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FINAL ENVIRONMENTAL ASSESSMENT

For The

NESHAMINY WATER SUPPLY SYSTEM

Project Sponsored By The

Neshaminy Water Resources Authority

And The

Philadelphia Electric Company

Prepared By The

DELAWARE RIVER BASIN COMMISSION

August 1980

CONTENTS

PART I.

PERSPECTIVE

PART I. PERSPECTIVE

The North Branch Water Treatment Plant (NBWTP) is a component of the planned Neshaminy Water Supply System (NWSS), sponsored by the Neshaminy Water Resources Authority (NWRA), which is to provide supplemental water supply for Central Bucks and Montgomery Counties in Pennsylvania. The Point Pleasant pumping facilities would withdraw water from the Delaware River to supply the NWSS and, in addition, supply water for cooling the already approved and under construction Limerick electric generating station as sponsored by the Philadelphia Electric Company.

This document represents an environmental appraisal of the North Branch Water Treatment Plant and a reappraisal of the related components of the Point Pleasant Diversion Plan.

Final Environmental Impact Statements were previously prepared on:

1. "Point Pleasant Diversion Plan, Bucks and Montgomery Counties" by the Delaware River Basin Commission (DRBC) in February 1973;
2. "Limerick Generating Station, Units 1 and 2" by the U.S. Atomic Energy Commission in November 1973; and
3. "Neshaminy Creek Watershed" by the U.S. Department of Agriculture, Soil Conservation Service, in April 1976.

The 3.8 applicant for the Point Pleasant Pumping Station, the Neshaminy Water Resources Authority, prepared an updated environmental report on the Neshaminy Water Supply System in February 1979. (A "3.8

application" refers to Section 3.8 of the Delaware River Basin Compact which is the referral and review process utilized by the DRBC in approving projects which have a substantial effect on the water resources of the basin.)

The NWRA held a public hearing on that environmental report on May 30, 1979. The NWRA further prepared "Responses to Significant Concerns At and After Public Hearing of Environmental Report" on August 28, 1979.

In February of 1980, the DRBC prepared an environmental assessment of the Point Pleasant project and its related components, and the Executive Director published his "Notice of Intent" to declare a negative declaration on the project, based upon that updated environmental appraisal. That appraisal included a review of many documents, twenty-four (24) of which were written subsequent to the last of the three Final Environmental Impact Statements (1976).

The public notice on the Executive Director's intent to make a negative declaration on the environmental appraisal requested objections to the issuance of such negative declaration by March 12, 1980. Approximately 400 letters raising objections to the project were received, with many of them submitted as signed form letters. Proponents of the project or its elements were not heard from because the notice of intent to issue a negative declaration did not call for their remarks. As a matter of fact, all persons interested in the project -- whether for or against -- will have an opportunity to be heard at an official DRBC public hearing under our Rules of Practice and Procedure which relate to project approval under Section 3.8 of the Compact.

The following document represents a thorough response to issues raised by the public since the notice of intent to issue a negative declaration was made on February 15, 1980. The central question is have significant adverse environmental impacts been discovered since preparation of the previous three environmental impact statements which would constitute grounds for preparing another environmental impact statement?

In the alternative, is the comprehensive appraisal of this project, conducted through the previous three environmental impact statements, and as supplemented by subsequent reports and assessments, coupled with DRBC's own 3.8 hearing, sufficient to comply with NEPA?

PART II.

SUMMARY AND CONCLUSIONS

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A. HISTORY AND STATUS OF THE POINT PLEASANT PROJECT AND RELATED ELEMENTS

1. Elements of the Overall Point Pleasant Project.

The overall Point Pleasant project consists of the following major facilities: (See Figure II-1)

(1) Point Pleasant Pumping Station and Delaware River Intake Facilities (Joint)

(2) Combined transmission line from Point Pleasant to Bradshaw (Joint)

(3) Bradshaw Reservoir (Joint)

(4) Bradshaw to North Branch Neshaminy Transmission Line and Release Facilities (NWRA)

(5) Lake Galena Reservoir (Pa. 617) (NWRA)

(6) North Branch Water Treatment Plant, North Branch and Pine Run (NWRA)

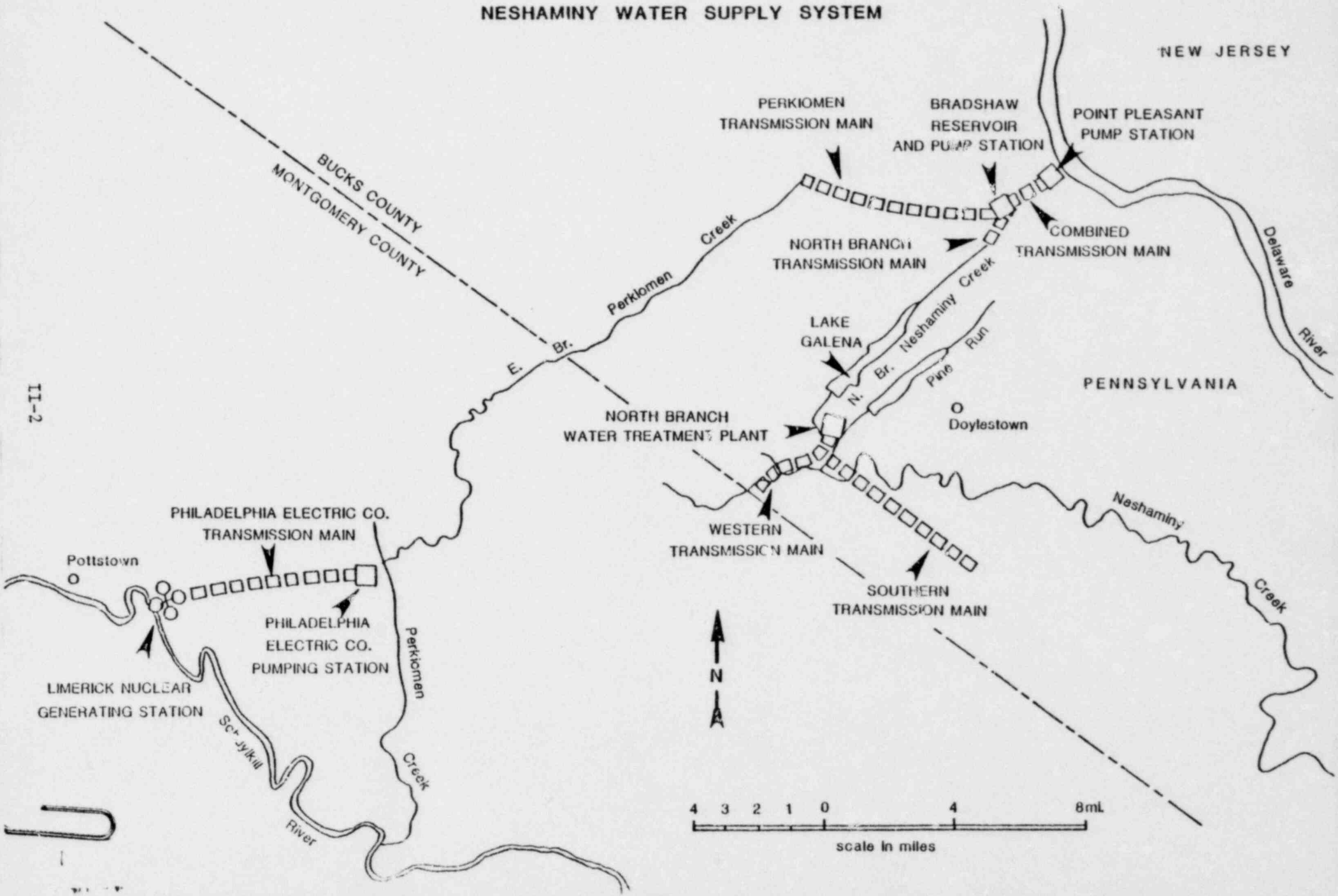
(7) Western and Southern Transmission Mains for Treated Water (NWRA)

(8) Bradshaw to Perkiomen Transmission Main and Release Facilities (PECO)

Those facilities designated as "(Joint)" in the above list would serve both the proposed Bucks-Montgomery County public water supply system and the Limerick Nuclear Generating Station water supply system. Those referenced as "(PECO)" would serve the Limerick plant, while "(NWRA)" facilities relate solely to elements associated with public water supply operations.

In addition to these elements of the Point Pleasant project, other facilities peripherally relate to the project and have been considered to the extent necessary to make a proper decision on the Point Pleasant project. Among those peripherally related facilities are: (a) the existing Pine Run Reservoir (Pa. 616), a flood control facility operated by NWRA; (b) the existing Core Creek Reservoir (Pa. 620), a multipurpose project operated by NWRA; (c) the previously proposed Yardley Pumping Station for diversion from the Delaware to

Figure No. II-1



Core Creek; (d) intake facilities on the Perkiomen near Graterford for Limerick; (e) the Schuylkill River diversion facilities for Limerick operated by PECO; and (f) the proposed Merrill Creek Reservoir, to be operated by a group of electric utilities, which would serve a total of 19 electric plants in the Delaware River Basin.

To place the current environmental assessment process in context, the next several sections will review the history of prior actions and approvals taken on the public water supply and Limerick water supply aspects, as well as joint elements, of the Point Pleasant project.

2. History of Action on the Neshaminy Water Supply Project and Neshaminy Work Plan.

The basic Point Pleasant-Neshaminy Water Supply Project resulted from the 1966 Water Resources Study - Neshaminy Creek Basin, Pennsylvania (Pennsylvania Water Resources Bulletin No. 2), a joint report prepared by the Pennsylvania Department of Forests and Waters (now Department of Environmental Resources), the Soil Conservation Service of the U.S. Department of Agriculture, and Bucks and Montgomery Counties. The report (Exhibit No. 1)* proposed the construction of eight single-purpose flood control reservoirs and two multipurpose reservoirs, together with pumping facilities at Point Pleasant and Yardley on the Delaware River. These facilities were projected to provide required supplementary surface water supplies for portions of Central Bucks and Montgomery County areas (Exhibit No. 2)*. The supplementary surface water supplies for the Neshaminy Basin area were to be imported via the North Branch of Neshaminy Creek and Lake Galena and from below Lake Galena on the Neshaminy to a "taking point" (North Branch Water Treatment Plant) to be located in or near the Borough of Chalfont, Bucks County, for treatment and distribution.

The fundamental watershed project for Neshaminy Creek was approved by the Delaware River Basin Commission and added to the Delaware River Basin

*Found in Bulletin No. 2

Comprehensive Plan on October 26, 1966, in Docket No. D-65-76 CP, Neshaminy Creek Watershed Project, Bucks and Montgomery Counties, Penna. This decision was supplemented by DRBC Docket No. D-65-76 CP(2), Bucks and Montgomery County Commissioners, Neshaminy Creek Watershed Project, Bucks and Montgomery Counties, Penna., approved January 25, 1967. The supplemental docket added the entire multipurpose project as described in the 1966 Water Resources Study to the DRBC Comprehensive Plan.

In 1970, Bucks County prepared and submitted the Feasibility Study of Delaware River Pumping Facilities at Point Pleasant, Pennsylvania, which assessed the proposed design of the Point Pleasant diversion facilities to provide public water supply in Bucks and Montgomery Counties, together with water quality augmentation for the Neshaminy Creek.

The Pennsylvania Water and Power Resources Board, on December 8, 1970, issued to Bucks County Water Allocation Permit No. WA-649, authorizing the withdrawal of Delaware River water for public water supply in the following amounts:

	To 1980	To 1990	To 1995
Average withdrawal, MGD	5	15	35
Maximum withdrawal, MGD	35	60	75

The permit recognized that the county had plans to pump additional quantities of water from the Delaware River at Point Pleasant for water quality augmentation in the Neshaminy Creek watershed and for industrial water supply in Montgomery County via Perkiomen Creek.

On March 17, 1971, DRBC approved Docket No. D-65-76 CP(3), Commissioners of Bucks County, Point Pleasant Pumping Station, Bucks County, Pennsylvania. This docket added the proposed project to DRBC's Comprehensive Plan but deferred approval pursuant to Section 3.8 of the Compact until submission of final plans.

The facilities included were a pumping station at Point Pleasant with the capacity and layout to handle all the required pumpage of the Delaware River water to the Neshaminy Basin, plus the proposed pumpage into the Perkiomen Creek Basin. A 66-inch transmission main, consisting of 14,000 feet of concrete pressure pipe and 5,300 feet of concrete culvert pipe, would convey the total pumpage from the Point Pleasant Station to the terminus of this main, near Bradshaw Road, where the pumpage would be divided. The Neshaminy pumpage would flow by gravity through a 60-inch concrete culvert into the North Branch and on to Reservoir PA 617. The Perkiomen pumpage would flow into a 35 mg open-storage reservoir, from where it would be pumped by means of a 46 mgd capacity station through 30,300 feet of 42-inch concrete pressure pipe to the start of the Perkiomen watershed, from which point the pumpage would flow by gravity in 6,300 feet of 36-inch concrete culvert pipe to the East Branch of Perkiomen Creek.

As part of the 1971 docket review, DRBC prepared and processed an environmental statement for the project in accordance with the National Environmental Policy Act, entitled "Final Statement - Environmental Impact of the Proposed Pt. Pleasant Diversion Plan, Bucks and Montgomery Counties, Pennsylvania."

In February 1973, DRBC prepared and submitted to the Council on Environmental Quality (CEQ) an expanded Final Environmental Impact Statement on the Point Pleasant Diversion Plan, Bucks and Montgomery Counties, Pennsylvania. The Final EIS concluded that the proposed project would be beneficial to the Neshaminy and Perkiomen watersheds and not detrimental to the Delaware River provided that specific, listed mitigating measures were observed.

Meanwhile, due to the dynamic changes in growth patterns in Montgomery and Buck Counties during the late sixties and continuing into the seventies, there was continued adjustment of the projected population to be served by the proposed public water supply facilities. The population projections and predicted supplementary surface water requirements of the Central Bucks County

Service Area were updated in 1972, by a report entitled Master Plan for Water Supply - Bucks County, Pennsylvania - 1970. In 1975, further population projection adjustments were made resulting in amendments to the 1970 Master Plan for Water Supply. The adjustments were not of such magnitude to require change in the design capacities of the proposed plant. The final design of the plant started in 1975.

In early 1976, it was deemed necessary to review once again the projected population and resulting water needs. As a result, the final design of the treatment plant was halted to permit the completion of this review. During the period throughout 1976 and into early 1977, three additional studies of the Service Area were completed: The Central Bucks County Water Supply Study; the Water Supply Study for Montgomery County; and the Interim Projections Report for Bucks, Chester, Delaware, Montgomery, Philadelphia Counties, Pennsylvania. Based on these studies, the design capacity of the treatment plant was selected to remain at 20 mgd for the initial installation; however, the ultimate capacity was reduced from 80 to 40 mgd to meet the supplemental water needs of the service area.

In September of 1978, the Neshaminy Water Resources Authority filed with the Pennsylvania Department of Environmental Resources a water allocation permit application for the down-sized public water supply project. After an extension evaluation, summarized in the Report on the Application of the Neshaminy Water Resources Authority for Water Allocation from Pine Run, North Branch Neshaminy Creek, and Delaware River, on November 1, 1978, PaDER announced its approval of Water Allocation Permit No. 0978601, which supercedes and replaces the permit No. WA-649 previously issued on December 8, 1970, by the Pennsylvania Water and Power Resources Board.

