c. Projected Conditions Without Project

It is estimated that the Sanitary Authority system will be fully operative by mid-1973. Eventually, secondary treatment will be provided on this system in the valley, and it is likely that additional communities will be connected into the system. The present Ross Street outfall of effluent in Wilkes-Barre will probably also be eliminated. Therefore, because of these and related actions upstream on the Lackawanna River, water quality in the Wyoming Valley in terms of sewage discharge will eventually consist of treated secondary effluent barring any future inundations of treatment facilities.

The drainage of acid water from mines, as a current water quality problem, will eventually be solved according to all indications. It is projected that with increased control of the mine pool levels, additional discharge locations and with changes in the quality of the discharges due to a raising of the present deepwell pumps, this problem could be solved in about five years. Additional flooding which may occur without the proposed project will, however, upset this control system.

The problems of surface runoff into tributaries, debris and siltation should be substantially reduced over time with clean-up efforts and better controls, but these too may reoccur if future flooding extends beyond the existing defined (prior to "Agnes") flood plain.

4. Flood Control

a. Pre-Flood Conditions

Flood control in the Wyoming Valley includes consideration of the interrelationship of the Susquehanna River hydrology (flow variations), the system of controls devised by the Corps of Engineers to prevent flooding, attendant problems such as those caused by ground water, and subsidence.

Very short-term extremes of hydrologic variability, and measures that have been taken to deal with them, were more significant to the environment of the region than were those reflected in long-term historical records. This has been particularly true of flood flows. On the Susquehanna River at Wilkes-Barre, accurate flood records existed since 1890. The five largest floods since 1890, in order of magnitude of discharge,occurred in March 1936, March 1964, March 1902, April 1940, and May 1946. Based on available evidence, however, prior to accurate record keeping and Hurricane "Agnes", which produced the greatest flood of record in June 1972, the maximum flood discharge was that which occurred on 18 March 1865 and corresponded to a river stage of 33.1 feet at Wilkes-Barre. The March 1936 flood was a reoccurrence of essentially the same peak discharge when the river stage was measured at 33.07 feet. Lesser floods had greater frequencies, of course, and the Susquehanna reached "flood stage" (22 feet above zero datum of 512.07 feet msl) every two years on the average.

A flood of 26 feet was expected every five years, one of 29 feet every 10 years, and 31 feet every 20 years.

Following the flood of 1936, the Corps of Engineers built a series of levees and associated features to prevent future damage to most of the developed portions of the Wyoming Valley which might be caused by a flood equal to the 1936 flood. As a barrier between the river and the developed areas of Wilkes-Barre and adjoining Hanover Township on the east bank of the river, 24,460 linear feet of earth levee were constructed. To protect the adjoining boroughs of Kingston and Edwardsville on the west bank of the river, 18,429 linear feet of earth levee was constructed. A ponding area located in Pringle Borough and a concrete pressure conduit 16.5 feet in diameter and 6,659 feet long, were also constructed to carry the flow of Toby Creek through the protected area. These projects were completed in 1943.

Between 1953 and 1957, 16,465 feet of earth levee and 2,490 feet of steel sheet piling were constructed to protect the boroughs of Forty Fort and Swoyersville on the west bank of the river. In addition, Abrahams Creek was diverted outside the protected area, and an earth levee and drainage structure was built at the mouth of Hicks Creek in the borough of Exeter. The borough of Plymouth on the west bank was protected by 8,680 linear feet of earth levee, and two streams running through the borough (Brown and Wadham Creeks) flowed in conduits through the levees, while a third stream (Coal Creek) was diverted outside the protected area. This latter project was operationally completed in 1948.

In order to protect developed areas behind the levees from flooding from small tributaries, a number of streams in the Wyoming Valley were also walled. North of North Street in Wilkes-Barre, 160 feet of concrete wall was built to act as a continuation of the adjacent earth levee. A 1, 600 foot portion of Mill Creek in Wilkes-Barre, a 2, 600 foot section of Laurel Run in Wilkes-Barre, and a portion of Solomon Creek (approximately 4, 200 feet) in the southern end of Wilkes-Barre were also walled.

For the discharge of storm runoff and sanitary sewage during flood periods, a number of pumping stations were provided in municipalities with earth levees or flood walls. A large impounding basin for Solomon Creek located in Hanover Township required an additional 3, 200 feet of earth levee for construction. Two other ponding areas, a debris dam with a conduit to carry the storm flow of Brown Creek and a debris dam to control Wadham Creek were also built in Plymouth.

All the levees were originally constructed to a height of three feet above the crest of the 1936 flood. Over the years, portions have subsided and problems have occurred with leakage. In some cases the flood facilities were poorly maintained. Restoration of subsided portions has been undertaken at various times and locations since the levees were constructed. A major project was the permanent restoration of the Riverside Drive section of the Wilkes-Barre levee, which consisted of approximately 2, 230 feet of sheet pile wall driven into the levee crown.

Studies on the effects of cessation of subsurface mine pumping operations have generally concluded that rising mine water pools in the Wyoming Valley, previously controlled by pumping, could be expected to continue as a major contributing factor to surface damage, including subsidence of the earth levees. In addition to being caused by removal of mine pillars and other poor mining practices, subsidence that has resulted in a loss of protection along some of the flood control structures in the Wyoming Valley probably is due in part to water saturation of subsurface rocks during the rise in mine pool levels. Saturated rocks, especially clay and shale, tend to become soft, lose compressive strength and become less resistant to loading. Water will also lubricate bedding, fracture and fault planes, thus increasing the probability of failure along these planes of weakness. Supersaturation of the unconsolidated deposits will increase their tendency to flow through breaches into the mine voids. Available documentation, however, also suggested that severe settling under the levees and flood plain would not result from surface flooding as long as the mines remained flooded and the alluvial deposits saturated as they have been in recent years.

In addition to the problems of subsidence, problems with the potential for ground water flooding have occurred in the Wyoming Valley. During high water periods on the Susquehanna River, ground water from mine pools has flowed to the surface creating threats of surface flooding, particularly in the area of south Wilkes-Barre. Stabilization of the water table through pumping operations has been generally successful during periods of normal flow, and as a result, previously widespread problems, such as basement flooding and damage to surface structures, appear to have been minimized.

b. Post-Flood/Existing Conditions

During the Hurricane "Agnes" flood of June 1972, the levee system was overtopped and then breached at eight locations and severe erosion occurred at four separate areas of the levees. All the pumping stations for surface runoff behind the levees were inactivated and, in general, the other flood control facilities including impounding areas, conduits and stream channels were filled with varying amounts of silt. At present, (November 1972), the levee breaches are repaired, nine of the 13 pumping stations are restored and an extensive program of interim levee raisings to design levels and restoration of related flood control facilities and surrounding areas is underway by the Corps of Engineers. Priority of reconstruction is related to the degree of erosion which occurred during the flood and the extent of other damage. Debris and siltation persist as minor problems, but flood control features in the Wyoming Valley will soon be restored to pre-flood effectiveness.

c. Projected Conditions Without Project

The levee restoration project included a plan to survey the extent of subsidence in all areas and to raise most of the levees an additional amount averaging three feet. This immediate action program, which includes improvements to other facilities as well, is expected to be completed in approximately one year (late 1973).

The erosion problem which occurred during and immediately after the flooding in June 1972, decreased in significance as the ground water levels were stabilized. Minor subsidence which may affect the levees is expected to recur from time to time in the future. Wherever such a condition threatens to affect a large area in the future, appropriate remedial action is expected to be taken. Also careful control of ground water levels by the Commonwealth to prevent flooding should continue to be provided.

As mentioned in the section on surface water and drainage, a greater potential for destructive flooding in the future without the proposed project appears to exist. Whether or not this will actually occur is speculation at the present time, but in any case, projected conditions without the project will never again be as secure as prior to Hurricane "Agnes".

5. Water Use

a. Pre-Flood Conditions

The use of water resources in the Wyoming Valley has been restricted over the years largely because of the problems of water quality, and the availability of other sources of supply for industrial and domestic needs.

Historically, the Susquehanna River and smaller tributary streams have not been drawn upon for consumptive uses or for industrial processes or products because (1) relatively pure water supplies have been available to meet needs in the Wyoming Valley from upland slopes, (2) much of the process water for mining came as a byproduct of mineral extraction itself, in the form of accumulations of underground mine water, and (3) the flowing streams were (in the past) much more useful for natural waste disposal than as sources of basic water supply. As a consequence, over the years, a water supply system developed which was unique in that it was privately owned and served the large urban area of Luzerne and Lackawanna counties. Water supply has not in the past constituted an impediment to economic and social development of the region, nor has it seemed likely that supplies would be a limiting factor to general economic growth.

Recreational use of water in the Wyoming Valley was primarily limited to the Susquehanna River, but this use has been minimal. Overall, residents in the area have tended to perceive the river as highly polluted and generally not useful as a recreation resource except for occasional fishing, boating and nature outings. The banks of the river and the levees were used as pathways, but any formal recreational activities such as picnics were restricted to park areas adjacent to the river in the Wyoming Valley. The Susquehanna River and its immediate surroundings have been considered an aesthetic resource in the area and preservation of views of the river from residential areas were considered desirable by local residents.

b. Post-Flood/Existing Conditions

Conditions of water use regarding water supply for consumptive purposes and recreation have not significantly changed since the flood. Water supply from utility systems was only temporarily interrupted and service was quickly restored. Aesthetic considerations have changed since the flood, however, and views of the river are considered much less important than they were prior to the flood.

c. Projected Conditions Without Project

In the future, water demand for consumptive purposes is projected to rise only moderately, and under normal hydrologic conditions expected water demand should be met without difficulty. Recreational use of the river will increase in the future, due in part to the general increased interest in the environment and outdoor activities, planned improvements to parks in the area, and decreased river pollution. Values related to aesthetic appreciation of the river may change over time, and for example, a "good view of the river" may again become more important in people's minds.

C. Atmosphere

1. Climate

a. Pre-Flood Conditions

Climate is the result of the interaction of the various elements of weather, geography and topography that are common to a large geographical area. Climate also follows a fairly established cycle throughout the year despite local fluctuations. Weather is considered to be composed of many different elements which usually affect comparatively small areas for relatively short periods of time; hence it is more erratic in its occurrence than climate. Weather comprises clouds, heat, sunshine, rain and winds. The degree of interaction of these elements upon each other determines the severity of the weather. This subsection is a description of the historical relationship of climate to local weather conditions in the Wyoming Valley prior to the flood.

The mean annual temperature at the Wilkes-Barre/Scranton weather station (Wilkes-Barre/Scranton Airport) since 1914 has been 49.8 degrees Fahrenheit. January and February were registered as the two coldest months of the year. July was the warmest. During a normal year, temperatures in excess of 90 degrees were not common; and temperatures below zero degrees occurred on the average of only three times a year. In summer, temperatures in the Wyoming Valley

were relatively cool due to the surrounding mountains. The average annual precipitation between 1910 and 1960 in the Wyoming Valley area was 37.2 inches. Precipitation has averaged the highest amounts in July, with the lowest amounts occurring in January and February of each year. Severe rain or snow storms are not common in the area – snowfall between 1910 and 1962 has averaged 43 inches per year. Prevailing winds were from the west-southwest and were influenced by the Wyoming Valley which is oriented southwest to northeast. The winds at the Wilkes-Barre/Scranton Airport Station were of moderate velocity, averaging 8.9 miles per hour. In the summer the wind velocities were lower, and predominately from the southwest and west-southwest. In the winter months, wind velocities tended to be higher and range in direction from the west-southwest to the north-northwest. Severe wind storms were uncommon. During a five-year period prior to 1962, each year had on the average the following weather: 68 clear days per year, 113 partly cloudy days per year, and 184 cloudy days per year. Heavy fog occurred about 27 times a year in the area with the highest incidence of fog occurring during the months of November through February.*

b. Post-Flood/Existing Conditions

Since climatic factors in the Wyoming Valley are subject to influences over a wide geographical area and over a long period of time, the post-flood conditions of climate and weather in the study area are the same as those existing prior to the flood.

c. Projected Conditions Without Project

The projection of changes in climate and weather over the long-term is, at best, an inexact science. Therefore, it is safest to assume that past conditions are a preview of the future.

2. Air Quality

a. Pre-Flood Conditions

Factors which have mostly affected air quality in the Wyoming Valley included pollution sources and types, topography and the overall meteorological conditions of the area.

Air quality in the Wyoming Valley has been degraded in the past mostly because of burning mine refuse banks and underground mine fires. Air pollution has been a local cause for concern, but pollution

*Luzerne County Planning Commission, Climate, Topography and Pollution Report, 1962, 34 p.

levels have not been overly severe. Local emissions from burning mine refuse banks have mostly contributed to the potential health hazard involved, and effects on property have been evident in the form of damage to metal and painted surfaces.

Local manufacturing industries have not in the past contributed greatly to air pollution. Open burning of garbage at refuse dumps has been, however, a prominent contributor to air pollution.

Among the worst atmospheric polluting agents in the Luzerne County have been the burning culm banks and various mine fires. Sulfur dioxide, hydrogen sulfide, carbon monoxide and carbon dioxide were the chief products of this source of combustion. Important airborne contaminants from other sources have been suspended and settleable particles, sulfur dioxide and hydrogen sulfide. Fly ash, produced by local steam heating and electric generating plants, has been another of the principal polluting agents.

The meteorological and topographical characteristics of the Wyoming Valley have contributed unfavorably to the air quality situation. With the surrounding hills extending up to 1500 feet above the valley floor, the Wyoming Valley formed a natural basin. Predominantly southwesterly winds swept up this basin, but had a minimal disturbing effect because the mixing depth of the air was high, varying from about 5, 000 feet in July to about 1, 200 feet in January. Consequently, the mountains surrounding the valley confined and concentrated vapors; and they were spread over the populated areas of the valley for a longer period than would normally have occurred if clearing winds prevailed. Inversions have taken place occasionally and the potential for air stagnation has been the greatest during the month of September.

b. Post-Flood/Existing Conditions

Existing conditions related to air quality are not substantially different from those prior to the flood. The situation with regard to manufacturing activities, power and steam generation, topographic and meteorological conditions, and mine and refuse fires is essentially unchanged.

c. Projected Conditions Without Project

In time it is expected that air quality in the Wyoming Valley will improve with better controls on normal sources of emissions. Elimination of culm bank and other refuse fires is also foreseen, though this problem should take longer to solve. In the absence of new control methods, mine fires are expected to continue. An additional problem

could be the development of fires in the vast amount of flood generated trash that has been dumped into seven land-fill pits scattered throughout the valley's foothills. Due to the earth cover placed on this debris daily, the possibility is remote. Various agencies have agreed to watch this situation closely and to take appropriate steps if new fires occur.

D. Fish and Wildlife

1. Pre-Flood Conditions

Fish and wildlife in the study area, as in any area of diverse physical features, consisted of a wide variety of species whose presence and characteristics depended upon historical factors, availability and use of general land and water resources, and unique features at any particular location. This section provides an overview, in the absence of detailed study information, of the presence and general characteristics of fish and wildlife in the study area vicinity prior to the flood. Aquatic, terrestrial and avian species are discussed in that order. Much of the data available is based on a study approximately 15 miles downstream in the vicinity of Shickshinny and Berwick.*

a. Aquatic

The predominant kinds of aquatic organisms in the Susquehanna River primarily consisted of bottom fauna or benthos, a food for fishes and waterfowl; zooplankton, an assemblage of small animals transported by currents and also food supply; and fishes, which are an important component of the aquatic ecosystem as consumers, and the source of sport fishing. Little information is available to indicate that the first two types of organisms were of significant importance in the study area, especially in relation to the flood control features in the valley. River pollution has also tended to suppress the viability of these organisms.

Available information indicates that about 39 species of fish were present in the Susquehanna and adjoining ponds and streams in the vicinity of the study area in 1971. These are listed below and the principal game fish in the river are indicated by an asterisk.

*Pennsylvania Power and Light Company; Ichthyological Associates, An Ecological Study of the North Branch Susquehanna River in the Vicinity of Berwick, Pennsylvania, (Ithaca, New York: July, 1972).

Table 1. Fish species found in Susquehanna River and tributaries near Wilkes-Barre

SALMONIDAE
- Salmo trutta - brown trout

ESOCIDAE
- *Esox niger - chain pickerel

CYPRINIDAE
- Campostoma anomalum - stoneroller
- *Cyprinus carpio - carp
- Exoglossum maxillingua - cutlips minnow
- Notemigonus crysoleucas - golden shiner
- Notropis amoenus - comely shiner
- Notropis cornutus - common shiner
- Notropis hudsonius - spottail shiner
- Notropis procne - swallowtail shiner
- Notropis rubellus - rosyface shiner
- Notropis spilopterus - spotfin shiner
- Pimephales notatus - bluntnose minnow
- Rhinichthys atratulus - blacknose dace
- Rhinichthys cataractae - longnose dace
- Semotilus atromaculatus - creek chub
- Semotilus corporalis - fallfish

CATOSTOMIDAE
- *Carpiodes cyprinus - quillback
- *Catostomus commersoni - white sucker
- *Hypentelium nigricans - northern hog sucker
- *Moxostoma macrolepidotum - shorthead redhorse

ICTALURIDAE
- *Ictalurus catus - white catfish
- *Ictalurus natalis - yellow bullhead
- *Ictalurus nebulosus - brown bullhead
- *Ictalurus punctatus - channel catfish

CYPRINODONTIDAE
- Fundulus diaphanus - banded killifish

CENTRARCHIDAE
- *Ambloplites rupestris - rock bass
- Lepomis cyanellus - green sunfish
- *Lepomis gibbosus - pumpkinseed sunfish

Table 1. (Continued)

CENTRARCHIDAE (Continued)

*Lepomis macrochirus - bluegill sunfish
*Micropterus dolomieui - smallmouth bass
*Micropterus salmoides - largemouth bass
*Pomoxis annularis - white crappie
*Pomoxis nigromaculatus - black crappie

PERCIDAE

Etheostoma olmstedi - tessellated darter
*Perca flavescens - yellow perch
Percina peltata - shield darter
*Stizostedion vitreum - walleye

COTTIDAE

Cottus bairdi - mottled sculpin

The presence, distribution and other characteristics related to the viability of local fish populations have been affected by various conditions of the river. These have included river flow, pollution, food supply, the existence of other organisms in the overall ecology, and sport fishing. Pollution from mine water has been a particularly limiting factor on the existence of fishes due, in part, to the covering of fish nests and food supplies through the deposition of iron compounds in the discharges. Ponds located within the flood plain and local streams have also contained some fishes, but their presence in these environments appears to have been limited. Sport fishing in the river has been restricted primarily due to river pollution, the lack of boat launching facilities and by shallow non-navigable areas between river pools. Most anglers have not eaten the fish they caught because they have considered the river too "polluted". Fishing activity has been heaviest during April and in early May. Angling on the Susquehanna above the Lackawanna River confluence has been considered excellent in contrast to conditions in the study area.

There were no known rare or endangered species of fish or exceptionally unique aquatic habitats in the vicinity of the study area prior to the flood. Ponds of water in the flood plain which periodically flooded and replenished with aquatic organisms have been considered an ecologically interesting resource, however.

b. Terrestrial

Terrestrial wildlife in the study area vicinity has been primarily associated with the presence or absence of suitable habitats and food supply. In general, the species of greatest abundance in the study area

are those which have adapted best to the interspersion of vegetation types over the years. The clearing and farming of land previously in solid stands of timber has, for example, favored some species of animals, but has been a detriment to others.

The lower forms of terrestrial fauna have developed in balance with other animal life in the area. An indication of their presence or distribution is related to the prior viability of the other animal life. Table 2 is a list of species of mammals most likely to occur in the vicinity of the Wyoming Valley which was derived from data contained in the previously mentioned Pennsylvania Power and Light Company study of the Susquehanna River.

Species which have benefitted the most from past clearing and farming probably include the cottontail rabbit (Sylvilagus floridanus), woodchuck (Marmota monax), meadow mouse (Zapus nudsonius) and the prairie deer mouse (Peromyscus maniculatus). Other species such as the whitetailed deer (Odocoileus virginianus), red fox (Vulpes fulva), raccoon (Procyon lotor), opossum (Didelphis marsupialis) and several species of mice and shrews have been adaptable enough to at least maintain past population levels despite the clearing of forests or the reversion of crop land to forests. However, many of the forest mammals such as the flying squirrels (Glaucomys sabrinus), porcupine (Erethizon dorsatum), red squirrel (Tamiasciurus hudsonicus), and woodland mice (Napaeozapus insignis) have probably diminished in total numbers.

The growth of urban areas in the Wyoming Valley and other disturbances such as strip mining have greatly affected the presence of most of the wildlife; and only agricultural areas, undeveloped stream banks, park areas, and the river islands and banks remained as suitable habitats. The most predominant species in these locales in the valley have been rabbits, squirrels, rats and mice, and some foxes (Urocyon cinereo-argenteus and Vulpes fulva), raccoons, opossums, skunks (Mephitis mephitis), muskrats (Ondatra zibethicus), and beavers (Castor canadensis). Areas nearest the flood control features which contained the most suitable habitats included all the river islands, Kirby and Nesbitt Parks and the adjacent undeveloped areas, the water impounding basin in Hanover, and farming areas adjacent to the river in Wyoming. The portion of the west river bank between Plymouth and Edwardsville has been considered the most unspoiled natural part of the entire study area.

Game hunting has been restricted to the less developed areas of the valley and there has been considerable trapping for muskrats. The most sought after game was the white-tailed deer, and next in order of importance, the cottontail rabbit and the gray squirrel (Sciurus carolinensis). The floodplain forests in the valley have been popular locations for small game hunters.

There were no apparent rare or endangered species of mammals in the study area prior to the flood, but some of the habitat locations within the study area have been considered important and viable features of the local ecosystem.

Table 2. List of mammals of Luzerne County in 1949[a]
(A, abundant; C, common; U, uncommon; R, rarely seen)

Species	Status	Preferred Habitat			
		Forest	Brush	Grass & Weeds	Water
Whitetail Deer (Odocoileus virginianus)	C	X	X		
Black Bear (Ursus americanus)	U	X	X		
Snowshoe Hare (Lepus americanus)	U	X	X		
Eastern Cottontail (Sylvilagus floridanus)	C		X	X	
New England Cottontail (Sylvilagus transitionalis)	U	X	X		
Woodchuck (Marmota monax)	C	X	X	X	
Eastern Gray Squirrel (Sciurus carolinensis)	C	X			
Red Squirrel (Tamiasciurus hudsonicus)	C	X			
Raccoon (Procyon lotor)	C	X	X		
Opossum (Didelphis marsupialis)	C	X	X		
Beaver (Castor canadensis)	U				
Muskrat (Ondatra zibethicus)	C			X	X
Striped skunk (Mephitis mephitis)	C	X	X	X	
Shorttail Weasel (Mustela erminea)	U	X	X		
Longtail Weasel (Mustela frenata)	C	X	X		
Least Weasel (Mustela rixosa)	R				
River Otter (Lutra canadensis)	R				
Mink (Mustela vison)	C				X
Gray Fox (Urocyon cinereoargenteus)	C	X	X		
Red Fox (Vulpes fulva)	C	X	X		
Bobcat (Lynx rufus)	R	X	X		
Starnose Mole (Condylura cristata)	C	X	X	X	
Hairytail Mole (Parascalops breweri)	U	X	X	X	
Shorttail Shrew (Blarina brevicauda)	C	X	X	X	
Least Shrew (Cryptotis parva)	U			X	
Smoky Shrew (Sorex fumeus)	C	X	X	X	
Masked Shrew (Sorex cinereus)	C	X	X	X	
Longtail Shrew (Sorex dispar)	R	X			
Northern Water Shrew (Sorex palustris)	U	X	X		
Little Brown Myotis (Myotis lucifugus)	C				
Eastern Pipistrel (Pipistrellus subflavus)	R				
Big Brown Bat (Eptesicus fuscus)	U				
Red Bat (Lasiuris borealis)	U				
Eastern Chipmunk (Tamias striatus)	C	X	X		
Southern Flying Squirrel (Glaucomys volans)	U	X			
Northern Flying Squirrel (Glaucomys sabrinus)	C	X			

Table 2. (Continued

Species	Status	Preferred Habitat: Forest	Brush	Grass & Weeds	Water
Eastern Woodrat (Neotoma floridana)	R	X	X		
Deer Mouse (Peromyscus maniculatus)	C	X			
White-footed Mouse (Peromyscus leucopus)	C	X	X		
Boreal Redback Vole (Clethrionomys gapperi)	C	X	X		
Meadow Vole (Microtus pennsylvanicus)	C			X	
Yellownose Vole (Microtus chrotorrhinus)	R	X			
Pine Vole (Pitymys pinetorum)	C	X	X	X	
Southern Bog Lemming (Synaptomys cooperi)	U			X	
House Mouse (Mus musculus)	C				
Norway Rat (Rattus norvegicus)	C				
Meadow Jumping Mouse (Zapus hudsonius)	C			X	
Woodland Jumping Mouse (Napaeozapus insignis)	C	X			
Porcupine (Erethizon dorsatum)	U	X			

[a]Taken from Grimm, W. C. and R. Whitebread. 1952. Mammal survey of northeastern Pennsylvania, Pa. Game Comm., Harrisburg, Pa. 82 p.

c. Avian

The presence and characteristics of birds in the vicinity of the study area also related primarily to the availability of suitable habitats and food supply. At one time or another during an average year, a significant number of bird species appeared in the area. A listing of 174 species, most of which were transients occurring only during spring or fall migration, has been derived from data included in the Pennsylvania Power and Light Company study of the Susquehanna River, which is referenced above. The species list is shown in Table 3 (a rare status refers to the occurrence of the bird near the area rather than the uniqueness of an indigenous bird).

Summer residents in the area have been birds usually associated with interspersed vegetation types such as the song sparrow (Melospiza melodia), robin (Turdus migratorius), grackle (Quiscalus quiscula), mourning dove (Zenaidura macroura), and red-winged blackbird (Agelaius phaeniceus). The meadowlark (Sturnella magna) has been found in grassland areas. Major flyways for migrating birds are located to the east and west of the valley but the wooded areas in between, including the river banks and islands, have had use as migratory resting areas. The predominant game species in the study area include ringnecked pheasants (Phasianus colchicus), doves and ducks. The latter two birds are migratory.

The most important habitat areas near the project included the river islands, some river banks and Kirby and Nesbitt Parks. The riverside of the levees in these parks has been especially active as a migratory rest area and as many as several hundred species have utilized it during the course of a year. Mallards, wood ducks, black ducks, black crowned night herons, green herons, great blue herons, spotted sandpipers, killdeer, gulls and occasionally wild turkeys (Meleagris gallopavo) are some of these species. The presence of this type of activity in the center of a metropolitan area is considered rare.

Hunting for birds has taken place in various undeveloped locations of the Wyoming Valley but not within the study area. No information is available to indicate that rare or endangered species of birds have existed in the area, but the location and characteristics of the parks and other riverside features have been considered unique.

2. Post-Flood/Existing Conditions

The general effect of the flood was to greatly upset the wildlife ecology in the study area. Some of the specific effects were only temporary but others will be felt for several years. Also, the severity of these flood effects is related to the degree of alteration of specific habitats or other areas frequented by wildlife.

Table 3. Status of birds which occur in northern Pennsylvania [a, b] (C, common; U, uncommon; R, rarely seen)

Species	Transient	Summer Resident	Winter Resident	Permanent Resident
Falconiformes				
Turkey Vulture (*Cathartes aura*)		C		
Goshawk (*Accipiter gentilis*)	R			
Cooper's Hawk (*A. cooperii*)		C	U	
Sharp-shinned Hawk (*A. striatus*)		C		
March Hawk (*Circus cyaneus*)		U		
Rough-legged Hawk (*Buteo lagopus*)	R			
Red-tailed Hawk (*B. jamaicensis*)		U	U	
Red-shouldered Hawk (*B. lineatus*)	U			
Broad-winged Hawk (*B. platypterus*)	C	U		
Golden Eagle (*Aquila chrysaetos*)	R			
Bald Eagle (*Haliaeetus leucocephalus*)	R			
Osprey (*Pandion haliaetus*)	C	R		
Gyrfalcon (*Falco rusticolus*)	R			
Peregrine Falcon (*F. peregrinus*)	R			
Pigeon Hawk (*F. columbarius*)	U			
Sparrow Hawk (*F. sparverius*)		C	U	
Galliformes				
Turkey (*Meleagris gallopavo*)				C
Ruffed Grouse (*Bonasa umbellus*)				C
Ring-necked Pheasant (*Phasianus colchicus*)				C
Charadriiformes				
American Woodcock (*Philohela minor*)	C	U	R	
Columbiformes				
Rock Dove (Domestic pigeon) (*Columba livia*)				C
Mourning Dove (*Zenaidura macroura*)	C	C		U
Cuculiformes				
Yellow-billed Cuckoo (*Coccyzus americanus*)	C	R		
Black-billed Cuckoo (*C. erythrophthalmus*)	C	C		
Strigiformes				
Screech Owl (*Otus asio*)				C
Great Horned Owl (*Bubo virginianus*)				C
Long-eared Owl (*Asio otus*)				R

Table 3. (Continued)

Species	Transient	Summer Resident	Winter Resident	Permanent Resident
Strigiformes (continued)				
Short-eared Owl (A. flammeus)	R			
Snowy Owl (Nyctea scandiaca)	R			
Barred Owl (Strix varia)				U
Saw-whet Owl (Aegolius acadicus)	R			
Caprimulgiformes				
Whip-poor-will (Caprimulgus vociferus)	C	U		
Common Nighthawk (Chordeiles minor)	C	C		
Apodiformes				
Chimney Swift (Chaetura pelagica)	C	C		
Ruby-throated Hummingbird (Archilocus colubris)	C	U		
Piciformes				
Yellow-shafted Flicker (Colaptes auratus)	C	C		
Pileated Woodpecker (Hylatomus pileatus)				U
Red-bellied Woodpecker (Centurus carolinus)				U
Red-headed Woodpecker (Melanerpes erythrocephalus)	R			
Yellow-bellied Sapsucker (Sphyrapicus varius)	C			
Hairy Woodpecker (Dendrocopos villosus)				C
Black-backed Three-toed Woodpecker (Picoides tridactylus)			R	
Downy Woodpecker (Dendrocopos pubescens)				C
Passeriformes				
Eastern Kingbird (Tyrannus tyrannus)	C	U		
Great Crested Flycatcher (Myiarchus crinitus)	C	C		
Eastern Phoebe (Sayornis phoebe)	C	C		
Yellow-bellied Flycatcher (Empidonax flaviventris)	U			
Acadian Flycatcher (E. virescens)	U			
Traill's Flycatcher (E. traillii)	U			
Least Flycatcher (E. minimus)	C	C		
Eastern Wood Pewee (Contopus virens)	C	C		
Olive-sided Flycatcher (Nuttallornis borealis)	R			
Horned Lark (Eremophila alpestris)	U			
Barn Swallow (Hirundo rustica)	C	C		
Cliff Swallow (Petrochelidon pyrrhonota)	U	U		
Tree Swallow (Iridoprocne bicolor)	C	U		

Table 3. (Continued)

Species	Transient	Summer Residents	Winter Residents	Permanent Residents
Passeriformes (continued)				
Bank Swallow (Riparia riparia)	R			
Rough-winged Swallow(Stelgidopteryx ruficollis)	C	C		
Purple Martin (Progne subis)	C	C		
Blue Jay (Cyanocitta cristata)				C
Common Raven (Corvus corax)	R			
Common Crow (C. brachyrhynchos)				C
Fish Crow (C. ossifragus)	U			
Black-Capped Chickadee (Parus atricapillus)				C
Boreal Chickadee (P. hudsonicus)	R			
Tufted Titmouse (Parus bicolor)				C
White-breasted Nuthatch (Sitta carolinensis)				C
Red-breasted Nuthatch (S. canadensis)	R			
Brown Creeper (Certhia familiaris)	C	U		
House Wren (Troglodytes aedon)	C	C		
Winter Wren (T. troglodytes)	U	R		
Carolina Wren (Thryothorus ludovicianus)		R		
Long-billed Marsh Wren (Telmatodytes palustris)	R	R		
Short-billed Marsh Wren (Cistothorus platensis)	R	R		
Mockingbird (Mimus polyglottos)	U	U		
Catbird (Dumetella carolinensis)	C	C		
Brown Thrasher (Toxostoma rufum)	C	C		
Robin (Turdus migratorius)	C	C		
Wood Thrush (Hylocichla mustelina)	C	C		
Hermit Thrush (H. guttata)	C	R		
Swainson's (Olive-backed) Thrush(H. ustulata)	C	R		
Gray-cheeked Thrush (H. minima)	U			
Veery (H. fuscescens)	U	U		
Eastern Bluebird (Sialia sialis)	U	U		
Blue-gray Gnatcatcher (Polioptila caerulea)	U			
Golden-crowned Kinglet (Regulus satrapa)	C			
Ruby-crowned Kinglet (R. calendula)	C			
Water Pipit (Anthus spinoletta)	R			
Cedar Waxwing (Bombycilla cedrorum)				U
Northern Shrike (Lanius excubitor)	R			
Loggerhead Shrike (L. ludovicianus)	R			
Starling (Sturnus vulgaris)				C
Solitary Blue-headed Vireo (Vireo solitarius)	C	U		
White-eyed Vireo (V. griseus)	U	U		

Table 3. (Continued)

Species	Transient	Summer Residents	Winter Residents	Permanent Residents
Passeriformes (continued)				
Yellow-throated Vireo (V. flavifrons)	U			
Red-eyed Vireo (V. olivaceus)	C	C		
Warbling Vireo (V. gilvus)	C	C		
Black and White Warbler (Mniotilta varia)	C	C		
Prothonotary Warbler (Protonotaria citrea)	U	R		
Worm-eating Warbler (Helmitheros vermivorus)	R			
Golden-winged Warbler (Vermivora chrysoptera)		U		
Tennessee Warbler (V. peregrina)	R			
Orange-crowned Warbler (V. celata)	R			
Nashville Warbler (V. ruficapilla)	C	U		
Parula Warbler (Parula americana)	C	U		
Yellow Warbler (Dendroica petechia)	C	C		
Magnolia Warbler (D. magnolia)	C	R		
Cape May Warbler (D. tigrina)	R			
Black-throated Gray Warbler (Dendroica nigrescens)	R			
Black-throated Green Warbler (D. virens)	C	C		
Cerulean Warbler (D. cerulea)	R			
Yellow-throated Warbler (D. dominica)	R			
Blackburnian Warbler (D. fusca)	U	U		
Chestnut-sided Warbler (D. pensylvanica)	C			
Bay-breasted Warbler(D. castenea)	C			
Blackpool Warbler (D. striata)	C			
Pine Warbler (D. pinus)	U			
Prairie Warbler (D. discolor)	R			
Palm Warbler (D. palmarum)	R			
Ovenbird (Seiurus aurocapillus)	C	C		
Northern Water-thrush (S. noveboracensis)	U	U		
Louisiana Water-thrush (S. motacilla)	C	U		
Yellow-throat (Geothlypis trichas)	C	C		
Yellow-breasted Chat (Icteria virens)	U			
Connecticut Warbler (Oporonis agilis)	R			
Mourning Warbler (O. philadelphia)	R	R		
Hooded Warbler (Wilsonia citrina)	U	U		
Wilson's Warbler (W. pusilla)	U			
Canada Warbler (W. canadensis)	C	U		
American Redstart (Setophaga ruticilla)	C	C		

Table 3. (Continued)

Species	Transient	Summer Residents	Winter Residents	Permanent Residents
Passeriformes (continued)				
House Sparrow (Passer domesticus)				C
Bobolink (Dolichonyx oryzivorus)	C	R		
Eastern Meadowlark (Sturnella magna)		C		
Red-winged Blackbird (Agelaius phaeniceus)	C	C		
Rusty Blackbird (Euphagus carolinus)	C			
Common (Purple) Grackle (Quiscalus quiscula)	C	C		
Brown-headed Cowbird (Molothrus ater)	C	C		
Orchard Oriole (Icterus spurius)	R	R		
Baltimore Oriole (I. galbula)	C	C		
Western Tanager (Piranga ludoviciana)	R			
Scarlet Tanager (P. olivacea)	C	C		
Summer Tanager (P. rubra)	R			
Cardinal (Richmondena cardinalis)				C
Rose-breasted Grosbeak (Pheucticus ludovicianus)	C			
Evening Grosbeak (Hesperiphona vespertina)			C	
Blue Grosbeak (Guiraca caerulea)	R			
Indigo Bunting (Passerina cyanea)	C	C		
Purple Finch (Carpodacus purpureus)	C	C		
Pine Grosbeak (Pinicola enucleator)	R			
Common Redpoll (Acanthis flammea)	R			
Pine Siskin (Spinus pinus)	R			
American Goldfinch (Spinus tristis)	C	C		
Red Crossbill (Loxia curvirostra)	R			
White-winged Crossbill (L. leucoptera)	R			
Dickcissel (Spiza americana)	R			
Rufous-sided Towhee (Pipilo erythrophthalmus)	C	C		
Savannah Sparrow (Passerculus sandwichensis)	C	C		
Grasshopper Sparrow (Ammodramus savannarum)	C	C		
Henslow's Sparrow (Passerherbulus henslowii)	R	R		
Sharp-tailed Sparrow (Ammospiza caudacuta)	R			
Vesper Sparrow (Poaecetes gramineus)	C	C		
Slate-colored Junco (Junco hyemalis)	C	R	C	
Tree Sparrow (Spizella arborea)	C			
Chipping Sparrow (S. passerina)	C	C		
Field Sparrow (S. pusilla)	C	C		
White-crowned Sparrow (Zonotrichia leucophrys)	U		U	

Table 3 (Continued)

Species	Transient	Summer Residents	Winter Residents	Permanent Residents
Passeriformes (continued)				
Golden-crowned Sparrow (Z. atricapilla)	R			
White-throated Sparrow (Z. albicollis)	C	U		
Fox Sparrow (Passerella iliaca)	C			
Lincoln's Sparrow (Melospiza lincolnii)	R			
Swamp Sparrow (M. georgiana)	C	R		
Song Sparrow (M. melodia)	C	C		U
Lapland Longspur (Calcarius lapponicus)	R			
Snow Bunting (Plectrophenax nivalis)	R			

[a]Poole, Earl L. 1964. Pennsylvania birds, an annotated list. Livingston Publ. Co., Narbeth, Pa. for the Delaware Valley Ornithological Club. 91 p.