None of the actions previously taken by DRBC regarding the water supply aspects of this project has been appealed. To date, no appeals have been filed to the decisions of any other state or federal agency involved with this project challenging the adequacy of environmental assessments of the water supply project, although numerous opportunities for such appeals and challenges were provided over the 14 years this project has been under consideration.

3. History of Actions Related to the Limerick Nuclear Generating Station Water Supply Elements.

In addition to providing treated water supply to Central Bucks and Montgomery Counties, the proposed Point Pleasant project will withdraw Delaware River water for transfer via Perkiomen Creek to be used by the Philadelphia Electric Company (PECO) for cooling purposes at its Limerick Electric Generating Station located along the Schuylkill River near Pottstown, Pennsylvania.

DRBC Docket No. D-65-76 CP(3), dated March 17, 1971 (referenced above), added the Perkiomen transfer element for Limerick to the overall Point Pleasant-Neshaminy project. As noted above, a Final Environmental Impact Statement on the Point Pleasant Diversion Plan, covering both the public water supply and Limerick transfers, was prepared by DRBC and filed with the Council on Environmental Quality in February 1973. The Final EIS of 1973, after considering various alternatives, concluded that a withdrawal from the Delaware River, subject to certain conditions, was necessary and proper to meet cooling water needs for the Limerick Station, and that such a withdrawal, if operated within the stated limitations, would not have a significant adverse effect on the environment.

The DRBC approved Docket No. D-69-210 CP, Philadelphia Electric Company, Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania, on March 29, 1973. This docket decision conditionally approved the water supply features of the project, subject to a specific list

of conditions, particularly conditions relating to limits on diversions from the Schuylkill, Perkiomen and Delaware during low flow periods. One of the conditions for such withdrawal was that the DRBC, at its sole discretion, would determine the adequacy of storage capacity in the basin necessary to provide sufficient water to meet PECO's consumptive water use at Limerick and to maintain a 3,000 cfs flow in the Delaware River at the Trenton gauge.

Approval of the water supply elements was based, at least in part, upon the previously approved Final EIS on the Point Pleasant project. However, DRBC deferred a final decision on the Limerick Station per se until completion of a Final EIS by the Atomic Energy Commission (AEC) on the nuclear power plant and related facilities.

Subsequently, in November 1973, the U.S. Atomic Energy Commission's Directorate of Licensing completed the Final Environmental Statement related to the Proposed Limerick Generating Station, Units 1 and 2, Philadelphia Electric Company.

Based on this EIS, the previous EIS prepared by DRBC, and the record compiled at hearings before the Atomic Safety and Licensing Board and the Appeal Board of the Nuclear Regulatory Commission (NRC) issued to Philadelphia Electric Company construction permits for the Limerick plant in March 1975, an extensive (96 pages) decision was rendered by the Atomic Safety and Licensing Appeal Board. In the Matter of Philadelphia Electric Company (Limerick Generating Station, Units 1 & 2), Docket Nos. 50-352 and 50-353 (March 19, 1975), that decision addressed specifically numerous contentions made by intervenors in the AEC/NRC proceedings concerning the adequacy of the Final EIS prepared in 1973 by the Atomic Energy Commission.

The Atomic Safety and Licensing Appeal Board's decision, and NRC's issuance of construction permits for Limerick, were appealed to the Third Circuit Federal Court of Appeals by the project's opponents. The appellants

challenged the adequacy of the environmental impact statements relied on by the NRC, both the EIS prepared by the Atomic Energy Commission and that prepared by DRBC in February 1973. In particular, appellants charged that the previous environmental impact statements had not properly assessed the impacts of water supply elements of the Limerick project, including the Point Pleasant diversion.

Based on the AEC's Final EIS and DRBC's own EIS of 1973, DRBC issued notice of intention to act upon Docket No. D-69-210 CP (Supplement No. 1) in July 1974. Proceedings to amend the Commission's earlier decision on the Limerick Station, however, were deferred while objections filed by the Environmental Coalition for Nuclear Power were heard by a hearing officer appointed by DRBC. Following an adversary hearing before Judge Sidney Goldmann, the hearing officer submitted his report and conclusions on July 21, 1975. Oral argument by counsel for the applicant, for the objectors and applicant was heard by the full Commission in August 1975.

In November 1975, DRBC proceeded with final action on the docket concerning construction of Limerick and related water supply facilities. Docket No. D-69-210 CP (final), Philadelphia Electric Company, Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania, issued November 5, 1975, included the Limerick project in the DRBC Comprehensive Plan. The docket further gave 3.8 approval to construction of the Limerick Station, together with the Schuylkill River and Perkiomen Creek intake and diversion structures. The final docket imposed a series of conditions limiting the diversions and requiring specific measures to mitigate potential environmental impacts. Condition (c.) required:

> "If...the storage will not be adequate for all protected needs of the Basin, the applicant will build or cause to be built, at its own expense, at a location approved by the Commission, a reservoir of sufficient storage capacity to assure the water supply needed for consumptive use by the Limerick plant, during periods when such use would reduce the flow in the Delaware River at the Trenton gage below 3,000 cfs. Storage and release of water in such facility will be under the Commission's regulation, at the expense of the applicant."

This DRBC docket decision was filed with the Third Circuit Court of Appeals prior to its decision on the then pending appeals of the Nuclear Regulatory Commission's action.

The Third Circuit's decision on the NRC appeals was rendered in Environmental Coalition of Nuclear Power, Limerick Ecology Action, and Delaware Valley Committee for Protection of the Environment v. Nuclear Regulatory Commission and Philadelphia Electric Company, No. 75-1421 (November 12, 1975). The Court of Appeals rejected the challenges to the environmental impact statements and, in essence, found the previous environmental assessments prepared by DRBC and the NRC adequate to satisfy the purposes of NEPA. The Third Circuit's decision and order were not appealed to the U.S. Supreme Court.

A year later, on September 30, 1976, DRBC adopted Resolution No. 76-13, concerning provision of supplementary water supply storage for certain power projects, including both the Limerick and Hope Creek Nuclear Generating Stations. The Commission exercised its authority under conditions set forth in earlier DRBC approval of Docket Nos. D-69-210 CP (Limerick) and D-73-193 CP (Hope Creek), and ordered the involved utility companies "to proceed to develop, or cause to be developed, an application under Section 3.8 of the Compact, supported by an environmental report in compliance with the Commission's rules and regulations, for the construction of the required supplement storage." The resolution further required that the application and accompanying environmental report be

submitted by October 1, 1977.

The actions of the DRBC, the Atomic Energy Commission, Nuclear Regulatory Commission, and Third Circuit Court of Appeals, cited above, established the right of PECO to draw water from the Delaware for consumptive use at Limerick. As a result, unless there has been a significant change in the plan for the water supply elements of the Limerick project or their impacts, the DRBC has no basis to conduct a de novo review of these elements.

4. History of Actions on the Combined Project.

The Delaware River Basin Commission received an application from the Neshaminy Water Resources Authority on July 5, 1979, requesting Section 3.8 review and approval for construction of the Point Pleasant Pumping Station, the combined transmission line to Bradshaw Reservoir, the North Branch Neshaminy transmission main, the North Branch water treatment plant (Chalfont), the western transmission main, and the southern transmission main. As stated previously, the plan to provide needed supplemental water to Bucks and Montgomery Counties had already been approved by the DRBC and placed in its Comprehensive Plan.

The Philadelphia Electric Company applied to DRBC, under Section 3.8 of the Compact, on August 2, 1979, to construct the remaining portions of its previously approved plan to utilize Delaware River water for the Limerick plant when necessary and allowable. The remaining parts of the Limerick water supply element are the Bradshaw Reservoir and the transmission facilities to the East Branch of the Perkiomen Creek.

Both applicants included updated environmental reports on the construction aspects of these water supply elements of the overall Point Pleasant project. The DRBC environmental review staff reviewed these documents plus additional documents germane to the project since the DRBC Final Environmental

Impact Statement on Point Pleasant prepared in 1973. The additional or new information documents number over twenty (20). The DRBC prepared an environmental assessment of the construction aspects of the Point Pleasant project and an updated environmental appraisal of the overall Point Pleasant project in February 1980*, with the Executive Director's public notice of intent to issue a "negative declaration" under the NEPA requirements.

Public and agency comments received subsequent to the notice of intent for "negative declaration" are considered in this document.

5. Current Status of the Point Pleasant Project Elements.

The Neshaminy Water Resources Authority, based upon the DRBC Comprehensive Plan approval of Delaware River water supply for Bucks and Montgomery Counties, sold a bond issue of about $10,000,000 in March 1973, for the purpose of constructing the necessary water supply facilities for their portion of the Point Pleasant project.

The Philadelphia Electric Company has proceeded to construct the Limerick Generating Station and appurtenances based upon the DRBC Comprehensive Plan approval to take water from the Schuylkill River, Perkiomen Creek and the Delaware River, when necessary; DRBC 3.8 approval to construct intakes in the Schuylkill River and Perkiomen Creek; State of Pennsylvania approvals; and the Nuclear Regulatory Commission's construction licensing approval which was validated by the U.S. Court of Appeals. The Philadelphia Electric Company is well into the construction phase of the project and has committed about $1.5 billion.

6. Status of Other Peripherally Related Projects.

The existing Pine Run Reservoir (Pa. 616), owned and operated by the NWRA, has been constructed and serves as a flood control reservoir as well as a natural water supply source to serve the proposed Chalfont water treatment plant.

*Part III of this revised EA.

The existing Core Creek Reservoir (Lake Luxembourg) (Pa. 620) is yet another NWRA reservoir which was constructed for the purpose of flood control, water supply storage and recreation (Core Creek Park). Water supply aspects have been abandoned since interconnection with the Philadelphia system for Lower Bucks County. Future plans of the NWRA are to consider pumping a maximum of 5 mgd from the Delaware at the proposed Yardley Pumping Station to provide adequate flow through the Core Creek facility in Lower Bucks County to enhance recreational use of Luxembourg Lake and the surrounding park. In the two years the lake has been utilized and stocked by the Pennsylvania Fish Commission, make-up flows from the Delaware have not been deemed necessary. Except for minor evaporative losses, if the 5 mgd was ever diverted from the Delaware to Core Creek for fish, wildlife and recreation enhancement it would still flow into the Neshaminy and hence to the Delaware for salinity control.

The PECO intake facility on the Schuylkill River to provide cooling water for the Limerick facilities is under construction based upon earlier Pennsylvania, Federal and DRBC approvals. The intake facility on the Perkiomen near Graterford to serve Limerick has already received DRBC, State and Federal approval.

Status of the proposed Merrill Creek project is covered in item (C.) of this Part II.

B. ENVIRONMENTAL IMPACT ISSUES RAISED BY THE PUBLIC AND INTERESTED AGENCIES

Fourteen environmental impact issues were stressed by the public and interested agencies in their comments to the DRBC as a result of the Executive Director's notice of intent to issue a negative declaration, based upon the DRBC's environmental assessment of February 15, 1980. Six procedural issues were raised.

The environmental issues related to:

1. Low water in the Delaware River.
2. Need for additional reservoirs.

3. Impacts on aquatic biota.

4. Water quality.

5. Flood, erosion and sedimentation impacts.

6. Growth inducement.

7. Aesthetic impacts.

8. Archeological and historical concerns.

9. Rock blasting impacts.

10. Emergency services.

11. Conservation.

12. Alternatives.

13. Financial.

14. Water for Limerick Generating Station.

The environmental issues raised by the public were generally covered in DRBC's February 15th assessment, but have been elaborated upon in Section IV of this document.

C. PROCEDURAL ISSUES RAISED BY THE PUBLIC

The six procedural issues stressed by the public subsequent to the Executive Director's notice of intent to issue a negative declaration on February 15, 1980, were:

1. Public needs additional information on the Point Pleasant project and its related components.
2. DRBC's action on the Point Pleasant project should await completion of other studies being conducted by DRBC.
3. DRBC has a conflict of interest because it receives money for water sold.
4. A new EIS should be prepared on the Point Pleasant project and its related components.

5. The new EIS should be prepared by another agency.

6. A new EIS should have an enlarged scope to include the Limerick Nuclear Generating Station and the Merrill Creek project.

As to the public needing additional information on the Point Pleasant project and its related components, the DRBC mailed to each individual who offered comments by March 12, 1980, a copy of the environmental assessment of February 15, 1980. The DRBC has maintained a policy of allowing interested persons to review reference documents at its offices or providing, at basic cost to reproduce, copies of materials referenced in the environmental assessment of February 15, 1980. Further, DRBC, the Atomic Energy Commission, and the Soil Conservation Service of the U.S. Department of Agriculture, followed required public notice/public hearing provisions in the preparation and completion of their environmental impact statements completed in 1973, 1973 and 1976, respectively. Also, the DRBC followed public notice/public hearing regulations on its docket decisions which placed the Point Pleasant Pumping Station and its related components into the DRBC Comprehensive Plan. The public has had continuous access to information concerning this project through DRBC's offices. Further, the applicant, Neshaminy Water Resources Authority, prepared an updated environmental report on the project, held public hearings and printed its response to the public hearings in the summer of 1979.

This document, entitled Final Environmental Assessment of the Point Pleasant Project and its Related Components, is a comprehensive appraisal of the Neshaminy Water Resources Treatment Plant and appurtenances and a comprehensive reappraisal of the Point Pleasant project and its other related components. And, finally, the public will have an opportunity to comment on all aspects of the project, whether they are for or against it, during the DRBC public hearing to be held under Section 3.8 of the Compact.

Should DRBC's action on the Point Pleasant project await completion of other studies being conducted by DRBC? Other studies and planning procedures presently under way by DRBC, such as the "good faith" negotiations on the Supreme Court decree of 1954, the Level B Study Report, and the environmental impact statement presently under way for the Merrill Creek project, have been cited as important elements for the Point Pleasant project consideration.

As to the Merrill Creek project, it is peripherally related to the Point Pleasant project only if the Merrill Creek project is approved by the Commission and releases from that proposed reservoir would be made to augment Delaware River flows to meet diversion requirements to serve Limerick as well as many other power plants in the basin. However, utilization of Delaware River water by the Limerick Generating Station has not been preconditioned with construction of the now apparently defunct Tocks Island project nor construction of the Merrill Creek project or any other project in the basin. The Philadelphia Electric Company has agreed that they will not take water from the Delaware River should it cause the flow at Trenton to fall below 3,000 cubic feet per second, unless releases are made from a non-mainstem reservoir to be constructed in the future at Merrill Creek or some other possible project site by a consortium of electric utilities in the basin.

Water resource management policy assumptions presently contained in DRBC's Comprehensive Plan and validated as the preferred plan in the Draft Final Level B Study Report, are consistent with the water withdrawals as contemplated at the Point Pleasant Pumping Station for use by the Limerick Generating Station and water supply needs of Bucks and Montgomery Counties. The "good faith" negotiations process to the 1954 Supreme Court decree, an effort to redefine the rights and responsibilities of the five parties based upon current hydrologic information, is utilizing the same growth and water use assumptions utilized in the Level B Study process.

Does DRBC have a conflict of interest because it receives money for water sold?

The DRBC is not the sponsor of the Point Pleasant project. It is reacting to water supply needs as highlighted by the Pennsylvania Department of Environmental Resources, NWRA, the two county governments, plus the Philadelphia Electric Company. It is true that any new surface water user must pay to DRBC a nominal fee for the utilization of surface water. However, DRBC does not profit on such sale of water nor does it utilize such revenues to increase its staff over the one man-year necessary to operate its surface water sales program. Revenues obtained by DRBC from the sale of surface water to new users are placed in a fund from which monies are taken to repay the Federal Government for the construction of water supply components of the Beltzville and Blue Marsh reservoirs. Revenues are also appropriated by New Jersey and Pennsylvania to maintain DRBC's payback fund to the Federal Government.

Items 4, 5 and 6 mentioned above, concerning a new environmental impact statement, shall be considered together:

First, opponents to the project claim that any new environmental impact statement should have an enlarged scope to include Limerick and Merrill Creek projects. It should be pointed out that an environmental impact statement has already been prepared on the Limerick project and has weathered the federal appellate court level test as to its adequacy. It should be further pointed out that a complete environmental impact statement is in the process of being completed for the Merrill Creek project -- which addresses alternatives to that project.

As to whether or not a new environmental impact statement should be prepared for this project by DRBC, the U.S. Environmental Protection Agency or the U.S. Army Corps of Engineers is, of course, the central procedural question of this overall document. It is believed that EPA is not a candidate to be the lead agency for the purpose of implementing the National Environmental Policy Act, i.e., preparing yet another environmental impact statement on the Point Pleasant project -- since they will not give another federal permit for this project or its related components.

Second, if a federal executive agency were required to prepare another environmental impact statement on the Point Pleasant project and its related components, it would probably be the Corps of Engineers, since it would issue permits under Section 404 of the Federal Water Pollution Control Act. However, the Corps of Engineers has written DRBC and stated that an updated environmental assessment of the Point Pleasant project and its related components, since preparation of the three previous environmental impact statements, should suffice and a new environmental impact statement would not be necessary. (See Appendix I for Corps letter.)

D. CONCLUSION

Based upon:

1. The Council on Environmental Quality's policy of determining whether or not an environmental assessment and negative declaration are sufficient to meet the purpose of the National Environmental Policy Act;

2. Review of the DRBC's environmental assessment of February 15, 1980;

3. Consideration of the public and agency comments made subsequent to the Executive Director's "Notice of Intent" of February 11, 1980, and as analyzed in Part IV of this document;

4. Consideration of the present and future water supply needs of Bucks and Montgomery Counties as well as the planned needs for the Limerick Generating Station;

5. Observing that the Point Pleasant project for which construction approval has been requested by the Neshaminy Water Resources Authority is a scaled-down water supply version from what has already been approved and placed in the DRBC's Comprehensive Plan; then

6. It is concluded that this final environmental assessment and a negative declaration is deemed to be the proper course of action.

A proposed docket decision under the DRBC Section 3.8 review and approval process will be initiated for public notice/public hearing and Commission action in the near future.

PART III.

ENVIRONMENTAL ASSESSMENT OF FEBRUARY 15, 1980

PART III

ENVIRONMENTAL ASSESSMENT

For The

PROPOSED NORTH BRANCH WATER TREATMENT PLANT

Sponsored By The

NESHAMINY WATER RESOURCES AUTHORITY

And A Review Of
RELATED COMPONENTS

Sponsored By The

Neshaminy Water Resources Authority
And The
Philadelphia Electric Company

Prepared By The
DELAWARE RIVER BASIN COMMISSION
(Lead Agency)

Abstract.--This assessment supports these conclusions:

1. A preliminary decision not to prepare an Environmental Impact Statement is appropriate because the North Branch Water Treatment Plant would not have significant adverse impacts on the human environment.

2. A supplementary EIS is not necessary to update the Final EIS on the Point Pleasant Diversion Plan, issued by DRBC in February 1973, because subsequent documents support the conclusion of the FEIS that beneficial impacts would outweigh adverse impacts and the project would be a feasible and beneficial use of water resources of the Delaware Basin.

February 15, 1980

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FIGURES*

* Figures 1-1 thru 1-5 and 2-2 thru 2-7 are based on figures from the NWRA Environmental Report, February 1979. Figure 2-1 is based on a figure in the "Point Pleasant, Pennsylvania, Pumping Facilities Feasibility Study", March 1970, DRBC. Figures 2-8 and 2-9 are based on figures in the PECO Environmental Report, July 1979.

TABLES*

* Tables 2-1, 2-2, and 2-3 are based on tables in the Environmental Report and other documents prepared by NWRA.

ENVIRONMENTAL ASSESSMENT
For The Proposed
NORTH BRANCH WATER TREATMENT PLANT
Including A Review Of Related Components

Perspective

The North Branch Water Treatment Plant (NBWTP) is a component of the planned Neshaminy Water Supply System (NWSS), sponsored by the Neshaminy Water Resources Authority (NWRA), which is to provide supplemental water supply for Central Bucks and Montgomery Counties in Pennsylvania. The Point Pleasant Pumping Facilities would withdraw water from the Delaware River to supply the NWSS and, in addition, supply water for cooling the Limerick electric generating station as sponsored by the Philadelphia Electric Company. (See Figure 1-1)

A Final Environmental Impact Statement, entitled "Point Pleasant Diversion Plan, Bucks and Montgomery Counties", was issued by the Delaware River Basin Commission in February 1973. That FEIS and others issued by the United States Department Of Agriculture - Soil Conservation Service (USDA, SCS, April 1976), and the United States Atomic Energy Commission (USAEC November 1973), evaluated all the components related to the Neshaminy Water Supply System and to the facilities for supplying cooling water for the Philadelphia Electric Company, except the North Branch Water Treatment Plant.

The purpose of this Environmental Assessment, in accordance with the National Environmental Policy Act of 1969 and with the Delaware River Basin Commission Rules of Practice and Procedure, Article IV, is to determine whether an Environmental Impact Statement should be prepared for the NBWTP and to review the impacts of its related components described in DRBC's FEIS of 1973 to see if that document needs to be updated. An Assessment is, of necessity, briefer

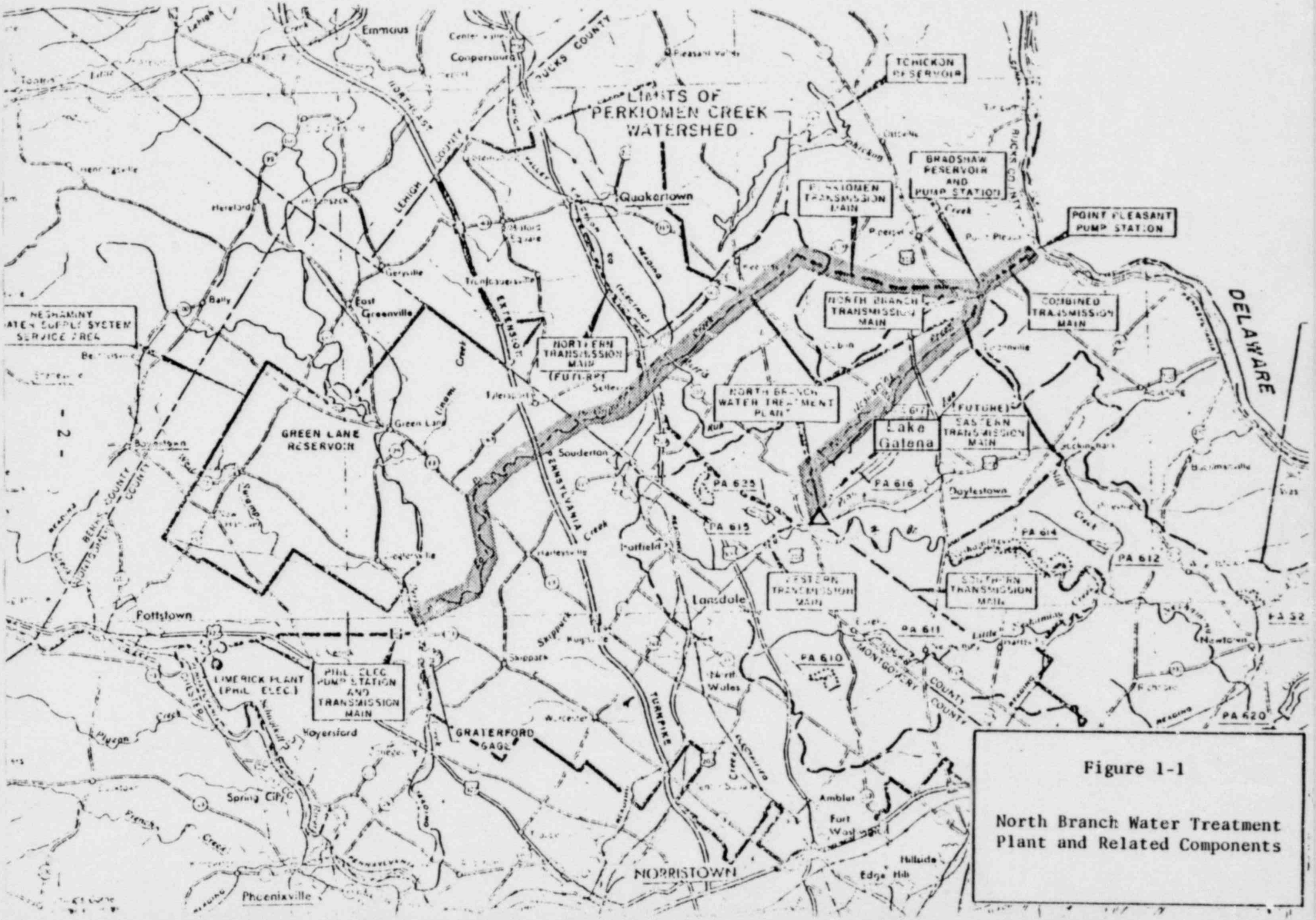


Figure 1-1

North Branch Water Treatment Plant and Related Components

than an Environmental Impact Statement but contains sufficient facts and analysis of scope and magnitude of probable impacts, associated with the proposed project, to determine whether an EIS needs to be prepared. This Assessment is in two parts: part one pertains to the NBWTP and part two pertains to its related components. Some components, such as the Point Pleasant Pumping Plant, the Combined Transmission Main, and Bradshaw Reservoir, are common to the facilities discussed in both parts of this assessment so there is, necessarily, some overlap.

The significant changes in the physical facilities of the Neshaminy Water Supply System as presented in DRBC's Environmental Impact Statement of February 1973 and the present plan are as follows: a maximum diversion of 95 MGD is now planned versus 150 MGD cited in the EIS; the Bradshaw Reservoir would hold 70 MGD (present design) versus 46 MGD; and a minimum pumpage of 27 cfs for the East Branch Perkiomen would not be year round as originally proposed but from mid-April thru mid-November, under average stream flow conditions. The physical features addressed are: the diversion works on the Delaware, the Combined Transmission Main, the Bradshaw Reservoir, the Perkiomen Transmission Main, the East Branch Perkiomen Transmission Main, and the service area Transmission Mains.

The Limerick Nuclear Generating Station analysis is not included in this Assessment because the Limerick Project was subjected to a thorough environmental assessment by the Atomic Energy Commission (now Nuclear Regulatory Commission - NRC). The Final Environmental Impact Statement for the Limerick Project was appealed through the NRC administrative procedure, and then through the U.S. Court of Appeals for the Third Circut. This Commission included the

Limerick Project in its Comprehensive Plan and granted final Section 3.8 approval on November 5, 1975. The approval (Docket D-69-210 CP(Final) covers water intake and discharge structures on the Schuylkill River at the station, a water intake structure on Perkiomen Creek, and the facilities required to divert and convey Perkiomen Creek water to the station. The approval is heavily conditioned to protect the water resources of the Basin and its population.

Conclusions And Recommendations

PART 1. North Branch Water Treatment Plant

This assessment concludes that the NBWTP would impose few significant adverse impacts on the environment and these few adverse impacts could be largely eliminated by making changes in the project. Consequently, this assessment recommends issuance of a notice of a "Finding of No Significant Impact" (Negative Declaration) and a preliminary decision not to prepare an EIS.

PART 2. Related Components

Independent analysis of changes that have occurred since 1973 in the design of components related to the North Branch Water Treatment Plant has led DRBC staff to the following conclusion:

Subsequent documents support the conclusions of the Final Environmental Impact Statement on the Point Pleasant Diversion Plan, required by the National Environmental Policy Act of 1969 and issued by DRBC in February 1973, that the proposed project would be a feasible and beneficial use of water resources in the Neshaminy and Perkiomen Watersheds and not detrimental to the Delaware River, provided that mitigating measures are implemented as listed in DRBC's FEIS under "Conclusion", page 3, (and as stated in this assessment). (See: NWRA February 1979; PECO July 1979; and other references listed in Section 5.0.) Consequently, this assessment recommends that no supplementary EIS be prepared.

1.0 NORTH BRANCH WATER TREATMENT PLANT

1.1 Background

On December 14, 1970, the Bucks County Planning Commission, on behalf of the Bucks County Commissioners, submitted an application for review of a proposed water treatment facility to the Delaware River Basin Commission (DRBC) for inclusion in DRBC's Basinwide Comprehensive Plan. The project application specific to the treatment plant was evaluated and adopted by DRBC on January 29, 1971 under DRBC Docket Decision D-70-242 CP. The North Branch Water Treatment Plant had been an integral part of the Neshaminy Creek Watershed Plan (NCWP) included in the Comprehensive Plan by Docket No. D-65-76 CP in 1966. Supplemental surface water supply, recreation, and streamflow augmentation were added to the NCWP by DRBC Docket No. D-65-76 CP(2) dated January 25, 1967.

In March of 1970, E.H. Bourquard Associates, Inc. submitted a Feasibility Study of Delaware River Pumping Facilities at Point Pleasant, Pennsylvania to the Delaware River Basin Commission (Bourquard March 1970). Included in that study was the North Branch Water Treatment Plant, then referred to as the "taking point" for water treatment and distribution to Central Bucks and Montgomery Counties. The proposed treatment plant would be located on 29 acres at the confluence of North Branch of the Neshaminy Creek and Pine Run in Chalfont Borough, Bucks County, Pennsylvania. It would use existing natural flows to be supplemented by Delaware River water via the Point Pleasant Pumping Station during periods of low flow in Pine Run and the North Branch. (See Figure I-2)

1.2 Project Description

1.2.1 Water Treatment Plant

The applicant's revised design capacity selected for the treatment plant, based upon a consensus of up-to-date population forecasts and resultant supplemental water needs, would be 20 mgd initially, with a maximum capacity of 40 mgd by the year 2010. (See Figure 1-3 for layout of facilities).

1.2.2 North Branch Intake Dam

The North Branch Intake Dam would be approximately seven feet high and would consist of four steel roller gates that would be closed under most conditions. The dam would form a pool and divert water to the raw water intake line for flow by gravity to be used at the treatment plant. The roller gates are designed so that they may be raised out of the channel during high flows.

1.2.3 Pine Run Intake Dam

The Pine Run Dam design and operation is identical to the North Branch Intake Dam, except that it consists of two roller gates forming a dam approximately four feet high.

The combined amount of withdrawal at both intakes would vary depending upon the amount of treated water required for service area demands, not to exceed the established minimum flow requirements downstream of the treatment plant.