[b]Waterbirds (Gaviiformes, Podicipediformes, Pelecaniformes, Anseriformes, Ciconiiformes, Gruiformes, most Charadriiformes, and Coraciiformes) are not included.

Probably the most affected organisms in the study area were fishes. By the time the flood occurred most of the species in the river had spawned and hatching had occurred. Adult fish were not significantly affected but probably all the newly hatched young were destroyed. Smaller aquatic fauna was also destroyed and nesting and feeding areas altered or otherwise adversely affected.

The flood also affected terrestrial and avian wildlife, particularly food supplies, nesting areas and protective cover. Many animals and birds unable to flee the high water were drowned. Clean-up efforts after the flood also affected this wildlife to the extent that protective undergrowth was removed. It has been estimated that the local wildlife populations are 80% smaller now than prior to the flood.* Particularly affected were game animals such as ringnecked pheasants and rabbits. These and other species have begun to return with regrowth of feeding and nesting areas, but total repopulation will not occur for some time.

3. Projected Conditions Without Project

Conditions within the study area related to the presence and natural characteristics of wildlife are expected to eventually return to pre-flood levels of viability. With the revitalization of habitat areas, land animals and birds in particular will become fully re-established, but this will take perhaps three years.* The situation with fish and other aquatic animals will also take a long time to stabilize. Because of the flood's effects on the younger and weaker of these organisms, a "drought" year for that age classification will occur in about two or three years.

Future floods within the project area are expected and are part of the ecological processes in the study area. More devasting floods such as the one caused by Hurricane "Agnes" are not expected and should this latter type of flood occur again without the proposed project, wildlife activity in areas not normally expected to be flooded will again be disrupted with relatively long-term adverse effects.

*Personal communications, Pennsylvania Game Commission and National Audubon Society.

E. Vegetation

1. Pre-Flood Conditions

Vegetation within the Wyoming Valley has included both aquatic and terrestrial plants, originally developed as a part of processes occurring at a regional scale and modified to a large degree over the years by urbanization and other uses of the land. Within the study area, these influences have been especially apparent — the effects of deep and strip mining, cultivation and development have greatly limited natural vegetative growth and changed its character. This section presents an overview of principal vegetation types, their viability and use prior to the flood.

The significance of aquatic vegetation in the study area has been normally related to the extent of occurrence of aquatic environments. In many aquatic systems such as the Susquehanna River, phytoplankton (microscopic plants drifting in the water) have been the basic producers of food. Phytoplankton are ingested by some aquatic invertebrates and vertebrates, the primary food consumers in the "food chain" of the ecosystem. There has been evidence from the generic diversity and suppression of phytoplankton communities at various locations in the river that organic enrichment (sewage discharges) has been moderate, but that ferrous iron in the acid mine discharges has had an adverse effect on this vegetation. Aquatic vascular plants, another primary vegetation type, anchor in the river substrates and provide food and shelter for aquatic organisms. Changes in these plants may also reflect environmental quality of the river and affect organisms which are dependent upon them. Therefore, although aquatic vegetation has been a potentially important element of the local environment, its viability has been occasionally suppressed by outside influences such as mine water discharges.

The terrestrial ecology in the study area originally included characteristics of vegetation inherent in plant and animal associations indigenous to a much larger area. The study area is physiographically within the ridge and valley section of the Appalachian Valley Province, which is characterized by many narrow and even-crested ridges running more or less parallel in a northeasterly to southwesterly direction. The northwestern half of this Province drains into the Susquehanna River. The ridge and valley section is a portion of the original oak-chestnut forest region of the eastern deciduous forest, which included several forest communities. Since the study area is located within the Wyoming Valley between mountain ridges, the vegetation types were originally characteristic of the lowland slopes of this oak-chestnut

region. Lesser northern hardwood communities such as white pine, hemlock, river birch – sycamore or sweet birch have occupied specific sites. In later years, mixed oak forests were predominant in the region. The occurrence of specific local vegetation is determined by topography and soil, but agricultural and forestry practices as well as urban development have substantially modified the natural vegetation in the study area.

Very little of the historic overgrowth occurred in the study area immediately prior to the flood. Areas of trees which have been preserved were located primarily in Kirby and Nesbitt Parks, on adjacent undeveloped areas to the west and north of these parks, or some of the river islands and generally along the riverbanks either in the flood plain or behind the levees. Much of these were second growth and could be described as typical river bottom hardwood species. Typical species in the flood plain included silver maple (Acer saccharinum) and sycamore (Platanus occidentalis) and, near the river but behind the levees, willows (Salix spp.), red (river) birch (Betula nigra), box elders (Acer negundo), cottonwood (Populus deltoides), slippery elm (Ulmus rubra) and American elm (Ulmus americana). Commercial tree species that were generally found in northeastern Pennsylvania, based on forest sample plots surveyed by the U. S. Department of Agriculture, are listed in Table 4.

Table 4. Commercial tree species found in Northeastern Pennsylvania

Softwoods

Virginia pine (Pinus virginiana)
Pitch pine (Pinus rigida)
Eastern white pine (Pinus strobus)
Red pine (Pinus resinosa)
Eastern hemlock (Tsuga canadensis)
Other softwoods:
- Spruce (Picea spp.)
- Tamarack (Larix laricina)
- Eastern redcedar (Juniperus virginiana)
- Northern white-cedar (Thuja occidentalis)

Hardwoods

Select white oaks:
- White oak (Quercus alba)
- Swamp white oak (Quercus bicolor)
- Bur oak (Quercus macrocarpa)

Select red oaks:
- Northern red oak (Quercus rubra)

Table 4. (Continued)

Hardwoods (Continued)

Other white oaks:
- Chestnut oak (Quercus prinus)
- Post oak (Quercus stellata)

Other red oaks:
- Black oak (Quercus velutina)
- Scarlet oak (Quercus ooccinea)
- Pin oak (Quercus palustris)
- Willow oak (Quercus phellos)

Hickory (Carya spp.)
Yellow birch (Betula alleghaniensis)
Sugar maple (Acer saccharum)
Soft maples:
- Red maple (Acer rubrum)
- Silver maple (Acer saccharinum)

American beech (Fagus grandifolia)
Blackgum (Nyssa sylvatica)
Sweetgum (Liquidambar styraciflua)
Ash (Fraxinus spp.)
Aspen (Populus spp.)
American basswood (Tilia americana)
Yellow-poplar (Liriodendron tulipifera)
Black walnut (Juglans nigra)
Black cherry (Prunus serotina)
American sycamore (Platanus occidentalis)
Black locust (Robinia pseudoacacia)
Other hardwoods:
- Butternut (Juglans cinerea)
- Elm (Ulmus spp.)
- Flowering dogwood (Cornus florida)
- Paper birch (Betula papyrifera)
- Sweet birch (Betula lenta)
- Willow (Salix spp.)

Source: U. S. Department of Agriculture, The Timber Resources of Pennsylvania, U. S. Forest Service Bulletin NE-8 (Northeastern Forest Experiment Station, Upper Darby, Pa.: 1968), pp. 45-6.

Undergrowth vegetation has been predominant in the wooded areas not actively used, such as in the flood plains along the river-banks. There have been few shrubs or brush present, except for nettles; and this type of growth has been affected by flooding and shading from the trees. The predominant weed has been the giant ragweed, which has been practically limited to the flood plains. Other naturally occurring under-growth vegetation included red and black raspberry, grey birch, fire

cherry, viburnums, sumac, black-eyed susans, rhododendron, blueberries, sweet fern and other common species. This undergrowth has been especially suitable for the abundant bird life in the area. The river islands in the study area have contained very hardy flood plain vegetation including some wildflowers.

Grasses are not abundant in the flood plain of the study area, except some sedges. Grasses usually require a drier situation and are generally limited to the sides of the levees. This and other growth on the sides of the levees have tended to be a problem in some areas — roots, for example, have damaged riprap. Eradication of some of this vegetation has taken place as part of levee maintenance programs, either by hand or with sprays. Spraying has been more effective but has also been more unsightly.

The major "uses" of vegetation in the study area have been for wildlife habitats, parks and recreation areas and farming. Wildlife habitats occurred in all areas but especially where the natural vegetation had not been disturbed, such as on the river islands and on various portions of the flood plain. Concentrations of vegetation were included in Kirby, Nesbitt and River Commons Parks, the major recreational facilities of the valley. Another less important "use" of local vegetation has been the provision of aesthetic quality to the area. Various portions of the riverbank have been cultivated for truck farming for local consumption, particularly in areas adjacent to the river in Wyoming and in south Wilkes-Barre, although this has been on the decline. The forested areas were not a highly productive timber resource, and no commercial timbering activity existed in the valley.

There have been apparently no rare or endangered species of vegetation within the study area, other than American elm (Ulmus americanus). The more heavily overgrown areas such as those associated with Kirby and Nesbitt Parks and the river islands, however, have been considered unique ecological features of the valley.

2. Post-Flood/Existing Conditions

During and immediately after the flood, the high water extensively damaged much of the vegetation. The flood occurred after the new growth had sprouted and this was completely destroyed, especially in the flood plain areas. (Flooding to some degree is expected periodically, but this usually occurs much earlier in the year.) Cleanup activities after the flood also eradicated much of the vegetation that was left. Some of the trees in the flooded areas were damaged and it has been estimated that perhaps 90% of the undergrowth was cleared in some areas on the river side of the levees.*

*Personal communication, National Audubon Society.

Reproduction of this vegetation has begun to take place but full restoration of pre-flood conditions will take a long time. Little information is available on the effects of the flood on aquatic vegetation, but a reasonable assumption is that this too is presently in a damaged state. Some cultivated areas adjacent to the river and growth on the levees were also damaged, due to the effects of erosion.

3. Projected Conditions Without Project

In the absence of further flooding as destructive as Hurricane "Agnes", vegetation in the flood plains and in other portions of the study area is expected to return to normal pre-flood conditions. Natural seeding from existing vegetation, from seed dissemination by animal activities and growth from the root system should bring about a solid recovery in approximately three to five years. Other programs, such as the plans to redevelop Kirby and Nesbitt Parks, should aid in this process; and increased interest in the river ecology and controlled recreational and educational use of the natural environment will tend to preserve vegetation in the study area. Without the project, presently cultivated areas or wildlife habitat areas adjacent to the river will not readily be subdivided for residential or other development. Also without the project, further devastation of vegetation in the future is more likely to reoccur.

EXISTING AND PROJECTED SOCIO-ECONOMIC CONDITIONS

A. General Development: Wyoming Valley Project Study Area

The Wyoming Valley Flood Control Study Area, shown in Figure 2, includes the riverside municipalities of Edwardsville Borough, Exeter Borough, Swoyersville Borough, Forty Fort Borough, Hanover Township, Kingston Borough, Plymouth Borough, Wilkes-Barre City, and Wyoming Borough, all of which are located in Luzerne County.

1. Pre-Flood Conditions

Local characteristics, population, and growth trends in the eight municipalities have generally reflected conditions in the larger, northeastern Pennsylvania Region.

The City of Wilkes-Barre and the seven smaller residential settlements in its vicinity were predominantly working-class communities whose residents were heavily dependent on anthracite coal mining. General pre-flood socio-economic characteristics included the presence of strong ethnic sub-cultures, an older population, lower income and wages, a high parochial school enrollment, low crime rates, and the absence of racial conflicts. Major features of the towns included an aging housing stock consisting primarily of single family homes, an inadequate property tax base, and the survival of small-scale business establishments. The nearby valleys that contained the coal fields were characterized by strip pits, banks of spoil and refuse, mine fires, subsidence, and refuse odors while the Susquehanna River frequently was polluted from discharges of mine acid water.

Due to the severe economic recession associated with the decline of the mining industry, population in both the study area and the region has steadily decreased from its peak in the 1930's, although the rate of decline has diminished substantially in the recent past. As shown in the table below, study area population in the two decades between 1950 and 1970 dropped from 147,147 to 118,899 at a corresponding rate of 19.2 percent.

Table 5. Study Area Population, 1950-1970

Municipality	Population 1950	1960	1970	%Change 1950-60	%Change 1960-70
Edwardsville Borough	6,686	5,711	5,633	-14.6	-1.4
Exeter Borough	5,130	4,747	4,670	- 7.5	-1.6
Forty Fort Borough	6,173	6,431	6,114	4.2	-4.9
Hanover Township	5,909	5,068	4,784	-14.2	-5.6
Kingston Borough	21,096	20,261	18,325	- 4.0	-9.6
Plymouth Borough	13,021	10,401	9,536	-20.1	-8.3
Swoyersville Borough	7,795	6,751	6,786	-13.4	+0.5
Wilkes-Barre City	76,826	63,551	58,856	-17.3	-7.4
Wyoming Borough	4,511	4,127	4,195	- 8.6	1.6
TOTAL	147,147	127,048	118,899	-13.7	-6.4

The recent reduction in the rate of population loss was due to improved economic opportunities in the valley, which had begun to curb out-migration losses through the attraction of new industry and jobs.

2. Post-Flood Conditions

The flood line of Hurricane "Agnes" is shown in Figure 4, page 6. The immediate direct impacts of this storm are described below.

"Some 24,000 damaged homes, business places, and other type buildings.
More than 80,000 homeless.
Total damages exceeding $1,000,000,000.
Ruined shopping centers and downtown businesses.
Run down utilities with about a total of $20,000,000 damages.
Idled 50,000 workers.
A zany but workable, improvised communications system.
Several dead.
Immeasurable grief and horror.
Threats of sickness.
Mud and dirty water.
No power.

"More than 1,000,000 tons of debris.
Wrecked churches, synagogues, convents.
30,000 persons in evacuation centers.
50,000 persons at homes of relatives and friends.

"Ripped up roads and highways.

Subsidence and cave-ins.
Tears.
Looting, yeggs, and scavengers.
Damaged railroads.
A tremendous task for the people of Wyoming Valley". *

3. Projected Conditions Without Project

The future of the project study area as well as most of the rest of the Wyoming Valley depends in large part on the outcome of the disaster project urban renewal applications submitted by 14 of the flood-affected communities. Most of these applications are quite extensive in terms of size of area covered (for example, one includes the entire municipality of Kingston) and scope of improvements requested. While a significant number of persons have expressed interest in the individual home repair loan and grant programs, it is now clear that without the massive financial assistance available only through urban renewal, the success of complete area restoration is highly improbable. In addition, the prospect of utilizing urban renewal on the scale presently contemplated represents a unique opportunity to correct many of the area's past physical and environmental problems such as an inefficient local street system, obsolete land use patterns, and a deteriorating housing stock, and to create a new and superior living environment.

It is highly unlikely, however, that any renewal applications will receive final approval until there is assurance that the communities in question are protected from future flooding and the flood plain is legally established. In addition to probable Federal reluctance to invest heavily in a flood-prone area, the Pennsylvania eminant domain code specifically prohibits the redevelopment of properties acquired through urban renewal in such areas unless the new structures are "flood-proofed", or protected from future floods equal to or of lesser magnitude than the flood of record.

B. Land Use In The Immediate Impact Area

For the purposes of this study, the immediate impact area has been defined as the property abutting the levees and the area adjacent to it generally extending one or two blocks in depth. Since the project extends over many political boundaries, the land use analysis will

*Source: Carl J. Romanelli and William M. Griffith, The Wrath of Agnes (Media Affiliates, Inc., Wilkes-Barre, Pa.), 1972.

begin with Plymouth and continue up the west side of the river through Edwardsville, Wilkes-Barre (Kirby and Nesbitt Parks), Kingston, Forty Fort, Wyoming, Exeter, ending with Wilkes-Barre and Hanover on the east side of the Susquehanna. The land uses considered are residential, commercial and industrial, recreational, and public/ semi-public facilities. These uses are illustrated on the section maps on the following pages, Figures 5-11.

1. Residential

a. Pre-Flood Conditions

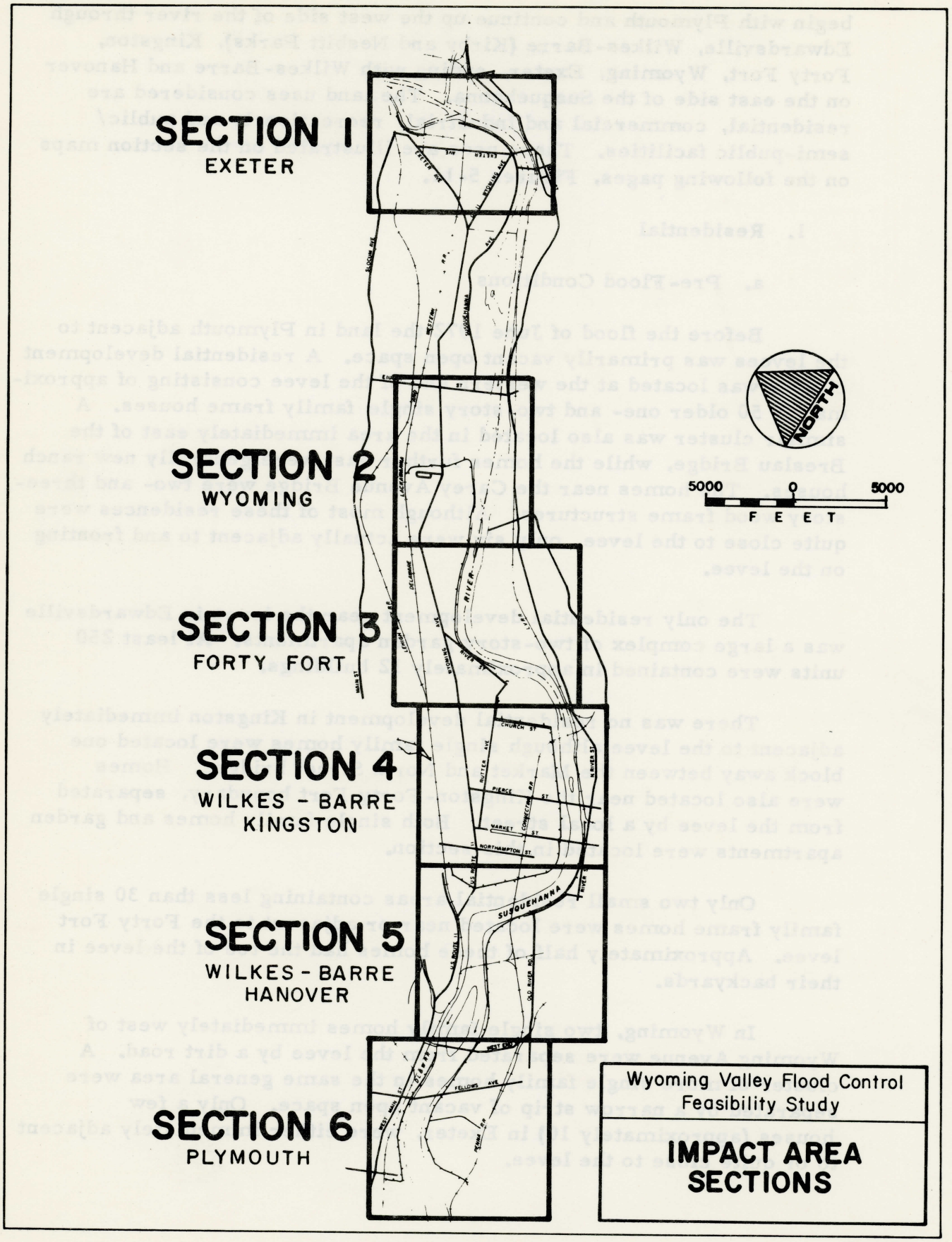
Before the flood of June 1972 the land in Plymouth adjacent to the levees was primarily vacant open space. A residential development cluster was located at the western end of the levee consisting of approximately 50 older one- and two-story single family frame houses. A similar cluster was also located in the area immediately east of the Breslau Bridge, while the homes further east were generally new ranch houses. The homes near the Carey Avenue Bridge were two- and three-story wood frame structures. Although most of these residences were quite close to the levee, only six were actually adjacent to and fronting on the levee.

The only residential development near the levee in Edwardsville was a large complex of two-story garden apartments. At least 250 units were contained in approximately 12 buildings.

There was no residential development in Kingston immediately adjacent to the levee although single family homes were located one block away between the Market and North Street bridges. Homes were also located near the Kingston-Forty Fort boundary, separated from the levee by a local street. Both single family homes and garden apartments were located in this section.

Only two small residential areas containing less than 30 single family frame homes were located near or adjacent to the Forty Fort levee. Approximately half of these homes had the toe of the levee in their backyards.

In Wyoming, two single family homes immediately west of Wyoming Avenue were separated from the levee by a dirt road. A cluster of more single family homes in the same general area were separated by a narrow strip of vacant open space. Only a few houses (approximately 10) in Exeter, were either immediately adjacent to or quite close to the levee.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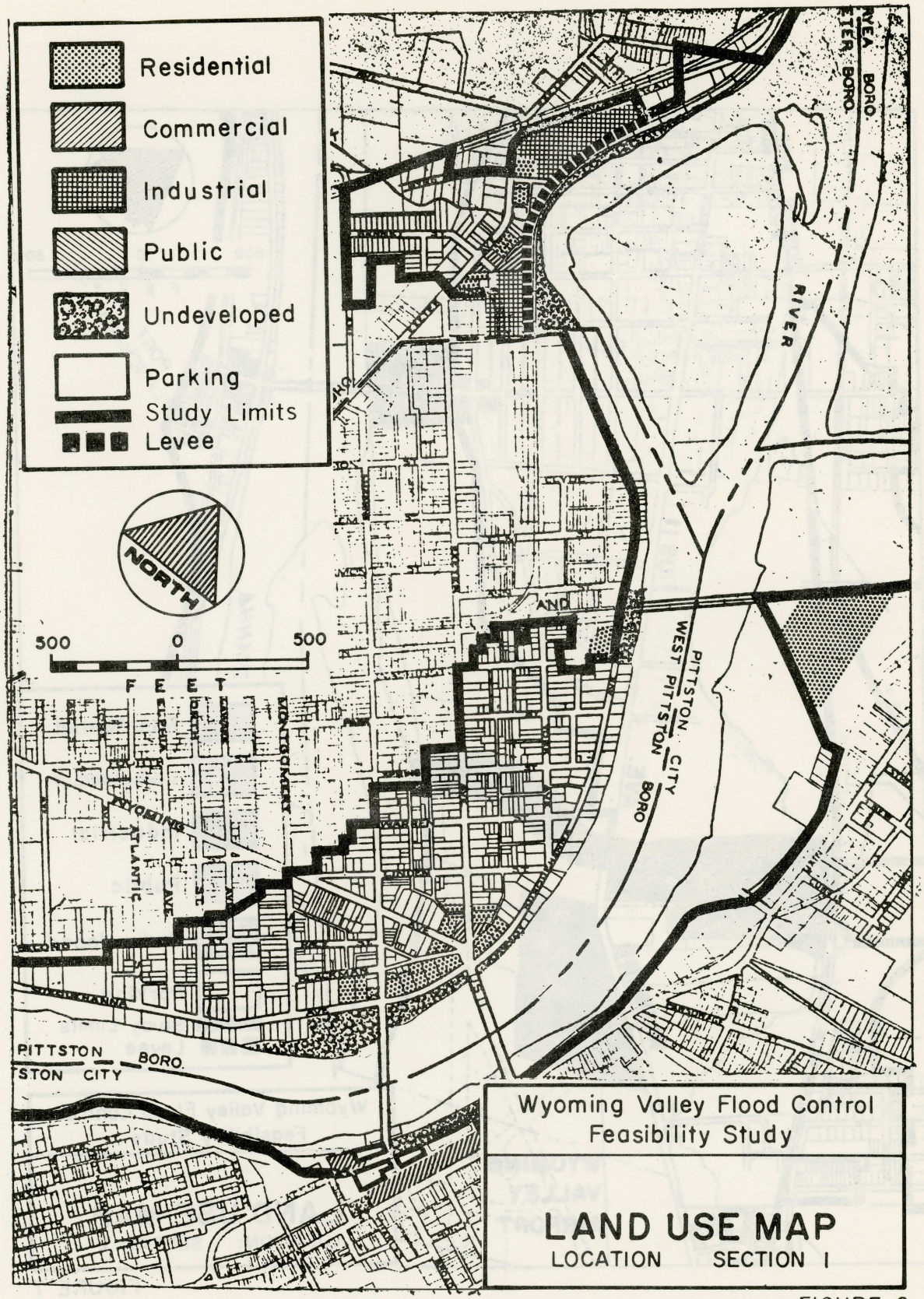
EXETER
SECTION 2
WYOMING
SECTION 3
FORTY FORT
SECTION 4
WILKES - BARRE
KINGSTON
SECTION 5
WILKES - BARRE
HANOVER
SECTION 6
PLYMOUTH
NORTH
5000 0 5000
F E E T
Wyoming Valley Flood Control
Feasibility Study
IMPACT AREA
SECTIONS

FIGURE 5


Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
NORTH
500
0
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FEET
RIVER
PITTSTON CITY
WEST PITTSTON BORO
PITTSTON BORO.
STON CITY
Wyoming Valley Flood Control
Feasibility Study
LAND USE MAP
LOCATION SECTION I

FIGURE 6

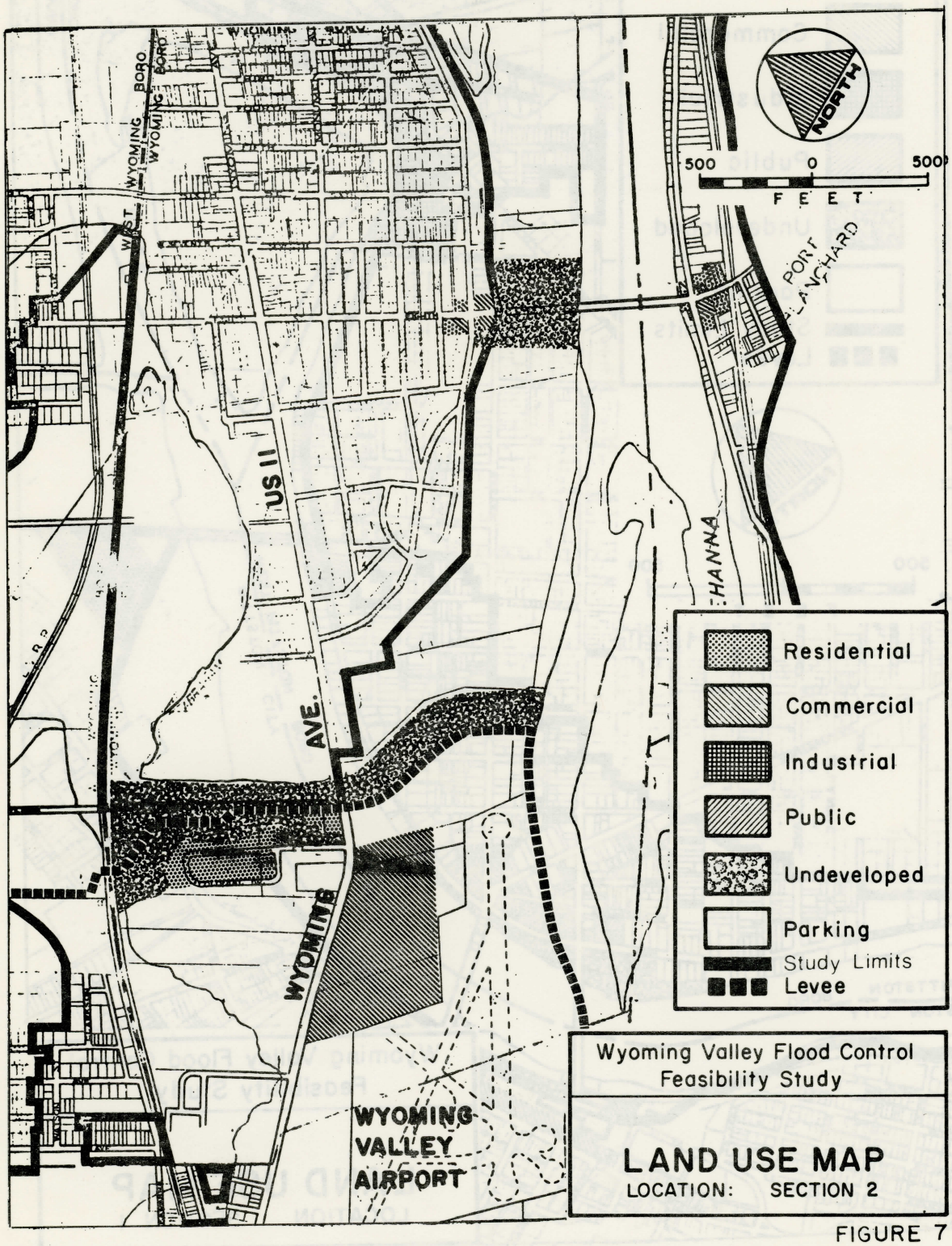
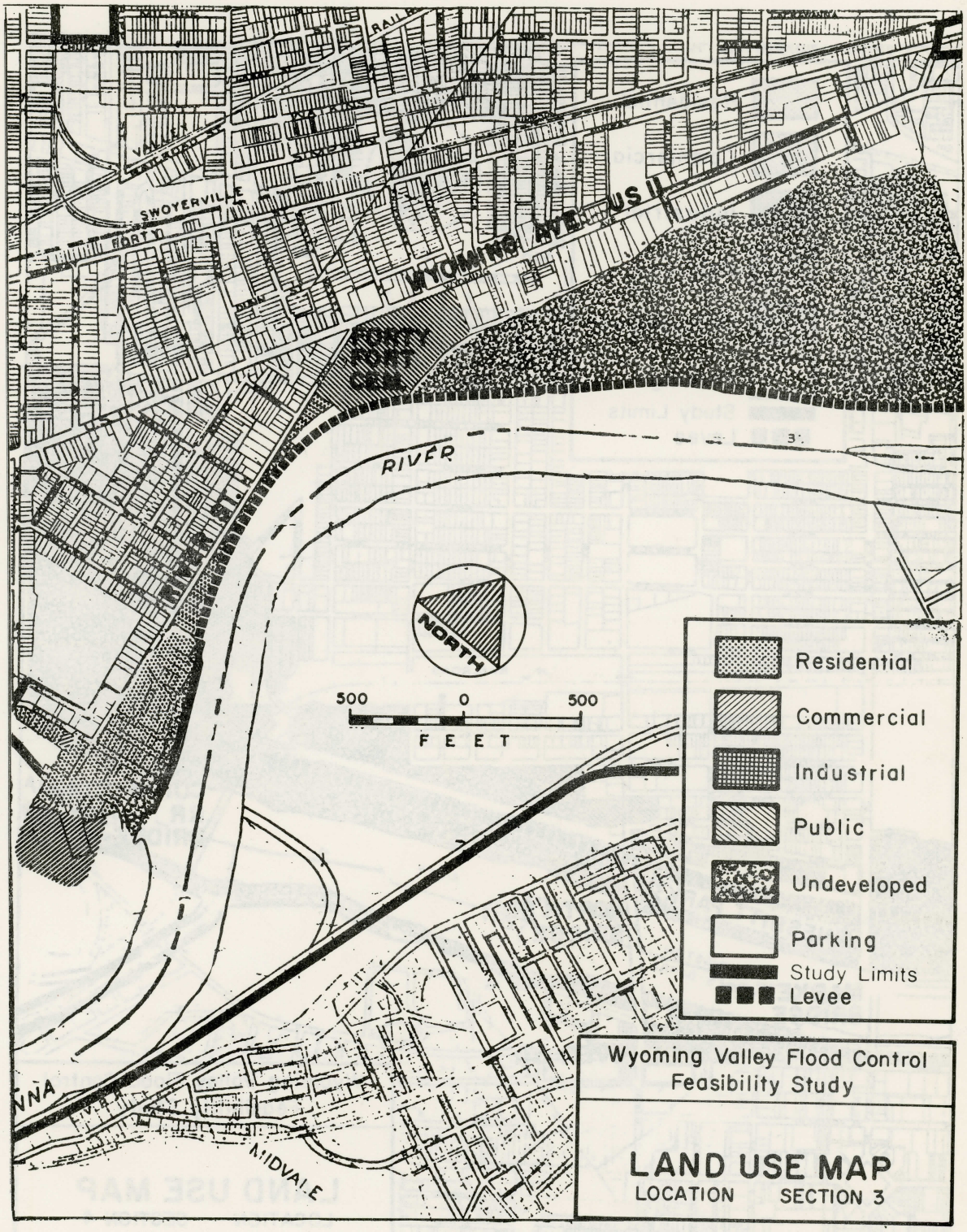