1.2.4 Rechannelization

About 1,500 feet of Pine Run, from its confluence with the North Branch of Neshaminy Creek, would be re-channeled. This operation essentially

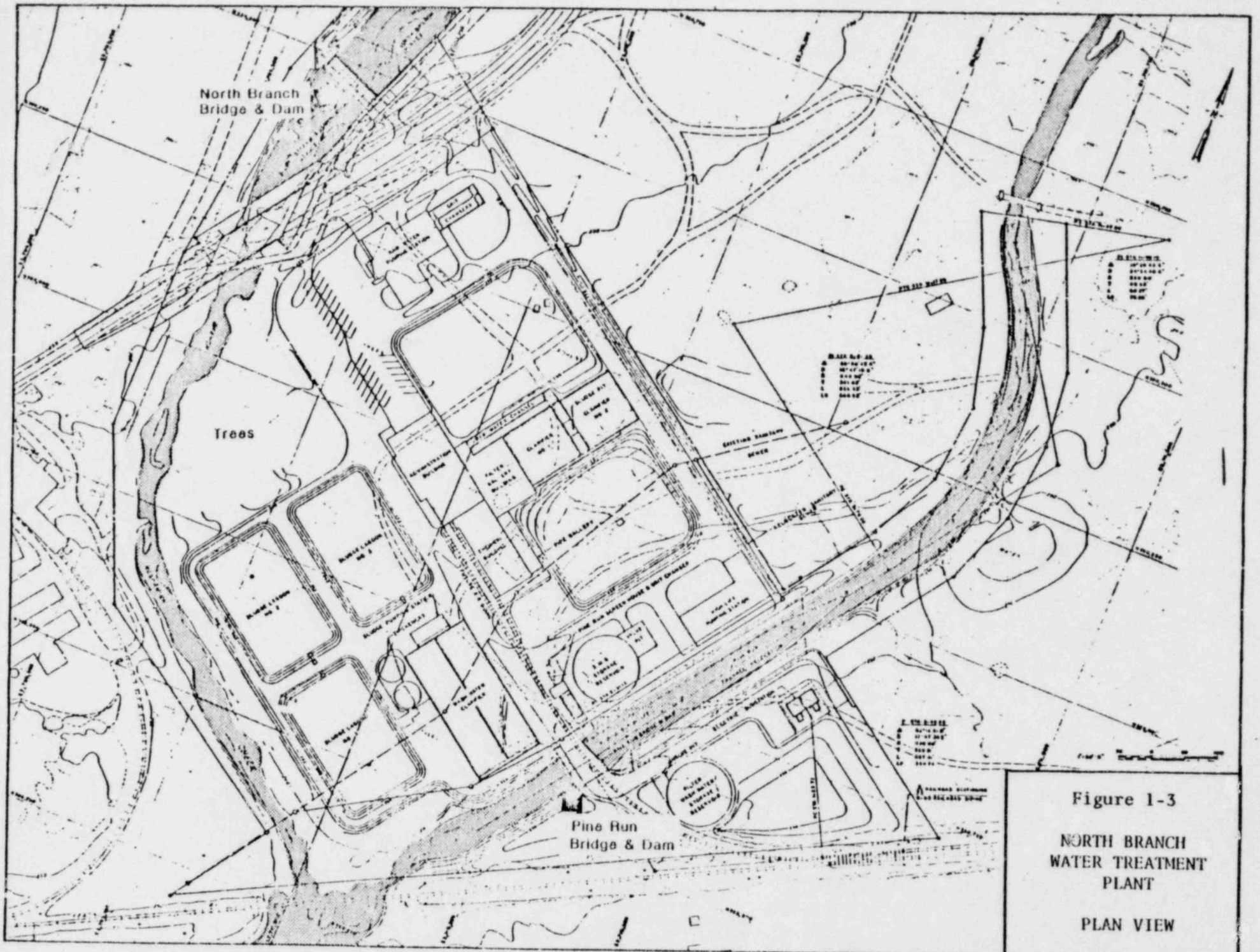


Figure 1-3

NORTH BRANCH
WATER TREATMENT
PLANT

PLAN VIEW

would move a segment of Pine Run approximately 150 feet east of its present location to improve the siting characteristics of the stream and treatment plant. Re-channelization would allow diverted water to flow by gravity into the plant by creating greater channel depth in the vicinity of the intake site.

The banks of Pine Run in the affected area would be re-contoured and lined with rip-rap to prevent erosion. Similarily, the banks of the North Branch Neshaminy in the vicinity of the intake would undergo stabilization.

1.2.5 Sludge Lagoons

Three sludge lagoons would be used to store sludge generated at the plant. Each lagoon would be lined with an impervious soil blanket and have a net capacity of approximately 1,250,000 gallons at a depth of five feet and occupy a gross rectangular area of 140 x 220 feet. The expected amounts of sludge produced by the plant would be approximately 9,000 gpd when the plant is supplying 10 mgd of treated water and 18,000 gpd of sludge at 20 mgd capacity. Solids content of the sludge is estimated at five percent, accumulating at a rate of 850,000 ft^3/yr at a 20 mgd water supply capacity.

Final design of the treatment plant would include a sludge de-watering facility based upon the actual volume and characteristics of sludge produced during its initial operation. Construction of the facility is envisioned during 1983, and would eliminate the need for sludge lagoons, except for emergency purposes. The de-watered sludge produced by the treatment plant would then be hauled to an approved landfill.

1.2.6 Service Area Transmission Mains

The finished water delivery system, consisting of four transmission mains varying in size and length from 18 to 36 inches and from 13,850 to 30,300

feet respectively, would radiate to the north, south, east and west from the treatment plant. The municipalities that would have access to the finished water at specified "take off" points are listed in Appendix A.

The four transmission mains*, appurtenant to the North Branch Treatment Plant, would be constructed within the boundaries of the Neshaminy Creek Watershed with the exception of the future extension of the Northern Main into Montgomery County. The extension would start at a location just north of Reservoir PA-625 near the Bucks-Montgomery border.

The transmission mains would be constructed through the 149,000-acre Neshaminy watershed that is 60 percent tenant operated with 43,780 acres of existing farmland, 20,880 acres of grassland, 14,020 acres of woodland and 70,320 acres of other land.

Specifications on transmission main size, length, and municipalities eventually receiving service are shown in Appendix A.

*Initial construction would include only the western and southern mains. Final design plans for the eastern and northern mains would be prepared when local water purveyors in those service areas request supplemental water. (See Figures 1-4 and 1-5).

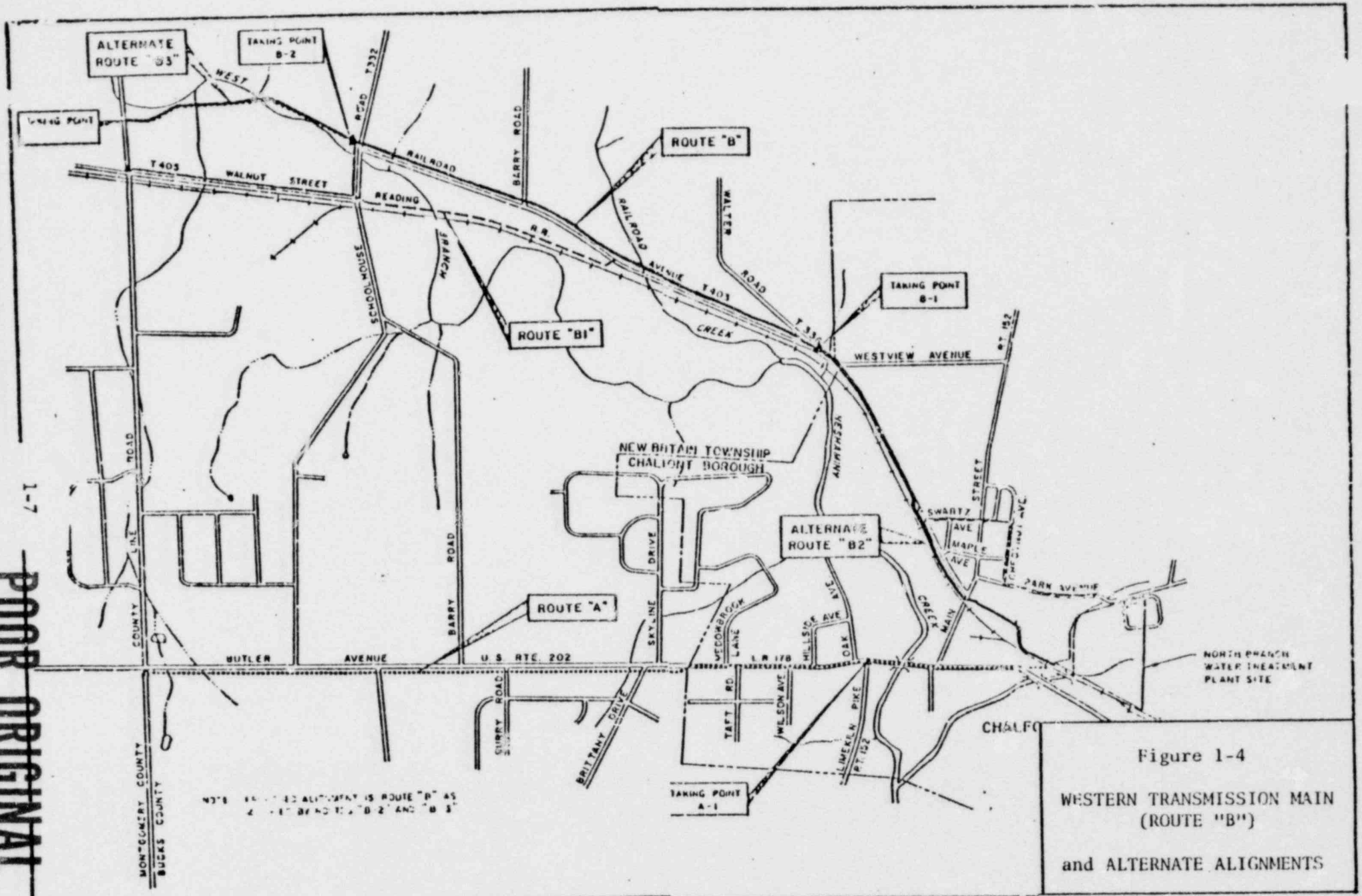


Figure 1-4

WESTERN TRANSMISSION MAIN
(ROUTE "B")

and ALTERNATE ALIGNMENTS

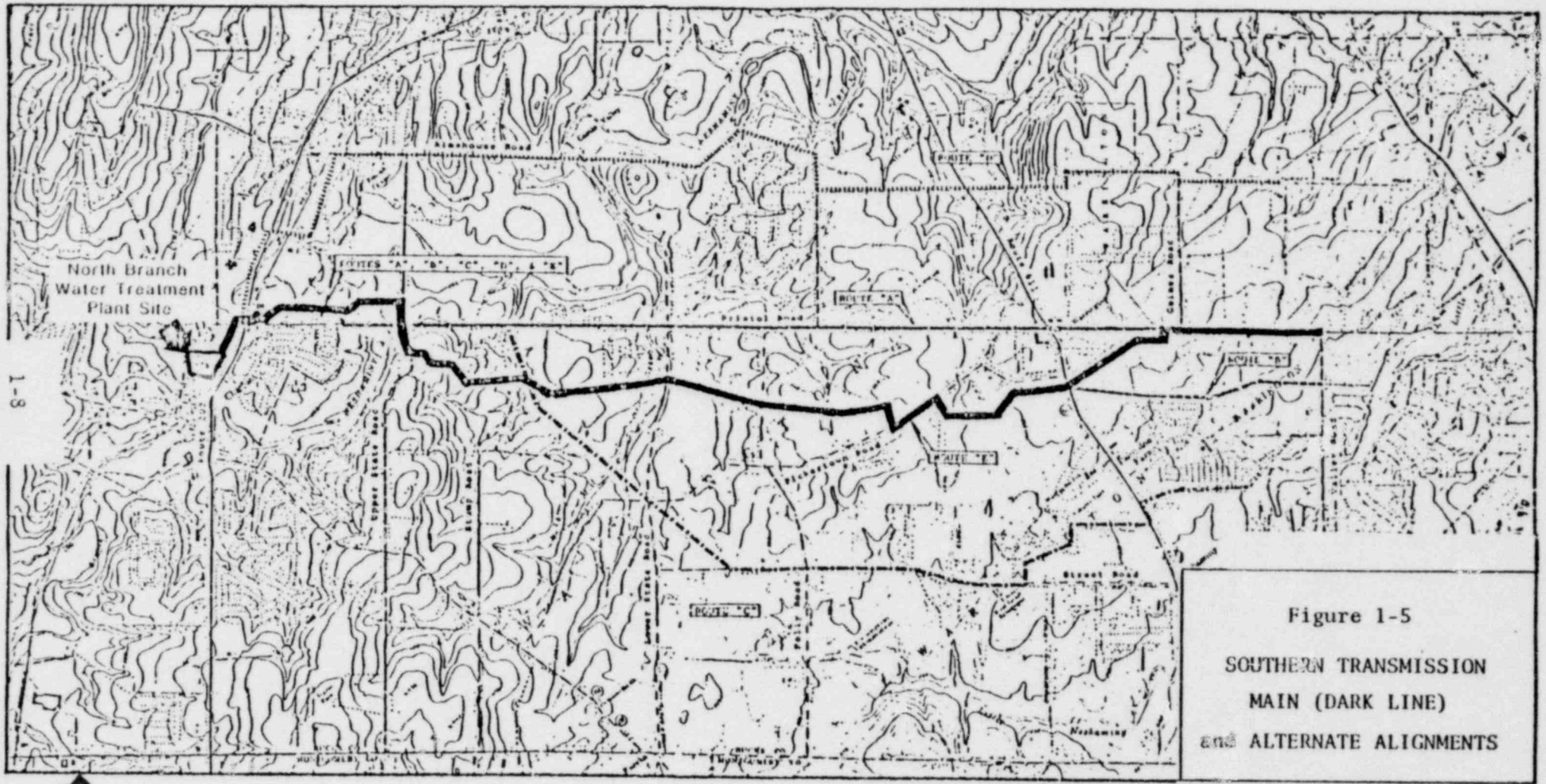


Figure 1-5

SOUTHERN TRANSMISSION MAIN (DARK LINE) and ALTERNATE ALIGNMENTS

1.3 Alternatives

Alternatives for the North Branch Water Treatment Plant, per se, relate to different designs and different locations for the plant (see NWRA, February 1979, pp VI-6/VI-8). Alternatives for related components of the Neshaminy Water Supply System, with which the NBWTP would be associated, are discussed in Part 2 of this assessment, under the heading "Alternatives", page 2-26.

1.4 Probable Environmental Impacts

1.4.1 North Branch Treatment Plant

Construction of the treatment plant would affect approximately twenty nine acres of woodland. The existing forest cover, dominated by large white oaks and thin understory, would be cleared and covered by approximately four feet of fill necessary to raise the entire site above the 100-year flood. Protection of the treatment plant from flood would be partially afforded by appropriate operation of Lake Galena. Some wildlife would relocate successfully but most would be eliminated. This loss of wildlife would be an unavoidable adverse impact. Existing terrestrial habitat would be replaced by a landscaped industrial complex. Short-term construction impacts, including increased traffic, noise, erosion, and sedimentation in the adjacent streams, would have a temporarily adverse effect on

the local environment. The aesthetics of the site would be changed from those of a small wooded area to those of an industrial complex. Large reservoir storage tanks would affect visual quality in the vicinity of Chalfont, Pennsylvania. Potentially hazardous chemicals would be stored above the flood plain and handled in accordance with a spill prevention program, including adequate containment.

1.4.2 Intake Dams

Construction of water intakes and intake dams would affect local resident aquatic life. Settling of suspended solids immediately upstream of the intake dams is likely to produce a change in habitat favoring the sediment-preferring forms of aquatic life. Fish populations in the area would likely change to favor bottom-feeding species. Construction impacts would be short term and are not considered significant. Impingement and entrainment effects during operation is considered in Section 2.4.2.6.3, p. 2-43, of this assessment. The intake dams would inhibit upstream movement of fish; however, no threatened or endangered species would be affected.