NORTH
500 0 500
FEET
WYOMING BORO
WYOMING BORO
WEST
US 11
AVE.
WYOMING
WYOMING VALLEY AIRPORT
PORT LANCHARD
HANNA
Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
Wyoming Valley Flood Control Feasibility Study
LAND USE MAP
LOCATION: SECTION 2

FIGURE 7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WYOMING AVE.
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FORTY FORT CEM.
RIVER
NORTH
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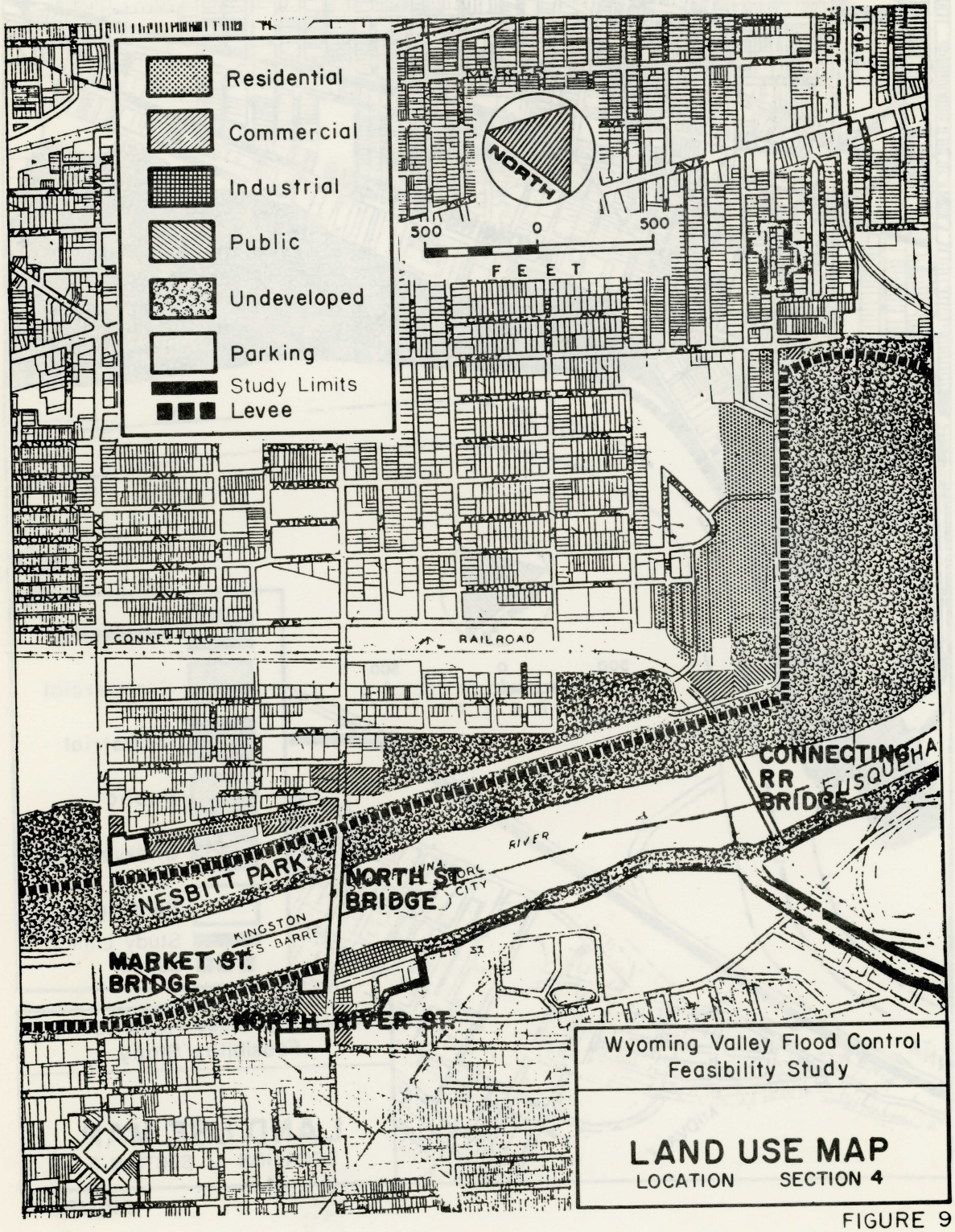
FEET
Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
Wyoming Valley Flood Control
Feasibility Study
LAND USE MAP
LOCATION SECTION 3
MIDVALE

FIGURE 8


Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
NORTH
500
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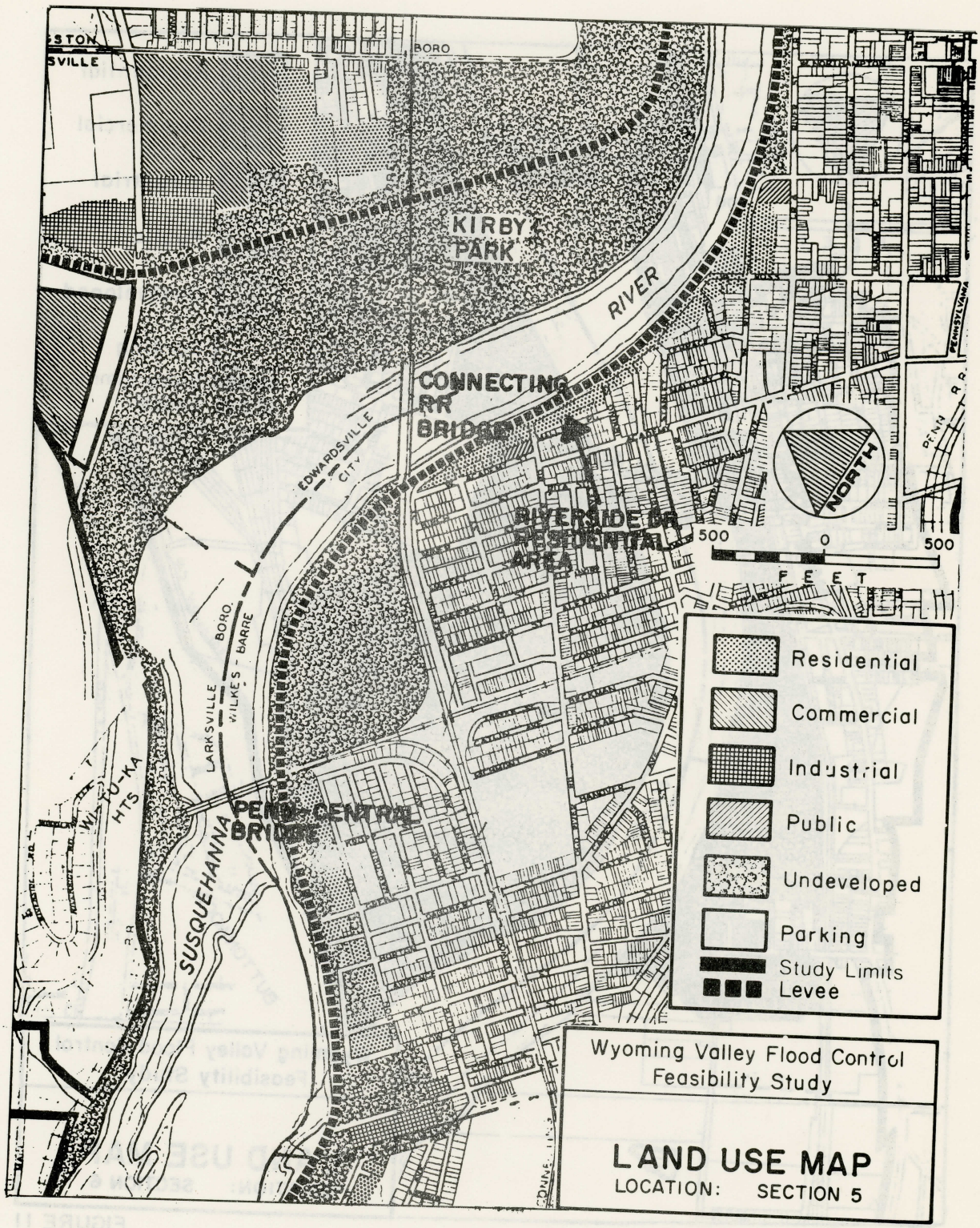
500
FEET
RAILROAD
CONNECTING RR BRIDGE
SUSQUEHA
RIVER
NESBITT PARK
NORTH ST. BRIDGE
KINGSTON
MARKET ST. BRIDGE
NORTH RIVER ST.
Wyoming Valley Flood Control Feasibility Study
LAND USE MAP
LOCATION SECTION 4

FIGURE 9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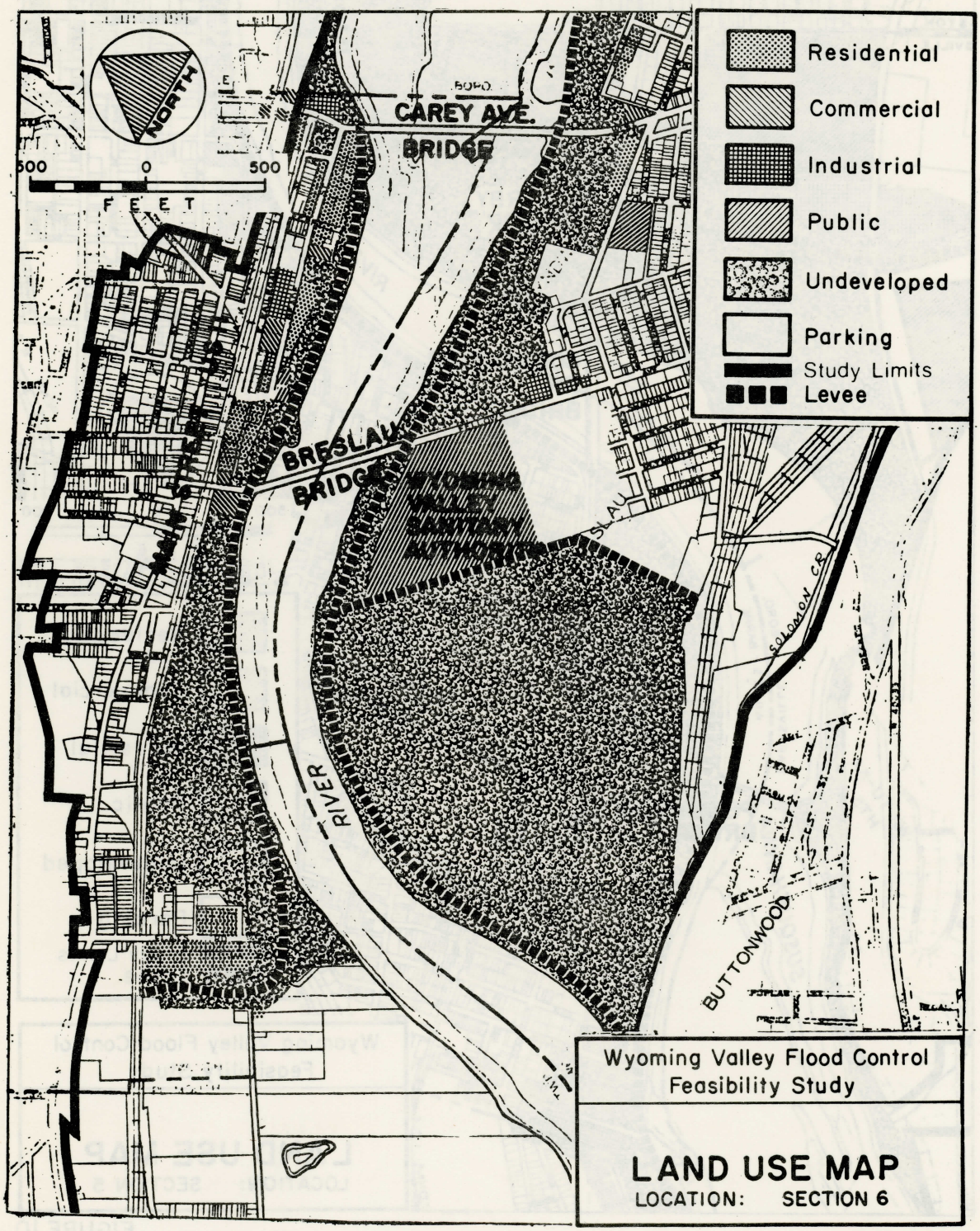
KIRBY PARK
RIVER
CONNECTING RR BRIDGE
EDWARDSVILLE CITY
RIVERSIDE DR RESIDENTIAL AREA
NORTH
500 0 500
FEET
LARKSVILLE BORO.
WILKES - BARRE
W-TU-KA HTS
PENN CENTRAL BRIDGE
SUSQUEHANNA
Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
Wyoming Valley Flood Control Feasibility Study
LAND USE MAP
LOCATION: SECTION 5

FIGURE 10


NORTH
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FEET
CAREY AVE.
BRIDGE
BRESLAU
BRIDGE
RIVER
SLAU
SOLOMON CR.
BUTTONWOOD
Residential
Commercial
Industrial
Public
Undeveloped
Parking
Study Limits
Levee
Wyoming Valley Flood Control
Feasibility Study
LAND USE MAP
LOCATION: SECTION 6

FIGURE 11

Residential development in Wilkes-Barre between the Carey Avenue bridge and the Wilkes-Barre Connecting Railroad bridge was separated from the levee by 50 to 100 feet of open space. Several different types of single family homes were in this general area. The large, expensive single family homes on Riverside Drive between Pickering and West Ross Streets were separated from the levee by only a local street.

b. Post-Flood/Existing Conditions

After the flood almost all the residential areas described above still existed but most suffered extensive water damage. The damage was particularly severe in those areas located near the breaks in the levees since rapid on-rushes of water dislodged many homes from their foundations.

When the flood water subsided many residents moved into mobile homes furnished by the U. S. Department of Housing and Urban Development located on their own property. Although some people are beginning to return to their houses, the large number of mobile homes still remaining in the area indicates that this not yet a major trend, but some residents have begun to rehabilitate their damaged houses. The fact that the trailers were offered rent-free for one year and, in some cases, the need for long drying-out periods before rehabilitation can proceed, and uncertainties regarding the status and scope of proposed urban renewal projects have all been contributing factors to the slow pace of residential restoration.

c. Projected Conditions Without Project

Although residential rehabilitation is already taking place on a small scale, it is not likely that these efforts will be great enough to restore all the homes to pre-flood conditions. The Small Business Administration low interest loans and grants to homeowners will help some local people to make their houses once again livable, but these will not satisfy the basic financial needs of the area. All of the municipalities have applied for urban renewal funds but these will not be granted until the renewal areas have adequate flood protection. Consequently, if the flood control system is not improved, the affected municipalities can probably look forward to some deterioration and spot abandonment rather than complete restoration of the local housing stock.

2. Commercial and Industrial

a. Pre-Flood Conditions

A wide variety of commercial and industrial establishments were located in the immediate impact area before the flood. At the Breslau bridge in Plymouth there was a lumber company adjacent to the levee and several auto repair shops approximately one block away. There were also several small manufacturing businesses in the vicinity but none were adjacent to the levee.

A large portion of the land near the Edwardsville section of the levee was devoted to commercial and industrial uses. Both a shopping center and a restaurant were adjacent to the levee while another large shopping center, a radio station and an oil tank farm were located only a short distance away.

There was no industrial development near the levee in Kingston but several commercial establishments were located nearby. Between the Market and North Street bridges there was a motel, a large department store and a new car dealer. An auto junkyard was next to the Wilkes-Barre Connecting Railroad bridge and a restaurant abutted the levee on Rutter Avenue.

No commercial or industrial development was located in the vicinity of the levees in Forty Fort. A large shopping area in Wyoming was located near the levee but there were no other commercial or industrial developments in the area. In Exeter, however, both types of land uses were found adjacent to almost half the length of the levee. Oil tank farms occupied the major part of this area with a variety of commercial establishments nearby.

There was no commercial development near the Wilkes-Barre or Hanover levees and industrial areas were separated from the levees by 50 to 100 feet of vacant open space. These industrial sections generally consisted of light industry and small manufacturing firms.

b. Post-Flood/Existing Conditions

After the flood most of the structures that housed the businesses and industries remained but in some cases damage was extensive. Most of the stores and factories are still undergoing repairs and some have already reopened and are operating again. Although some of the establishments that were considered marginal before the flood may have permanently closed, there is little indication that businesses which were viable before the flood have closed permanently. Local merchants seem anxious to return to "business as usual" and many continued to operate while repairs were being made.

c. Projected Conditions Without The Project

Since the flood, the businesses and industrial operators in the immediate impact area have begun to repair their facilities primarily with the help of Small Business Administration low interest loans. These loans have provided much needed immediate financial aid but will probably not be sufficient to return the business viability to its pre-flood level. The urban renewal funds that have been requested would do much to help the local business community but, as with housing and all other redevelopment covered by urban renewal, these funds will not be made available if the area is not considered "flood free." Therefore, if there is no improvement in the flood control system, the economic health of the immediate impact area as well as the municipal tax bases may suffer. If the smaller firms cannot afford to repair the flood damage and replace their stock and equipment, more and more of these concerns may eventually be forced to close.

3. Recreation and Open Space

a. Pre-Flood Conditions

There was a considerable amount of open space along the levees in the immediate impact area but little was actually publicly acquired and developed as park land. The area below the Breslau Bridge in Plymouth abutting the levee was entirely undeveloped open space with the exception of one area that was cleared and used for a softball field. Smaller undeveloped areas were also located between the Breslau and Carey Avenue Bridges. A similar type of undeveloped land was also located between the levee and the nearby commercial and residential developments in Edwardsville.

Kingston had several blocks of open space between the North Street bridge and the Wilkes-Barre Connecting Railroad bridge. In Forty Fort there was a considerable amount of open space abutting the levee including a 14-acre tract between the cemetery and the airport which had been obtained by the Borough for a proposed park. The park development had been forestalled, however, because of legal problems regarding access. Other open space in the Forty Fort area was essentially undeveloped.

In addition to the open spaces adjacent to the Wyoming levee, there was a relatively large area used for vegetable farming. There was no open space anywhere in the vicinity of the Exeter levee.

Wilkes-Barre had a considerable amount of open space adjacent to the levees, most of which had been designated as park land. Kirby and Nesbitt Parks were located on the west side of the river with the River Commons running along the right bank of the city proper. Kirby Park (111 acres) had been developed with facilities for both active and passive recreation, including ball diamonds, tennis courts, a basketball court, play apparatus and picnic facilities. Nesbitt Park, on the other hand, was totally undeveloped for formal recreation. The River Commons was a landscaped park along the river bank used primarily for passive recreation. At the end of the park near the Court House in an area known as Colonel Everett Smith Playground, there were two tennis courts, a spray pool, playground equipment, and a hard-surfaced area.

b. Post-Flood/Existing Conditions

Since most of the open space in the immediate project area was undeveloped, the post-flood or existing conditions are not radically different than the pre-flood state. All of the open spaces near the levees were inundated, so in some areas there is still evidence of flood-caused silt and debris. The farming areas in the vicinity of the airport in Wyoming are presently under cultivation again.

The riverside parks in Wilkes-Barre were also affected by the flood waters. Although most of the debris has been cleared, silt deposits are still evident on many of the play facilities in Kirby Park. Since Nesbitt Park was essentially undeveloped there has not been a significant change in the area except for some destruction of vegetation. The River Commons has been sufficiently cleared to allow passive recreation but the playground section near the Court House is not yet in full use.

c. Projected Conditions Without Project

Plymouth, Forty Fort and Wilkes-Barre are the only municipalities in the immediate impact area that are planning to redevelop open spaces regardless of proposals for additional flood control.

Before Hurricane "Agnes", private developers intended to build approximately 150 garden apartments in Plymouth near the western end of the levee and another cluster of approximately 30 modular units near the Breslau Bridge. It is likely this will still be developed as previously planned because the land has been rezoned for this type of housing and the developer has an option to purchase the land. According to local officials, it is also most probable that the proposed park development in Forty Fort described in the preceding sub-section will be implemented in the near future.

The Wilkes-Barre Department of Parks and Recreation has been formulating plans for the restoration and redevelopment of Kirby Park and some adjacent areas of Nesbitt Park, both before and after the flood. Since a final site plan is almost completed and construction is slated to begin no later than Spring 1973, it is evident that this development will occur even if no changes are made in the existing flood control system. Because funds have already been obtained from the Economic Development Administration, the U. S. Department of Housing and Urban Development, and the State Department of Community Affairs, the park project will not be subject to flood-related financial constraints.

4. Public and Semi-Public Facilities

a. Pre-Flood Conditions

Very few public or semi-public facilities were located in the immediate impact area. In Plymouth there was a power substation very close to the toe of the levee. There were no public facilities near the Edwardsville levee, but at the bend in the Kingston levee (near the Wilkes-Barre Connecting Railroad bridge) there was a Department of Public Works building that housed offices, storage and garage space. The Forty Fort Cemetery, located immediately adjacent to the levee, was one of two large public facilities in the immediate impact area. The Wyoming Valley Sanitary Authority, situated below the Breslau Bridge in Hanover Township, also occupied a large area abutting the levee. The Wilkes College performing arts building, located on the corner of West South and River Streets in Wilkes-Barre, was separated from the levee by a local street. The Luzerne County Court House was also situated near the Wilkes-Barre section of the levee. There were no public facilities in the Exeter immediate impact area.

b. Post-Flood/Existing Conditions

All of the facilities described suffered extensive flood damage, but the cemetery and the Sanitary Authority were the most severely affected. Of the 6,000 bodies buried in the cemetery, over 2,000 were washed out. Gravestones and caskets were scattered all over the area and three granite mausoleums were smashed. About 1,100 corpses were recovered and buried within 30 days after their removal. Due to the flood, a large portion of the cemetery can no longer be used for burial sites. The Sanitary Authority treatment facilities were badly damaged and raw sewage was discharged into the river for almost four months before repairs restoring service were completed.

c. Projected Conditions Without Project

With the exception of the Forty Fort Cemetery, it is likely that the public facilities will probably be returned to their pre-flood condition and level of use. The flooded areas of the cemetery, however, will not be used for burial sites again whether or not the flood control system is improved.

Although the Sanitary Authority will resume treatment at full capacity as soon as all the necessary repairs are completed, it may be in a difficult financial position if the flood control system is not improved. The Sanitary Authority receives revenue from a sewer rental charge applied to each dwelling unit and this money is used toward bond retirement. Since almost 10,000 homes have been vacated by the flood, the Sanitary Authority has lost a significant percentage of its revenue base. The Environmental Protection Agency has indicated that an EPA grant is being considered for upgrading the treatment plant from primary treatment to secondary treatment, and increasing capacity from 30 million gallons per day (mgd) to 40 mgd.

C. Aesthetic Considerations

The primary aesthetic considerations of the proposed project are the visual aspects of the levees, including both levee appearance and view obstructions.

1. Pre-Flood Conditions

Before the flood, the levees generally consisted of large earth berms with some short limited areas of sheet piling in the Forty Fort levee from the cemetery to the end of the levee paralleling River Street, and as a part of the Wilkes-Barre levee along Riverside Drive. The extent of sheet piling in Wilkes-Barre was limited because residents living on Riverside Drive resisted further obstruction to their view of the river and considered the piling an aesthetic eyesore.

Almost all of the levees were overgrown with weeds and other vegetative cover because few of the municipalities adequately landscaped the levees or restricted the natural vegetative growth. With the exception of a few areas in Wilkes-Barre, the levees resembled overgrown open spaces. The levees along the River Commons and those in Kirby Park, however, had been maintained better and were somewhat manicured before the flood.

Since most of the levees were quite high before the flood, few of the homes in close proximity to the levees had views of the river

from the first floor levels. In many cases, however, residents were able to see the river from second-story windows. In addition to obstructing views, the levees also acted as visual barriers or walls that enclosed front or rear yards of those homes actually abutting the levees.

2. Post-Flood/Existing Conditions

There has been very little change in either the visual appearance of the levees or the prior view obstructions since the flood. In areas where the levees broke, and subsequent repairs were made, much of the vegetative cover was destroyed leaving the restored levees as bare mounds of earth. Weeds have begun to grow again on these sections but the growth has not yet returned to pre-flood conditions.

Other than some changes in vegetation on the river side of the levees, the view obstruction characteristics of the levees are substantially the same as before the flood.

3. Projected Conditions Without Project

With the exception of the proposed park developments in Forty Fort and Wilkes-Barre, the appearance of areas adjacent to the levees and the levees themselves will probably remain the same except for the eventual regrowth of pre-flood vegetative cover. The park proposed for the area between the cemetery and the airport in Forty Fort may have a positive impact on the levee it abuts because levee landscaping could be an integral part of the park development plans. The restoration and redevelopment plans for Kirby and Nesbitt Parks definitely shows the levee as an integral part of the park landscaping.

The planned riverside development of Nesbitt Park includes a boat launching ramp and an area for informal picnics. The site plan for the Kirby Park redevelopment includes ball-fields, a track, tennis courts and picnic areas on the land side of the levee, while on the river side an outdoor environmental education area, a softball field and a model airplane or special use field are proposed. Since the park activities extend on both sides of the levee in Kirby Park, it will be very important to maintain and encourage both vehicular and pedestrian access over the levee. Park planners have expressed an interest in shaping the earth form of the levee to make it more interesting and useful to the park. It appears that every effort will be made to change the image of the levee as a wall or a barrier separating and isolating the two areas of the park.

D. Transportation Facilities

The Wyoming Valley area is served by several major transportation arteries and facilities. Interstate Route 81 and the Pennsylvania Turnpike Northeast Extension are major north-south routes, and Interstate Route 80 to the south provides east-west movement to and from Stroudsburg and Bloomsburg. Route U.S. 11 is another north-south artery and State Routes 115, 309, and 315 provide additional east-west access. The Penn-Central Railroad, the Delaware Lackawanna & Western Railroad and the Wilkes-Barre Connecting Railroad all serve the Wyoming Valley and the Wilkes-Barre/Scranton Airport located in Avoca serves the entire region.

Three major expressway facilities proposed in the Luzerne/Lackawanna Transportation Study are in the Wyoming Valley area. These are the Wilkes-Barre Distributor located east of downtown Wilkes-Barre, the Cross Valley Expressway which would cross the Susquehanna River just north of Wilkes-Barre, and the Wyoming Valley Expressway which would cross the river both to the south and north of Wilkes-Barre.

1. Pre-Flood Conditions

Major transportation arteries and facilities in the study area were Route U.S. 11 (Wyoming Avenue), South and North River Streets in Wilkes-Barre, the Wyoming Valley Airport, the Wilkes-Barre Connecting Railroad and its bridges across the river, the Delaware Lackawanna & Western Railroad, and the following bridges: North Street and Market Street Bridges connecting Wilkes-Barre and Kingston and the Carey Avenue and Breslau Bridges connecting Hanover Township with Plymouth Borough. Prior to the flood, all these facilities were operating, although repairs were being considered for several of the bridge structures.

2. Post Flood/Existing Conditions

These conditions will be discussed by community from north to south.

a. Exeter Borough

Local roads in the impact area near the levee in Exeter are open and operating and there appears to be no permanent street damage. The Delaware Lackawanna & Western Railroad tracks which run riverside of the levee are also in servicable condition.

b. Wyoming Borough/Forty Fort Borough

Route U.S. 11 (Wyoming Avenue) which crosses the levee at one point is being used and there appears to be no serious damage to this route. River Street and the other local streets inundated during the flood are also open. Minor repairs have been completed or are currently being completed on these roads. The Wyoming Valley Airport is operating, although much of the vacant land at the site is being used as a staging area for mobile home preparation by the U.S. Department of Housing and Urban Development (H.U.D.).

c. Kingston/Wilkes-Barre

The North Street Bridge was washed away during the flood, and it is currently being reconstructed for use as a temporary river crossing. The bridge will be replaced with a permanent structure later.

d. Edwardsville Borough

Local streets near the levee in Edwardsville are open but still need minor repair work. The portion of U.S. 11 (Wyoming Avenue) that crosses the levee is open.

e. Wilkes-Barre

The Riverside Drive area adjacent to the levee was severely flooded due to a nearby break in the levee. Numerous large pot holes and a covering of silt still exist on Riverside Drive.

f. Hanover Township/Plymouth Borough

Nearly all local roads in the flooded areas are operating at pre-flood conditions. Breslau Bridge, which connects Hanover with Plymouth, has been closed due to flood damage; and no definite plans have yet been established for its reopening.

3. Projected Conditions Without Project

The Luzerne/Lackawanna Transportation Study has proposed a number of new transportation facilities as well as improvements to existing ones. These facilities will be discussed where they are important to the project study area.

a. Exeter Borough

There are no anticipated changes in the transportation facilities in this area.

b. Wyoming Borough/Forty Fort Borough

There will be no changes in the transportation facilities in the study area.

c. Forty Fort Borough/Kingston Borough/Wilkes-Barre

A bridge for the proposed Cross Valley Expressway will cross the levee located on the west side of the river and will intersect north of the levee on the east side of the river. Local streets will remain the same with the possible exception of River Street in Forty Fort and Kingston. A southerly extension of River Street to North Street in Kingston is proposed but is given a low priority of construction. A temporary structure is being constructed at the location of the North Street Bridge and a new permanent structure is being considered.

d. Wilkes-Barre/Hanover Township

A bridge for the proposed Wyoming Valley Expressway will cross the levee on the east side of the river to a point on the west side where there is no levee. This section of the expressway has been assigned a medium priority of construction. Local roads will retain their existing use designations.

e. Plymouth Borough

At present, the Breslau Bridge is closed and studies regarding the future of this bridge are being considered. No indications of what action is likely to be taken are currently available. Route U.S. 11 in Plymouth is to be improved and a bypass section for this highway is proposed which would run parallel to and near the edge of the levee. This project has been given a medium priority of construction. All other transportation facilities in the Borough will retain their existing character and function.

E. Historic Landmarks

1. Pre-Flood Conditions

Before the flood, there were nine sites in the immediate impact area listed in the Pennsylvania Register of Historic Sites and Landmarks, two of which were also listed in the National Register of Historic Places. These sites are shown on the map, Figure 12. With the exception of the Forty Fort Meeting House on River Street in Forty Fort, all of the sites were located in Wilkes-Barre. The sites near the Wilkes-Barre segment of the levee were: Kirby Hall

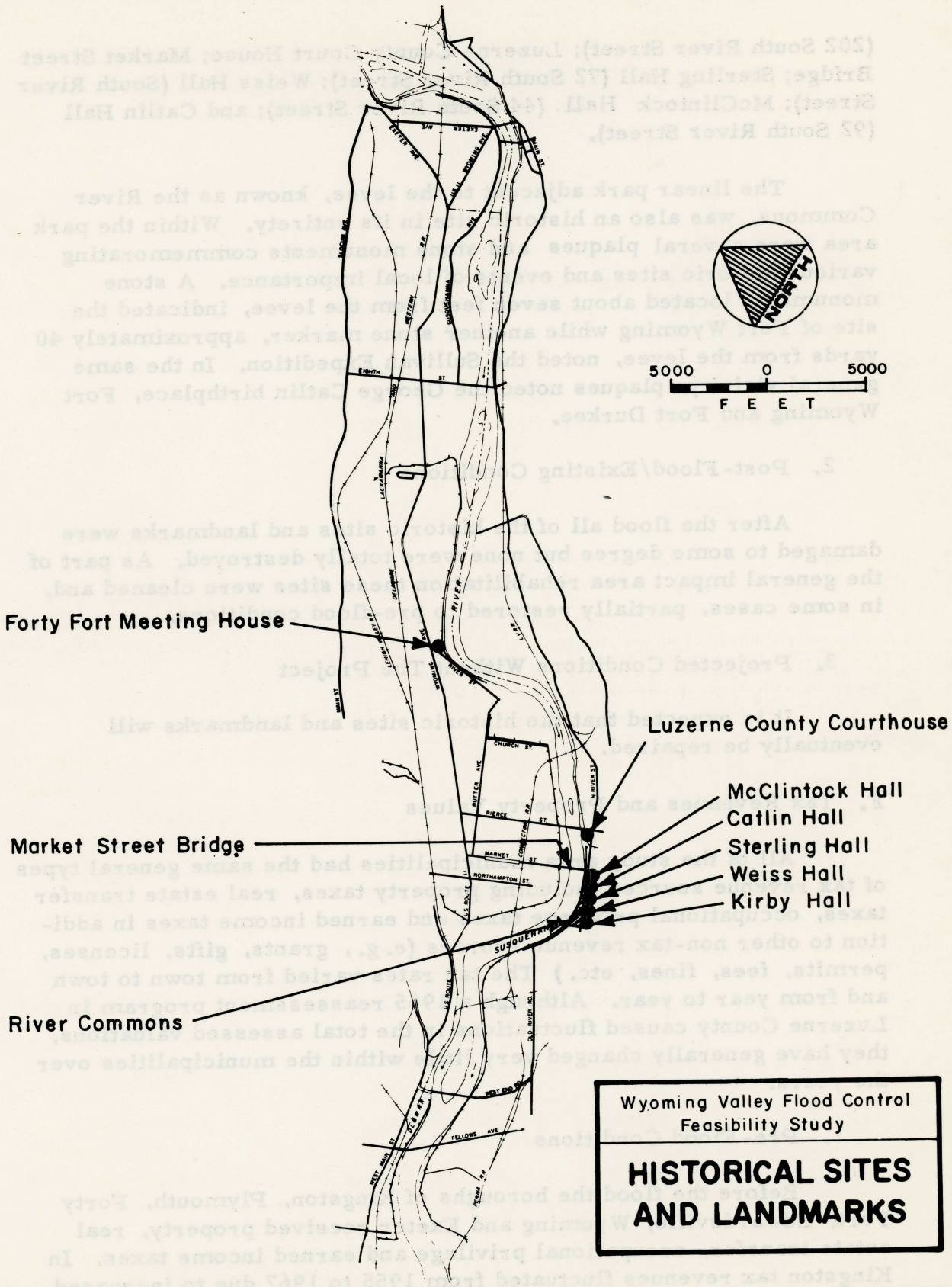

NORTH
5000 0 5000
FEET
Forty Fort Meeting House
Luzerne County Courthouse
McClintock Hall
Catlin Hall
Sterling Hall
Weiss Hall
Kirby Hall
Market Street Bridge
River Commons
Wyoming Valley Flood Control
Feasibility Study
HISTORICAL SITES
AND LANDMARKS

FIGURE 12

(202 South River Street); Luzerne County Court House; Market Street Bridge; Sterling Hall (72 South River Street); Weiss Hall (South River Street); McClintock Hall (44 South River Street); and Catlin Hall (92 South River Street).

The linear park adjacent to the levee, known as the River Commons, was also an historic site in its entirety. Within the park area were several plaques and stone monuments commemorating various historic sites and events of local importance. A stone monument, located about seven feet from the levee, indicated the site of Fort Wyoming while another stone marker, approximately 40 yards from the levee, noted the Sullivan Expedition. In the same general vicinity, plaques noted the George Catlin birthplace, Fort Wyoming and Fort Durkee.

2. Post-Flood/Existing Conditions

After the flood all of the historic sites and landmarks were damaged to some degree but none were totally destroyed. As part of the general impact area rehabilitation these sites were cleaned and, in some cases, partially restored to pre-flood conditions.

3. Projected Conditions Without The Project

It is expected that the historic sites and landmarks will eventually be repaired.

F. Tax Revenues and Property Values

All of the study area municipalities had the same general types of tax revenue sources including property taxes, real estate transfer taxes, occupational privilege taxes and earned income taxes in addition to other non-tax revenue sources (e.g., grants, gifts, licenses, permits, fees, fines, etc.) The tax rates varied from town to town and from year to year. Although a 1965 reassessment program in Luzerne County caused fluctuations in the total assessed valuations, they have generally changed very little within the municipalities over the years.

1. Pre-Flood Conditions

Before the flood the boroughs of Kingston, Plymouth, Forty Fort, Edwardsville, Wyoming and Exeter received property, real estate transfer, occupational privilege and earned income taxes. In Kingston tax revenues fluctuated from 1955 to 1967 due to increased expenditures, the institution of the occupational privilege and earned

income taxes, and the 1965 Luzerne County reassessment program. The average value of homes in Kingston near the immediate impact area (the east side of Wyoming Avenue) was approximately $30, 000, with some homes valued as high as $70, 000 or more.

The homes in Plymouth in the vicinity of the levees ranged in average value from $15, 000 for the older, pre-World War II homes to $20, 000-$35, 000 for the newer homes in the area. Like Kingston, Plymouth had a diversified and substantial tax structure. Although there had not been any significant changes, the total assessed valuation of real estate decreased slightly during the 1960's. This decrease was probably due to the decreases in coal land valuations and the 1965 County reassessment program.

The overall change in Kingston's total assessed valuations had been very slight with a general trend toward a very slow increase in values. Homes within the Forty Fort impact area ranged from $14, 000 to approximately $35, 000 with an average value of approximately $20, 000.

The revenues for Edwardsville, Wyoming and Exeter came primarily from real estate sources. Both Edwardsville and Wyoming exhibited a slow increase in total assessed valuation due to the 1965 County reassessment. In Exeter, however, there was a great decrease in total assessed valuation in the early 1960's because of the substantial reduction in coal land assessments in the borough. The County reassessment program reversed this trend and was responsible for a subsequent increase of over 104 percent.

The homes near the levee in Exeter are estimated to have had average values ranging from $25, 000 to about $30, 000, since most are approximately 30 years old. The homes in the residential development known as Colonial Village, near the Wyoming segment of the levee had average values of $45, 000 to $50, 000 before the flood. The residential section near the levee in Edwardsville consisted of a garden apartment complex (264 apartments) with rents ranging from $170 for a one-bedroom unit to $235 for three bedrooms.

Hanover Township's revenues were derived from per capita, municipal, school and institutional taxes. There was no residential development in the immediate flood impact area of Hanover.

In Wilkes-Barre, revenues came from city property, county and institutional property, school property, personal, occupational privilege, city personal (resident) wage and school resident taxes. Since Wilkes-Barre is in Luzerne County, it was also subject to the

1965 county reassessment program with the resulting fluctuations in total assessed valuation. The median value of homes in the flooded areas of Wilkes-Barre ranged from $10,000 to $15,000. Homes in certain areas, particularly those near the river in south Wilkes-Barre, were worth considerably more with values of $80,000 or more.

2. Post-Flood/Existing Conditions

After the flood, the situation previously described changed dramatically because all of the homes located in close proximity to the levees were greatly damaged by the flood waters. The water reached well above the second-story levels of many houses. As a result, Luzerne County is presently inspecting and reassessing real estate which was subjected to flood damage. A new market value of these homes is being determined according to the height of the water, relative to what was destroyed (i.e., plumbing, electrical systems, etc.). In some cases damage was so severe that the new assessment is based on only the structural shell and the land.

Since the municipalities affected by extensive flood damage depended upon real estate taxes for a large part of their revenue, the post-flood assessment devaluation will cause them to lose much of their anticipated revenues. If the municipalities do not receive outright grants to supplement the remaining tax revenues, some may be in serious financial trouble. According to the Luzerne County Assessor, Kingston, Forty Fort and Wilkes-Barre may be faced with this situation.

3. Projected Conditions Without Project.

The decreased market values of the inundated homes may encourage some residents previously living in less desirable areas to move to the "better" areas of town as the wealthier residents move to higher and drier land in the suburbs. Although there is no evidence indicating that this trend has already begun, it is a possibility that may become a reality if the existing flood control system is not improved. If this type of in-town migration does occur, it is likely that those people taking advantage of low market values to move to more desirable areas may not be able to maintain their new homes in pre-flood condition. In addition, residents living in the area flooded by "Agnes" may not completely renovate their homes because of a lack of confidence in the existing flood protection system. Either one or both of these situations may prevent these areas from returning to their full pre-flood market values, thus creating a correspondingly lower tax base.

G. Economic Conditions and Employment

Evaluation of the economic situation and employment characteristics of the study area will first consider the regional context. As economic conditions are varied in northeastern Pennsylvania; similar changes were reflected throughout the study area.

Northeastern Pennsylvania has long been an important manufacturing area, but this has been overshadowed until recently by extensive coal mining activity. Although mining employment was double that of manufacturing in 1930, during the period between 1940 and 1950 manufacturing overtook mining as the dominant employer in the region. In 1940, 33 percent of the employed labor force was still in the mining industry while only 18 percent were in manufacturing, but by 1964 the situation had been dramatically reversed with less than 4 percent of the labor force in mining and almost 44 percent in manufacturing.

As the higher income jobs in the coal industry were replaced with lower paying work in apparel or other industries employing a large percentage of women, total personal income in the region decreased substantially from 1949 to 1959. Between 1959 and 1964, income began to increase in Luzerne County. During the 1965 to 1969 period, the total personal income in the region increased approximately 38 percent with greater earnings in manufacturing, government, and the wholesale and retail trade sectors accounting for most of the absolute growth. In general, the region experienced growth in total value added and total wage and salary payments in the decade from 1958 to 1968.

Rapid growth in manufacturing absorbed a large reservoir of unemployed labor and helped to stabilize the region's economy, tax base, population and institutions. The new plants which helped produce this rapid growth were attracted to the area primarily by the quantity and quality of available labor, proximity to large metropolitan markets and a modern highway network.

1. Pre-Flood Conditions

The economic development of the region continued to be strong during 1971 while the nation as a whole experienced a slow year for capital expenditures for new plants and equipment. During this time Luzerne County accounted for the greatest growth of new plants in the region and also ranked first regarding total new projects (new plants plus expansion). The projects in Luzerne County were expected to result in 2, 134 new jobs, almost 40 percent of the region's total. Luzerne County also led the Commonwealth in the number of PIDA

(Pennsylvania Industrial Development Authority) financed projects, ranked fourth in loan commitments, fifth in both project cost and planned employment, and tenth in estimated payroll. While the overall economic situation was steadily improving, unemployment in the study area was still fairly high (7 to 8 percent) and the area was therefore eligible for Economic Development Administration (EDA) funds. Because of the type of job opportunities available, salaries were low and many households depended on two primary wage earners for total household incomes. An important factor accounting for the relatively low average wage level in manufacturing was the heavy reliance on low-wage, nondurable goods industries.

2. Post-Flood/Existing Conditions

Although unemployment temporarily jumped to 22 percent after the flood, employment levels were then reestablished and sustained at a high level due to flood recovery jobs. With the exception of the Interstate Bakery in Kingston with about 500 employees, no large businesses closed after the flood. It is expected that many marginal businesses will not reopen, but local opinion indicates that this will not hurt the overall business community and will rather serve to strengthen the remaining viable businesses.

Since most of the larger industries are located outside the flood plain, the flood did not severely damage the economic base of the area. Many of the smaller firms that suffered extensive damage have applied for Small Business Administration low interest loans and grants to restore their businesses.

3. Projected Conditions Without Project

Although the tremendous damage caused by "Agnes" is a temporary setback to the continuing economic development of the region, the data for 1971 reflect a strong record of accomplishment for the industrial development agencies of the region. This strength will aid not only in a speedy recovery from the effects of the disaster but also in the continued growth and diversification of the region's economic base in the future.

Since the mid-sixties the evidence of an economic recession has been reversed and the labor force is expected to grow from about 360,000 in 1971 to over 370,000 in 1980. While almost all the job growth in the 1960's was in manufacturing, nearly two-thirds of the growth in the 1970's and beyond will probably be in services (such as banking, insurance, utilities, tourism, etc.). It has been projected that increasing employment, diversification of jobs, more new industries

paying higher wages, more male jobs, increased union pressure and decreasing unemployment percentages will result in a fast rise in income.

Even if the flood control system in the study area is not improved, these projected economic developments will still occur in all likelihood. The fact that very few businesses are leaving the area because of the flood lends support to the local feelings that the level of confidence in the economic potential of the area is, and will remain, high.

III. THE ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

A. Environmental Conditions

1. Geology and Soils

a. Major Land Features

There will be no significant adverse or beneficial impacts of the project on major land features of the Wyoming Valley.

b. Mines

With the possible exception of the mine water and subsidence problems, most of the aspects of mining in the Wyoming Valley are only remotely related to the project. Therefore no discernable project impacts will occur. Project impacts related to mine water and subsidence are discussed in the section on Water Resources.

c. Land Resources

The impact of the project on surface land resources will be to encourage development in vacant areas areas adjacent to existing development near the Susquehanna River. Other than the use or displacement of existing land resources that this would entail, no significant effects related to development are anticipated in more outlying areas.

Another impact wo uld be the use of extenxive amounts of earth fill and other materials of construction for the new levees. The amount of fill required will depend upon the type of construction used. Source of material will be dependent on quality, which may or may not mean borrow areas in Wyoming Valley will be used.

2. Water Resources

a. Surface Water - Drainage

Probable beneficial impacts of the project on surface water resources include increased river control during periods of high water, drainage control of local tributary streams, and the increased possibility for stabilization of ground water discharges. Probable adverse effects of the project would include the additional costs involved in providing the ancillary control features such as increased heads at pumping stations, especially for the local streams. In addition, greater control of the river flow in the Wyoming Valley would increase the possibility of future flooding in upstream and/or downstream areas during periods of heavy rainfall. A short-term adverse impact may be the creation of turbid conditions in the Susquehanna River where riverside landfill construction is required adjacent to the river.

b. Ground Water

Probable impacts of the project on ground water resources are likely to be limited to effects on the mine pools during periods of extremely high water. If the project is adequate to contain future flood levels, if seepage from the flood plain is not a problem, and if the surface water drainage system is adequate during periods of flooding, stabilization of the mine pools and subsequent control of surface damage from these underground pools should be possible under almost any circumstances. Inadequacy in any of these areas would allow the past problems associated with uncontrolled mine pools to occur in the future.

c. Water Quality

Major adverse impacts of the project on water quality will occur mostly during construction of the new flood control facilities, and could include increased turbidity where the existing waterways are directly affected and possible pollution with debris or other byproducts of construction. These impacts will be of a short-term nature only. Because of the complex nature of all the related water and waste control features in the valley, careful integration of the project with these features will be necessary to avoid undesirable secondary project effects. Control of erosion will have the effect of reducing siltation problems, although as a secondary effect, this problem may increase in downstream areas. There may be problems, however, with siltation due to potential erosion if earth rather than sheet pile levees are constructed especially where the levees abut the river. Use of stone riprap on the exposed slopes will reduce this potential.

d. Flood Control

From the standpoint of flood control the most immediate and significant impact of the project will be greatly increased confidence that the levees will be sufficient to prevent future devastating floods in Wyoming Valley. In addition to this obvious benefit, better control of ancillary factors such as surface and tributary runoff, pumping and impounding due to new or improved facilities will be possible.

Possible adverse effects of the project, from the standpoint of flood control, will be a shifting of the floodwater problems to upstream and/or downstream areas which may or may not have adequate protective structures. Construction during high water should be avoided.

e. Water Use

The project will have no impact on the supply of potable water for the Wyoming Valley, but will affect recreational and aesthetic uses of the Susquehanna River. If sheet piling is used to raise the levees, access to the river and flood plains for recreation will be highly restricted, especially in park areas, and aesthetic impacts will be the most adverse. Where earth fill is used, recreational use of the river may not be restricted with proper design and the adverse aesthetic effects will be less severe. Impacts related to recreation and aesthetics are further considered in the following section, Land Use in the Immediate Impact Area, under "Socio-Economic Considerations."

3. Atmosphere

a. Climate

There is no discernable significant relationship between the project and local climate, hence no impacts are expected. A secondary effect related to weather may be altered conditions for the drainage of rain water and for snow-removal, but the costs and benefits of this are likely to balance each other over the study area.

b. Air Quality

The only probable impacts of the project on air quality will be short-term in nature, and will include pollution emissions during construction of the levees and the possible burning of accumulated construction refuse, if considered necessary and permitted.

4. Fish and Wildlife

Overall, the probable impacts of the project on wildlife of all types are not likely to be extensive. The most sensitive areas are the location of existing wildlife habitats in the study area. Probable impacts of the project on these areas include increased protection from inundation of mammal and bird habitat areas not located in the flood plain, and depending upon the type of construction used, effects related to isolating habitat areas from nearby development.

Raising the levees will tend to separate habitat areas from adjacent existing development or areas of intensive use, such as in Kirby and Nesbitt Parks adjacent to residential areas of Kingston Borough. If sheet piling is used, however, natural animal paths may be blocked. A beneficial effect of earth levees may, on the other hand,

be eventually an increase in potential nesting or feeding areas for certain species. No significant adverse or beneficial effects on fish are expected.

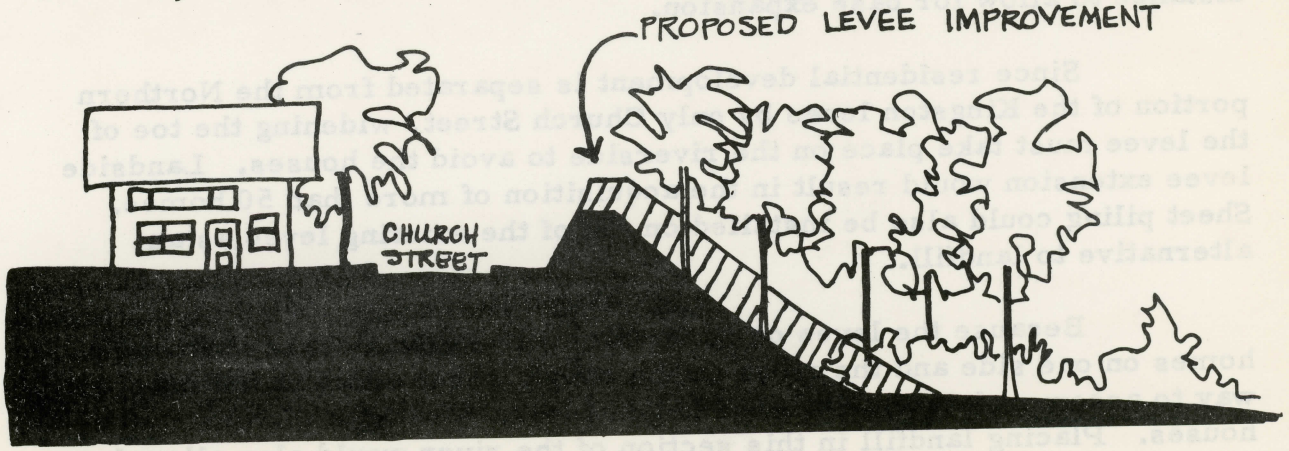
Possible short-term adverse effects on wildlife are likely to occur during construction of the project, especially in areas with a proximity to potential habitats. Clearing, grubbing, borrowing, or other operations could disturb or destroy feeding and nesting areas, and noise from the construction machinery might tend to frighten away animals and birds. Timing of the construction activities could also be critical. The potential adverse effects on wildlife during nesting periods would be the most severe.

5. Vegetation

Overall, the probable impacts of the project in the study areas are not expected to be significantly harmful to vegetation. Besides the increased protection afforded to vegetation outside the flood plain, more area for growth and use for habitats or as an aesthetic feature on the levees will be provided.

Some adverse effects may occur in the process of constructing the levees. Besides the temporary disruption caused by construction machinery and activities, raising the levees using earth fill will require the taking of some trees in adjacent areas. Kirby and Nesbitt Parks, the undeveloped area to the north of the park in Kingston and especially River Commons park would be seriously affected in this manner. Other possible adverse effects of a secondary nature may occur. These could include the acceleration of new development in agricultural and other open space areas and the transference of flood water discharges to areas further downstream. These adverse effects, however, are not expected to be of major significance in the study area.

The sketch below illustrates how the proposed project could affect adjacent foliage in Kingston Borough.



B. Socio-Economic Conditions

1. General Development: Wyoming Valley Project Study Area

As the proposed project would provide flood protection for a storm of at least the magnitude of the recent Hurricane "Anges" flood, thereby defining the flood plain as "that area between the levees", its approval will remove a major constraint to renewal planning and project funding approvals in most of the valley. Two of the municipalities which have submitted applications currently have no flood protection at all and as the proposed project only provides for increased protection in the areas already protected, the flooding situation in these towns will be unimproved.

2. Immediate Impact Area Land Use

a. Residential

An influx of urban renewal money will help return residential areas to their pre-flood condition and, with proper planning, may help upgrade them. The specific local effects of the project on the immediate impact area depend on the manner in which the levees are raised. If sheet piling is used there may be an adverse aesthetic impact, but no homes will be dislocated. If the levees are raised by landfill, some homes might be acquired to provide the area needed to extend the base of the levee on the landside to support the additional height.

The levee in Plymouth may be raised and if landfill construction is used, approximately five homes may have to be acquired. The alternatives to this action are to extend the levee completely on the riverside or to use sheet piling.

Raising the levee in Edwardsville will not have an impact because the residential area is separated from the levee by sufficient distance to allow for base expansion.

Since residential development is separated from the Northern portion of the Kingston levee by only Church Street, widening the toe of the levee must take place on the riverside to avoid the houses. Landside levee extension would result in the acquisition of more than 50 homes. Sheet piling could also be installed on top of the existing levee as an alternative to landfill.

Because the levee on River Street in Forty Fort is abutted by homes on one side and the river on the other, sheet piling is the only way to accommodate the required height increase without disturbing the houses. Placing landfill in this section of the river would also allow for the necessary levee improvements without causing disruption.

The levee extending west from the river along Abrahams Creek, crossing Wyoming Avenue and going past the Delaware Lackawanna Railroad will need additional height. With the exception of two houses west of Wyoming Avenue immediately adjacent to the levee, enough land seems to be available to accommodate landfill construction. Although it may not be required, sheet piling is a possible alternative to landfill.

Because the Exeter segment of the levee is abutted by several homes plus commercial and industrial areas, landfill would involve a considerable amount of disruption. In this case, sheet piling seems to be the only alternative with no disruption because there is no land available for riverside levee base expansion.

The only residential area on the east side of the river that will be affected by the project is the Riverside Drive section in Wilkes-Barre. Since the levee abuts the river on one side and Riverside Drive on the other, landfill could interfere with the houses facing the levee by eliminating their access if it is added on the landside rather than the riverside of the levee. Sheet piling would not physically detract from the residential area, but would impair views of the river and could detract from the area's status, possibly decreasing the market value of the homes. Conversely, by virtue of the increased protection, market values might increase.

b. Commercial and Industrial

If the levees are raised to a height sufficient to protect the area from another flood similar to the one caused by Hurricane "Agnes", the area will become eligible for urban renewal programs, including assistance to industrial and commercial concerns. Returning the area to its former "flood free" condition may also help build confidence in the area for future business development.

Since the levee in Plymouth requires only moderate raising, there will probably not be a significant impact on existing commercial uses although a fairly large lumber yard is located immediately adjacent to the levee near the Breslau Bridge. Raising the levee could be accomplished by using landfill on the riverside or by placing sheet piling on the existing levee.

The Edwardsville segment of the levee also only requires a moderate raising. A restaurant is located adjacent to the levee immediately west of Wyoming Avenue. If riverside expansion is not feasible, sheet piling can be used to add the height and avoid dislocation.

Although the Kingston levee will probably need to be raised, it will not have an impact on any commercial or industrial areas if the landfill can be placed on the riverside of the levee or if sheet piling is used.

In Forty Fort and Wyoming, there are no commercial or industrial establishments in the immediate impact area.

Adjacent to the Exeter portion of the levee is a considerable amount of commercial and industrial land including oil tank farms and stores such as convenience goods, auto dealers, and restaurants. Since railroad tracks abut the levee on the riverside thereby prohibiting expansion in this direction, landfill construction would displace large and permanently fixed structures while sheet piling would avoid dislocation.

c. Recreation and Open Space

Since the Plymouth levee only requires a slight height increase, it will have minimum impact on the site of the proposed housing development. The levee abutting the proposed park in Forty Fort will need a moderate increase however, and may have an adverse impact on the park development. Landside base expansion may preempt some of the proposed park land if landfill construction is used, while using fill in this section of the river would significantly minimize the impact. The increased heights under any construction method may eliminate access to the river thus preventing the inclusion of boating marinas in the park plan.

The height increases on the west side of the river in Wilkes-Barre will have a significant impact on the development of Kirby and Nesbitt Parks. Plans for the redevelopment of the heavily used Kirby Park include activity areas on both sides of the levee. If landfill is used it could easily be integrated into the park design, but if this is not done well, the levee might be perceived as a barrier by park users and valuable recreation space may still be lost. Sheet piling would effectively eliminate almost all possibilities for access across the levee, and would also be incompatible with a park environment.

Although development is not proposed for the riverside of the levee in Nesbitt Park, raising the levee will still have an impact on the park. Again, if landfill is used, it could be blended into the park design while sheet piling would stand out as a more obvious wall enclosure.

Raising the levee in Wilkes-Barre proper will have an impact on the River Commons since it will emphasize the separation of the park and the river, possibly changing the very nature of a park that was developed to take advantage of the river amenities.

d. Public and Semi-Public Facilities

If the flood control system is expanded, the financial future of the Sanitary Authority will be substantially improved. As homes are rebuilt under the urban renewal program and the pre-flood income level from the sewer rental charges is regained, the Sanitary Authority will be in better financial condition.

The flood control project will not affect any of the other facilities significantly although some new facilities may be constructed as part of the urban renewal plans.

3. Aesthetic Considerations

Raising the levees with either landfill or sheet piling will have a significant aesthetic (i.e. visual) impact in many of the areas along the levees. Since the additional height required to prevent a flood similar to Hurricane "Agnes" varies from levee to levee due to different land elevations, flow characteristics, and the effects of subsidence, the resulting visual impact will also vary accordingly. The following discussion explains the proposed flood protection actions for each levee section and the probable aesthetic impacts that may be expected.

The levee at Exeter may be raised considerably. If additional landfill is used, either a residential area on the landside or railroad tracks on the riverside or both would be dislocated. If sheet piling is used, neither use would be physically disrupted but the backyards of four to six homes would be enclosed by a metal wall and the river view would be more obstructed than it is with the existing levee.

The section of the Wyoming levee running west from the river along Abrahams Creek, crossing Wyoming Avenue and extending across the Delaware Lackawanna Railroad may be raised. Since none of the homes in this area are near the river, higher levees would not obstruct the river view but they could, nevertheless, have an adverse aesthetic impact. If landfill construction is used, two homes west of Wyoming Avenue may be dislocated but the levee would still be an earth mound with a vegetative ground cover.

The levee running parallel to the Susquehanna River from north of the airport in Wyoming to the Forty Fort Cemetery will be raised. With the exception of the proposed park area between the cemetery and the airport, either type of levee raising will have a very minor aesthetic impact. There are no residences located near this section of the levee and the land is not presently used for recreation. When the park is developed, the levee may have an aesthetic impact although the effects of landfill construction would be considerably less severe than sheet piling since it can be more easily integrated with park development.

The remainder of the levee in Forty Fort runs along River Street from the cemetery to the area of Butler Street. If landfill is placed in the river to accommodate the levee base expansion, the aesthetic impact may be somewhat less severe than if more sheet piling is added. Since sheet piling is presently part of the earth levee, river views are already obstructed and backyards enclosed. The additional amount needed would then increase the degree of the visual impact rather than create a new obstruction.

The Kingston portion of the levee (extending from Rutter Avenue to the North Street bridge along Church Street) may be raised significantly. Levee raising in the section between Rutter Avenue and the Wilkes-Barre Connecting Railroad bridge will add to the obstructed view from the homes on Church Street. Using landfill will require the acquisition of some heavily wooded land to avoid dislocating homes and this reduction in wooded area would have a visual impact for those people using this side of the levee for recreation, as well as for persons who previously viewed the area from their homes. Substituting sheet piling for landfill would eliminate the need for land acquisition but would have a significantly worse visual impact. In addition, this solution would not allow passage over the levee, thus restricting the opportunities to view any aesthetic amenities on the riverside.

Using either method of levee construction would have a minimal aesthetic impact on the section between the railroad bridge and the North Street bridge in Kingston. No residential areas front the levee and the adjacent open space is not used for recreation. The only differences would be the sheet piling limiting access to, and thus the view of, the river, and any feelings that sheet piling may be less attractive than earth walls.

The levee extending from the North Street bridge down to the Wilkes-Barre Connecting Railroad bridge on the west side of the river goes through Nesbitt and Kirby Parks in Wilkes-Barre. Since the planned park development includes the levees, either method of raising the levees to the required height could have an adverse aesthetic impact.

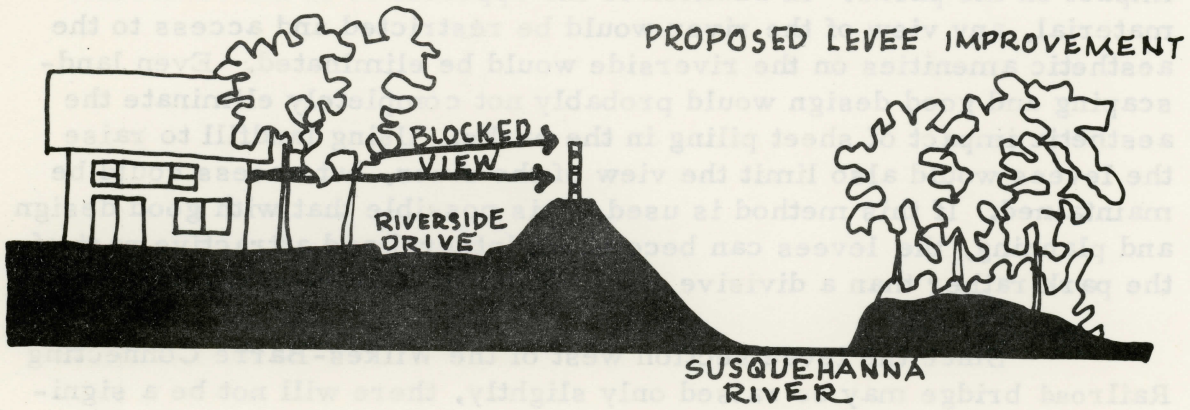
If sheet piling is used, the levee will have a severe aesthetic impact on the parks. In addition to the appearance of the construction material, any view of the river would be restricted and access to the aesthetic amenities on the riverside would be eliminated. Even landscaping and good design would probably not completely eliminate the aesthetic impact of sheet piling in the parks. Using landfill to raise the levees would also limit the view of the river, but access could be maintained. If this method is used, it is possible that with good design and planning, the levees can become an integral and attractive part of the park rather than a divisive and visually disruptive element.

Since the levee section west of the Wilkes-Barre Connecting Railroad bridge may be raised only slightly, there will not be a significant aesthetic impact here. There is no residential development adjacent to the levee and no view of anything in particular to be obstructed. Although additional landfill would be less noticeable than sheet piling, neither method would seriously diminish aesthetic quality.

The levee in Plymouth may also need to be raised. Although there is residential development quite near the levee, the existing earth mound has already obstructed the view of the river and enclosed abutting areas. Again, additional landfill would have less of a detrimental visual impact than sheet piling.

In Wilkes-Barre proper, the levee section between the North and Market Street bridges may be raised considerably. The required height increases will have a major aesthetic impact in this area. The River Commons, including Colonel Everett Smith playground, will be visually separated from the river. The use of sheet piling would enclose the park and change the character of this open space. Since it would be difficult to cosmetically disguise the additional levee height, the visual impact would be rather abrupt. If landfill is used, however, the aesthetic impact would be somewhat less intense. Although the additional height would still eliminate the river view, the levee itself could be landscaped and designed to fit into the existing park scheme.

The levee along Riverside Drive in Wilkes-Barre will require additional height. If sheet piling is used, none of the residents along this street will be able to see the river from the first and possibly the second floor levels. In addition to eliminating the view, sheet piling would visually degrade an area formerly characterized by large and attractive homes. Although landfill would still eliminate the same view, the levee could be landscaped to lessen the visual impact although no landscaping other than grass or walkways would be allowed on the levees.



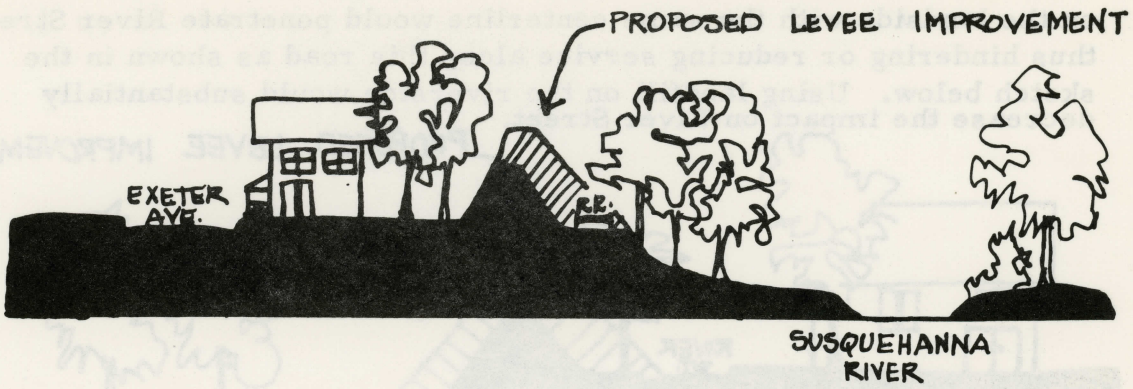
From the Wilkes-Barre Connecting Railroad bridge south to the end of the levee in Hanover Township, the levee gradually slopes from a moderate increase to no increase. Since most of this land is undeveloped open space with few homes near the levee, the required increases will not have a significant aesthetic impact. Because the area is undeveloped and overgrown with grass and weeds, raising the levee with landfill would allow it to take on the character of the existing terrain. If sheet piling is used instead, the levee will be much more evident.

An additional impact related to levee aesthetics where improvements are proposed concerns future use of the levees as walkways. This use, from an aesthetic standpoint, would be most viable where the levees are raised using earth fill rather than sheet piling.

4. Transportation Facilities

a. Exeter Borough

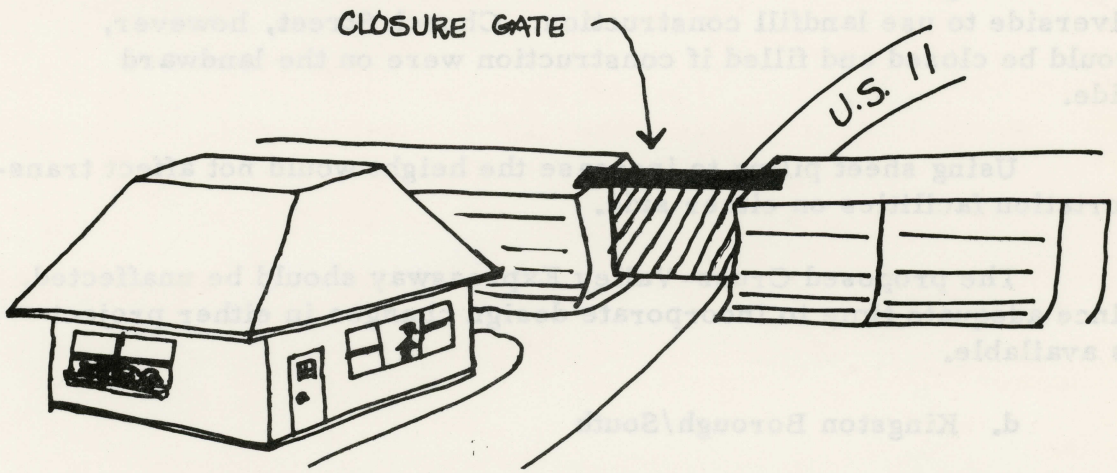
The levee section in Exeter will be increased considerably. If the centerline of this levee remains constant, a horizontal landfill on both sides of about 25 feet may be incurred. This could remove the land shelf the railroad is located upon as shown in the sketch below. Relocation in some manner would be necessary for the railroad. Movement of the centerline to the riverside would cause increased problems with the railroad.



An upward extension of the levee using sheet piling or expansion to the landside would physically leave the railroad untouched.

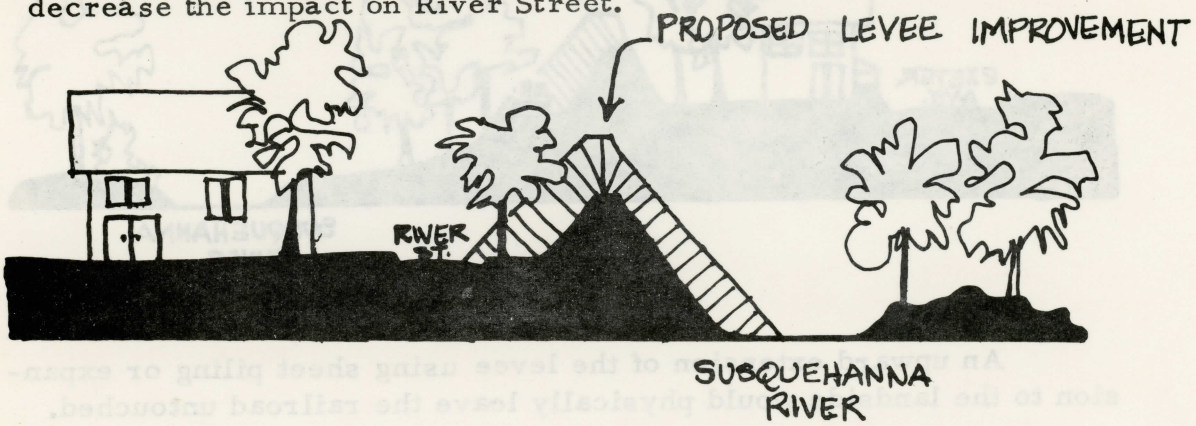
b. Wyoming Borough/Forty Fort Borough

The levee running parallel to Abrahams Creek and then south along the river to Forty Fort will be raised moderately. Where Wyoming Avenue - Route U.S. 11 presently crosses the levee, there will be no increase in the roadway elevation. This will mean that in time of flood conditions a closure structure will be used to seal the opening in the levee.



The Wyoming Valley Airport uses a north-south runway which at its northernmost point is approximately 1000 feet inside the levee. The increase in levee height will not affect airport operations. An additional increase of 25 feet would be needed to penetrate Approach Zone airspace.