1.4.3 Rechannelization

Proposed stream channel alteration and bank stabilization in the North Branch of Neshaminy Creek and relocation of Pine Run would change the natural characteristics of streams in affected areas. Relocation of Pine Run would not be significantly adverse since natural characteristics of the stream have been altered by earlier use of the site as an amusement park. Conduits and weirs constructed as part of the amusement park would be removed during construction.

1.4.4 Sludge Lagoons

Treatment plant production of sanitary sludge would require use of sludge lagoons constructed to handle waste for the first two years of operation. The sludge would be unsightly and could, in the event of a failure of the impervious soils blanket, possibly contaminate groundwater. These potential impacts would eventually be mitigated by implementation of a sludge dewatering facility and be off-site disposal of the disinfected sludge. The Water Treatment Plant would not have a wastewater discharge to surface streams. The sludge lagoons would be designed to prevent earth slides in the dikes, following flood stage, and thus prevent escape of sludge into water bodies.

1.4.5 Service Area Transmission Mains

In general, the environmental impacts expected from construction of transmission mains are of short duration and would include traffic congestion on roadways adjacent to proposed pipeline routes, generation of dust and noise, and increased sediment levels in streams near the construction area. Streams affected by pipeline crossing would experience a short-term increase in siltation,

and aquatic life in the vicinity of the crossing site would be temporarily disrupted. Control of water quality effects of the stream-crossing operations would be in compliance with erosion and sedimentation standards established by the Pennsylvania Department of Environmental Resources.

Removal of trees and disruption of terrestrial environment and wildlife along the transmission main right-of-way would have an effect on the local environment. An average maximum working width of about 25 feet along the pipeline route would be directly affected by construction activities. Upon completion of the pipeline, existing ecological communities would be reestablished as a small short-grass ecosystem. Ecological productivity could be enhanced, at least temporarily, in places where eco-tones or transitional environments are created.

Alignment of the western transmission main, in large part adjacent to an existing railroad bed, its relatively short length and lack of major stream crossings indicate that construction of the main would not have a significant adverse effect on the local environment. Construction of the South Transmission Main would have a temporarily adverse effect on aquatic life by increasing stream sediment levels downstream of the Neshaminy and Mill Creek crossings. Construction activities would disrupt suburban and agricultural lands in northern Warrington Township and would affect traffic patterns on Bristol Road along the last 6000 feet of the pipeline.

Right-of-way areas would remain as open space since development would be restricted or prohibited in those areas. No unique habitat or endangered species would be affected by this element of the project.

1.5 Conclusions

As indicated throughout this part of this assessment, adverse impacts associated with construction and operation of the proposed North Branch Water Treatment Plant are relatively insignificant, compared with benefits to be derived from increased and steady water supply. Also, those adverse impacts that could arise can mostly be mitigated through appropriate construction and operation procedures. Consequently, a finding of no significant impact is appropriate and this assessment recommends issuance of a notice of a preliminary decision not to prepare an environmental impact statement, i.e., a "negative declaration".

.2.0 RELATED COMPONENTS

2.1 Background

2.1.1 General

The purpose of this review of the components related to the North Branch Water Treatment Plant (NBWTP) is to determine if significant changes have occured in them since the Final Impact Statements (DRBC 1973) were issued to require a supplementary EIS.

The components related to the NBWTP are in two categories: 1) those associated with the Neshaminy Water Supply System and 2) those associated with water supply for cooling electric generating stations as sponsored by the Philadelphia Electric Company.

2.1.2 Neshaminy Water Supply System

2.1.2.1 Purpose.--The purpose of the Neshaminy Water Supply System is to meet existing and predicted supplemental water supply requirements of Central Bucks and Montgomery Counties, Pennsylvania. The Neshaminy Water Resources Authority (NWRA), by authority of Bucks County Commissioners, is the project sponsor and would be responsible for financing, designing, and constructing the proposed water supply system.

2.1.2.2 Need.--The need for the proposed project has been evidenced by intermittent groundwater quantity and quality problems in communities within the project service area. Recent population and land use studies have projected an increase in population for the area that would, in the absence of the proposed project, continue to use an over-subscribed groundwater resource. The

need to augment groundwater supplies in Central Bucks and Montgomery Counties has been recommended by the Water Supply Study for Montgomery County, Pennsylvania 1977 by Betz Environmental Engineers (Betz 1977) and by the work performed by Justin and Courtney, Inc., included in the Bucks County Master Plan for Water Supply 1975 (Justin & Courtney 1975). Further analysis performed by the Level B staff of the Delaware River Basin Commission at the request of Pennsylvania has supported these conclusions in the Draft Final Report on the Delaware River Basin Commission Comprehensive Study, (DRBC, Level B, October 1979). These studies indicate that a worsening of the adverse effects of over pumping groundwater, possibly to the extent of endangering public health, and creating economic hardship, can be expected from the projected increase in the service area's population, especially during drought years.

The forecast supplemental water needs for the Neshaminy Water Supply System and for cooling water for electric generating stations is as shown in Table 2-1.

2.1.2.3 Feasibility studies.--As noted under the background discussion in Part I of this assessment (NBWTP), Bourquard Associates released a Feasibility Study of Delaware River Pumping Facilities at Point Pleasant, Pennsylvania in March 1970 (Bourquard 1970). In 1979, Bourquard and other consultants (Dresnack 1979; Richman 1979) assisted the Neshaminy Water Resources Authority with preparation of an Environmental Report (NWRA 1979) which was submitted to DRBC in March 1979. That ER is based on conclusions and recommendations of numerous prior reports.

Bourquard's 1970 study describes a proposed design for the Point Pleasant Pumping Facilities that would provide sufficient pumping capacity

Table 2-1

Predicted Supplemental Water Needs

Neshaminy Water Supply System and Philadelphia Electric Company

Service Area or Agency	Average Daily, MGD				Maximum Daily, MGD			
	1981	1990	2000	2010	1981	1990	2000	2010
Central Bucks Cty.	2.7	4.9	5.9	7.3	2.7	7.3	8.9	10.9
Central Mont. Cty.	7.3	10.5	15.7	18.8	7.3	15.8	23.5	28.2
Min. Flow Releases*	3.5	3.5	3.5	3.5	5.3	5.3	5.3	5.3
Water Supply Needs	13.5	18.9	25.1	29.6	15.3	28.4	37.7	44.4
Water Supply Withdrawal**	14.9	20.8	27.6	32.6	16.8	31.2	41.5	48.8
Phila. Elec. Co.**	22.1	22.1	22.1	22.1	46.2	46.2	46.2	46.2
Total Water Requirements	37.0	42.9	49.7	54.7	63.0	77.4	87.7	95.0

* Minimum release of 5.3 MGD shall be maintained from 3/1 to 6/15 and 2.73 MGD shall be maintained during the remainder of the year (Neshaminy Creek). Average daily release for the year is 3.5 MGD.

** Includes 10% for water losses in transit.

from the Delaware River to meet forecasts for supplemental water needs for Central Bucks and Montgomery Counties and for Philadelphia Electric Company's Limerick Nuclear Generating Station located on the Schuylkill River near Pottstown, Pennsylvania. Preliminary alignments for pipeline rights-of-way to deliver supplemental water to the East Branch of Perkiomen Creek for eventual downstream use by the Limerick Generating Station and to the North Branch of Neshaminy Creek for municipal use at the Chalfont site are shown in Figure 2-1.

2.1.2.4 Applications and DRBC Dockets.--In 1971, the Delaware River Basin Commission amended its Comprehensive Plan to include the Point Pleasant Pumping Facility described in the Feasibility Study (Bourquard, 1970) as an element of the Neshaminy Creek Water Resources Plan. The March 17, 1971 decision (DRBC-D-65-76 CP(3)), consistent in part with Bucks County Water Allocation Permit No. WA-649, granted by the Pennsylvania Water and Power Resources Board, included a pumping facility design capable of withdrawing enough water to provide additional quantities from the Delaware River at Point Pleasant for low-flow augmentation of industrial and municipal water supplies in Montgomery County via Perkiomen Creek up to a maximum of 150 mgd by 1995.

Other early applications and dockets are discussed in Part I under background for the NBWTP. In July 1979, the Neshaminy Water Resources Authority, Bucks County, Pennsylvania, submitted a 3.8 application to DRBC for six components of the Neshaminy Water Supply System (NWRA February 1979). These components are: 1) Point Pleasant Pumping Station, 2) Combined Transmission Main, 3) North Branch Transmission Main, 4) North Branch Water Treatment Plant, 5) Western Transmission Main and 6) Southern Transmission Main.

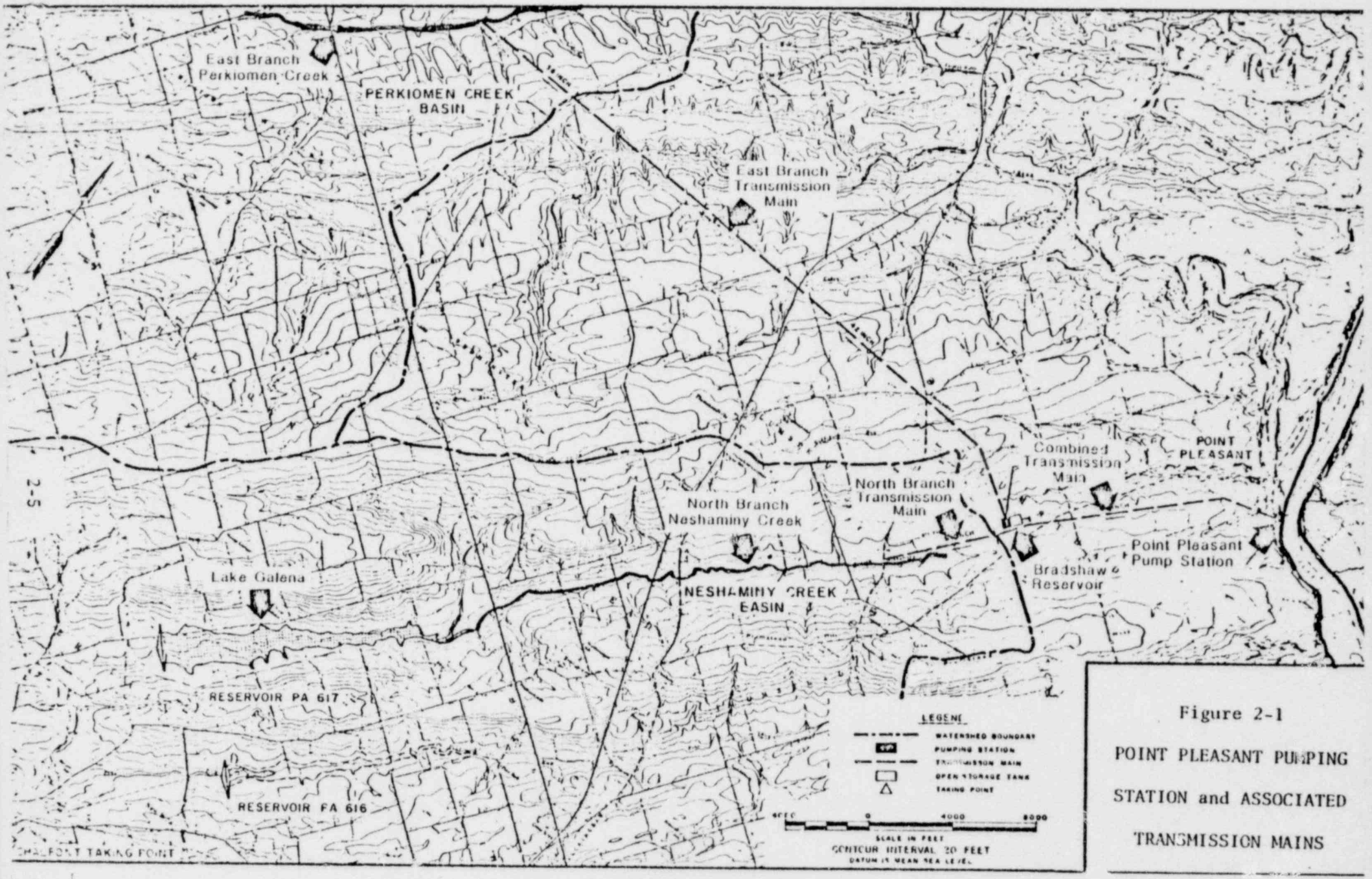


Figure 2-1

POINT PLEASANT PUMPING STATION and ASSOCIATED TRANSMISSION MAINS

2.1.3 Cooling Water for Electric Generating Station

2.1.3.1 Purpose.--The purpose of the water to be diverted to the East Branch Perkiomen Creek is to provide cooling water for industrial use to Philadelphia Electric Company's Limerick Nuclear Generating Station.

2.1.3.2 Need.--Table No. 2-1, page 2-3, gives the predicted supplemental water needs of the Neshaminy Water Supply System and Philadelphia Electric Company.

2.1.3.3 Feasibility Studies.--Several feasibility studies dealing with ecology, water quality, water quantity, physical structures, and other subjects are documented in the twelve appendixes to a final environmental impact statement on the "Point Pleasant Diversion Plan, Bucks and Montgomery Counties, Pennsylvania", released by DRBC in February 1973.

In July 1979, the Philadelphia Electric Company completed an environmental report relating to Bradshaw Reservoir, The Perkiomen Transmission Main, East Branch Perkiomen, and Perkiomen Creeks (PECO July 1979). The environmental report supplements the analyses contained in the relevant feasibility studies contained in DRBC's FEIS of 1973.

2.1.3.4 Applications and DRBC dockets.--Philadelphia Electric Company has been authorized by the Delaware River Basin Commission to withdraw surface water, under certain conditions, from the Schuylkill River, Perkiomen Creek and the Delaware River for cooling, under DRBC Docket Decision D-69-210 CP dated March 29, 1973. Conditional to that decision was the availability of adequate water supply storage in the Delaware River Basin, as determined by

DRBC, to support all water needs, both consumptive and non-consumptive, and to maintain a flow of 3000 cfs at Trenton. The "river follower" concept, as applied to the Limerick Station and other electric generation facilities, includes flow constraints that prevent the applicant from operating the station at full load, or only a percentage of full load, depending upon the available water supply in both the Schuylkill and Delaware River Basins. In a drought situation, the Delaware River would have a larger available supply, including upstream storage, than the Schuylkill River. The Delaware River, then, could provide a more reliable supply. Under extreme conditions, the Generating Station could conceivably be forced to suspend its operation until an adequate flow becomes available. On July 27, 1979, PECO submitted an application to DRBC for Compact Section 3.8 approval of Bradshaw Reservoir, Bradshaw Pumping Station, and the Perkiomen Transmission Main.

2.2 Project Description

2.2.1 General

Design capacities of the Point Pleasant Pumping Facility and of the North Branch Treatment Plant have been revised numerous times in response to continuing change in population trends and predicted water requirements. The larger withdrawals included in earlier DRBC Comprehensive Plan decisions, included additional quantities of water to be taken from the Delaware for water quality augmentation in the Neshaminy Watershed and for municipal and industrial purposes in Montgomery County via Perkiomen Creek. Further investigation of need for additional flows has found that communities and agencies responsible for wastewater treatment facilities within the service area lacked definite plans and financial commitments. The provision of additional supplies for these purposes was consequently dropped from the project.

2.2.2 Neshaminy Water Supply System

2.2.2.1 Source of water supply.--Predicted water supply has been based upon useage of up to 15.0 million gallons per day of natural flows of the North Branch Neshaminy Creek and up to 10.0 mgd from Pine Run, and from water taken from the Delaware River at Point Pleasant, Bucks County, Pennsylvania. A proposed pumping station on the Delaware River and a pipeline would deliver water to the North Branch Neshaminy Creek, and convey these supplies to Lake Galena, a multipurpose reservoir located approximately five miles downstream. Water would be discharged to the Creek from Lake Galena, maintaining a constant minimum flow of sufficient quantities to supplement natural flows withdrawn from Pine Run and the North Branch Neshaminy Creek at the North Branch Treatment Plant.

Construction of a system of eight flood control and two multipurpose reservoirs in the Neshaminy Watershed is under way. Construction of multipurpose reservoirs include recreational facilities as part of their development. Eight reservoirs have been constructed and two are to be built. Lake Galena (PA-617), the larger of the two existing multipurpose reservoirs, would store water for eventual use by the North Branch Treatment Plant.

2.2.2.2 Service Area.--The system would distribute the treated water via proposed transmission mains into the western, southern, eastern, and northern sub-service areas in Bucks and Montgomery Counties. At this time, only the alignments for the western and southern transmission mains have been selected. Final design plans would be prepared for the eastern and northern transmission mains when local water purveyors in those areas request supplemental water.

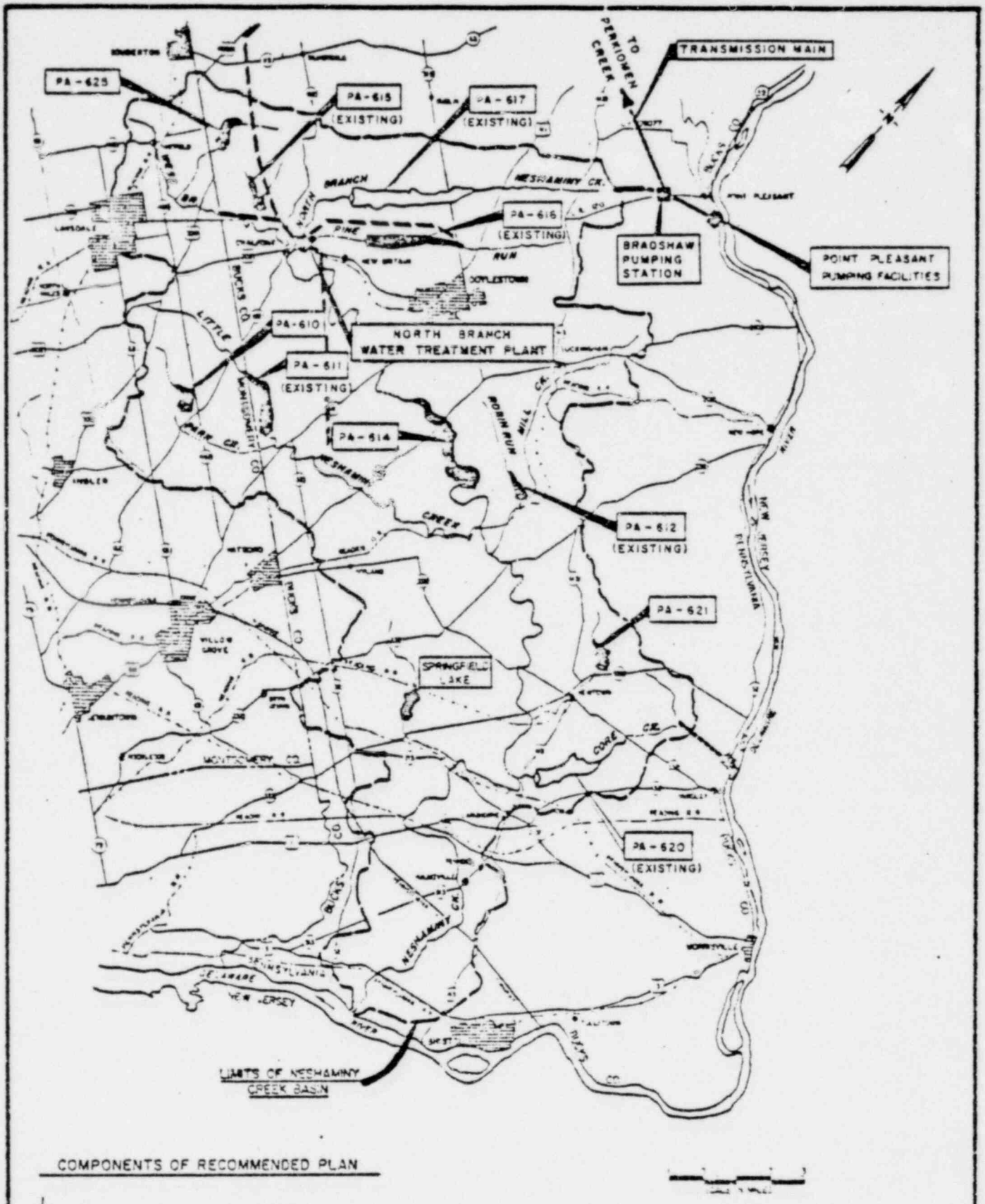
2.2.2.3 Components of the system.--Structural components of the Neshaminy Water Supply System, as listed in the application from NWRA to DRBC are as follows:

1. Point Pleasant Pumping Station
2. Combined Transmission Main
3. North Branch Transmission Main
4. North Branch Water Treatment Plant
5. Western Transmission Main
6. Southern Transmission Main

In addition to the structural components, Lake Galena and two receiving streams, Pine Run and North Branch Neshaminy Creek form part of the total water supply system. Individual components are described briefly in the following paragraphs. Detailed descriptions may be found in the applicants' environmental reports. (NWRA February 1979) (PECO July 1979). Components of the system and other features of the Neshaminy Basin are shown in Figure 2-2.

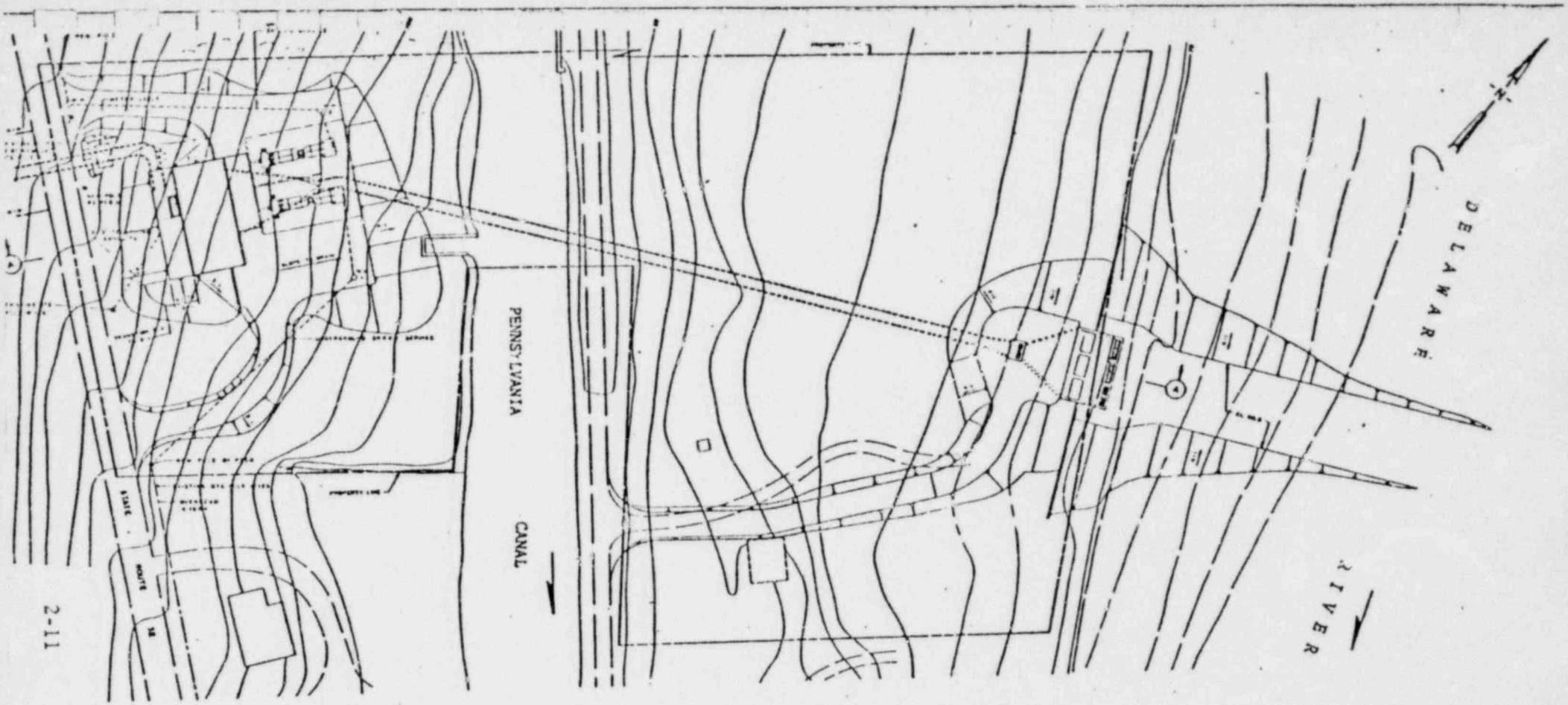
2.2.2.3.1 Point Pleasant Pumping Station

Point Pleasant, Pennsylvania is located on the Delaware River (River Mile 157.2) near the mouth of Tohickan Creek. Slow moving water characterizes the river at this point, and the pumping station intake would be located in the river bank approximately 800 feet downstream from the confluence of Tohickan Creek. The proposed intake would require an entrance channel to be dredged approximately 150 feet out into the river from the intake structure. River depths at the project site during low flow periods average approximately seven feet. The intake itself would be a low profile structure set into the river bank at or below the normal water surface elevation (See Figures 2-3 and 2-4.) The water withdrawn would be delivered 400 feet west, crossing under



NESHAMINY CREEK BASIN AND VICINITY

Figure 2-2
NESHAMINY CREEK
BASIN AND VICINITY



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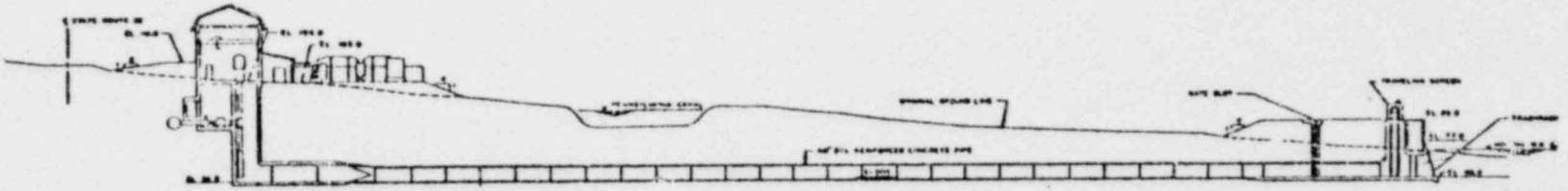

PROFILE A-A

Figure 2-3

POINT PLEASANT

GENERAL PLAN
AND
PROFILE

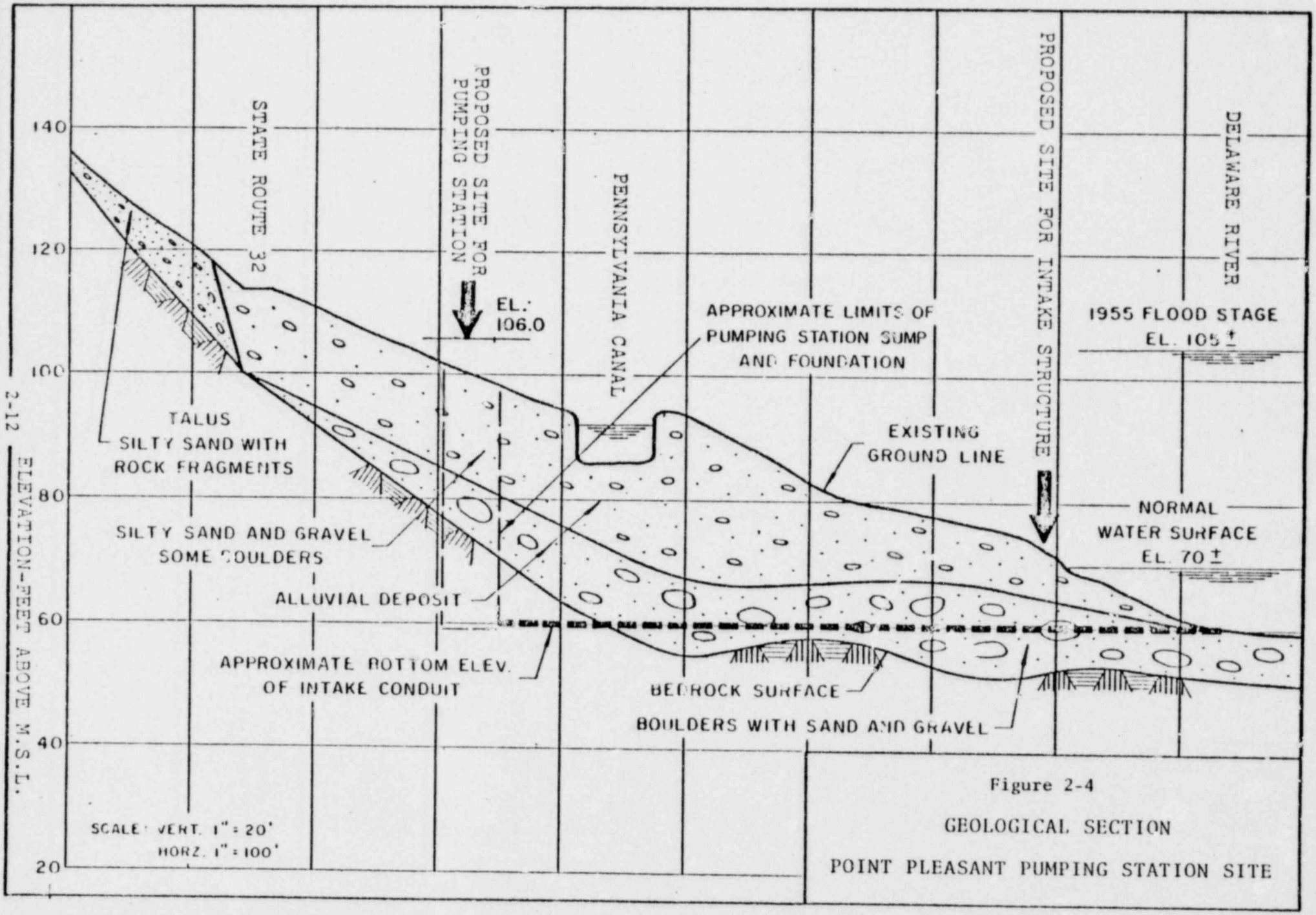

Figure 2-4

GEOLOGICAL SECTION

POINT PLEASANT PUMPING STATION SITE

the Delaware Canal to the pumping station located between the Canal and Route 32.