Along River Street in Forty Fort an increased landfill levee on the landside with the same centerline would penetrate River Street, thus hindering or reducing service along this road as shown in the sketch below. Using landfill on the riverside would substantially decrease the impact on River Street.



If sheet piling rather than landfill is used where Wyoming Avenue crosses the levee, a closure gate will still be required. There will be little difference in impact. The same conditions would also apply to the Wyoming Valley Airport. River Street in Forty Fort would be unaffected by sheet pile construction.

c. Kingston Borough/North

The levee section running from Rutter Street to the North Street Bridge will be raised. There is sufficient room to the riverside to use landfill construction. Church Street, however, would be closed and filled if construction were on the landward side.

Using sheet piling to increase the height would not affect transportation facilities on either side.

The proposed Cross-Valley Expressway should be unaffected, since adequate time to incorporate design changes in either project is available.

d. Kingston Borough/South

The levee section between North Street Bridge and the Market Street Bridge will be increased moderately. Fill to the land side would probably take some of the parking area at the nearby motel. Sheet pile construction would leave intact all transportation facilities.

e. Kingston Borough/Wilkes-Barre City

Both the North Street Bridge (or its replacement) and the Market Street Bridge may penetrate the new levees and require closure gates for the North Street bridge and sandbags for the Market Street bridge.

f. Wilkes-Barre/Kirby Park

Internal movement in the park may be affected by a sheet pile project as penetration to the river side would not be possible. Should the increased levee height be a result of a landfill operation, vehicular access to the river side could be maintained.

g. Edwardsville Borough

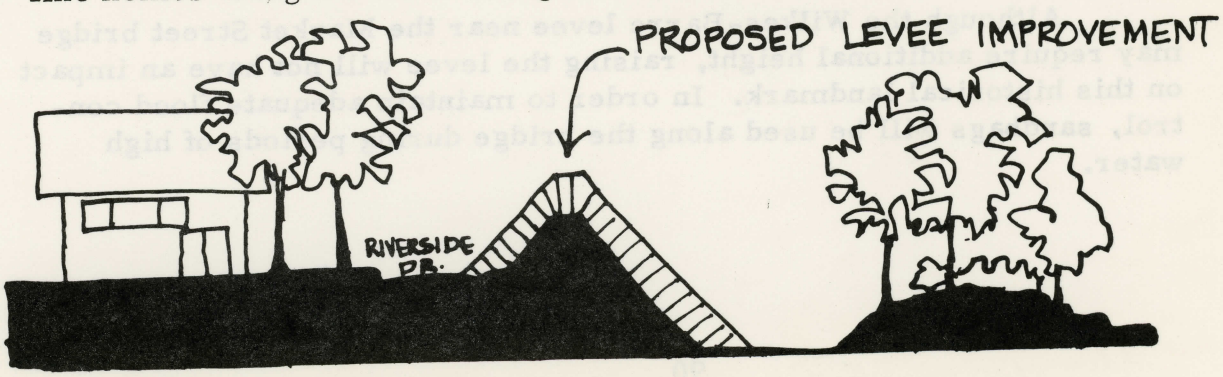
A moderate increase along this levee section will take place. Neither landfill nor a sheet pile construction would severely impact transportation facilities. The Wilkes-Barre Connecting Railroad bridge would be a few feet below the top of the levee. The same is true for Wyoming Avenue. Either a closure gate or a sand bag closure during time of flood conditions will provide protection.

h. Plymouth Borough

A slight to moderate increase along the levee section in Plymouth will not affect local roads. Only the Breslau Bridge, currently closed, penetrates the levee below its new height. Closure gates or sand bagging will close this route in time of flooding.

i. Wilkes-Barre

The levee section along Riverside Drive will be raised. Landfill construction with an increase along the existing levee centerline would cover Riverside Drive, leaving no access to many fine homes along the river's edge. See sketch below.



Filling on the riverside would probably allow for the increase in levee height without disturbing access along Riverside Drive. Sheet pile construction will preserve Riverside Drive and the necessary local access.

j. Wilkes-Barre/Hanover Township

South of the Wilkes-Barre Connecting Railroad bridge on the Wilkes-Barre side of the river the levee will be raised approximately slightly. No local roads in the impact areas should be affected.

Both the Breslau Bridge and the Carey Avenue Bridge may penetrate a few feet below the adjusted levee height. Closure gates or sand bag operations will necessitate closing the bridges during extreme flood conditions.

The anticipated river crossing of the Wyoming Valley Expressway should not be affected by the Project.

Plans for this route have not been established and therefore levee improvements can be incorporated into future plans.

5. Historic Landmarks

Raising the Forty Fort levee abutting the cemetery with either landfill or sheet piling will not directly affect the Forty Fort Meeting House. Since the levee may require an additional seven feet of height, it is possible that the toe of the levee could encroach upon the area surrounding the Meeting House if all the fill is placed on the landside of the levee, although this is a highly unlikely possibility.

Since Kirby Hall, Sterling Hall, Weiss Hall, McClintock Hall and the George Catlin House are all on the east side of River Street in Wilkes-Barre, raising the levees by either construction method will not have an impact on these buildings. It is also unlikely that raising the levees will affect the Luzerne County Court House because it is protected by a sizeable parking lot.

Although the Wilkes-Barre levee near the Market Street bridge may require additional height, raising the levee will not have an impact on this historical landmark. In order to maintain adequate flood control, sandbags will be used along the bridge during periods of high water.

If landfill is used to raise the levee along the River Commons an additional increment, the project will definitely have an impact on historic landmarks. Since there is little space available for levee expansion on the riverside, a considerable amount of space would need to be acquired on the landside. In addition to land acquisition, expansion could also cover those historical areas presently noted by plaques or stone markers. If sheet piling is used instead of landfill, the project will only have an aesthetic impact on the site.

6. Tax Revenues and Property Values

As previously discussed the project will facilitate urban renewal approvals for financial restoration assistance. This money is necessary to rebuild the damaged areas so they can be returned to their pre-flood conditions and values. In addition, improving the flood control system can only serve to increase the level of confidence in the stability of the local economy. Before the flood, property in the Wyoming Valley was highly marketable because of the shortage of land available for new development, and there is no reason to believe that this will change if adequate flood protection is provided. Local agencies and officials recently interviewed have indicated that few people are failing to return to renovate their homes and if this confidence level remains high, it is likely that existing home and property values will show an increase over time.

The proposed levee improvement program could cause a slight decrease in the tax base of several municipalities, if property acquisition is necessary for project construction. However, the amounts of acquisition anticipated are relatively small and this short-term negative effect would eventually be more than compensated for by the expanded tax base that would be created by new development and restoration.

7. Economic Conditions and Employment

Improving the flood control system in the study area will help future economic development. Protecting the study area from another flood of record will further boost the level of confidence with regard to new development.

Raising the levees will be particularly advantageous for the small businesses that were located in the area before the flood. Although these firms may be eligible for Small Business Administration

low interest loans and grants, the loans may not be sufficient to restore the area to pre-flood conditions. If, however, the valley is considered to be protected, the municipalities will be eligible for urban renewal money. This influx of funds will aid the business community both directly and indirectly. As the study area is restored, the economic vitality will improve in a corresponding manner.

C. Specific Impacts

1. Beneficial Impacts

The project will increase river control during periods of high water, thereby greatly improving flood protection for the Wyoming Valley inhabitants. In addition, drainage control of local tributary streams and the possibilities for stabilization of ground water discharges will be increased. The improved flood protection afforded by the project should provide sufficient assurance to the Federal and State governments that the possibility of future flood recurrence is highly improbable, thereby removing a major obstacle to the approval of Federal urban renewal area restoration grant applications submitted by 14 of the valley municipalities. This improved protection should also restore confidence in the area and encourage property owners to repair or rebuild their homes and businesses. Indirect net effects will be the eventual restoration of local property values and municipal tax bases to at least pre-flood levels and an improved financial outlook for the Wyoming Valley Sanitary Authority.

In the long run, it is possible the long-term effect of the proposed project will be better quality control of sewage and mine acid discharges due to redesign or elimination of substandard discharge facilities. Also, control of erosion will have the effect of reducing siltation problems.

The increased levee heights will, in at least three locations, have a beneficial barrier effect. In Exeter, a new, higher level will shield those homes on the landside from the Delaware Lackawanna and Western Railroad located on the riverside, thereby acting as a noise buffer. Increased levee height in Wyoming will aid in isolating the ecologically valuable Abrahams Creek and island areas north of the levee from the Wyoming Valley Airport and other developed areas to the south, thereby protecting and preserving natural habitats from

noise pollution and general urban encroachments. A higher levee will serve the same barrier function for several natural habitat sections in Kingston. Earth levees may also increase potential nesting or feeding areas for certain species.

Finally, it is possible that through landscaping and design improvements, the aesthetic quality of levees might be improved over existing conditions in certain locations. Opportunities for aesthetic improvement include levee sections in Exeter (adjacent to the residential area), Forty Fort (near the proposed park), Wilkes-Barre on the west side of the river (bordering Kirby Park) and Wilkes-Barre on the east side of the river (bordering the River Commons). These benefits are not automatic, however, and must be deliberately planned and incorporated into the final design of the project before they are realized.

2. Adverse Impacts

There are several generally adverse impacts which apply to most or all of the project study area.

First, the scope of the project, which includes only the improvement of existing levees, will leave several communities which presently have no flood control facilities unprotected from future flood recurrence. In addition, greater control of the river in the Wyoming Valley study area municipalities will create adverse impacts in the form of increased flooding potential for upstream and/or downstream communities during periods of heavy rainfall until supplementary flood protection measures can be undertaken.

Second, additional costs must be incurred to provide ancillary control facilities such as increased heads at pumping stations and to provide the necessary closure structures for existing and proposed roads.

Third, there maybe undesirable impacts during the construction process, including noise and air pollution, dust, and dirt from construction machinery, increased turbidity of surface waters where they are directly affected, and the possible impediment of traffic in certain places. These impacts may be expected to occur periodically during the construction stage, which is expected to last one year or less. Measures will be taken to prevent other possible adverse effects such as encroachment on areas adjacent to construction sites, spilling of debris and other by-products into the river, erosion, siltation, subsidence, and the creation of unstable earth fills.

Other construction impacts are the disturbance or elimination of feeding and nesting areas due to clearing, grubbing, borrowing and other operations, and the possibility of noise frightening away birds and animals. The latter could be especially disruptive if construction is undertaken during nesting periods.

In addition to the general possible adverse impacts described above, the project will result in a number of specific, local area impacts, depending on the method of construction utilized. In general, if landfill construction is used, the negative effects will be primarily associated with land acquisition and disruption of existing or proposed development, with consequent effects on property values and the local tax base and occasionally, the elimination or impediment of access; sheet pile construction, on the other hand, causes detrimental effects on aesthetic amenities, access, and, occasionally, the environment. A summary of the tradeoffs anticipated, by levee location, is shown in the Table 6 below.

TABLE 6. PROBABLE ADVERSE PROJECT IMPACTS

Levee Location	Method of Construction		
	Landfill on Riverside (or West Side)	Landfill on Landside (or East Side)	Sheet Piling
Wyoming, Exeter, Swoyersville	relocation of Delaware Lackawanna and Western Railroad near Hicks Creek; partial filling of Abrahams Creek diversion channel	possible acquisition of oil tank farms, businesses such as convenience goods distributors, auto dealers, and restaurants, and approximately 10 homes; possible acquisition of 2 homes and farm land	negative aesthetic impact on 10 homes near levee; could impede access to river where there is some fishing activity; negative aesthetic impact to homes along Colonial Drive; alteration of natural character of area; could restrict wildlife movements

TABLE 6. (Continued)

Levee Location	Method of Construction		
	Landfill on Riverside (or West Side)	Landfill on Landside (or East Side)	Sheet Piling
Forty Fort -	water turbidity during construction	could require acquisition of up to 35 linear feet of proposed park; could take or restrict River Street; possible acquisition of 15 or more homes in vicinity of River Street	severe negative aesthetic impact on proposed park; elimination of access from proposed boating areas; negative aesthetic impact on Forty Fort Cemetery, proposed mini park and monument adjacent to cemetery, and the historic Forty Fort Meeting House; severe aesthetic impact on approximately 30 homes in River Street area; could restrict wildlife movements
Kingston-Wilkes-Barre -	acquisition of Nesbitt parkland, including disruption of a wooded area, proposed parking areas, and an access road; acquisition of Kirby Park land; short-term adverse effect in Nesbitt Park of removing vegetation and therefore, natural habitats (could cause a slight change in balance and distribution of	possible acquisition of Holliday Townhouse Motel (or would constitute a severe aesthetic impact on this business) and another structure; acquisition of a dirt road adjacent to levee; acquisition of Kirby Park land; would require closing of Church Street; possible acquisition of more than 50 homes, a shopping area, a restaurant, a	adverse aesthetic impacts on Nesbitt and Kirby Parks; severe barrier between two sections of Kirby Park; could restrict some pedestrian access to Nesbitt Park from nearby residential development; would restrict wildlife movements in Kirby Park

TABLE 6. (Continued)

Levee Location	Method of Construction		
	Landfill on Riverside (or West Side)	Landfill on Landside (or East Side)	Sheet Piling
Kingston-Wilkes-Barre - (continued)	wildlife as marshy areas are replaced with grassy areas with less vegetation)	car dealer, and a Department of Public Works facility	
Edwardsville -	temporary removal of trees, plants and various forms of wildlife	could require acquisition of adjacent restaurant and pumping station	would alter character of area and restrict certain recreational uses of levees
Plymouth -		possible acquisition of a lumberyard and approximately 6 homes; possible conflict with proposed housing sites; possible acquisition of pumping stations; could require lengthening of stream conduits	adverse aesthetic impacts for 6 homes immediately adjacent to levee; possible adverse impacts on proposed housing
Hanover -			would constitute a barrier for wildlife between impounding basin and the river; incompatible with natural environment

TABLE 6. (Continued)

Levee Location	Method of Construction		
	Landfill on Riverside (or West Side)	Landfill on Landside (or East Side)	Sheet Piling
Wilkes-Barre	water turbidity during construction	would close Riverside Drive, thereby prohibiting access to adjacent homes, possible acquisition of homes; would cover historic monuments in ground of River Commons; acquisition of parking lot of Court House	severe aesthetic impact on historic River Commons and complete alteration of beauty and character of this facility; severe aesthetic impact to homes on Riverside Drive and possible related decrease in property values

D. Steps Taken By Sponsor To Eliminate or Ameliorate Adverse Impacts

Adverse impacts may be assigned to two areas: Interim – during the project construction phase; and, Permanent – following project completion.

1. Interim

a. The construction area will be approached via public rights-of-way or over publicly owned land. No private land will be so utilized without obtaining appropriate approvals. This practice will minimize inconvenience on private activity in the vicinity of the project.

b. Unless required by the force of circumstance, no construction activity will take place at night.

c. Contractual controls will be exercised on the use of heavy machinery on streets and thoroughfares in order to minimize interference with traffic. Standard Corps of Engineers safety provisions for construction equipment will be employed.

d. To the extent possible the utilization of construction equipment and techniques which make noise, raise dust and spread dirt, will be avoided. When required, dust pallatives will be used.

e. The site of the work will be limited in order to minimize damage to the landscape.

f. No toxic or water polluting chemicals or additives such as defoliants will be utilized.

g. During the course of construction all efforts will be made to protect exposed earth and levee slopes in order to prevent erosion and siltation. Banks will be seeded immediately and the seeding will be protected by a layer of straw.

h. During earth moving operations close to the water, all soil and fill will be handled in such a manner so as to prevent spills of material into the river. Following the placement of such fill, effective compaction techniques will be utilized.

i. A sub-surface study program will be conducted prior to the initiation of the project to protect against the adverse effects of subsidence, collapse, or the creation of unstable earth fills.

j. The feasibility of scheduling construction during off-nesting periods will be considered.

2. Permanent

These adverse impacts are related to acquisition of private property and the displacement and relocation of private interests from it; and, the manner of integration of Federal, local and private improvements. Environmental considerations identified in this Statement will be of major importance in the project decision-making phases. The tradeoffs involved in each landfill vs. sheet pile issue will be carefully weighed, and, wherever possible, choices will be made on the basis of impact minimization or elimination. In addition, a public hearing will be held describing the adverse impacts and providing the citizens an opportunity to become familiar with alternative solutions. Additional community meetings may be held in areas which may be affected by various protective works. When it is possible that a project

improvement can be enhanced by the action of another public agency (state program, urban renewal, etc.) cooperation with that agency will be extended appropriately.

Specific and presently recognized adverse impacts will be approached as follows:

Appropriate relocation procedures will be followed in the event of displacement.

Where sheet piling is utilized, its negative aesthetic impact will be minimized by planting and camoflage.

Integration of project improvements with parkland, cemetery and other sensitive areas will be attempted by landscaping and urban design techniques.

Waterfront access problems will be carefully considered.

A comprehensive study of the proposed project's relationship to the River Commons area in Wilkes-Barre will be undertaken in an attempt to ascertain construction and design solutions which will minimize disruption of this important historic and recreational resource.

IV. ANY ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

Because the flood control system can be improved by the use of either steel sheet piling or landfill, there are different adverse impacts associated with each method in addition to those related to the project in general.

Because raising the levees results in greater control of the river discharge in the Wyoming Valley, other areas may be adversely affected during periods of severe flooding. The project will also produce adverse impacts with regard to surface water and drainage in terms of the additional costs and the study and design efforts involved in providing the ancillary control features, such as increased heads at pumping stations.

Most of the adverse impacts related to water quality will occur during construction and will be short-term in nature. Construction may cause increased turbidity where existing waterways are directly affected. Other short-term adverse impacts related to construction include machine-caused noise and air pollution; excessive dust and dirt stirred up around the work areas; and the possibility of traffic congestion in places where the levees are intersected by roads and when heavy machinery is moved to the work sites.

Improvements made to the flood control system in general will have a slight adverse effect on the vegetation and wildlife in the immediate impact area. Removing trees and other types of existing vegetation and disturbing wildlife habitats during construction will have a short-term but, nevertheless, negative effect on the natural environment.

If landfill is used to increase levee heights, the project may have an impact on surface resources when extensive amounts of earth are removed from higher elevations within the existing flood plain. Using earthworks to improve the flood control system will also have more specific adverse impacts throughout the study area, including those relating to acquisition of development, disruption of the environment, and access across the levees.

Finally, the permanent attachment of closure gates on the Market Street Bridge, a historic landmark, is an unavoidable adverse aesthetic impact.

Using earthworks to increase levee height in Exeter will disrupt a railroad track if fill is placed on the riverside, or about ten homes plus significant commercial and industrial uses if filled on the landside.

In Wyoming, two houses will be displaced if landfill is put on the landward side of the levee. Filling in this manner will probably also require the acquisition of some farmland abutting the levee.

Approximately 15 homes or more located along the Forty Fort segment of the levee will be dislocated if earth is used on the landside of the levee. It is likely that River Street will also be closed, Church Street in Kingston will be closed, and over 50 homes and several businesses disrupted if landside construction is undertaken.

Using landfill on either side of the levee in the vicinity of Nesbitt Park will have an adverse impact. If fill is placed on the riverside, some parking areas will be eliminated and access over the levee will be impaired while fill on the landside will interfere with existing commercial development. Putting earth on the landside of the Edwardsville levee will disrupt a restaurant and a pumping station. A lumber yard and five or six homes that abut the levee in Plymouth will be disturbed if fill is used on the landside.

If earth is used to raise the levee on the landside in Wilkes-Barre, the project will have significant adverse impacts. Riverside Drive will be closed and the houses along the street might be displaced. The River Commons will be adversely affected with regard to its functional, historical and aesthetic value. Part of the Courthouse parking lot will also be needed to accommodate the levee expansion.

As previously stated, any landfill levee improvements will have an adverse impact on vegetation. If landfill is used on the riverside in Kingston and in Kirby and Nesbitt Parks, and on the landside of the River Commons, trees and other types of growth will be removed.

If sheet piling rather than landfill is used to increase the levee heights, the adverse impacts will be somewhat different. While landfill will cause disruption and have only moderate aesthetic impacts in most cases, sheet piling will have more pronounced effects on aesthetics. Using sheet piling in Exeter will enclose the yards of approximately ten homes that abut the levee. Although the homes facing the levee will not be acquired if sheet piling is used, the very appearance of this construction material will constitute an adverse aesthetic impact.

The proposed park in Forty Fort will be adversely affected if sheet piling is used because the river view will be eliminated. Since the homes along River Street in Forty Fort are already enclosed by sheet piling, the additional effects will be considered as an increase

in degree rather than the creation of an adverse impact. In Kingston, however, using sheet piling will have a decided visual effect on the homes facing the levee along Church Street.

Using sheet piling in both Nesbitt and Kirby Parks will have a very important adverse impact. In addition to being potentially unpleasing, the levee could affect the user's perception of the general aesthetic amenities of the park.

Although the Hanover section of the levee passes through undeveloped land, sheet piling will have an adverse impact because it will be so obviously different from the existing terrain.

The use of sheet piling along Riverside Drive in Wilkes-Barre will effectively eliminate the river view from the first and second-story levels of the houses facing the river, thus having an adverse impact. Because of the exclusive character of this area, it is possible that property values would also be affected. Raising the levee with sheet piling will also have a similar effect on the River Commons area because the park users will not be able to enjoy the view that was previously an integral part of the park, and the presence of a sheet piling wall is out of character with adjacent surroundings.

In addition to aesthetic effects, sheet piling also restricts access. Placing sheet piling along the length of the Exeter levee will hinder access to the river for fishing or other recreational purposes. Sheet piling will have an adverse impact on the proposed park in Forty Fort. Access to the river through the park will be eliminated and it would be nonsensical to incorporate a boat marina into the park development. Using sheet piling in Kingston will again restrict access to the wooded areas along the levee and to Nesbitt Park. If sheet piling is used in Kirby Park, it will divide the park, thus leaving the riverside development inaccessible to park users.

Although the Edwardsville levee is not part of a formal recreation facility, it has been used for recreational purposes and placing sheet piling on it will virtually eliminate any future use.

Using sheet piling along the River Commons in Wilkes-Barre will not only restrict access to the river but will change the character of the park.

In addition to limiting pedestrian access across the levee, the sheet piling will also eliminate access for wildlife. Obstructing natural paths will tend to inhibit the natural ranging patterns of land animals.

V. ALTERNATIVES TO THE PROPOSED ACTION

Seven reasonable alternatives to the proposed action were identified. While several had certain attractive features, such as the preservation of a river view or a less expensive implementation cost, none had the combined qualities of providing adequate flood protection and being capable of implementation within the short time period available under the present circumstances. A description of the alternatives considered and a discussion of their advantages and drawbacks are shown below.

1. Bridge Relocation

Raising the Susquehanna River bridges would offer a certain amount of flood protection to Wyoming Valley inhabitants. However, such a solution would be extremely expensive and because several concrete bridges cannot be raised in place and must be relocated, community disruption would be substantial. Furthermore, although a complete study of this solution has not been undertaken due to project time constraints, it appears that bridge relocation would not entirely eliminate the need for levee raising in order to achieve adequate flood protection for the study area.

Bridge relocation would, however, reduce the height of required levee raising, and if technical constraints limit the feasible additional levee height to less than the required degree of protection, then bridge raising or alteration should be considered further. Such consideration would require a detailed investigation of the transportation needs of the entire valley and the relationship of the bridges to the regional transportation plan, as well as an engineering analysis of reasonable methods for increasing the opening dimensions of existing bridges.

Since the consideration of locations for any relocated bridges, and the possibilities for effecting modifications to existing structures is beyond the scope of present investigations, an assessment of the environmental impact of this solution is not possible. If further consideration of this alternative becomes appropriate at some future time, an analysis of the environmental impact will proceed concurrently.

The construction of new bridge approaches would probably require acquisition of active business and residences in order to develop road ways meeting current standards. The impact of lost revenue, displaced employment and loss of homes would be considerable. In addition, potential temporary effects of bridge construction include disturbance of the river bottom, erosion from disturbed bank areas, spillage of construction wastes and debris, aesthetic impacts and traffic and business disruption.

2. Channel Dredging

Dredging the channel so that the riverbed is deeper and smoother would minimize flood danger by increasing the amount of water flow, although some levee raising would still be required. In addition, such a solution would cause siltation problems, completely disrupt the river ecology and require considerable annual expenditures to maintain the condition. A final disadvantage of this alternative is that it would provide incomplete protection, and result in extensive and time consuming studies of the river bottom and hydrology prior to any actual construction thus delaying adequate flood control protection. In addition, dredging also increases the possibility of a breakthrough to the mine tunnels underlying the river bed.

3. Channel Widening

The Susquehanna River water surface elevation could be reduced through channel widening, thereby decreasing the height requirements of adjacent levees. This solution is unattractive from an environmental viewpoint because it would cause siltation problems and create an extremely shallow water level during low stages of the river, thereby precluding most fish life. Also all of the existing bridge piers must be relocated under this scheme and an extensive amount of land adjacent to the river would have to be acquired, causing disruption and/or dislocation of homes, businesses, streets, public facilities, and recreation resources. The bridge and community relocation requirements would obviously also require a longer implementation time than the actions proposed for levee raising.

4. Upstream Impounding Basins

A series of flood control dams upstream from the project area accompanied by large reservoir storage areas or impounding basins could eliminate the need for levee raising. This solution is both impractical and unfeasible, however, for the purposes of providing immediate and full flood protection in the study area for the following reasons: very large reservoir areas would be needed to adequately protect the valley, requiring extensive funds and assuming approvals of the municipalities involved as well as full interstate cooperation between New York and Pennsylvania; large tracts of land would be removed from production and many areas with high scenic, ecological, and recreational value would be inundated; and, finally, extensive, lengthy studies to determine basin needs and to locate and design these facilities would be necessary. Thus, while impounding basins may be considered a desirable supplement to levee raising, they cannot be regarded as an effective substitute.

Additional impounding basins will, however, provide additional protection to the Wyoming Valley in the future.

5. River Diversion

Theoretically, the Susquehanna River could be diverted from the Wyoming Valley to a less developed area. This proposal is especially intriguing because such a diversion might facilitate anthracite recovery for future energy resources, although it is obviously impractical for numerous reasons, particularly high cost, the difficulties of finding an alternative river location, and consequent environmental and ecological disruption.

6. Obstruction Removal

It is conceivable that a comprehensive study of downstream river conditions would reveal opportunities to facilitate water flow by identifying major obstructions which could be eliminated. A thorough and detailed study of the river hydrology would also be required before recommendations could be made with assurance, however, and it is unlikely that the total effect of such opportunities would preclude the need for levee raising entirely. Because of the considerable time requirements to ascertain obstruction removal opportunities and requirements and the uncertainties associated with the outcome of such studies, this proposal was eliminated from further consideration.

7. No Project

The most serious effect of a choice to not implement the proposed project would be the continual exposure of the Wyoming Valley inhabitants to the threat of flooding. Another critical consideration is the inability of the Federal and State governments to approve urban renewal applications for area restoration assistance unless adequate flood protection is assured. While individual rehabilitation efforts are currently underway and confidence in the area's future potential remains high, it is clear that the success of local recovery efforts depends heavily on the receipt of massive outside financial assistance. A more complete discussion of the impacts of the "no project" alternative is contained in Section II of this Statement ("ENVIRONMENTAL SETTING WITHOUT THE PROJECT") and sub-item 3 ("Projected Conditions Without Project") under each of the major topic headings.

VI. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This project may be characterized as a basic improvement to the land. If successful, it withdraws land from inundation, or at least renders it less frequently subject to the flooding phenomena. In so doing, the benefits realized by the present generation of land users transfers intact to future users. Man has provided himself with protection from a repetitive and destructive force of nature to the extent that his realistic dangers may be reasonably diminished. His energies may now be more easily turned to other natural demands and to personally preferred opportunities for the use of his energies. The opportunity to conduct human activity in a geographic place has been enhanced. The short- and long-term productivity which may result will be derived from the manner in which the location and resources remaining in the area are utilized. How this will be accomplished is beyond the scope of the present project, which provides only the opportunity for broader, safer action. Informed at the present time by the experiences of the past, it may be hoped that future events will improve the environment, not only economically, but in terms of the physical surroundings of the Wyoming Valley residents and their general health and welfare.

VII. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION

Land

The necessity to acquire new areas of land bordering the existing levees and sheet piling areas to provide a wider levee base for the project improvements if landfill construction is used is the most obvious of the irretrievably committed resources. Directly related are the loss of resources in the form of private property and taxable land used for project construction. All such requirements for an increased right-of-way area will impact upon privately developed, developable, and taxable property more when earth levees are required, and less when the sheet piling structures are utilized.

The impact will take the form of permanent withdrawal of the required land and whatever improvements may be presently located upon it, and the elimination of that land from future development consideration.

The amount of land to be withdrawn will be determined by the height and variety of flood protection improvement to be erected. The severity of the impact on private, community, and aesthetic interests will further depend on its location. A remote "rural" setting for levee or piling would presumably be less objectionable than one in an already densely developed area. In this fashion the expected requirements for ten additional feet of elevation in Exeter and Wilkes-Barre which border dense development and significant public/historic areas may be expected to be the most delicate and objectionable owing to these factors, and may call for special design solutions if alternative construction techniques are not feasible. The seven- to ten-foot elevation requirements for Wyoming, Forty Fort and Kingston should prove somewhat easier to accommodate due to the availability of a compatible area and lower development density at the project sites. The three- to five-foot additional height requirement for Kingston, Hanover, and Plymouth should, for the above cited reasons, prove to be the least difficult and controversial of all. Details of the acquisition, displacement, and related consideration for presently existing residential, commercial, industrial, recreational and public uses are cited in Sections II and III.

Changes to the land which are expected as a consequence of this project are, in the short range, the elimination of man-made improvements on the riverside of the elevated flood protection works; and, in the long range, the encouragement of the local economy by the additional security of the improvements to be constructed.

Material for Construction

The maximum 2.5 million cubic yards of fill material to be utilized as levee material and support material for sheet piling, or the maximum 13 lineal miles of steel sheet piling may be assumed to be permanently committed. In this instance the source of the landfill appears to be of the greatest concern. The river bed will not be used as a borrow area although fill material may be obtained from the slopes of the valley above river land, or the material presently composing the mine deposits or culm banks. Should the culm banks be so utilized, a significant and positive aesthetic improvement to the Wyoming Valley may be expected. Glacial till exists in pockets throughout the valley, which may be of satisfactory quality for use.

In addition, small amounts of concrete will be required to construct walls and renovate pumping stations; sand for use in filter blankets; riprap to be acquired locally; new pumping machinery; and a large and diverse amount of labor will be required to accomplish this project.

Ecosystem

The vegetative growth of trees, brush or grasses occupying swampy conditions in the path of the new construction would be permanently eliminated and replaced by varieties of grass. This displacement would be a most pronounced feature for earth levee construction and less for the sheet piling.

Wildlife native to the area which customarily cross the levees may find their way permanently blocked by the sheet piling variety of project improvement. This is not expected to be of serious consequence to the wildlife since such a development would only serve to contain them and not eliminate them. It is possible that such containment would enhance their abundance, since their habitat would be isolated by a "fence" between their natural habitat and a hostile man-made development.

VIII. COORDINATION WITH OTHERS

A. Public Participation - A public meeting on this project was held on December 5, 1972 to present the phased plans for improving the flood control system in the Wyoming Valley. The environmental aspects of the plan were not discussed in great depth or detail. News releases were issued concerning the public meeting and also noting that the preliminary draft environmental statement had been prepared and was available from the District Engineer. In addition, during the course of the statement preparation, the individuals and agencies listed below were contacted for opinions and comment.

1. James Price, Executive Director, Luzerne County Redevelopment Authority

2. Lawrence A. Pawlush, Director, Pennsylvania Department of Environmental Resources
   Paul Milnes, Facilities Chief & Acting Planner, Department of Environmental Resources

3. Judge Max Rosenn, Chairman, Flood Recovery Task Force

4. Roy Morgan, President, WILK Radio Station
   President, Wilkes-Barre Chamber of Commerce
   Chairman, Flood Control Sub-Committee of Flood Recovery Task Force

5. Mr. Sinavage, Director, Wilkes-Barre Model Cities Agency
   Diane Ereier, Director, Wilkes-Barre Model Cities Physical Development

6. James McClellan, Director, Wilkes-Barre Department of Parks and Recreation
   Peter Q. Bohlin, Architect, Bohlin & Powell Associates (Consulting Park Planners)

7. Henry L. Levi, Executive Director, Wyoming Valley Sanitary Authority

8. Min Matheson, Head of Flood Victim's Action Council

9. Mrs. Vito Raymond, Director, Luzerne-Lackawanna Environmental Council
   Mrs. Peter Sensi, Wilkes-Barre Branch Office, Luzerne-Lackawanna Environmental Council
   Ms. Joyce Crumbly, Wilkes-Barre Branch Office, Luzerne-Lackawanna Environmental Council

People and Agencies Interviewed (Continued)

10. Ms. Shirley Beard, Commission for Economic Opportunity

11. Theodore Jacobsen, Project Leader, Ichthyological Associates
J. Douglas Thompson, Senior Aquatic Biologist, Ichthyological Associates

12. Mr. Gallager, City Manager, Wilkes-Barre
Leo Corbett, City Engineer, Wilkes-Barre
Samuel Gutman, Director, Department of Planning & Development, Wilkes-Barre

13. Frank Slattery, Former Mayor of Wilkes-Barre
Former Member, Susquehanna River Basin Association
Director, various employment opportunity programs

14. William DeRemer, Councilman, Plymouth Borough
Robert Mundy, Secretary, Plymouth Borough

15. Leonard Ziolkowski, Planning Director, Economic Development Council of Northeastern Pennsylvania
Gabrielle Ramsaur, Economic Development Council of Northeastern Pennsylvania

16. Paul Sachs, Engineer, Kingston Borough
John Burke, Kingston Borough Engineer (Smith, Miller & Associates, Kingston, Pennsylvania)

17. Ralph Schrey, Assistant Director of Planning, Luzerne County Planning Commission
Frank Chadwick, Senior Planner, Luzerne County Planning Commission

18. Edwin Sites, Regional Director, Northeastern Pennsylvania, Department of Community Affairs

19. Nick Souchik, Executive Director, Civil Defense, Wilkes-Barre

20. Lee Sweinberg, Borough Engineer, Forty Fort

21. Dr. R. B. Rozelle, Professor, Wilkes College

People and Agencies Interviewed (Continued)

22. Dr. Reif, Professor, Wilkes College

23. Howard Miller, Chief Planner, Susquehanna River Basin Commission

24. Historic Sites Survey, Pennsylvania Historical and Museum Commission

25. National Audubon Society, New York City

26. Pennsylvania Fish Commission, Sweet Valley, Pennsylvania

27. Pennsylvania Game Commission, Dallas, Pennsylvania

B. Government Agencies. The preliminary draft environmental statement was sent to the following government agencies requesting their views and comments. Their comments are summarized below and copies of their letters are attached to the environmental statement.

1. U.S. ATOMIC ENERGY COMMISSION

Comment: No comments to offer in connection with project.

2. FEDERAL POWER COMMISSION

Comment: Proposed project would have no effect on bulk electric power facilities, including potential hydroelectric developments, and on natural gas pipeline facilities.