To meet existing and future supplemental water requirements of Central Bucks and Montgomery Counties and to provide make-up water at a maximum of 42 mgd for water lost by evaporation from cooling facilities at the Limerick Nuclear Generating Station, the Point Pleasant Pumping Facility would have an ultimate withdrawal capacity of 95 mgd. The capacity of the Point Pleasant Pumping facility combines Philadelphia Electric Company's withdrawal of 46*mgd, and the forecast demands of Central Bucks and Montgomery Counties of 49**mgd, and are based on the figures shown in Table 2-1,, page 2-3.

2.2.2.3.2 Combined Transmission Main

A 66" diameter Combined Transmission Main, designed to convey the total withdrawal from the Delaware River would start from the Point Pleasant Pumping Station, cross under Pennsylvania Route 32, and traverse a relatively steep ridge along the approximately 2.5 mile right-of-way to the 70-million gallon Bradshaw storage reservoir. (See Figure 2-5.) The Pipeline would be placed below ground and construction would require blasting of rocky overburden followed by a cut and fill operation. The combined main would be capable of routing municipal supplies directly to the North Branch Neshaminy Creek via the North Branch Gravity Flow Main or to Bradshaw Reservoir simultaneously to provide a constant source of water supply should the Bradshaw Reservoir be emptied for maintenance.

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*Includes 10% for water lost in transit.
**Includes 10% for water lost in transit and a maximum of 5.3 mgd to maintain established minimum flows.

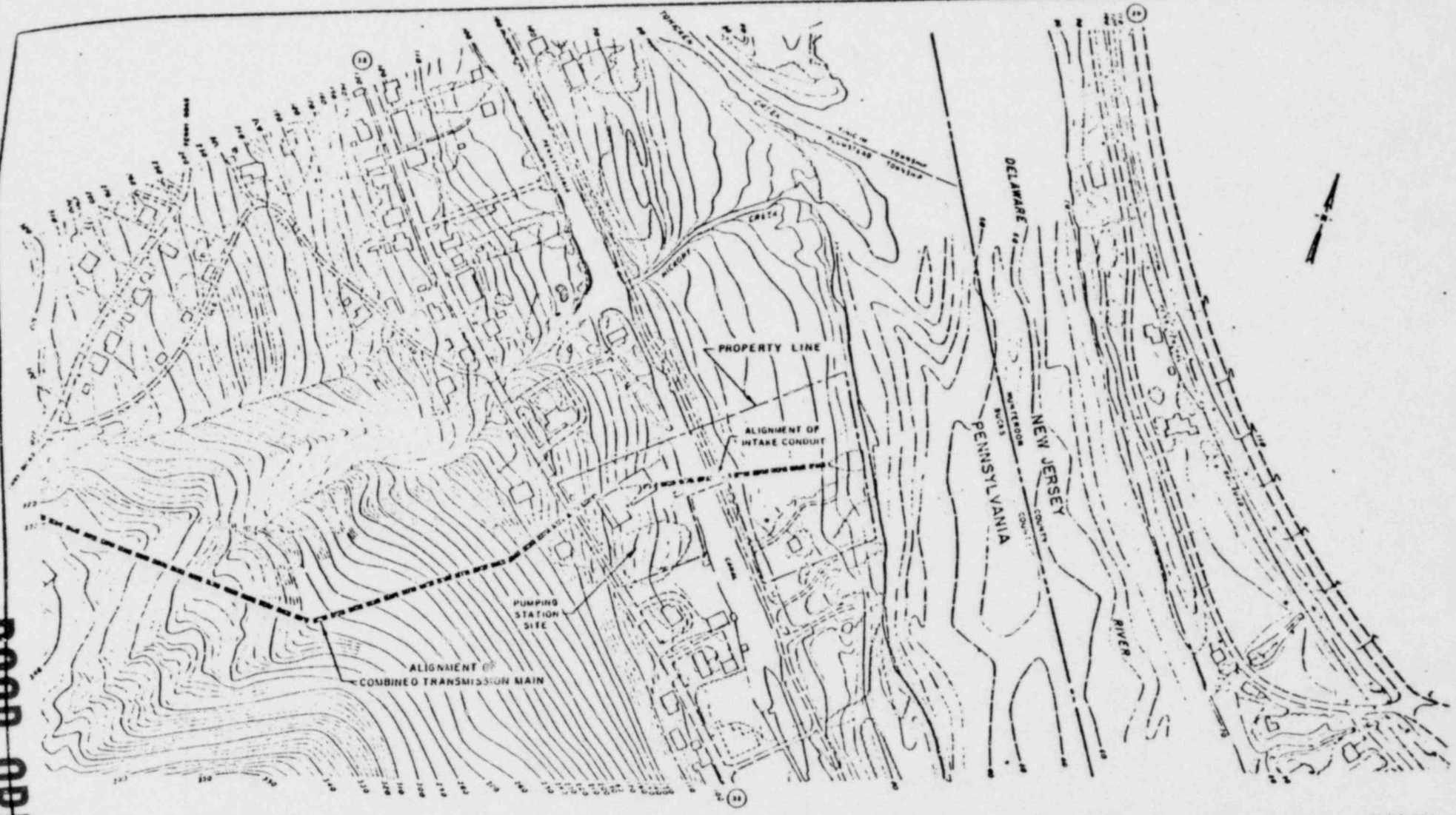


Figure 2-5

COMBINED TRANSMISSION MAIN

2.2.2.3.3 North Branch Transmission Main

The North Branch Transmission Main, a 46" diameter pipeline 5,600 feet long, would extend from Bradshaw Reservoir to the eventual point of discharge to the North Branch Neshaminy Creek near the intersection of Pennsylvania Route 413 and Bradshaw Road. Design of the Main includes the use of an energy dissipator to reduce the erosive effects of the discharge. The pipeline would be constructed by the cut and fill method adjacent to Bradshaw Road through relatively undeveloped farmland.

2.2.2.3.4 North Branch Water Treatment Plant (See Part 1, page 1-4.)

2.2.2.3.5 Western Transmission Main (See Part 1, page 1-8.)

2.2.2.3.6 Southern Transmission Main (See Part 2, page 1-8.)

2.2.2.4 Costs

The estimated cost of the Neshaminy Water Supply System is as shown in Table 2-2. A comparison of costs for the proposed system and alternative systems is shown in Table 2-3.

2.2.3 Cooling Water for Generating Stations

2.2.3.1 Source of water supply.--A pumping station on the Delaware River at Point Pleasant, Pennsylvania, would withdraw water from the Delaware River and pump it through a transmission main which would terminate in a 70-million gallon reservoir located near Bradshaw Road where the pumpage would be divided: part flowing by gravity into the North Branch Neshaminy Creek and on to Reservoir PA-617 (Lake Galena), and part pumped into the East Branch Perkiomen Creek to serve the Limerick Nuclear Generating Station.

Schuylkill River water at the Limerick plant site could be used for consumptive use when the flow as measured at the Pottstown gage is in excess

Table 2-2

NESHAMINY WATER SUPPLY SYSTEM

ESTIMATED INSTALLATION COSTS

April 1979 Price Level

Name of Facility	Installation Costs	Past Expenditures	Future Costs
Point Pleasant Pumping Facilities			
Pt. Pleasant Pumping Station	$ 4,365,000		
Combined Transmission Main	3,015,000		
North Branch Trans. Main	795,000		
Total	$ 8,175,000	$ 370,000	$ 7,805,000
Reservoir PA-617			
Water Supply Cost	2,100,000	2,100,000	0
North Branch Water Treat. Plt.	19,010,000	1,230,000	17,780,000
Western Transmission Main	1,235,000	70,000	1,165,000
Southern Transmission Main	2,825,000	20,000	2,805,000
Administration & Overhead	620,000	420,000	200,000
TOTAL ALL ITEMS	$33,965,000	$ 4,210,000	$29,755,000

Table 2-3

NESHAMINY WATER SUPPLY SYSTEM

COMPARISON OF ALTERNATE SYSTEMS
April 1979 Price Level

Water System	Installation Cost of System	Unit Cost ($/1,000 G) in Year Indicated for Production of:			
		1982		1989	1997
		5 MGD	10 MGD	15 MGD	20 MGD
10/20 MGD Initial Capacity, expandable to 40 MGD. Bucks & Montgomery Counties and Philadelphia Electric	$ 33,965,000	$ 1.13	$ 0.65	$ 0.58	$ 0.50
10/20 MGD Initial Capacity, expandable to 40 MGD. Bucks & Montgomery Counties	$ 31,630,000	$ 1.42	$ 0.79	$ 0.67	$ 0.57
5 MGD Initial Capacity, expandable to 10 MGD. Bucks County Only	$ 18,715,00	$ 2.96	$ 1.58	$ 0.93	$ 0.75

Note: Bucks County projected usage is 27% of production and Bucks Only system is based on such usage in the years indicated.

of 530 cfs with one unit in operation and 560 cfs with two units in operation with certain conditions that are spelled out in DRBC's 1973 final EIS (DRBC 1973, pp 29-31).

Perkiomen Creek water could be used when flows measured at the Graterford gage exceed 180 cfs with one unit in operation and 210 cfs with two units in operation, exclusive of water pumped from the Delaware River.

2.2.3.2 Service area.--Water pumped into the East Branch Perkiomen Creek would augment the flow of that creek and to some extent the flows of Perkiomen Creek and the Schuylkill River. Water not consumed at the generating station and released to the Schuylkill would also somewhat augment the river downstream of the station. The geographic areas where the users of these flows are located would be the service area affected.

2.2.3.3 Components of the system.--In addition to the pumping station at Point Pleasant and the combined main from the pumping station to Bradshaw reservoir, as discussed under the heading "Neshaminy Water Supply System", page 2-8 et seq., of this assessment, the structural components of PECO's system for providing cooling water for generating stations are Bradshaw Reservoir and the Perkiomen Transmission main. In addition to the structural components, East Branch Perkiomen and Perkiomen Creeks would form part of the total water supply system. Individual components are described briefly in the following paragraphs. Detailed descriptions may be found in the applicant's environmental report (PECO July 1979). The components of PECO's portion of the total water supply system are shown in Figure 2-6 as part of the general plan for the water supply system.

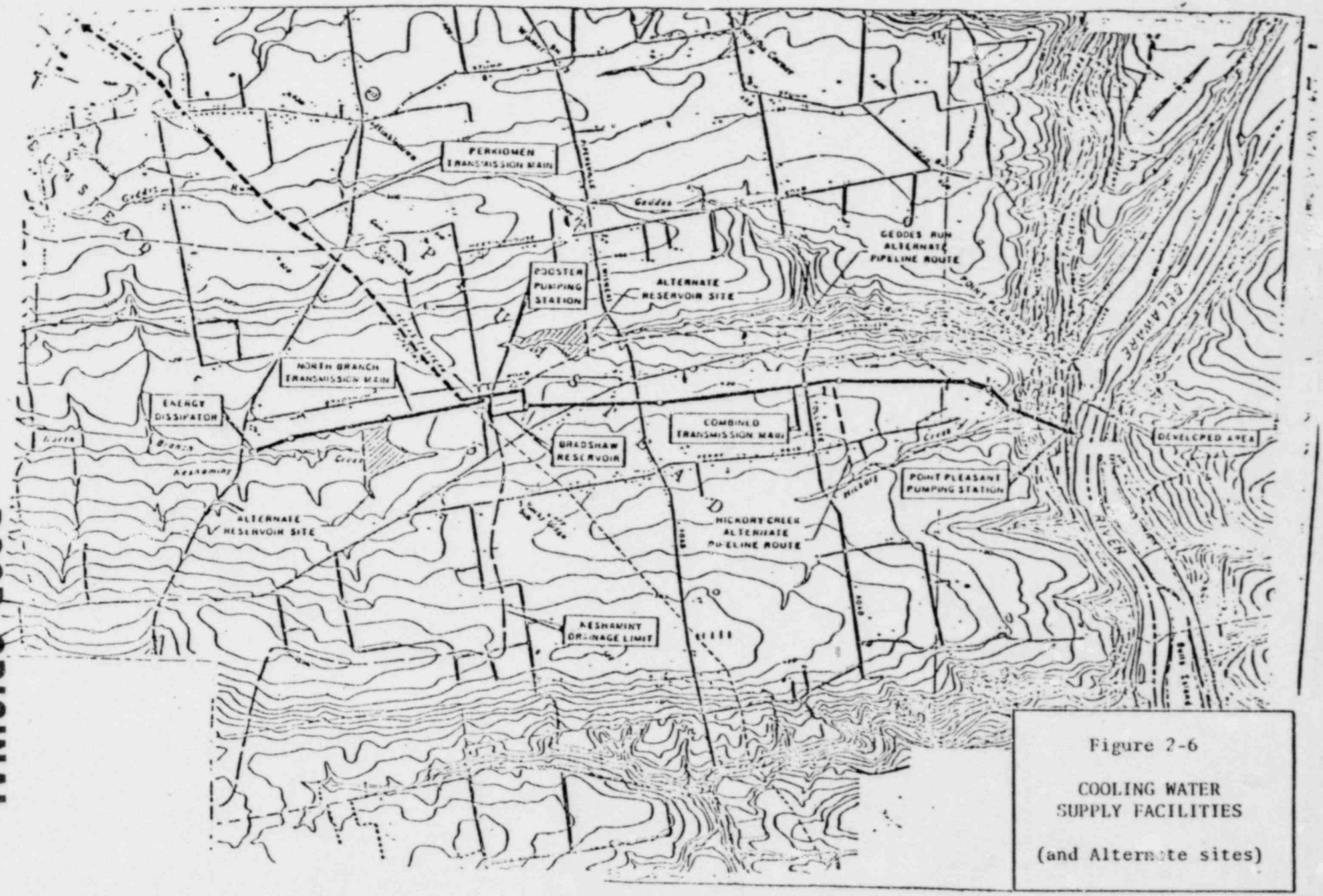


Figure 2-6

COOLING WATER SUPPLY FACILITIES

(and Alternate sites)

2.2.3.3.1 Bradshaw Reservoir

The purpose of Bradshaw reservoir is to accommodate differing discharge flow rates, to provide one day emergency cooling water storage, and to allow for settling of silts and clays suspended in the water pumped from the Delaware River.

The reservoir would be located in Plumstead Township in Bucks County at the intersection of Bradshaw and Myers Roads. The facility would cover approximately 28 acres of fallow field formed by four earthern impervious dikes, each 900 feet in length and varying in height from 5 to 20 feet depending upon existing ground contours. Impervious earthern material excavated from the reservoir site would be used to form the dikes. An impervious layer having a minimum thickness of three feet of existing material or two feet of compacted material obtained from an external source would be used to form the bottom of the reservoir.

Facilities at the reservoir would include a pumping station capable of pumping a maximum of 46 mgd approximately 6.7 miles to the East Branch of Perkiomen Creek. The pumping station would also contain a gated outlet structure feeding the gravity-flow North Branch Transmission Main, eventually discharging to the headwaters of North Branch Neshaminy Creek. Removable trash racks would be installed at the entrance to the structure to prevent debris from fouling the pumps or passing to either Creek.

The 70-mg Bradshaw storage reservoir to be constructed and maintained by Philadelphia Electric Company would receive water diverted from the Delaware River via the Combined Transmission Main. The facilities and related piping

at the junction of the Main and the Reservoir would be capable of distributing water directly to the North Branch Transmission Main, (by-passing the reservoir) or to both facilities simultaneously. (See Figure 2-7.)