3. ECONOMIC DEVELOPMENT ADMINISTRATION, USDC

Comment: Increasing the height of a landfill levee in Kirby-Nesbitt Park would probably enhance the use of the levee for recreational activities including skiing, sledding, coasting, etc. If sheet piling is used to increase the levee height, however, it would limit the use of much land normally available for recreational purposes.

Response: Concur

4. FOREST SERVICE, USDA

Comment: Forest cover is a compatible use of flood plains and care should be taken to destroy as little forest cover as possible in the construction of the levees.

Response: Concur

Comment: Alternatives considered do not include federal funding for raising of levees contingent upon and in conjunction with flood plain zoning.

Response: Since the improved flood control measures to be implemented will be part of an existing flood protection system that is outside the 100-year flood plain, it is not part of the Corps of Engineers' responsibility to initiate flood plain management.

Comment: The levees will be raised to a height that will contain a flood of the magnitude of the one caused by "Agnes". What will happen if the area is rebuilt and destroyed again in the future by a greater flood.

Response: The possibility of a greater flood will always exist, no matter how high the levees are raised.

5. BUREAU OF MINES, USDI

Response: The Bureau of Mines provided extensive and specific editorial comments which were all appropriately added to the text of the statement.

6. SUSQUEHANNA RIVER BASIN COMMISSION

Comment: The study of alternatives was of a cursory nature and does not provide a useful basis on which any given alternative can be evaluated by the public or other agencies.

Response: Due to the short time frame in which the proposed emergency flood control project was developed, all of the alternatives were not comprehensively studied. Further evaluation of the most feasible alternatives will be conducted in later stages of the project.

Comment: The proposal does not appear to consider the effects of upstream flood control projects which could have measurable potential to reduce river stage at Wilkes-Barre.

Response: The effects of upstream flood control projects, such as the Tioga-Hammond Lakes project and the Cowanesque Lake project, were considered in the section, "Alternatives to the Proposed Project".

Comment: The project, if implemented, may increase the flood hazard immediately upstream of the levees and also downstream for an undetermined number of miles.

Response: Concur

Comment: The proposal avoids considering the issue of moving the levees back from the natural floodway.

Response: Concur; will receive additional consideration in later phases of the study.

Comment: The plan suggests placing fill on the riverside of the levee, thus decreasing the floodway.

Response: Any proposed encroachment on the natural floodway will be studied in great detail from both an engineering and ecological point of view prior to final design.

Comment: The proposal provides for gates to seal the Market and North Street bridge traffic lanes during periods of high water. This action, without some plan for relief of the pressure on the bridges seemingly will result in higher water levels and possible bridge failure.

Response: Concur

Comment: The plan does not appear to be coordinated with other planning underway regarding cross valley travel in the event the bridges must be closed or are lost.

Response: Consideration of cross valley travel and coordination with transportation planning underway appears in the sections entitled, "EXISTING AND PROPOSED SOCIO-ECONOMIC CONDITIONS: Transportation Facilities" and "Alternatives to the Proposed Action" and preliminary contacts have been made with the Pennsylvania Department of Transportation. Transportation planning coordination will be the subject of additional study and meetings with the appropriate government agencies prior to the final design of any flood control improvements. Highway bridge designs have also been reviewed by the Army Corps of Engineers with regard to their flood control projects in the area. If any modifications are needed for existing bridge designs, they will be coordinated with flood control improvements.

Comment: The proposal requires the pledge of a large amount of local funds for land rights and relocation costs, and annual operation and maintenance funds in an area that is recognized as being economically depressed.

Response: The required non-Federal funds do not have to be supplied by the locality, but could come from the State or the county as well as (i. e. any non-Federal source).

Comment: The cost estimates seem somewhat low for the proposed work when compared with the costs shown for initial repairs to the levees.

Response: All cost estimates shown are very preliminary in nature and only reflect preliminary studies for improving the flood control system.

7. BOROUGH OF KINGSTON

Comment: The effects of deep mines on the environmental setting could be clarified. Editorial comments on mining activities were offered for inclusion in the final EIS.

Response: The information will be incorporated into the final EIS.

Comment: A correction regarding existing housing in Kingston adjacent to the levee was made. Also clarification of two commercial establishments reported earlier. The "auto junk yard" was actually a temporary impoundment area for flood-damaged cars.

Response: This information will be used in the preparation of the final EIS.

Comment: It would be more advantageous to the Borough of Kingston to have levee improvements take place on the river side of the levee instead of the land side where disruptions to existing residential and commercial properties would occur.

Response: The river channel in the Wyoming Valley is the narrowest upstream of Market Street. Increasing levee heights by expanding into the river could possibly create hydraulic flow problems. However, where possible, bases of levees will be widened in the direction that results in the minimum impact to the community.

Comment: Channel modification in the vicinity of Plains and Plymouth may improve the flow characteristics of the channel.

Response: Channel modifications in the area of the DL&W Railroad bridge downstream of Plymouth Borough were partially evaluated. The evaluation was not completed because the impounding effect of the Shickshinny gorge will probably control water surface elevations in the area downstream of Plymouth. This situation will be re-evaluated when additional hydraulic information is available concerning the Shickshinny gorge.

8. FORTY FORT BOROUGH

Comment: The Corps of Engineers should close the breach in the dike at the Forty Fort Cemetery, and repair the eroded river bank in the Mohawk Street area.

Response: The breach has been closed and the Mohawk Street bank erosion rehabilitation is completed.

Comment: Raising and extending the existing levee and wall system is in order.

Response: The survey report, resulting from this study, not the EIS, is the means by which Congress may authorize an extension or raising of the existing flood control system.

Comment: A pumping station is needed just northeast of the Forty Fort Cemetery for controlling Abrahams Creek runoff.

Response: A flood barrier and diversion channel are part of the existing flood control system for Abrahams Creek. It is necessary that a ponding area at the mouth of Abrahams Creek be utilized during extremely high flows. This area should not be developed.

Comment: Renovation of the Forty Fort Meeting House should be part of the overall master plan.

Response: This renovation cannot be included in this office's flood control study. Development of a master plan is not included as part of a Corps of Engineers local flood protection project since this is a local planning function.

Comment: There is a need for additional flood control dams and reforestation of the upstream watershed area.

Response: The need for additional flood control dams will be evaluated during a review study of the Susquehanna River Basin authorized by resolutions of the Committees on Public Works of the Senate (7 July 1972) and the House of Representatives (12 October 1972). Reforestation is a soil erosion control project and was not considered as part of the local flood protection study.

Comment: Access roads to the river should be considered to encourage recreation and community progress.

Response: Concur.

9. COMMONWEALTH OF PENNSYLVANIA - DEPARTMENT OF ENVIRONMENTAL RESOURCES (D.E.R.)

Comment: Greater upstream retention of flood waters by additional flood control dams appears to be necessary.

Response: Please refer to a response to a similar comment by Forty Fort Borough.

Comment: The feasibility and desirability of increasing the cross section of the channel in limited areas should be considered.

Response: Channel modification will be considered in the design stage for reaches of the river where the hydraulic efficiency can be improved. Modification of the channel in the immediate area of the Market Street, West End Road, and Fellows Street bridges could possibly eliminate the need to raise one or more of these bridges.

Comment: The D.E.R. strongly recommends that the various alternatives be closely analyzed in order to develop a project which will provide not only the desired protection but also minimize the adverse effects upon the environment.

Response: This will be accomplished during the detailed preconstruction planning phase of a project. This revised draft Environmental Statement accompanies a survey scope feasibility report. At this time additional flood control has not been authorized.

Comment: The D.E.R. concurs with the preliminary draft EIS that the effects of the proposed construction on the geological environment will be minimal and of a temporary nature. The DER requests information on the extent of erosion controls and sediment controls.

Response: The principal contractor selected to construct the proposed project will submit an erosion control plan for approval by the Corps of Engineers, showing the contractor's scheme for controlling erosion and disposing of wastes. The following items will be considered a minimum, and may be supplemented with other restrictions, depending on existing conditions.

a. Reduce by the greatest extent practicable the area and duration of exposure of readily erodible soils.

b. Protect the soils by use of temporary vegetation, or seeding and mulch, or by accelerating the establishment of permanent vegetation. Complete and protect segments of work as rapidly as is consistent with constructions schedules.

c. Retard the rate of runoff from the construction site and control disposal of runoff.

d. Trap sediment resulting from construction in temporary or permanent silt holding basins. This includes pump discharges resulting from dewatering operations.

e. Sprinkle or apply dust suppressors, or otherwise keep dust within tolerable limits on haul roads and at the site.

f. Use temporary bridges or culverts for crossing streams.

g. Borrow areas furnished by the Contractor shall be at a location where pollution from the operation can be minimized. Locations should be avoided where pollution would be inevitable.

h. Provide temporary measures for the control of erosion in the event construction operations are suspended for any appreciable length of time.

i. Provide protection against discharge of pollutants such as chemicals, fuel, lubricants, sewage, etc., into any stream.

j. Locate sanitary facilities away from streams, wells, or springs.

k. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum. Stream crossings by fording with equipment shall be limited to control turbidity and in areas of frequent crossings temporary culverts or structures shall be installed. All temporary culverts or structures shall be removed upon completion of the project. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams. Turbidity sampling and testing will be performed by the Corps and the information obtained will be used as a control for construction operations which would result in increased turbidity of the stream. Turbidity determinations will conform to applicable Federal, State, and local standards. In the event allowable turbidity levels are exceeded, as determined by the Corps, the Contractor shall suspend the operation or operations causing turbidity, and such suspension will not form the basis for a claim against the Government. The cost of work in connection with control of stream turbidity shall be considered as incidental to and included in the contract prices for the work performed under this contract.

Comment: The safety of the levee in areas subject to subsidence should be considered in the design stage.

Response: Concur.

Comment: Increased control of the river discharge in the Wyoming Valley will have an adverse affect on downstream areas during severe flooding. These areas should be identified so that the inhabitants of these areas can be alerted and planned accordingly.

Response: Concur.

Comment: Consideration should be given to making improvements in the sanitary sewer system.

Response: Our study revealed that the existing trunk line of the Wyoming Valley Sanitary Authority can withstand the burden of increased levee heights considered. In the event utilities need to be fortified or relocated, non-Federal interests are responsible for such work.

Comment: In addition to levees there should be channel dredging, removal of any obstructions, channel widening and construction of impounding basins.

Response: Channel dredging would require non-Federal interests to assume the large financial expenditures of annual maintenance. Channel dredging was considered but it would be very costly. This office concurs with removal of obstructions and channel widening in areas where hydraulic efficiency can be improved. Construction of impounding basins has been discussed in a response to similar comments by Forty Fort Borough.

10. SOIL CONSERVATION SERVICE

Comment: Exposed areas, including borrow pits, should be protected from erosion by seeding and mulching or diversion structures to route water away from exposed earth. Adjacent lands and waters should be protected from sedimentation by the use of sediment traps, basins or other techniques.

Response: Both erosion and sedimentation will be controlled during construction by appropriate measures. Please refer to a similar comment and a more detailed response under the Pennsylvania Department of Environmental Resources.

Comment: If mine spoil is satisfactory for construction material, it would eliminate the need to disturb the streambed.

Response: The streambed will only be disturbed to improve the carrying capacity of the channel. It will be determined during the design stage if mine spoil can be used as a construction material.

Comment: Increased control of the river discharge in the Wyoming Valley increases the flooding downstream.

Response: Please refer to the response to a similar comment by the Commonwealth of Pennsylvania - Department of Environmental Resources.

11. OFFICE OF ECONOMIC OPPORTUNITY

Comment: The comments were of a general nature, and pertain to housing patterns of low, middle and high income residents. Although tenants closest to the levee system occupy largely commercial structures or moderate to upper income housing, with "pockets" of low income rentals, the considerations of conservation and aesthetics are not ranked by the poor on the same priority level as housing and income.

Response: Concur.

12. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Comment: It is the Department's opinion that the project will not have a significant adverse environmental impact on the health, education and welfare of persons living in and around the project area.

13. U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION III

Comment: Effective flood plain management programs must be pursued to discourage future building on flood plains.

Response: Concur.

Comment: Adequate protection of those people and businesses now located on the flood plains must be pursued.

Response: Concur, however improvement must be in the best interest of the most people; that is, it must be justified.

Comment: A lead agency should be designated to develop a comprehensive flood control plan and program including actions related to flood control structures, flood plain management and legislation, flood insurance, etc., covering actions taken by various levels of government for the entire Wyoming Valley.

Response: This comment concerns responsibilities of both Federal and non-Federal entities. The Corps of Engineers has authority to develop plans for flood control structures and can provide information relative to flood plain management.

Comment: Land use planning and flood plain zoning can be considered as alternatives to construction of flood control facilities and might prove to be more cost effective.

Response: Concur.

Comment: Flood protection measures must be planned and implemented in conjunction with sixteen urban renewal projects proposed for the Wyoming Valley.

Response: Protection of presently unprotected areas in Wyoming Valley will be evaluated during a review study of the Susquehanna River Basin authorized by both Committees on Public Works of the United States Congress.

Comment: The Corps of Engineers should increase its present criteria of constructing flood protection facilities to only the 100 year level.

Response: The Corps uses as a guide for formulating flood control measures the maximization of net benefits, the 100 year flood, and the flood of record. The Corps therefore does construct projects to protect against floods greater than 100 years.

Comment: Water impounded within the communities after the levees were overtopped reduced the crest downstream.

Response: Concur.

Comment: Increasing the height of the levees 10 feet above their present level will adversely affect adjacent properties, historical sites, and destroy one of the primary incentives for settlement along the river.

Response: Please refer to the response to a similar comment by the Borough of Kingston. Additional settlement along the river should be discouraged through flood plain zoning as suggested by EPA in a previous comment. As now formulated, the bridges would be raised thereby requiring that the levees only be raised 4 to 5 feet.

Comment: An increase in levee height will increase the flooding potential downstream. This will prove disastrous if more and more land adjacent to the river is opened for additional development.

Response: Please refer to a similar comment by the Commonwealth of Pennsylvania-Department of Environmental Resources. It should be noted that the flood height downstream would not be any different than if there were no levees at all.

Comment: The impact of the Tioga-Hammond Lakes and Cowanesque Lake flood control projects are not considered in the proposed raising of the levees or reduction of flood crest levels.

Response: These two flood control dams are included in the analysis. The flow associated with a regional type storm the magnitude of Tropical Storm Agnes would be reduced by about 40,000 cubic feet per second with these dams in place.

Comment: The substrate parallel to the river has already subsided nine feet prior to the flood. Additional overburden proposed by increasing the height of the levees may cause greater and more extensive subsidence in the future.

Response: The Bureau of Mines, USDI, will participate with the Corps of Engineers in the design of the levees with regard to subsidence.

Comment: Use of sheet piling may impose a minimum load on the weakened substructure below the Valley bed.

Response: Use of sheet piling in areas where subsidence has occurred will be considered during detailed project planning.

Comment: It may be desireable for the Federal government to assume maintenance responsibilities of the flood control structures because previous experience has shown that maintenance has been poor.

Response: Existing Federal laws require that maintenance of a Federal flood control project be the responsibility of the non-Federal sponsoring interest.

Comment: The channel for the river could be redesigned to carry the flood waters of the 500 year frequency flood.

Response: Although this is engineeringly possible, it is not practical because of cost, necessary relocations of families, businesses, and bridges to accomodate such a large flood.

Comment: If a catastrophic flood becomes the basis for flood protection, it would necessitate moving the levee in Kingston further back from the river. This alternative could be undertaken instead of rebuilding residences and commercial establishments in some of the badly damaged areas.

Response: Regardless of what catastrophic flood is used as a basis for flood protection, an even larger flood can occur. This is one of the reasons the Corps does not provide protection to a specific degree in every case, but varies depending on the area and historical data. The Department of Housing and Urban Development is aiding in the redevelopment of areas in Wyoming Valley that are outside of the 100 year flood plain. The areas behind the levees are not in the 100 year flood plain.

Comment: Channel dredging and flood control dams upstream should be considered and presented in the draft EIS.

Response: Channel dredging and upstream dams have been discussed in a response to a similar comment by the Commonwealth of Pennsylvania Department of Environmental Resources.

Comment: Perhaps the most expeditious solution would be to use the river sediment to increase and repair the existing levees and build levees along those towns now not protected, add sheet piling along the levee crest and construct a flood control dam above the confluence of the Lackawanna River.

Response: River sediment is usually unsuitable as construction material for levees. Providing protection for presently unprotected communities is beyond the scope of this feasibility study but will be evaluated in a review study to be initiated in FY 1974 of the Susquehanna River Basin. Upstream flood control dams have been discussed in response to an earlier EPA comment.

Comment: Although 10,000 homes were vacated after the flood, this does not represent a loss of revenue to the Wyoming Valley Sanitary Authority, since many of these families moved into house trailers furnished by HUD, and continued to use the Sanitary Authority's facilities.

Response: Concur.

Comment: Some recreational land will be taken with the construction of higher levees decreasing the value of the residual recreation land because of its permanent separation from the river.

Response: Wherever possible, access to the river will be provided, especially in recreational areas.

14. U.S. DEPARTMENT OF THE INTERIOR

Comment: We suggest the statement be expanded to include and evaluate the environmental impact of raising the levee with earthwork or sheet piling at specific problem areas along the river.

Response: It is impossible to pinpoint the exact method by which the levees or floodwalls would be raised until more data concerning real estate and subsidence, are developed and detailed design of each section of levee is accomplished during the preconstruction planning phase following project authorization.

Comment: The peak discharge at the U.S.G.S. gage at Wilkes-Barre was 345,000 cfs, rather than 320,000 cfs as earlier reported. Flood stage at the Wilkes-Barre gage was 40.91 feet rather than the 40.6 feet estimated earlier.

Response: The EIS has been corrected to reflect these figures.

Comment: Levees are already too high and cause too much channel constriction in some reaches.

Response: In areas where the channel is constricted, the levees could be raised by adding a steel sheet pile wall or by expanding the levees to the landward side of the levee.

Comment: Existing bridges would not have to be raised if the levees were moved away from the normal floodway.

Response: During preconstruction planning, this office will investigate the possibility of providing channel improvements in lieu of raising one or more of the highway bridges. To move the existing levees away from the floodway would be extremely expensive in terms of the number of homes that would have to be removed and the cost of the land.

Comment: The river can break through into the mine voids and build-up inside the levee system.

Response: The Bureau of Mines, USDI, will assist the Corps in investigating such a possibility which is now considered remote.

Comment: The "Environmental Setting Without the Project" should include a list of authorized, proposed, and/or current projects that would reduce flood levels in the project area.

Response: Concur. The Tioga-Hammond Lakes and Cowanesque Lake projects would reduce the height of the June 1972 flood by about three feet in the Wyoming Valley area.

Comment: Catlin Hall, McClintock Hall and Denison House should be identified specifically as those historic sites on the National Register of Historic Places.

Response: This data has been incorporated in the revised draft EIS.

Comment: The statement should note that the Pennsylvania Historical and Museum Commission has been consulted regarding potential sites for listing in the National Register of Historical Places.

Response: The Commission was contacted for this purpose, and the contact is recorded in Section VIII. A. "Public Participation."

Comment: Damages caused by Hurricane "Agnes" to the historic sites within the proposed development area would be desirable. Potential impacts of contruction on historic sites (both buildings and plaques) would be beneficial.

Response: Damages to historic sites were as follows:

a. Luzerne County Court House: extensive water damage from flooding of first floor and basement. Courthouse records and offices of various county agencies were located on the basement level and were flooded. The courthouse has been restored.

b. Market Street Bridge: little or no damage.

c. Sterling Hall, McClintock Hall, Catlin Hall, Weiss Hall, and Kirby Hall were all being used by Wilkes College as dormitory halls and some classrooms. Damages to these buildings were moderate to heavy. All are being restored or repaired.

d. Forty Fort Meeting House - moderate to heavy damages were experienced. Restoration is completed.

e. Denison House - Damages to this structure were light, due to its site on high ground.

f. Swetland Homestead in Wyoming was not damaged.

g. The Wyoming Historical and Geological Society Building had water damage to books and files in basement. The building has been repaired, and some of the documents were saved; other books and papers had to be discarded.

h. None of the plaques were significantly damaged.

i. No historical building will be impacted by the proposed construction. Should any plaque have to be moved, it will be re-established with the assistance and advice of the Pennsylvania Historical and Museum Commission and the Wyoming Valley Historical Society.

Comment: The impact of project-induced development in the flood plain should be explored in section III, The Environmental Impact of the Proposed Action.

Response: Development could occur in the protected areas due to the project. The project should not directly cause development in unprotected areas susceptible to flooding.

Comment: A flood insurance program and strict flood plain zoning would contribute to the aesthetic, recreational and wildlife environment of the Wyoming Valley.

Response: Both of these items are responsibilities of non-Federal interests, however, the Corps of Engineers provides technical assistance when requested.

Comment: Adverse secondary project effects will result if development in the communities continues at the expense of present wildlife habitat.

Response: Concur.

Comment: Short-term adverse effects to fishery resources can be expected due to sedimentation.

Response: The contractors will be required to implement stringent erosion control devices and sedimentation control during construction of the project. Failure of controls will be cause for immediate cessation of activities, and restoration of controls.

Comment: Statements in the EIS regarding project construction and future development appear contradictory. Development will eliminate natural vegetation.

Response: While it is true that construction activities will likely be disruptive to vegetation in the immediate construction area, nearby vegetation will remain unchanged. However, should the Wyoming Valley communities allow future development near the levees, the potential exists for additional vegetation to be removed or destroyed.

Comment: A complete evaluation of the possible effects of this project on unprotected downstream areas should be included.

Response: Refer to the response to a similar comment by the Commonwealth of Pennsylvania.

Comment: We recommend that your study consider providing access over the levees and floodwalls and walkways along levee tops.

Response: Concur.

Comment: A discussion of large-scale flood control projects in the watershed and projections regarding changes in land use anticipated with the provision of additional flood protection should be included.

Response: This was discussed in a response to a similar comment by the Commonwealth of Pennsylvania - Department of Environmental Resources.

Comment: The Bureau of Mines commented on the environmental statement on 7 December 1972. The copy of the EIS in this office does not reflect these comments. Project specifications described in the Corps' letter of 19 January 1973 have no effect on those earlier comments.

Response: The preliminary draft EIS was coordinated at the regional level in response to a request from the Assistant Secretary for Program Policy, U.S.D.I. The Regional Coordinator (whose office is intermediate between the regional offices of the department and the Secretary's Office) requested a copy of the EIS in January 1973. At that point the revised draft was not completed, so that they were sent the preliminary draft; consequently, they were unaware of the revisions prompted by comments from regional and field offices of the U.S.D.I.

Comment: The type of fill material, sources, and quantity from each source should be indicated in the statement.

Response: When possible, this information should be discussed. In this case, the information was not available.

Comment: Water quality data at Hunlock Creek should be revised to include similar discharges.

Response: Concur. The additional data from the U.S. Geological Survey is appreciated and will be included in the final EIS.

14. Mr. Donald Charles

Comment: The Corps should spell out the flood plain management techniques to local interests and put pressure on the communities to insure their implementation.

Response: The Corps does not have authority to participate in local zoning ordinances or management.

Comment: A discussion should indicate how a project will alter the flooding characteristics of the river upstream and downstream, and what is to be done to take those changes into account.

Response: This comment has been discussed in similar comments by the Commonwealth of Pennsylvania - Department of Environmental Resources.

15. ECONOMIC DEVELOPMENT COUNCIL OF NORTHEASTERN PENNSYLVANIA

Comment: Examination of various flood control alternatives should be examined in depth to determine protection measures which are feasible and desirable.

Response: The depth of review of alternatives for flood control was considered to be in keeping with the mandate of providing protection which is the best practical, least damaging ecologically, and most feasible from an engineering standpoint.

Comment: The 100-year flood plain has not been defined.

Response: It was defined and distributed to local interests in early December 1972.

Comment: A series of measures consisting of flood control structures, flood plain management, flood plain legislation, and flood insurance requires sound information from a single recognized source.

Response: As explained in responses to comments by the Commonwealth of Pennsylvania - Department of Environmental Resources the Corps does not have authority to legislate flood plain regulations, etc., but does offer technical support.

Comment: There has been confusion with regard to the existing level of protection and what can be expected in the future.

Response: The existing flood control system provides protection from the 100-year flood. The recommended plan of improvement with the Tioga-Hammond Lakes and Cowanesque Lake reservoir projects would increase the degree of protection to the 370-year flood frequency.

Comment: The EIS and flood control report covers only those municipalities presently protected. The plan of improvement should include all communities in the Wyoming Valley.

Response: The unprotected communities in the Wyoming Valley will be investigated during a review study of the Susquehanna River Basin authorized by resolutions of the Senate and House Committee's on Public Works on 7 July 1972 and 12 October 1972, respectively.

Comment: The Council urges that the Corps coordinate with the consultant firm of Wilbur Smith and Associates, who have been hired by Luzerne County to develop recommendations on longer-range flood recovery effects, with regard to flood control plans.

Response: Concur. The staff of the Baltimore District are available for this type of planning effort.

Comment: The EIS should consider, in more depth, the use of flood plain zoning and land use planning by all levels of government as an action to alleviate potential damages from floods.

Response: Technical expertise is offered, however, these techniques must be implemented by non-Federal entities.

Comment: Zoning, building permits, and other regulatory measures are critical to full flood protection.

Response: Concur.

Comment: The aesthetic impact of the proposed levee and floodwall raising along with access to park land should be evaluated.

Response: Aesthetic appearance of the project will be studied in detail during the post-authorization stage of planning.

Comment: The Council suggests the Corps of Engineers evaluate the use of culm bank material as a source of material to raise the levees.

Response: Availability and acceptability of culm bank material will be considered in consultation with the Bureau of Mines, USDI, during post-authorization planning.

Comment: The Wyoming Valley's transportation plan should be developed in cooperation with the flood control plan to avoid conflicts between the two systems.

Response: Concur. The flood control plan will be designed not to conflict with transportation in the area.

Comment: The Council believes that flood protection measures must be planned and implemented in conjunction with all community redevelopment programs.

Response: The Corps will participate in these programs when requested, however, the Corps will not coordinate redevelopment efforts.

Comment: The Council urges that an advisory taskforce be established with those levels of government and private agencies who have an important stake in any flood control plan which is developed.

Response: Coordination is a purpose of the Susquehanna River Basin Commission, (SRBC).

Comment: Consideration should be given to developing a flood control plan for the entire Susquehanna River Basin.

Response: A study of the Susquehanna River in the interest of flood control has been authorized by the Congress and will be initiated by the Corps in Fiscal Year 1974.

Comment: The Council recommends that the flood plain information study requested by the Luzerne County Planning Commission be included in the planning process.

Response: It most definitely will be included.

APPENDIX A: Sources consulted

Wyoming Valley Flood Control Feasibility Study:

Sources Consulted

1. Soil Survey Maps of Developing Areas in Luzerne County, Pa. Vol. I & II prepared by U. S. Dept. of Agriculture, October 1967.

2. Climate, Topography and Pollution Report – Luzerne County Planning Commission, 1962.

3. Drainage and Flood Control Report – Luzerne County Planning Commission, 1961.

4. The Recreation Report – Luzerne County Planning Commission, 1967.

5. An Ecological Study of the North Branch Susquehanna River in the Vicinity of Berwick, Pennsylvania – Ichthyological Associates, July 1972.

6. Delaware Basin Bulletin Volume 10 No. 1 – Water Resources Association of the Delaware River Basin, September/October 1971.

7. The Comprehensive Plan for Edwardsville Borough – Edwardsville Borough Planning Commission, West Side Regional Planning Commission, Luzerne County Planning Commission, 1967.

8. Comprehensive Plan Report for Kingston Borough – Luzerne County Planning Commission, Kingston Borough Planning Commission, 1967.

9. Comprehensive Plan Report for Forty Fort Borough – Luzerne County Planning Commission, Forty Fort Borough Planning Commission, 1968.

10. Comprehensive Plan Report for Plymouth Borough – Luzerne County Planning Commission, Plymouth Borough Planning Commission, 1968.

11. State of the Region Report: 1972 and Beyond – Economic Development Council of Northeastern Pennsylvania, 1972.

12. The People: A Profile of Age, Sex, and Race – Economic Development Council of Northeastern Pennsylvania, 1972.

13. Where the People Are – Economic Development Council of Northeastern Pennsylvania, 1971.

Sources Consulted (Continued)

14. Comprehensive Analysis and Action Alternatives for Northeastern Pennsylvania, — The Mitre Corporation for the Bureau of Mines, U. S. Department of the Interior, 1970.

15. Luzerne-Lackawanna Transportation Study, Vol. III, Alan M. Voorhees & Associates, Inc., 1970.

16. Environmental Study of Luzerne and Lackawanna Counties, Pennsylvania — Arthur D. Little for the Department of the Army - 1968.

17. Manufacturing Growth of Northeastern Pennsylvania — Economic Development Council of Northeastern Pennsylvania, 1970.

18. Susquehanna River Basin Study, Summary — Susquehanna River Basin Study Coordinating Committee, June 1970.

19. Susquehanna River Basin Study, Preview — Susquehanna River Basin Study Coordinating Committee, June 1970.

20. Susquehanna River Basin Study, Appendix C — Economics and Geography — Susquehanna River Basin Study Coordinating Committee, June 1970.

21. A Comprehensive Open Space and Recreation Study: Wilkes-Barre, Pennsylvania — Allen Organization, Park and Recreation Planners, Bennington, Vermont, 1969.

22. Comprehensive Plan Report for Wyoming Borough — Luzerne County Planning Commission, Wyoming Borough Planning Commission, 1966.

23. The Comprehensive Plan for Exeter Borough — Luzerne County Planning Commission, Exeter Borough Planning Commission, 1968.

24. Comprehensive Plan: Wilkes-Barre, Pennsylvania — David M. Walker Associates, Inc., Philadelphia, Pa., 1968.

25. Manufacturing Growth and the Economy of Northeastern Pennsylvania: Trends During 1958-1968; Implication for the 1970's — Economic Development Council of Northeastern Pennsylvania, 1970.

26. Data Notes - Vol. 2, No. 2, Economic Development Council of Northeastern Pennsylvania, 1972.

APPENDIX B: Agency comments on the Preliminary Draft Statement

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DEC 4 1972

Col. Louis W. Prentiss, Jr.
Corps of Engineers
Department of the Army
P. O. Box 1715
Baltimore, Maryland 20203

Dear Colonel Prentiss:

This is in response to your letter of November 13, 1972 transmitting a copy of your preliminary draft environmental statement for the Wyoming Valley flood control project for review and comment. Since the Commission has no programmatic interests or facilities affected by the project nor any special expertise for evaluating the environmental impact, the statement has not been reviewed and we have no comments to offer.

Sincerely,

Robert J. Catlin, Director
Division of Environmental Affairs

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

Colonel Louis W. Prentiss, Jr.
District Engineer
Baltimore District, Corps of Engineers
Department of the Army
P. O. Box 1715
Baltimore, Maryland 21203

NOV 17 1972

Reference: NABPL-E

Dear Colonel Prentiss:

This is in reply to your letter of November 13, 1972, addressed to the Commission's Advisor on Environmental Quality, requesting comments of the Federal Power Commission on the preliminary draft environmental statement for the proposed Wyoming Valley Flood Control Project on the Susquehanna River, Pennsylvania. The statement was prepared and furnished for comment in compliance with the National Environmental Policy Act of 1969.

Our principal concern with developments affecting land and water resources is the possible effect of these developments on bulk electric power facilities, including potential hydroelectric developments, and on natural gas pipeline facilities.

Review by the Commission staff indicates that the proposed project apparently would have no significant effect on such facilities.

Very truly yours,

T. A. Phillips
Chief, Bureau of Power

U.S. DEPARTMENT OF COMMERCE
ECONOMIC DEVELOPMENT ADMINISTRATION
ATLANTIC REGIONAL OFFICE
320 WALNUT STREET
PHILADELPHIA, PENNSYLVANIA 19106

Col. Louis W. Prentiss, Jr.
U. S. Army Engineer District
P. O. Box 1715
Baltimore, Maryland 21203

SUBJECT: Preliminary Draft Environmental Statement
Wyoming Valley Flood Control

Dear Colonel Prentiss:

We have reviewed your draft environmental impact statement for the Wyoming Valley Flood Control. Your proposal has some impact on our Project No. 01-12-01074.70.

We are presently processing an application for a grant in the amount of $600,000 from the City of Wilkes-Barre for the restoration and development of the F. M. Kirby-Nesbitt Park. This grant would supplement a HUD grant for a total project cost of 1.5 million dollars.

At present, the Park is a principle recreational area for the residents of Wilkes-Barre, Kingston and Wyoming Valley as a whole. The present land fill dike has been used extensively as a recreational slope for skiing, sleding, coasting, etc. Therefore, increase in height would probably enhance such use.

We feel that your proposal insofar as it concerns Kirby-Nesbitt Park has a negative impact if land fill dike is used. In the event that sheet piling is used, this would create a "Chinese Wall" effect and prohibit the use of a better part of the acreage which would normally be available for recreational purposes.

Sincerely yours,

John E. Corrigan
Regional Director

DESCRIPTION OF PROJECT: Development of F.M. Kirby Park and Nesbitt Park is sorely needed as a result of Hurricane Agnes' devastation to the sites' approximately 131 acres which are situated on the west bank of the Susquehanna River directly across from the central business district of the City of Wilkes-Barre.

The development project will include a major first phase revitalization of the parks. Prior to the June 23 flood, they represented a major outdoor recreation area for the City and other surrounding municipalities. The parks are located within the heart of the Wyoming Valley, within the heart of the flood area, and within easy reach of virtually all residents of the greater Wilkes-Barre metropolitan area.

Specifically, the development of the parks will include, but not necessarilly be limited to providing basic park utilities (water, sewer, and electric, including general park lighting); athletic fields for multiple use; roadways; parking area; tennis courts; picnic areas; picnic shelters; restroom facilities; children's play and apparatus area; and a nature center area.

PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT: F.M. Kirby Park and Nesbitt Park development will have a fundamental impact on the environment of Greater Wilkes-Barre. All of Nesbitt Park and over half of Kirby Park are situated in the Susquehanna River flood basin. These areas are on the river side of dikes which were constructed in the later 1930's or early 1940's. Due to their unique situation the sites are ideally suited for open space purposes whereas they cannot be developed for other uses such as housing, business or industry. The sites provide a desirable buffer between the river and the boroughs of Kingston and Edwardsville.

Also of significance are the eco-systems which exist on the river side of the dike in Kirby Park. The area has developed into a veritable wild life habitat housing a variety of birds, small animals and many varieties of wild flowers. The National Audubon Society is presently making a study of the area to determine how best it might serve as a nature-interpertive center. As an example, a sand bar jets into the river providing a habitat for shore birds rarely seen this far inland. The preservation of the natural area may well be the first of a series of river side preservations along the flood plain thatcould have immeasurable impact upon the future environment of the valley.

The potential of the Susquehanna River has been ignored by many in the Wyoming Valley in recent years. Instead of utilizing the river as a unifying aspect of the valley--a focal point along which the valley has developed socially, economically, historically, etc.--it has more often been thought of as a barrier or an obstacle to overcome. Such "manhandling" of the river is unfortunate and can be considered a basis for many of the ills of the valley. Even

when utilized, the river was abused to the point of serious pollution Acid mine drainage is a serious problem. Yet the river must be preserved for its beauty, its leisure potential, its economic potential and its unifying significance around which the life-blood of the valley throbs. Therefore, the environmental impact of this project will be significant.

The social impact cannot be minimized. Prior to the flood, Kirby-Nesbitt Parks catered to tens of thousands of visitors per year. The parks represent regional type facilities centered in the heart of the metropolitan area. The flood virtually devastated the area so that complete redevelopment is necessary. However, glaring weaknesses were prevalent in the pre-flood conditions, which will be righted by the new development. Traffic patterns and parking were obsolete. Picnic area facilities were insufficient to support the demand. What little play apparatus existed was ancient, unchallenging and badly situated. The tennis courts' surfaces were very old and in poor condition. Lights were fifty years old and materials obsolete. The bathrooms were minimal and difficult to maintain and antiquated. Proper drainage on roads and play areas was poor, and play fields had undulating surfaces which were safety hazards.

This project will have significant economic consequences upon the valley. Residents and business will be encouraged to move back, make repairs, and then reestablish a market value in the immediate area. The total community will be aided in achieving stability following the flood and in developing a better life style.

ADVERSE ENVIRONMENTAL IMPACTS: Virtually no adverse impacts regarding any parts of the projects are descernable.

ALTERNATIVES TO THE PROPOSED PROJECT: For the facilities involved, there are no logical alternatives, as these parks cannot be replaced. Open space for recreation, park, and conservation purposes is at a premium in the valley. No other locations would be as central. Without the redevelopment of these areas the community will loose irreplaceable services.

RELATIONSHIP BETWEEN SHORT-TERM AND LONG TERM PRODUCTIVITY: All development is geared to long-term productivity, although speed is of the essence. This project is an emergency restoration with long-term values. Without the proper open-space facilities, the communities will remain poorer economically, aesthetically, and socially. No useful functions are served by Kirby-Nesbitt Parks in their present condition. Yet the need for these open space areas is of vital consequence. The sooner the development occurs, the better and one may be certain whatever is developed now will last for decades.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES: Kirby-Nesbitt Parks are maintained through the Kirby Park Trust Fund--a $500 Million fund, the annual proceeds of which are utilized annually. In 1972, the fund produced $35,000. So long as the park lasts, the fund remains intact. As the City owns the land, the park is not in jeopardy.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Washington, D. C. 20250

DEC 8 1972

Colonel Louis W. Prentiss, Jr.
District Engineer, Corps of Engineers
Department of the Army
Post Office Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

Your letter of November 13, 1972, to Dr. T. C. Byerly enclosing for review and comment a preliminary draft environmental statement on the proposed Wyoming Valley Flood Control project, Pennsylvania, has been referred to the Soil Conservation Service for reply.

Our state and field offices provide comments on preliminary drafts. Soil Conservation Service comments on this preliminary draft will be provided by Mr. Benny Martin, State Conservationist, Harrisburg, Pennsylvania. Forest Service comments will be provided by Mr. R. D. Raisch, Director, Northeastern Area, State and Private Forestry Division, Upper Darby, Pennsylvania. U.S. Department of Agriculture comments will be provided, as requested, on the draft environmental statement when it becomes available.

We appreciate your providing this preliminary draft environmental statement for our review.

Sincerely,

/Kenneth E. Grant

Kenneth E. Grant
Administrator

United States Department of the Interior
BUREAU OF MINES
4800 FORBES AVENUE
PITTSBURGH, PENNSYLVANIA 15213

December 7, 1972

Colonel Louis W. Prentiss, Jr.
District Engineer
Baltimore District, Corps of Engineers
P. O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

The preliminary draft environmental statement (November 1972) for the Wyoming Valley Flood Control Project has been reviewed by personnel of the Bureau of Mines Division of Environment and Eastern Field Operation Center.

We understand the urgency in preparing the environmental impact statement and the Corp's desire to have the statement as complete and comprehensive as possible at this stage. However, the statement is verbose and contains a considerable amount of information of questionable value. This is especially true of Section II, Environmental Setting Without the Project and the section on Atmosphere which may not be directly related to the proposed project.

In view of the concern for environmental problems in the Wyoming Valley, many of which are related to former anthracite mining, the opportunity to review plans for flood control is welcomed. The draft statement shows appreciation for the complexity of these problems and the inter-relation between surface water, mine pools, alluvial saturation, mine structures, and surface stability.

We have confined our review to statements concerning mineral resources and the mining industry. Specific comments are listed below for your consideration in preparing the final environmental statement.

Page 7, last par. - This paragraph needs revision to make it clear that the bedrock strata contain not one anthracite bed but as many as 21 anthracite beds in the deepest part of the coal measures, 18 of which were mineable.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER DARBY, PA. 19082
TELEPHONE (215) 352-5800

December 6, 1972
1940
Your ref: NABPL-E

Colonel Louis W. Prentiss, Jr.
District Engineer, Baltimore District
Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

Dear Col. Prentiss:

We appreciate the opportunity to review and comment upon the preliminary draft environmental statement for Wyoming Valley Flood Control, Susquehanna River, Pennsylvania. As you know, our interest is primarily in forested land in the project area, and is implemented through the Pennsylvania Department of Natural Resources.

We feel that forest cover is a compatible use of flood plains and that the communities involved should be encouraged to preserve as much of it as possible for such well suited uses as the River Commons. For this reason we recommend that care be taken to destroy as little forest cover as possible in the construction of the levees and location of borrow pits for levee material. The possible use of culm piles, if the material is suitable, would certainly be a happy solution.

The above sums up our responsibilities as we see them from a review of the draft. We have a broader, unofficial interest in common with many others in the wise use of flood plains. We note that the alternatives considered do not include federal funding for raising of levees contingent upon and in conjunction with flood plain zoning and the relocation of flood-destroyed improvements to areas outside the flood plain.

As we read the draft, the proposed height for the levees is not based upon any specified frequency flood - only one that will equal or exceed Agnes. This will enable Federal and State governments to approve urban renewal applications, the destroyed area will be rebuilt with greater investment than that destroyed, and next year or 500 years hence the levees may again be breached by an even greater storm. Is the long range solution to then raise them again? We hope to have the opportunity to hear your views on this sometime.

Sincerely,

ROBERT D. RAISCH
Director

Page 9, par. 1 - The statement is not clear as to whether the anthracite production data is for Luzerne County or the region. Production in the region reached a high of 100 million tons in 1917 and a low of 8.7 million tons in 1971. Production for Luzerne County, alone, was 2.6 million tons in 1971.

Page 9, par. 4 - The statement should be clarified to indicate that pumping in operating mines is necessary to prevent flooding of certain sections of the mines.

Page 9, last par., lines 2-3 - It is unlikely that subsidence has a major effect on topography though it has a continuing effect on the stability of the ground surface. Abandoned mine refuse banks and strip mine areas, of course, continue to affect the local topography.

Page 9, last par., lines 4-5 - The meaning of this sentence is not clear. The direction of mining operations was dictated by the position of the coalbeds which in the Northern field ranged from near-horizontal in the basin (under the river) to dips of 50 to 60 degrees on the limbs. Coal was mined in more or less parallel planes or layers.

Page 9, last par., lines 5-6 - Rather than "new" and "old" layers, it is suggested the following be used: - "Deeper coalbeds were mined below coalbeds that had been previously mined...." Actually the deeper beds are older, geologically, though they were mined later than the more accessible beds closer to the surface.

Page 9, last par., lines 7-8 - The amount of backfilling was limited to a small proportion of the mined-out space.

Page 10, lines 1-2 - Probably the principal causes of subsidence (other than pillar robbing) are caving of the overburden above wide roof spans and squeezing of inadequate mine pillars. Backfilling of voids in the relatively few areas where it was practiced was actually a deterrent to surface subsidence.

Page 10, par. 3 - Apparently this statement is to describe the adverse effects of past strip mining of anthracite in the area. The paragraph might be edited to the following:

> Past strip mining of anthracite in the Susquehanna River Valley has left the area with numerous abandoned pits of various dimensions, and piles of spoil and cleaning plant refuse. The pits constitute a safety hazard by increasing the likelihood of underground coal fires, and by causing the ponding of surface water which promotes the formation of acid drainage. The waste piles are not only aesthetically displeasing but many contain combustible material.

Page 10, last line and page 11, first line - Delete "the acid mine water problem" and insert "rising mine-water pools to levels that were above the valley flood plain." The volume rather than the chemical quality of the water was the significant factor.

Page 11, par. 2 - This statement is vague and needs clarification. The first sentence should indicate that at present coal resources are considered primarily as potential reserves; plans do not exist for the development of additional deep mines. The second sentence should indicate whether the problems referred to are a result of present or past mining; it is assumed the reference is to past mining. The third sentence should indicate whether it refers to abandoned, current and/or future mining operations. The reference to better controls in the future should be explained in greater detail and be more specific.

Page 11, par. 5 - The statement should describe Luzerne County rather than Northeastern Pennsylvania; the general facts, as stated, are the same for either area. The first sentence should be changed to indicate that the bulk of mineral production...consisted of coal.

Page 12, par. 2, lines 2-4 - As it stands this sentence implies that areas adjacent to the river are not satisfactory for building, which is probably not intended. Suggest deleting "but satisfactory for building" from sentence.

Page 12, par. 4, line 3 - Change "Black" to "Back".

Page 17, par. 1, line 9 - Add "for a short time" after the word "ineffective," and delete the last sentence in the paragraph. In the central part of the coal basin, beneath the river and the levees, the mined coalbeds have been inundated by mine pools for many years. Subsidence related to rising pool levels during Agnes affected mine voids located outside, and above the level of, the flood plain. This comment is based on the understanding that "inside the levees" refers to the river area between the levees. Possible ambiguity would be avoided by using the terms "riverside" and "landside" as on pages i and 1.

Page 17, par. 3, last sentence - Suggest rewording the sentence -- "Of much greater relevance to the pollution problems has been the introduction of mine drainage water with its varying content of acid, iron, and manganese, into the river system, although...."

Page 18, par. 3, lines 3-4 - Delete "sinking of boreholes." It is doubtful that sinking of boreholes since mining ceased permitted significant entry of surface waters into mines. Boreholes for flushing mine voids are capped after use. An important source of seepage is stream water escaping downward through cracks created by subsidence.

Page 24, par. 2, lines 10-12 - Investigations made by Bureau of Mines engineers, Environmental Affairs Field Office, Division of Environment immediately after "Agnes" indicated that erosion from severe turbulence and overtopping, rather than subsidence, was cause of the flood-related damage to the levees. Subsidence is believed to have been involved in the reduction of crest height of levees in the past, but not immediately prior to or during the latest flood.

Page 24, par. 4, lines 1-2 - See preceding comment.

Page 106, par. 1 - We understand that the project plans are not final. When they are finalized, the section on material for construction should include references to the source, quantity, and type of rock and fill material that will be needed.

The above comments are provided for assistance in the preparation of the environmental statement; it does not constitute a formal Bureau of Mines review.

Sincerely yours,

Robert D. Thomson

Robert D. Thomson, Chief
Eastern Field Operation Center

SUSQUEHANNA RIVER BASIN COMMISSION
5012 Lenker Street • Mechanicsburg, Pennsylvania 17055

From the Office of the
Executive Director

December 8, 1972

Colonel Louis W. Prentiss, Jr.
Department of the Army
Baltimore District Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

We are in receipt of your letter of November 13, 1972, requesting comments on the Preliminary Draft Environmental Statement, Wyoming Valley Flood Control, Susquehanna River, Pennsylvania.

The Draft Statement describes a proposed project to modify the existing flood control features in the Wyoming Valley of Luzerne County, Pennsylvania. Essentially the project consists of improvements to the system through raising the levees and sheet steel pile walls by heights varying from two to ten feet above existing levels. Beneficial and adverse effects of the proposed project are presented as is brief discussion of alternatives.

The short time frame in which you have developed the proposed project; the need for prompt action to restore the original degree of flood protection afforded the communities of the Wyoming Valley; and the pressures to increase this protection to the level of the Agnes flood with the utmost dispatch are all recognized and we commend the effort you have made.

We do have grave concern, however, that an attempt to resolve in a hasty manner a problem as complex as that of providing flood protection for the Wyoming Valley, may preclude or prejudice planning and implementation of a comprehensive approach to providing basinwide protection and management of flood plains.

It is therefore suggested that the existing flood control features of the Wyoming Valley be fully restored to their original design or slightly increased heights and structural integrity at the earliest possible date. This action, which I am sure you have well advanced, would restore the former level of flood protection afforded and enable final resolution of the flood management problem for the Wyoming Valley to be accomplished as part of a carefully considered overall basin program for flood plain management and protection. Such an overall program appears to have sufficient benefits to outweigh implementing a hastily planned proposal that contains many uncertainties and limitations.

To support this latter comment we submit the following regarding the proposal:

1. The study of alternatives appears to be of a cursory nature and does not provide a useful basis on which any given alternative can be evaluated by the public or other agencies.

2. The proposal does not appear to consider the effects of existing, under construction, and authorized upstream flood control projects which could have measurable potential to reduce river stage at Wilkes-Barre.

3. The proposed project provides the theoretical degree of protection against a repeat of Agnes flood conditions needed by some communities of the Wyoming Valley, but not others. In fact the project, if implemented, may increase the flood hazard immediately upstream of the levees and also downstream for an undetermined number of miles.

4. The proposal avoids considering the issue of moving the levees back from the natural floodway in two very tight areas by resorting to increased levee height, and thus increased water level. This solution may be the most economical, and minimize local costs but contributes to the problem of potentially increasing downstream flood hazard and potential future damage. The plan also suggests decreasing the floodway in some areas by placing new fill on the riverside. These actions appear to endorse and encourage encroachment on the natural floodway.

5. The proposal provides for gates to seal the Market and North Street bridge traffic lane openings, and for "minor channel improvements" at these bridges. This action, without some plan for relief of the pressure on the bridges seemingly will result in higher water levels, overtopping and possible bridge failure if a repeat of Agnes flows occur. Also the plan does not appear to be coordinated with other planning underway regarding cross valley travel in the event the bridges must be closed or are lost.

6. The proposal requires the pledge of a large amount of local funds for land rights and relocation costs, and annual operation and maintenance funds. The area is recognized as being economically depressed and with the added unfavorable economic impact of the June, 1972 flood the non-Federal cost of the project may be beyond local funding capabilities.

7. The cost estimates seem somewhat low for the proposed work when compared with the costs shown for the initial repairs to the levees. If this assumption is correct the local burden could be substantially increased. The relatively narrow benefit cost ratio might also reach an unfavorable balance, however, we believe the benefits shown may be somewhat conservative if the project can meet its objectives.

Again let me note we commend you and the Corps for your prompt response to restore the existing levees and initiate planning to provide added protection in the Wyoming Valley against a repeat of Agnes flood conditions. However, we urge that you not rely totally on raising the existing levees to accomplish this task; that you give thorough consideration to all alternatives and combinations of alternatives; and that your planning activity be closely coordinated with State and local interests and the SRBC.

Sincerely yours,

Robert J. Bielo

Robert J. Bielo
Executive Director

MEMBERS OF COUNCIL
RALPH M. BROWN
President
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BOROUGH OF KINGSTON

LUZERNE COUNTY, PENNSYLVANIA 18704
500 WYOMING AVE. — P. O. BOX 1229
PHONE 288-4576 AREA CODE 717

CHARLES A. BANKES
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Secretary
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Asst. Eng.
L. S. SPAULDING
Elec. Eng.

December 13, 1972

Colonel Louis W. Prentiss, Jr.
Corps of Engineers
District Engineer
Department of the Army
Baltimore District
P. O. Box 1715
Baltimore, Maryland 21203

In Re: Preliminary Draft
Environmental Statement
Wyoming Flood Control

Dear Sir:

We have received and reviewed the copy of subject document which was forwarded to us. Attached please find one copy of our memorandum of comment concerning the environmental statement.

Very truly yours,

John A. Burke

John A. Burke, P.E.
Kingston Borough Engineer

JAB/mw

Enclosure

cc: Ralph Brown, w/Enclosure
Eugene Goldstein, w/Enclosure

December 13, 1972

MEMORANDUM ON PRELIMINARY DRAFT ENVIRONMENTAL STATEMENT
WYOMING VALLEY FLOOD CONTROL

In general, the draft statement discusses various flood control proposals in the light of their effects upon the environment. It does not evaluate their effectiveness as flood control devices.

The following comments are based upon a review and analysis of the draft statement as it applies to Kingston Borough. Some of the remarks refer to clarification of details described in the draft statement, while others refer to concepts or conclusions noted therein. Where appropriate, page and line references are noted to facilitate review by the originating agency.

1. Some clarification is required concerning the effects of the mines on the local environmental conditions as discussed on pages 9 through 11. Lines 16 and 17, page 9, should be modified to emphasize the fact that the strip mine holes actually intercept heavy amounts of runoff from the mountains on both sides of the valley and provide access for most of it to run rapidly into the deep mine voids. The inter-connection of the workings in various mines was not exactly "accidental", but it was limited and results in the restricted migration of water to the Buttonwood outfall.

The paragraph at the bottom of page 9 and the top of page 10 refers to the mechanics of subsidence. The beds of coal were not actually mined in sequence from the higher to lower, as stated. In many areas the lowest beds were mined first. Attempts were made, of course, to columnize the location of pillars to provide continuous support. This was not uniformly accomplished. Packing or backfilling the mined-out voids was rarely practiced to provide lateral pillar support while

mines were in operation. Flushing of fine material into the abandoned mine workings from the surface has been done in selected locations to retard subsidences that have actually begun to occur or were threatened. The effect of the flushing has been two-fold; some lateral support has been afforded to the remaining pillars, and the void space into which the overlying strata can subside has been reduced. It is difficult to conceive that compaction of these flushing materials due to flooding of the mines has added appreciably to the problem of surface subsidence. It is possible, however, that saturation of the glacial material overlying the bed rock has contributed to reduction in the bearing capacity of these deposits and allowed them to compact with consequent reductions in surface elevations.

Similarly, the effects of saturation of exposed rock strata actually overlying and underlying flooded mine workings can lead to weakening of these rocks causing localized rock falls and heaving of the bottom. This action, however, would normally be expected to be restricted to relatively short distances above or below any given coal bed and would not be expected to affect the surface.

The reference at the top of page 11, states that the June Hurricane caused increased flooding of the mine workings and discharges of acid mine water into the surface waters, and that this situation has stabilized to essentially pre-flood conditions. This is true, but it should be noted that these pre-flood conditions which still prevail include similar annual flooding and discharges caused by normal spring runoff in the river and from adjoining mountain lands.

Reference is made on pages 16 and 17 to the drainage of mine water into the river through the Buttonwood outfall. Exception is taken to the statement that the outlet capacity at Buttonwood is adequate to stabilize mine pools on the west side of the river. During the sixty day period which was required to normalize

mine pool elevations, those elevations were several feet higher under Kingston than they were directly across the river under Wilkes-Barre. This condition resulted in substantial water damage, inconvenience, and potential health problems due to back-up of these waters into residential basements and storm and sanitary sewer lines.

This condition which was noted immediately after the flood was actually a re-enactment of the condition that occurs in Kingston each spring and after many severe rainfalls. Therefore, the existing discharge system for the mine pools for the west side of the river cannot be considered adequate for the future. If additional gravity outlets are to be considered necessary for the east side pools, they should be even more urgently considered for the west side, especially Kingston. Contrd of mine pools might be effected by additional bore holes with separate gravity drains directly to the river and by diversion works above the strippings to intercept runoff from the mountains and conduct it to the river. The former course of action involves increased discharges of acid mine water to the stream, a trade-off which must be weighed against the ill-effects of high water in the mine pools.

A related comment is made at the top of page 24, concerning the surface flooding caused by high water in the mine pools, "particularly in the areas of South Wilkes-Barre". Again, Kingston and other west side communities do experience this problem.

2. On page 49, paragraph 4, it is erroneously stated that there is no residential development in Kingston immediately adjacent to the levee. Actually there are approximately three blocks of single family homes lying between South Dawes Avenue and the levee in the area from Market Street to Pierce Street.

The commercial establishments referred to in paragraph 3, page 58, should include a service station. The so called auto junk yard is merely a temporary impoundment area for flood-damaged cars which were removed from the streets of Kingston during the debris clearing operations.

3. The last paragraph of page 61, states that damage to the Wyoming Valley Sanitary Authority facilities allowed the discharge of raw sewage into the river for four months before service was restored. This may be the case at the treatment plant, but within the Borough of Kingston one sewage pumping station was completely destroyed and the second was out of service prior to the flood and has not been reactivated since. This means that since the flood in June and for an indefinite period into the future all of Kingston Borough's sanitary sewage has been and will continue to be discharged raw into the river.

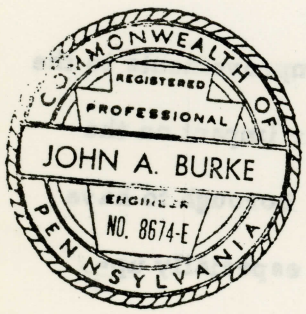
4. One pages 78, 80, 82, 83, 86 and 87, specific improvements to the flood control system in Kingston are discussed relative to their impact on the community. In general, it would be more advantageous to the Borough to have levee improvements take place on the river side of the levee, especially upstream from the Market Street Bridge to the Forty Fort Borough line. This would be based upon the desire to minimize disruption to existing residential and commercial properties and to the Third Avenue Urban Renewal Area. It is recognized, however, that this would result in a narrowing of the effective flood channel and might be undesirable from hydraulic and cost considerations. For the overall benefit of the Borough it is felt that technical flood control of the river should take precedence over localized disruptions to the community.

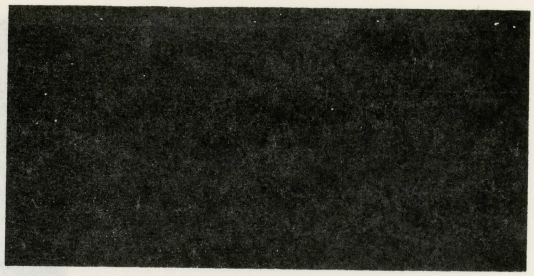
5. On page 102, there is a brief paragraph on river diversion. As noted, diversion of the river from Wyoming Valley is impractical. Much of

Kingston and parts of Forty Fort and Edwardsville lie within a large bend of the river. This flow path creates pressures on both the east side and the west side of the river. It would seem worthy of some effort to evaluate the possibility of straightening the channel to some extent in the vicinity of Plains and Plymouth where large low lying flats exist which are relatively undeveloped. While these proposed channel re-locations would not eliminate the Kingston bend in the river, they would undoubtedly ease the approach and departure, and improve the flow characteristics of the channel.

John A. Burke, P.E.
Kingston Borough Engineer

JAB/mw





FORTY FORT BOROUGH

Office of the Borough Co-Ordinator

December 13, 1972

Louis W. Prentiss Jr.
Colonel, Corps of Engineers
Department of The Army
Baltimore District
P.O. Box 1715
Baltimore, Md. 21203

Dear Colonel Prentiss,

Relative to the preliminary draft Environmental Statement, Wyoming Valley Flood Control, The following are our comments.

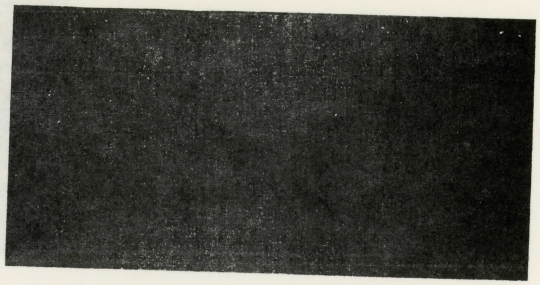
It is of deep concern to the people of the Borough of Forty Fort that the Corps of Engineers proceed as fast as possible to close the breach in the dike at the Forty Fort Cemetery (completed as of this date), and repair the eroded river bank in the Mohawk Street area. Following this raising, the earthen dike north of the Cemetery, adding sheet steel piling along River Street and including extension of piling from Butler Street toward Mohawk Street is in order.

Another critical item not part of your report is the need for a pumping is the need for a pumping station just northeast of The Forty Fort Cemetery to remove the ponding water which results from draining eighteen square miles at the head waters of Abrahams Creek. The undeveloped area as shown on page 53 of your report can then be used to its fullest.

Consideration of a Forty Fort Cemetery Park and Monument is also an important part of the future of The Borough of Forty Fort. In addition renovation of The Forty Fort Meeting House located in the Forty Fort Cemetery, should be part of the overall master plan.

Other thoughts which we have are the need for additional Dams at the head waters of the Susquehanna River. Continued reforestration in this area is needed to aid in control of water run off.

The thought of added and continued use of the River for recreation, is necessary to community progress. Perhaps you in your design of additional dike height, can incorporate two or three accesses by road down to water level.



FORTY FORT BOROUGH

Office of the Borough Co-Ordinator

Of concern to us in the severing of an old sanitary line going thru the cemetery. With breaking of the dike at the cemetery and non-functioning of The Wyoming Valley Sanitary Authority, problems could be in order during periods of heavy rain.

Briefly other thoughts which are considered are:

1. No present mine settlement is known since the flood.
2. With a possible higher water table, it is hoped that sand movement below will be minimized.
3. Some indication of Storm and Sanitary line settlement is evident.

We also want you to feel free to call us at anytime if you have a question or can be of further help to you.

Many thanks to you.

Sincerely,

Willard B. Evans
Borough Co-Ordinator

WBE/as

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES

The Secretary

P. O. BOX 1467
HARRISBURG, PENNSYLVANIA 17120

December 14, 1972

Louis W. Prentiss, Jr.
Colonel, Corps of Engineers
Baltimore District
P.O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

The Baltimore District has acted with all the necessary urgency occasioned by Hurricane Agnes. The Preliminary Draft Environmental Impact Statement on the WYOMING VALLEY FLOOD CONTROL project normally, I assume, would have taken about two years; you completed it in about 3-4 months. This is commendable and the Department of Environmental Resources will continue to work very closely with the District for the expeditious implementation of this project.

The technical staff of our Department has reviewed the Statement and its comments are attached.

Our Department can grant approval conditioned on the receipt of the Draft Environmental Impact Statement, which, we understand, is the next step in the process. The various bureaus under the Office of Environmental Protection and Regulation must examine the data more closely in the next step. We understand and hope that we will have more than 30 days in the next review cycle.

There has been some delay and confusion concerning the mailing and distribution of this project. The Office of Planning and Research which administers and coordinates all intergovernmental project reviews, has been instructed to clarify matters with the District.

Should there be any questions concerning this or any other Corps project, please call Mr. Nick Nichols, Office of Planning and Research, (717) 787-8137.

Sincerely,

Maurice K. Goddard

MAURICE K. GODDARD

Attachment

In reply, refer to:
P.S.C.H. Project No.
72-11-3-004

TECHNICAL COMMENTS ON THE PRELIMINARY
DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE
WYOMING VALLEY FLOOD CONTROL PROJECT

1. D.E.R. has reviewed the Preliminary Draft Environmental Statement on Wyoming Valley Flood Control, Susquehanna River, Pennsylvania, and offer the following comments for consideration.

2. The statement makes a good presentation on all facets of a complex situation. Although modification of the existing flood control facilities in the Wyoming Valley will provide the most immediate needed protection for this area, we strongly recommend that any changes made here should be coordinated to work in unison with the Tioga-Hammond and Cowanesque projects, as well as with the other headwater dams authorized for construction in New York.

3. Greater upstream retention of flood waters by additional flood control dams appears to be necessary. This would not only give better control of the river flow in the Wyoming Valley but would reduce the possibility of future flooding in downstream area which might be brought about by increased river control by local projects alone. We note that the Corps is concerned about this also, as indicated in the last sentence on Page 74, Part III, 2.a.

4. In addition to a combination of modification of existing flood control facilities and upstream retention, we suggest that consideration should also be given to the feasibility and desirability of increasing the cross section of the channel in limited areas. This could reduce the height to which the present local flood control projects must be raised. With the Corps' proposal to extend the lateral direction of the levees into the river, some cross section increase may become necessary to overcome the effects of such action.

5. Under "Alternatives to the Proposed Action", page 101 the comment appears under many of the alternatives that they were not thoroughly investigated because of time constraints. Although time is always a consideration in a flood control feasibility study, it is felt that no other time would be more appropriate than the present to investigate all alternatives. We strongly recommend that the various alternatives be closely analyzed in order to develop a project which will provide not only the desired protection but also minimize the adverse effects upon the environment.

6. One question which should be given consideration in the design stage is the safety of the levee in areas subject to subsidence. Permeabilities should be checked and adequate seepage control or "flattened" levee slopes should be used in areas with poor foundation conditions. This aspect is mentioned here as it may effect the configuration of the project.

7. D.E.R. concurs with the Preliminary Draft E.I.S. concerning the effects of the proposed construction on the geological environment. The immediate effects appear minimal and of a temporary nature such as siltation of

the river during construction of the level. We want to see in the forthcoming Draft E.I.S. what preventive measures are planned for the control of erosion and siltation.

8. A real concern is that the increased control of the river discharge in the Wyoming Valley will have an adverse affect on downstream areas during periods of severe flooding. We hope that maximum effort will be made at least to define the areas of projected severe downstream flooding so that the inhabitation of these areas can be alerted and planned accordingly.

9. During the planning and construction stage, the consideration should be given to making needed improvements in the sanitary sewer system. Also repairs in the construction area, especially where the system has been effected by subsidence.

10. Also along with the construction of the levees there should be channel dredging, removal of any obstructions, channel widening and construction of impounding basins.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Box 985 Federal Square Station, Harrisburg, Pennsylvania 17108

December 14, 1972

Colonel Louis W. Prentiss, Jr.
District Engineer
Department of the Army
Baltimore District
Corps of Engineers
P. O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

The Soil Conservation Service has been asked to reply to your letter of November 13, 1972 to Dr. T. C. Byerly concerning the Draft Environmental Statement for the Wyoming Valley Flood Project. Our comments are as follows:

Page 96, paragraph g. - We suggest clarifying "exposed earth" to include borrow areas. Also, in addition to seeding and mulching borrow areas, the land and streams adjacent to these areas should be protected from sediment deposition by utilizing sediment basins, sediment traps, and diversions to route water away from exposed borrow areas.

Page 106, first paragraph - If the mine spoil is satisfactory for construction material, it would eliminate the need to disturb the streambed. In addition, there should be a significant improvement to the aesthetic quality in the Wyoming Valley.

The statement does not mention the magnitude of increased flooding downstream. If peak discharges are significantly increased during severe flooding, then out-of-bank flow could have severe effects on soil erosion, sedimentation and overbank outwash.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

Benny Martin
State Conservationist

OFFICE OF ECONOMIC
OPPORTUNITY

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

December 21, 1972

Louis W. Prentiss, Jr.
Colonel, Corps of Engineers
District Engineer
Department of the Army
P.O. Box 1715
Baltimore, Maryland 21203

Dear Sir:

Thank you for your letter of November 13, 1972, regarding the draft environmental statement on the above mentioned project.

This office in coordination with our Regional Office and the affected community action agencies have carefully reviewed this statement. On the basis of information from this review, we do not find it implying any particular detriment to low income residents as distinct from other groups. Our questions are of general concern as they fall in the areas of conservation and aesthetics, which quite properly are not ranked by the poor as high in priority as housing and income.

As you know, the Wyoming Valley flood plain is not a predominately low income area and the sections closest to the levee system are largely occupied by commercial structures and moderate to upper income housing, interspersed with "pockets" of low income rental units.

This statement does not fully detail the economic impact of the project. If this project would safeguard employment and result in an eventual increase in housing for the poor, we believe it to be a safe assumption that it would be endorsed by the majority of them.

We appreciate the opportunity to comment on this draft statement.

Sincerely,

Arthur J. Reid, Jr.
Director
Intergovernmental Relations

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION III
401 NORTH BROAD STREET
PHILADELPHIA, PENNSYLVANIA 19108

December 27, 1972

OFFICE OF THE
REGIONAL DIRECTOR

MAILING ADDRESS:
P.O. BOX 12900
PHILADELPHIA,
PENNSYLVANIA 19108

Louis W. Prentiss, Jr.
Colonel, Corps of Engineers
District Engineer
PO Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

We have reviewed the draft Environmental Impact Statement concerning Wyoming Valley, Susquehanna River, Pennsylvania. In our opinion the project does not have a significant adverse environmental impact on the health, education, or welfare of persons living in and around the project area.

Thank you for the opportunity to review and comment on this draft Environmental Impact Statement.

Sincerely yours,

John E. McKenna
Regional Environmental
Coordinator

cc: Mr. Robert Lanza

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION III
6th & Walnut Sts., Philadelphia, Pennsylvania 19106

Office
of the
Regional
Administrator
Edward W. Furia

JAN 12 1973

Colonel Louis W. Prentiss, Jr.
District Engineer
Baltimore District
Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

In accordance with your November 13 request, we have completed our initial review of the preliminary draft environmental statement prepared by your consultant for the proposed additional Federal flood protection works in the Wilkes Barre vicinity, Wyoming Valley, Pennsylvania.

The project under consideration involves raising the existing flood control facilities, some 12.1 miles of levees, to the storm "Agnes" flood height plus an additional five feet to improve the flood control system for the Wyoming Valley. Improved flood protection would be accomplished by raising the present levee system by two to ten feet through the use of fill material or steel sheet pile. The latter type of construction appears to be preferred for most of the levees' length to minimize taking of land and houses. The proposed design elevation will provide levee protection for the flood caused by Hurricane Agnes, plus an additional three feet freeboard and two feet to account for subsidence.

Although this office appreciates the rigid time constraints involved in expediting this particular program, we feel that many other factors must be considered and evaluated prior to proceeding with the project. These questions are raised in our detailed comments that follow. These comments should be viewed as preliminary in nature and will not be filed with CEQ. You will receive our formal review when the draft environmental statement is submitted to this office.

Flood Plain Management and Land Use

We understand that the four existing Federal flood protection structures are being restored to their prior design status (1936 flood of record). The purpose of the study currently underway is to determine the feasibility of providing additional protection in light of the recent Hurricane Agnes flood of record.

EPA's concern with long range flood recovery efforts in the Wyoming Valley and elsewhere is based on both environmental and humane grounds. EPA believes that two basic program goals must be pursued simultaneously:

1. Effective floodplain management programs which will discourage future building on floodplains. By preserving such land much needed open space, especially in urban areas, would be provided which would improve air quality and generally enhance the quality of life; and

2. Adequate protection of those people and businesses now located on the floodplains. Previous levees and other flood control facilities generally have been designed to contain floods of less than 1:100 probability in any one year and have encouraged families and businesses to locate in basically unsafe areas, thus exposing them to the catastrophic flood (1:500) which exceeds the design standard.

Pursuit of these goals will prevent building a future disaster with its concomitant human suffering and economic loss. EPA therefore is basically concerned with the human settlement pattern and a policy in which government's role will no longer be merely to compensate people after the tragedy of a flood but rather to prevent these potential future tragedies altogether.

According to the Economic Development Council of Northeastern Pennsylvania (EDCNP), only eight municipalities in the Wyoming Valley will be provided flood control protection by the proposed project. These municipalities include Wilkes Barre, Edwardsville Borough, Exeter Borough, Forty Fort Borough, Hanover Township, Kingston Borough, Plymouth Borough, and Wyoming Borough. EDCNP also reports that two other municipalities which have submitted flood-related urban renewal applications have no flood protection and would not obtain flood protection under this proposal which is

limited to raising the existing levees. A comprehensive flood control plan and program including actions related to flood control structures, floodplain management, floodplain legislation, flood insurance, etc., covering actions to be taken by various levels of government, should be developed for the entire Wyoming Valley. A lead agency should be designated to develop such a comprehensive plan and program and directed to coordinate with the long range flood recovery efforts underway in the Wyoming Valley.

To be realistic a comprehensive flood control plan and program should relate to the Wyoming Valley comprehensive plans currently being prepared by consultants retained jointly by the Luzerne County Planning Commission and the EDCNP. Utilization of floodplain management techniques including land use planning and floodplain zoning can be considered as alternatives to construction of flood control facilities and might prove to be more cost effective. Coordination of comprehensive planning with flood control planning could identify these type of trade-offs.

Sixteen urban renewal projects are proposed for the Wyoming Valley. Flood protection measures must be planned and implemented in conjunction with these programs. A determination will be required as to the degree of protection and when flood protection will be available. The preliminary draft EIS is silent on these questions which are central to the entire flood recovery and urban renewal program in the valley.

The actual calculated probability of flooding as noted on p. 104 of the EIS is not specified nor is the degree of protection afforded by the raised levees as proposed. However, it is reported that the present levees only provide a level of protection against a 50 year flood and the Agnes flood was characterized by the COE as a flood of 175 year frequency. Now the Agnes flood increasingly is referred to as the "highest flood of record". In other words, the probability of a flood of this magnitude in any year could be one out of 100. Using the mortgage period of twenty years as the useful life of a building to be constructed behind the proposed levees and assuming that the levees will provide protection against a 100 year flood, the probability of the structure being flooded during its "useful life" is 1 in 5 (100/20=5). If an SBA loan was secured for

rehabilitation (30 years) the probability that the investment might be flooded is 1 in 3 1/3. This probability analysis presents the real risks in investing capital in buildings that are protected to this standard. Accordingly, the Agnes flood has brought into question the continued use of the 100:1 probability of flooding in any year as an appropriate standard for continued use by the COE in construction of man-made flood protection facilities. While the construction of levees to this standard has limited losses from lesser floods, it has encouraged development in the "protected" land areas behind the levees which leads to much greater economic losses and threat to human life by a catastrophic flood such as Agnes when the levees are topped.

Within the Wyoming Valley during the Agnes flood, the present levees of Kingston and Wilkes Barre also constricted the channel of the river between them and resulted in a very precipitous rise of water. The levees were topped and relieved the crest, but the cost was the flooding of the urban area. By partially impounding the flood waters within the city the crest downstream lowered.

The aesthetic issue is very carefully considered in the EIS. Construction of the levees as proposed, in many areas 10 feet above their present level, will not only adversely affect adjacent properties and certain historical sites, but will completely destroy the relationship of the City to the Susquehanna River. Thus, high levees, especially if they are constructed of steel sheet pile, will provide a physical barrier and destroy one of the primary incentives for settlement along the river.

Although restoration of the existing flood control project is definitely needed for the communities in this area, we are concerned that additional protection may induce increased flood plain development unless zoning ordinances are adopted and implemented by up and downstream townships. This action is mandatory for the welfare of area residents since the program under consideration will undoubtedly increase flood potential in adjacent reaches of the Susquehanna River.

The COE candidly admits that the increase in levee height will increase the flooding potential downstream. However, no provision for this danger has been made in the proposal. Increased downstream flooding will provide the

rationale for continued construction of levees. Such an occurrence could prove disastrous if more and more land adjacent to the river was opened for additional development as a result of the proposed project.

It is important to be cognizant of other flood recovery actions being considered in the remainder of the basin. Flood control measures for the Wyoming Valley are related to watershed management plans for the entire Susquehanna River Basin and will require coordination with the Susquehanna River Basin Commission which is the agency with the primary responsibility for a comprehensive plan for the Basin. For example, the impact of the two flood control projects upstream from the Wyoming Valley, the Tioga-Hammond (under construction) and the Cowanesque (still in doubt), are not considered in the proposed raising of the levees or reduction of flood crest levels.

Subsidence

As clearly identified in the EIS, subsidence has been a major factor in reducing the flood control effectiveness of the existing project. Previous mining practices has affected the nature of the substrate parallel to the River. These beds, nearly all of which have been undermined, have already subsided as much as nine feet prior to the flood event and the additional overburden proposed by increasing the height of the dikes with earth embankments may cause greater and more extensive subsidence in the future. Should such an event occur, the Valley would again be left unprotected from rampaging Susquehanna flood waters as was so tragically demonstrated in June, 1972.

For this reason it is recommended that detailed subsurface explorations be undertaken using contemporary methodologies (i.e.; an electrical resistivity program to determine if the underlying strata can support the additional embankment loadings without significant settlement as has previously occurred). Even though the use of sheet piling may not be aesthetically pleasing, the fact remains that this method of raising the existing levee height would impose a minimum load on the weakened substructure below the Valley bed.

As previously experienced with the existing project, maintenance has generally been poor. Obviously the effectiveness of the protective structures reduces with condition of the dikes. Therefore, it may be desirable for the Federal Government to assume maintenance responsibilities of the existing structures once rehabilitation is complete,

and likewise for the new projects should they be implemented. These responsibilities could commence when a specific amount of subsidence has occurred.

Alternatives

Several alternatives are raised by the 1972 flood with a new view of flood protection that requires further engineering study and cost benefit analysis:

1. The levees could be constructed to provide protection for the existing urban area against a catastrophic flood (1:500 year probability): and

2. The channel for the river could be redesigned to carry the flood waters of the 1:500 catastrophic flood.

Admittedly, the redesign of the channel and the further raising of the elevation of the levees to provide protection against a catastrophic flood will increase costs tremendously, but without protection against the catastrophic flood how can the investment in the city in view of the probabilities cited above be justified? Moreover, if a catastrophic flood becomes the basis for flood protection, the present channel constriction must be relieved. This latter point would necessitate moving the levee in Kingston further back from the river and devoting the riparian land to uses that would not be damaged by periodic flooding. Relocation of portions of the existing levee would help mitigate downstream flood damage by providing additional channel or floodplain storage. This alternative could be undertaken instead of rebuilding residences and commercial establishments in some of the badly-damaged areas.

3. Channel dredging and flood control dams upstream should be considered and presented in the draft EIS submission. While these options may be impractical, a more-detailed appraisal should be made.

4. Perhaps the most expeditious solution to the problem would be to utilize some of the River sediment to increase and repair the existing dike system to the 1936 flood level and include those towns not now protected. Then, add some low sheet piling along the levee crest and, lastly, construct a flood control dam above the confluence of the Lackawanna River. Such a structure would remain essentially empty most of the year and begin to fill only when the River exceeded a stream flow equal to a one in five year flood recurrence interval. A series of smaller structures off the main stem could be installed.

Sewage Treatment Facilities

On page 62, paragraph 2, the preliminary draft EIS discusses the Wyoming Valley Sanitary Authority's loss of revenue attributable to the flood. The Statement reads, "Since almost 10,000 homes have been vacated by the flood, the Sanitary Authority has lost a significant percentage of its revenue base". It should be noted here that some of the flooded homeowners have been relocated to trailer parks where they are still served by the facilities of the Wyoming Valley Sanitary Authority.

EPA has denied certification to some 13 EDA and HUD projects in this area because of inadequate sewage treatment facilities. In response to this, the Wyoming Valley Sanitary Authority passed a resolution for upgrading the existing 40 mgd primary plant to secondary treatment, provided a study proves economically feasible. Should outcome of this investigation demonstrate desirability, EPA will probably be requested to participate in this upgrading undertaking.

Recreational Opportunities

As shown on maps in the preliminary draft environmental impact statement, some recreational area will be taken with the construction of these dikes. The residual recreational land behind these structures will obviously lose value because of its permanent separation from the River.

Since many of the local residents have and will continue to identify with the River, the Corps of Engineers should provide the maximum riverside accessibility possible in designing these structures to afford area residents continuation of their recreational pursuits.

Thank you for the opportunity to comment on this preliminary draft EIS. Should you have any questions related to these comments, please feel free to contact us.

Sincerely,

Edward W. Furia
Regional Administrator

United States Department of the Interior

OFFICE OF THE SECRETARY
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ER-73/122

February 16, 1973

Colonel Louis W. Prentiss, Jr.
District Engineer
Corps of Engineers, Baltimore District
P. O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Prentiss:

This is in response to your letter of 19 January 1973, requesting the Department of the Interior's comments on a preliminary draft environmental statement entitled "Wyoming Valley Flood Control - Susquehanna River, Pennsylvania" dated November 1972. These comments are offered as technical assistance for use in the preparation of the draft environmental statement.

The urgency associated with this proposal can be appreciated. However, the full environmental consequences of its adoption do not appear to be as well clarified as is desirable, or needed. The proposal could set into motion secondary effects of both short and long term environmental impact. These impacts, such as increased flood plain encroachment, could raise serious question as to just what level this proposal will strike in the final environmental balance. From the point of this Department's interests, we find that level to still not be clearly evident.

The following specific comments are offered for your consideration in addressing this concern.

I. Project Description

Throughout the statement the alternative adverse impacts of levee raising with earthwork and with sheet piling are identified. Of the two alternatives, sheet piling, in general, has a severe impact on recreation, access, and aesthetics. Since the exact height increases and the type of construction to be used will be determined during the preliminary design project phase, it is difficult to evaluate fully the environmental impact statement. We believe the weighing of benefits and environmental costs cannot be adequately evaluated without firm data about what type of construction can be expected along specific reaches of the river. We suggest the impact statement be expanded to include and evaluate the environmental impact of each type of construction expected to occur at specific problem areas along the river.

The study was understandably done in a short time on basis of preliminary (provisional) information. For instance, Item I D, page 5, 2nd para.--The peak discharge at the Wilkes-Barre gage determined by USGS is 345,000 cfs instead of 320,000 cfs as originally estimated. The correct flood stage of the Wiles-Barre gage has been determined to be 40.91 feet instead of the estimated 40.6 feet used in the report. This means that the stage experienced was 3.9 feet higher than the controlling height of the levees instead of 3.6 feet as indicated in the report.

In many cases the proposed alterations and additions to the levee system will result in further encroachment into the channel and decrease the carrying capacity. This will cause future floods of the same magnitude to require a higher stage to pass through the constricted areas.

In the opinion of some of us who have been working in this area of activity (flood discharge data collection and on-the-scene witnessing) for a good long time, the following observations are offered for what they might be worth:

a. Levees are already too high and cause too much channel constriction in some reaches.

b. Consideration should be given to moving the levees away from the normal floodway on the side of channel where damages from flooding would be least. This would mean providing additional spans to certain bridges to allow flood flows to pass under without causing significant backwater effects upstream. The existing bridges would not have to be raised.

c. Past experience shows that the river can break through into the mine voids and boil-up inside the levee system. Constricting the channel and raising the head could cause even more severe trouble in this area. This possibility should be carefully checked.

II. Environmental Setting Without the Project

Pre-Flood Conditions. Paragraph 9. This paragraph clearly contradicts the findings of the North Atlantic Division, Corps of Engineers' February, 1972 Survey Report on flood control and mine subsidence along the Susquehanna River, Wyoming Valley, Pennsylvania. That report found there is "no longer a need for flood protection of the anthracite mines in the Wyoming Valley in view of the lack of mining activity". This apparent contradiction should be clarified.

Projected Conditions Without-the Project. This section should include a list of authorized, proposed, and/or current projects within the watershed that would in any way reduce flood levels in the project area. This information is needed to evaluate the joint effectiveness of basin-wide flood control measures.

The statement notes on page 66 that there are within the immediate impact area two sites that are listed on the National Register of Historic Places. The statement does not indicate specifically what these two sites are; it merely lists them along with seven other sites which are listed in the Pennsylvania Register of Historic Sites and Landmarks. In addition to specifically identifying Catlin Hall and McClintock Hall in Wilkes Barre as being in the National Register the statement should list the Denison House, 35 Denison Street, Forty Fort, as being in the National Register of Historic Places.

In compliance with Executive Order 11593, the statement should indicate that presence or absence of cultural resources, in addition to those listed in the statement on pages 66-68, has been established by professional examination and evaluation. The statement, likewise, should note that the Pennsylvania Historic Preservation Officer has been consulted to determine whether any sites deemed eligible for nomination to the National Register of Historic Places will be adversely affected. The Historic Preservation Officer for Pennsylvania is Mr. Bill Wewer, Executive Director, Pennsylvania Historical and Museum Commission, William Penn Memorial Museum and Archives Building, Box 1206, Harrisburg, Pennsylvania 17108.

We would recommend that the statement be more specific with regards to the extent of damage done by Hurricane "Agnes" to the historic sites within the proposed development area. We would also like to see the statement elaborate more fully on the impacts the development will have on these sites, particularly the Forty Fort Meeting House, and those historical areas presently noted by plaques or stone markers.

III. The Environmental Impact of the Proposed Action

A. Environmental Conditions

1. Geology and Soils

c. Land Resources

This section is incomplete since the impact of project induced development in the flood plain, has not been fully explored. The project designs are based upon the flood line of hurricane "Agnes" and, in the event of a future flood of greater magnitude, losses to residences and businesses will be directly proportional to increased usage of the flood plain. Intensive flood plain zoning should be encouraged in the project area and language to that effect should be included in this section.

Complimenting the above would be consideration of a flood insurance program having provision for relocation upon receiving damages. This, coupled with strict flood plain zoning, could eventually result in an open flood plain contributing to the aesthetic, recreational and wildlife environment of the Wyoming Valley.

Though the Corps probably has not authority in either of these sectors, they still constitute a viable alternative. As such, the Final Environmental Statement should offer treatment of them for public consideration. Environmental alternatives should not be limited solely to those over which the sponsoring agency has jurisdiction.

4. Fish and Wildlife

It should be noted that adverse secondary project effects will be extensive if increased development is encouraged in the project area, as present wildlife habitat will be eliminated.

Paragraph 2, sentence 4 should state that short-term adverse effects on fishery resources are likely to occur due to siltation during project construction results.

5. Vegetation

Paragraph 1 states, "probable impacts of the project in the study areas are not expected to be significantly harmful to vegetation". Paragraph 2 states, "other possible adverse effects of a secondary nature ....could include the acceleration of new development in agricultural and other open space areas". The conclusions as stated are contradictory. New development will eliminate much of the existing and projected natural vegetative growth and this section should indicate that loss.

The statement would be improved by a more complete evaluation of the possible effects of this project on unprotected down-stream areas (p.75 - Flood Control).

The impact statement proposes a comprehensive study of the project's relationship to the River Commons area in Wilkes-Barre to ascertain construction and design solutions which will minimize disruption of the resources. We suggest similar studies be undertaken for Kirby and Nesbitt Parks in Wilkes-Barre and the proposed park in Forty Fort (p.97).

In addition, we recommend that your proposed study consider the feasibility of providing access over the levees and development of walkways along levee tops. In areas where sheet piling may be used to raise the levess, it will be particularly important that the study consider methods of providing access to the river.

V. Alternatives to the Proposed Action

See comments under Item III.

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

This section makes no mention of probable effects of the project on downstream reaches. Present flooding conditions in project area are expected to be transferred downstream upon project implementation, and therefore, will require flood control measures as well. This chain of events could result in needless construction that could be avoided through advanced watershed planning. A thorough discussion of any large scale flood control projects in the watershed, regardless of planning stage should also be included in this section, as well as projections regarding changes in land use anticipated with the provision of additional flood protection. New development expected to accompany increased flood protection will undoubtedly diminish remaining wildlife habitat in the project area unless zoning restrictions are implemented and natural areas preserved.

Interior's Bureau of Mines previously reviewed and commented on this statement. Those comments were sent to you on December 7, 1972. A comparison of the original statement with the most recently received copy indicates that they are exactly the same; at least none of our comments have been incorporated into the statement thus far.

The project specifications established in your letter of January 19, 1973 have no effect on our previous comments. Some of our comments were editorial and technical; they were made to improve the quality of the statement. One major omission to the statement is that the source of fill material for the project has not been established in section VII, Irreversible and Irretrievable Commitments of Resources, page 106. It was indicated that 2.5 million cubic yards of fill may be required. The type of material, sources, and quantity from each source should be indicated in the statement.

Additionally, under Item I. Project Description, we have the following:

P. 20, para. 2, line 3.--It is Hunlock rather than Hemlock Creek. Table caption should be changed accordingly. Besides containing erroneous values, there are no valid comparisons. The water quality at 15,000 cfs will obviously differ from 2400 cfs. A revision incorporating the following table is suggested.

Water Quality Data for Susquehanna River near Hunlock Creek, Wyoming Valley, Pa.

	10/20/71	6/20/72	9/26/72
Time	1100	1245	1500
Discharge	2,360 cfs	15,400 cfs	2,400 cfs
Temperature	15.5°C	21.0°C	21.5°C
Dissolved oxygen	7.4 mg/l	7.8 mg/l	8.4 mg/l
Oxygen saturation	73%	87%	94%
pH	7.0	7.2	6.8
Iron	-----	1,600 µg/l	120 µg/l
Manganese	-----	380 µg/l	1,700 µg/l
Sulphate	-----	43 mg/l	188 mg/l
Total Organic Carbon	-----	5.5 mg/l	9.5 mg/l
Specific Conductance	550 mhos	210 mhos	568 mhos
Total Coliform	18,400	-----	14,000
Fecal Coliform	930	-----	4,400

Source: U.S. Geological Survey, Harrisburg, Pennsylvania.

The urgency attributed to this project is as well appreciated as is the scope and nature of the above comments on it. However, to proceed without responsive attention to them could be a commitment to a course of action with greater environmental consequences than the problem it is intended to resolve.

The opportunity to offer these comments is appreciated.

Sincerely,

Mark Abelson
Regional Coordinator

Fernow Hall
Cornell University
Ithaca, New York 14850
December 11, 1972

District Engineer
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

Dear Sir:

The purpose of this letter is to express to you my views on the preliminary study done by your district on the feasibility of increasing the existing flood protection projects in the Wyoming Valley in Pennsylvania. My comments are based only on the material sent from your office on 30 November 72, which included a short summary of the study and the Preliminary Draft Environmental Impact Statement. Unfortunately I was not able to attend the meeting in Wilkes-Barre.

At present I am a second year graduate student at Cornell University in the Field of Ecology and am writing a joint Masters thesis with Jed Callen, another graduate student, entitled "A System for Evaluating Environmental Impact on Aquatic Ecosystems in the Susquehanna River Basin." We have spent the last ten months researching this problem, reading and talking with people, and have learned quite a lot about the Basin, have made many observations, and come to several conclusions.

In reading through the announcement supplement, one seemingly minor point and one major omission came to my attention. The first, in the study description, was the requirement that "local interests" would have to agree to "Provide guidance and leadership in preventing unwise future development of the flood plain by use of appropriate flood plain management techniques to reduce flood losses." This appears to me an excellent requirement for any local community which is to benefit from flood control structure, primarily because of its value in reducing damages during floods when the structures prove inadequate. I urge you to require it in all other instances where you are planning projects. I would, however, like to see the requirements spelled out in detail and have the Corps put as much pressure on the local communities as possible to insure their implementation.

The second aspect of the supplement, and one which concerns me a great deal, has to do with the environmental impact of the proposal project. In particular, the effects that the project may have on downstream flood stage levels. The evidence I have come up with includes aerial photography of the floods, conversations with water resources planners

and hydrologists, and common sense reasoning seems to indicate that by significantly reducing the cross sectional area of the river in the Wyoming Valley, which is naturally very wide during flooding, the total storage capacity of that section of river will be greatly reduced. This, coupled with the change in channel shape means that water will be discharged downstream faster than before, "piling up" higher than usual, causing higher than expected flood stages. In other words, if the levees are increased in height in the Wyoming Valley, then quite likely they will also need increased protection at downstream locations (they certainly would have needed higher levees this past summer if the ones in Wyoming Valley had previously been raised). It is obvious that this would have to continue, with levees on each side of the river, all the way to Chesapeake Bay. Any Impact Statement on proposed levee projects should show how they will alter the flooding characteristics of the river upstream and downstream, and what is to be done to take those changes into account in an overall flood management plan.

Consideration of this type of impact was entirely lacking in your summary, but I hope it will be analyzed in detail and appear in the Draft Impact Statement. Also, I would imagine that answers to these same questions will be requested by the Susquehanna River Basin Commission, before they would support these projects.

Hopefully these issues were discussed at the Tuesday night meeting in Wilkes-Barre and views similar to mine were expressed.

I would greatly appreciate it if you would send me any further information you may have available on this project and a copy of the Environmental Impact Statement when it becomes available.

Thank you.

Sincerely yours,

Donald Charles

JOHN B. HIBBARD, President
ASA L. DAY, JR., Vice President
THOMAS P. SHELBURNE, Vice President
STUART F. PIPHER, Secretary
FRANK L. WILLIS, Treasurer and
Vice President of Fiscal Affairs

HOWARD J. GROSSMAN, Executive Director

ECONOMIC DEVELOPMENT COUNCIL
OF NORTHEASTERN PENNSYLVANIA

P.O. BOX 777 • AVOCA, PA. 18641 • TEL. 717/457-7456

STATEMENT SUBMITTED BY THE ECONOMIC DEVELOPMENT COUNCIL OF NORTHEASTERN PENNSYLVANIA BEFORE THE PUBLIC MEETING ON FLOOD PROTECTION MEASURES FOR WYOMING VALLEY, PENNSYLVANIA CALLED BY THE BALTIMORE DISTRICT, CORPS OF ENGINEERS ON DECEMBER 5, 1972 AT THE COUGHLIN HIGH SCHOOL AUDITORIUM, WILKES-BARRE, PENNSYLVANIA

My name is Howard J. Grossman, Executive Director of the Economic Development Council of Northeastern Pennsylvania, a non-profit organization to further economic, social and physical development in the seven counties of Carbon, Lackawanna, Luzerne, Monroe, Pike, Schuylkill and Wayne. The Council accomplishes these purposes through research, planning, development and related public information activities. These efforts are carried out by a full-time professional staff under policies established by a 94 member Board of Directors representing major interest groups of both the public and private sectors. All 21 county commissioners in the seven county region are members of the Council's Board of Directors. The work program and staff are supported by Federal and State grants and contracts, as well as contributions by private firms, units of local government, and other private organizations and individuals throughout the seven county region.

The Council is the designated local development district under the Appalachian Regional Development Program and the economic development district under the federal program of the Economic Development Administration.

Among our other roles, the Council is the designated regional clearinghouse for the A-95 Project Notification and Review System wherein the Council reviews most federally-aided applications submitted by applicant agencies in the above mentioned seven-county region. EDCNP was also recently designated by the Pennsylvania Department of Community Affairs as the regional agency to administer the Intergovernmental Personnel Act and has been asked to perform an analysis of fiscal problems of local governments in the seven-county area.

The most recent designation of the Council is as the lead flood recovery planning agency for Northeastern Pennsylvania in the wake of Tropical Storm Agnes. The Federal Regional Council, the Pennsylvania Department of Community Affairs and the Office of State Planning and Development have designated EDCNP "as the lead agency in the preparation of a disaster recovery and comprehensive development plan"for Northeastern Pennsylvania and given responsibility for "coordination of all sub-regional planning efforts and plans within the framework of the statewide disaster recovery and comprehensive planning."

Purpose of Public Meeting

It is the Council's understanding that the purpose of this public meeting is to exchange information concerning a study by the U.S. Army Engineer District, Baltimore, Maryland, of alternative solutions to the flooding problem at the four existing Federal flood-protection projects in the Wyoming Valley. The purpose of the Corps' study is to

determine the feasibility of increasing the degree of protection provided by the existing flood projects.

We wish to commend the Corps of Engineers for holding a public meeting of this nature, affording an opportunity for all interested parties to comment on alternative means of providing flood protection to the Wyoming Valley.

Environmental Statement and Related Studies

The Council has reviewed a variety of studies that have been accomplished in the past including a 21-volume study of the Susquehanna River Basin prepared by the Army Corps of Engineers some years ago in conjunction with the Susquehanna River Basin Coordinating Committee and currently being reviewed by the Susquehanna River Basin Commission.

The Council has also reviewed the preliminary draft environmental statement entitled Wyoming Valley Flood Control, Susquehanna River, Pennsylvania prepared by the U. S. Army Engineer District, Baltimore, Maryland, and published on November 13, 1972 which is the subject of this meeting. Our staff witnessed the television program shown to residents of Northeastern Pennsylvania over the weekend of December 1, in which Colonel Louis W. Prentiss, Jr., District Engineer of the Baltimore District outlined suggested improvements to the flood protection system in the Wyoming Valley. We have reviewed these documents and material in developing this statement concerning flood control measures in the Wyoming Valley. In addition, the Council forwarded extracts of related material to several municipalities in the Wyoming Valley requesting their views before preparing this statement.

Lack of 100-Year Flood Plain Definition

One simple fact stands out more than any other as we examine flood control measures required to protect the Wyoming Valley. This public meeting is being held five and one half months since Tropical Storm Agnes. There still does not exist a map which delineates the 100-year flood plain. We recognize the difficulties that exist in collecting data, and in developing and analyzing new hydrological data to officially define the 100-year flood plain. However, we do not understand why such an official definition does not exist five and one half months after the disaster. We urge that all possible resources be directed toward obtaining this definition to expedite planning of the 16 urban renewal projects proposed for the Wyoming Valley.

Definitive Information Required

A second overall comment relates to the confusion which still exists as to the status of flood control protection in the Wyoming Valley. A great deal of information has been developed concerning the basis for constructing the current levee system in the Wyoming Valley as a result of the 1936 flood. Additional information has been released concerning the role which subsidence played in undermining the levee system. Still more

information has been developed by the media and others on what measures will or will not be effective. All information developed seems to support one basic conclusion: that there probably does not exist any single protection measure which promises a basic solution to Wyoming Valley flood control needs. Actions relating to flood control structures, flood plain management, flood plain legislation, flood insurance and many others must be instituted if Wyoming Valley's citizenry are to have an adequate package of protection against future flooding. Such a complicated series of measures requires sound information, disseminated from a single recognized source.

There also has been confusion over what is meant by completion or phasing of flood control structures to provide 25-, 50-, 100-year, etc. protection and, in general, the current level of protection or the level which may be provided in the future. We hope that this will be clarified as a result of this and other such hearings or meetings.

Preliminary Draft - Environmental Statement - Wyoming Valley Flood Control

The Council received a copy of the 111-page report on a "recommended flood control project which would raise approximately 64,000 linear feet of levees and steel sheet pile wall to heights varying between two and ten feet above existing levels, dictated by the requirement that adequate flood protection constitutes levee raising to the June, 1972 Hurricane Agnes flood height, plus an additional three feet free board, and two feet to account for subsidence." We wish to make a variety of comments concerning the environmental statement. We would also point out the Council has other comments on details of the environmental statement which we would like to pursue directly with the appropriate representatives of the U. S. Army Engineer District, Baltimore, Maryland, in order to reduce the time taken by our agency at this public meeting.

Our general comments concerning the environmental statement include the following:

1. The recommended flood control project is designed to provide protection to only eight municipalities in the Wyoming Valley of Luzenre County. These municipalities include the city of Wilkes-Barre and the seven neighboring communities of Edwardsville Borough, Exeter Borough, Forty Fort Borough, Hanover Township, Kingston Borough, Plymouth Borough, and Wyoming Borough. The Council believes that the final flood control measures which are adopted should provide protection to all municipalities in the Wyoming Valley and that a plan should be developed by the Corps which clearly defines, delineates, and justifies the type of flood control protection to be provided. It should also cover actions which should be taken by the various levels of government. Planning should get underway immediately and should cover all the above-mentioned communities plus the two municipalities mentioned (but not named) on Page 78 of the environmental statement as currently having no flood protection, but who have submitted flood-related urban renewal applications.

2. Since flood control cannot be isolated in one sector of a river basin without having some impact on other portions of the basin, it is important to relate information in the environmental statement to actions contemplated or decisions being considered in the remainder of the basin. In this instance, the Susquehanna River Basin Commission is the agency primarily responsible for preparing a comprehensive plan for river basin control, and we urge that whatever system is developed to protect the Wyoming Valley against future flooding be fully integrated into the planning effort of the Susquehanna River Basin Commission. The environmental statement, itself, pays very little attention to the project's

relationship to the sub-basin or to the entire basin. The two announced flood control projects upstream -- Tioga-Hammond and Cowanesque -- are acknowledged as being important to total flood protection, but the entire system must be carefully examined and actions accellerated, if we are to find means to fully protect all residents in the Susquehanna River Basin.

3. The environmental statement includes a detailed evaluation of one proposal and mentions seven alternatives. The seven alternatives include:

   a. Raising of all Susquehanna River bridge crossings.

   b. Dredging of the river channel.

   c. Channel widening.

   d. Upstream impounding basins.

   e. River diversion.

   f. Obstruction removal.

   g. No project.

   The environmental statement briefly reviews these alternatives with the following conclusion, "While several had certain attractive features, such as the preservation of a river view or a less expensive implementation cost, none had the combined qualities of providing adequate flood protection and being capable of implementation within the time period available under the present systems." (P. 101)

   Some of the alternatives were recognized as being supplementary to the proposed project. If this is so, then the Council's previous statement concerning the need to look at a variety of solutions, in combination, is justified. We, therefore, emphasize that the alternatives mentioned in the environmental statement must be examined in considerable depth to insure that as full a range of protection measures as is feasible and desirable is provided to Wyoming Valley residents.

4. Preparation of a Wyoming Valley Sketch Plan by the consultant firm of Wilbur Smith and Associates is underway. This firm has been employed by the Luzerne County Planning Commission and the Economic Development Council of Northeastern Pennsylvania to develop a plan which will include a series of recommendations on longer-range flood recovery efforts in the Wyoming Valley. The Council urges that the U.S. Army Corps of Engineers and others concerned with flood control, relate and coordinate their flood control plans with this current Wyoming Valley planning effort. Before a final decision is reached on flood control measures, we urge that meetings be held with appropriate Corps officials to blend the comprehensive planning effort with the flood control protection program.

5. A critical element in a flood control program is the development and implementation of flood plain management techniques by local governments and the establishment of necessary legislation at the State and federal levels to promote flood plain management. In the Commonwealth of Pennsylvania, for example, Senate Bill 7 of the first special session of 1972, the Flood Plain Management Act, has been proposed. This bill would provide more direct State involvement in flood plain management. The State of New Jersey enacted a Wetlands Management Act of 1970, which helps to control development of flood plains. We urge that Pennsylvania enact legislation to help protect municipalities and their citizenry against flooding. We further urge that the U.S. Army Corps of Engineers, appropriate regional and local agencies, local governments and others more effectively utilize appropriate flood plain management techniques including land use planning and flood plain zoning. The environmental statement should consider in more depth the use of these techniques by all levels of government as an action to alleviate potential damages from floods.

   While flood proofing can be important, it can not solve all flood problems. Flood plain zoning and land use regulations must be speeded up to qualify all municipalities for Federal flood insurance.

   A related effort to the goal of providing flood protection would be the enactment of a national disaster insurance fund which would provide for insurance protection against floods and other disasters when all appropriate flood control measures fail to provide adequate protection. We urge that Congress enact this type of legislation.

   The so-called "second line of defense" of flood control such as zoning, building permits, and other regulatory measures are critical to full flood protection. The Council believes that such measures are as vital as the construction of structural facilities.

6. The esthetic issue is raised very carefully in the environmental statement. The major questions discussed are the use of steel sheet piling versus the use of land fill and the question of how high the levee should be raised. The environmental statement goes into considerable detail on the merits and limitations of various construction materials. The Council urges that a visual design study be undertaken immediately along the Susquehanna River and that such a study be utilized as a basis for determining the materials to be used. This must be done expeditiously in order not to delay the timetable for implementation. Such a study would also recommend appropriate access to park land along the Susquehanna River and would be an important guide for the total flood recovery program in the Wyoming Valley. We urge that the Environmental Protection Agency consider the funding of such a study. The study could also cover other important esthetic elements such as street patterns, use of cul-de-sacs, side walks, pedestrian pathways, and other common areas.

7. The potential use of culm bank material is mentioned in the environmental statement as a possible source of land fill for raising of levees. We are not currently willing to endorse or oppose the use of this material, but

believe the issue is important enough to suggest careful investigation of its potential. We recommend that the U.S. Army Corps of Engineers further consider the use of mine refuse by contacting appropriate coal company operators, mining engineers, and others as to its potential use.

8. The part of the environmental statement dealing with transportation mentions the relationship of the Wyoming Valley Expressway and the Cross-Valley Expressway, as well as several other major and minor roads, to the proposed flood control project. The report discusses a "closure" system which would be instituted at the Market Street Bridge and the North Street Bridge now under construction, since these bridges would penetrate the new levees at an elevation of seven to ten feet below the top of the levee. These gates would halt traffic across the Susquehanna River when in use. Therefore, it would seem in order to develop the area's transportation plan in close conjunction with the flood control plan to avoid conflicts between the two systems. This problem should be looked at in far more detail than has thus far been demonstrated.

9. The environmental statement contains a statement that: (Page 48)

> "It is highly unlikely, however, that any renewal application will receive final approval until there is assurance that the communities in question are protected from future flooding and the flood plan is legally established."

The questions of the degree of protection and of deadlines for utilization of urban renewal funds are issues which have to be resolved. Decisions on these subjects must be expedited if the urban renewal program and the entire flood recovery program are not to be jeopardized.

10. The Council believes that flood protection measures must be planned and implemented in conjunction with all community redevelopment programs. The environmental statement isa start in this direction, but does not take cognizance of all related programs and planning efforts now underway regarding the long-range future of the Wyoming Valley. We urge that this be done as soon as possible.

11. The Council urges that an advisory task force be established, with representation from federal, State, regional, county and municipal agencies -- public and private -- who have an important stake in any flood control plan which is developed. This task force would be an important link between the plans and programs of the Corps of Engineers and the Susquehanna River Basin Commission and the local actions required and being taken in regard to flood recovery. It would meet on an "as-needed" basis when coordination of the various plans and programs is needed. EDCNP is willing to assist in organizing such a committee and helping to coordinate its activities.

12. Consideration should be given to developing a flood control plan for the entire Susquehanna River Basin. Since the issues raised in the environmental statement would seem to apply to other sectors of the Basin, some economies might accrue from attacking the issues of types of measures, esthetics, etc., on a basin-wide front.

13. The Council recommends that the two-year study undertaken by the Corps of Engineers at the request of the Luzerne County Planning Commission to develop flood plain data be completed and released as an input to the planning process.

Summary

In summary, the Economic Development Council of Northeastern Pennsylvania agrees with the major conclusions reached in the preliminary draft environmental statement, subject to the detailed comments noted earlier.

The Economic Development Council of Northeastern Pennsylvania, as a regional planning and development agency serving seven counties of the Commonwealth, stands ready to assist in planning the development of an effective flood control system, which will meet the needs of Wyoming Valley residents. We hope our statement reflects our interest and concern about providing protection to the resolute people of this Valley. We look forward to working with the U.S. Army Corps of Engineers and other interested parties in our capacity as lead flood recovery planning agency for Northeastern Pennsylvania. We offer our cooperation to all local and county governments and to all public and private agencies at all levels in accomplishing this task.