The capacity breakdown for the reservoir is as follows:

18 mg	for operating capacity
46 mg	for emergency storage
6 mg	for silt buildup
70 mg	total capacity

As indicated earlier, Bradshaw Reservoir is designed to continue operation of the Limerick Generating Station for one day without additional water supply. The Reservoir is not required for safe shutdown of either reactor because a spray pond of 25 million gallons at the Limerick site would be sufficient to shutdown the plant and would provide reserve storage for normal operation.

2.2.3.3.2 Perkiomen Transmission Main

The Perkiomen Main, connecting Bradshaw Reservoir and the East Branch of Perkiomen Creek would convey water via a 48" diameter pipeline pumped approximately 6.7 miles along an existing gas pipeline right-of-way to the ridge line of the East Branch of the Perkiomen Creek Watershed. The pipeline would cross U.S. Route 611 approximately 0.7 miles north of Plumsteadville, Pennsylvania. No major streams would be affected by the project. (Figure II-8.) At the point of discharge to the East Branch, the applicant would construct an energy dissipator to reduce erosion of the creek bed and banks. A small connecting spur channel dug perpendicular to the stream channel is also included in the energy dissipator design. (Figure II-9.) The supplementary cooling water discharged to the Creek would travel 22.2 stream miles via open channel conveyance for eventual use at the Limerick Nuclear Generating Plant in Pottstown, Pennsylvania.

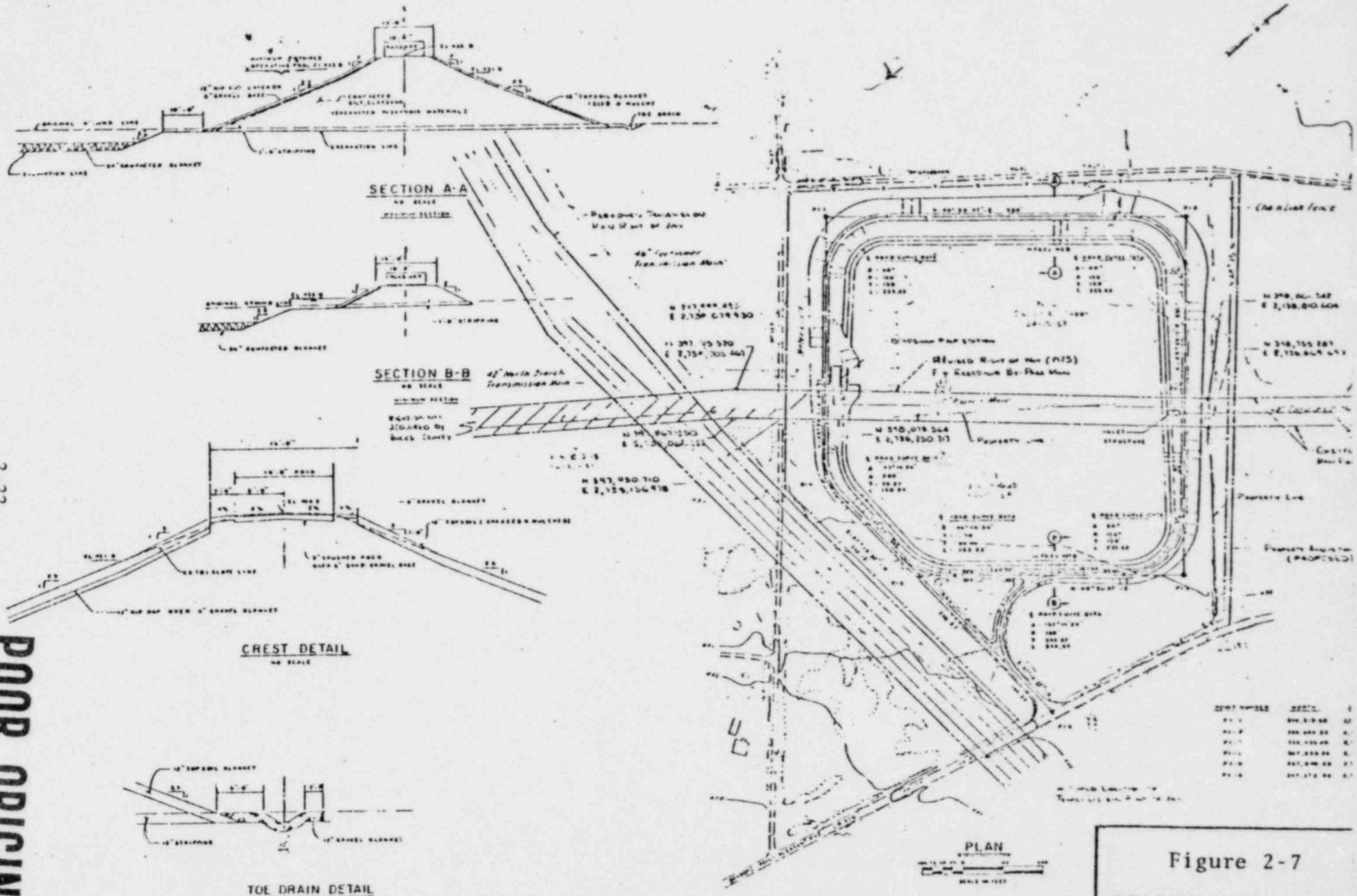


Figure 2-7

BRADSHAW RESERVOIR
AND
PUMP STATION

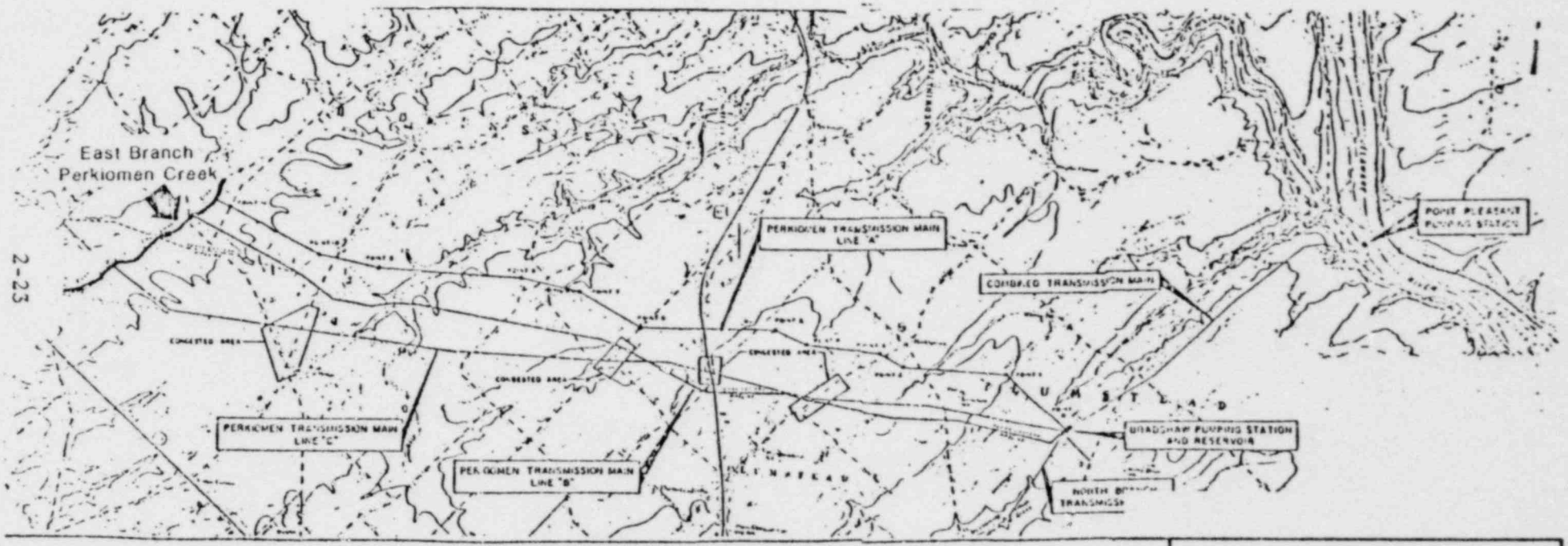
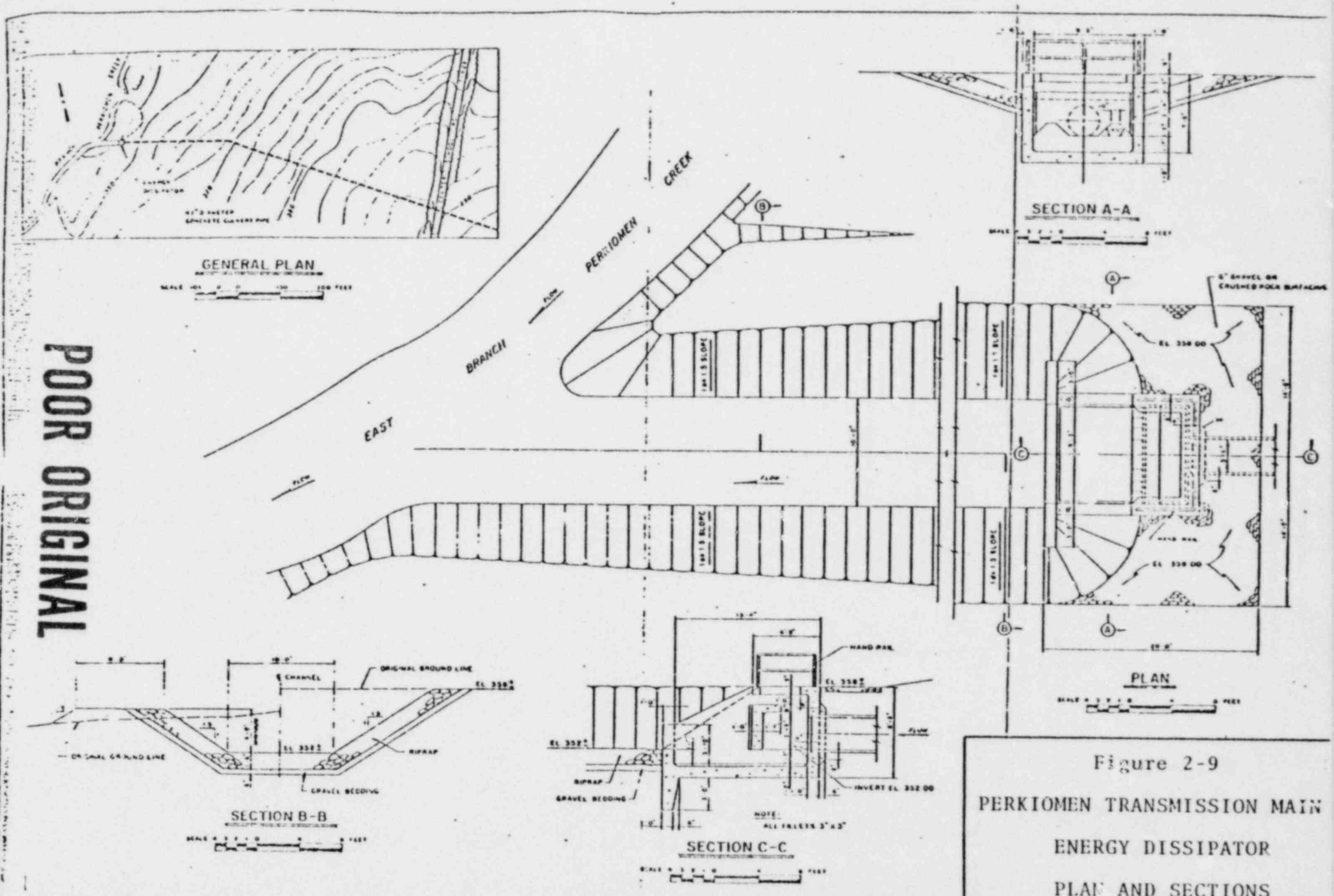


Figure 2-8

PERKIOMEN TRANSMISSION MAIN (LINE "B")



POOR ORIGINAL

Figure 2-9

PERKIOMEN TRANSMISSION MAIN

ENERGY DISSIPATOR

PLAN AND SECTIONS

2.2.3.3.3 East Branch Perkiomen Creek

The East Branch Perkiomen Creek rises in Bedminster Township, west of the community of Bedminster, and flows in a southwesterly direction through the Boroughs of Perkasie and Sellersville, to its confluence with the main Perkiomen Creek just south of Schwenksville, a distance of approximately 25 miles. The East Branch flows through a wide valley underlain by the Brunswick Formation with interfingerings of the Locatong Formation. It has a drainage area of 61.0 square miles. Seven man-made dams are located on the East Branch.

2.2.3.3.4 Perkiomen Creek

Perkiomen Creek drains 362 square miles of Lehigh, Berks, Bucks, and Montgomery Counties in southeastern Pennsylvania. No natural ponds or lakes exist in the watershed, which consists of low hills and rolling land. Much of this area is forested with second- or third-growth hardwoods typical of southeastern Pennsylvania. The Perkiomen and its tributaries are low to moderate gradient streams; flow rates in most are rapid and quite variable. The recorded maximum, minimum, and median flows in the creek, measured at the Graterford gage, are 39,900, 4.7, and 368 cfs, respectively.

2.2.3.4 Costs

2.2.3.4.1 General.--The cost to the applicants, NWRA and PECO, would depend upon the arrangement made for sharing the joint-use facilities, such as the Point Pleasant Pumping Station and the Combined Main, plus the separate cost to each applicant for facilities used independently. PECO would pay its allocated share of the installation and operating cost for the joint facilities and the total cost of the Bradshaw Reservoir and the Perkiomen Transmission Main.

In terms of the 1979 price level, the cost of the Neshaminy Water Supply System would be about $33,965,000 - as shown in Table II-2, page II-10 . PECO's share of this cost, and of operating costs, is still to be determined. The estimated installation cost of the Bradshaw Reservoir and the Perkiomen Transmission Main is about $8,700,000, all of which would be borne by PECO, as would the operation, maintenance, and repair costs for these two facilities.

2.3 Alternatives

2.3.1 Neshaminy Water Supply System

2.3.1.1 General.--Specific site location alternatives for the significant elements of the project and alternatives to the entire system are considered in this section. The purpose of the project is to supply Central Bucks and Montgomery Counties with an adequate and dependable supply of water. Analysis of the reasonable methods of achieving this purpose and the reasons for rejecting the various alternatives in favor of the proposed project are discussed.

2.3.1.2 No action alternative.--The "no action" alternative would be not to construct a supplementary water supply system in the Central Bucks and Montgomery County area. In this event, these communities would be forced to rely on existing water supplies for present and future water needs.

The most feasible local source of supply would be from groundwater. The existing surface water supplies could not meet demand since the surface water streams in the area are intermittant and of very poor quality during periods of low precipitation. In addition, the utilization of any surface water supply would require the same type of system facilities (i.e. water treatment plant, transmission mains, etc.) similar to those of the Neshaminy System.

water streams in the area are intermittent and of very poor quality during periods of low precipitation. In addition, the utilization of any surface water supply would require the same type of system facilities (i.e. water treatment plant, transmission mains, etc.) similar to those of the Neshaminy System.

Moreover, the development of reservoirs on the local streams necessary to provide a firm yield for water supply would be difficult and involve severe environmental and sociological impacts. Use of existing reservoirs for this purpose has been determined as not having the capability to meet demand requirements. (NWRA February 1979).

Residential development is expected to continue at established rates regardless of whether a regional supplementary water supply system is constructed. With groundwater as the only available source of supply, this would create an even greater dependence on an already stressed resource.

The impacts associated with the "no action" alternative would have essentially the same adverse impact on the environment as with the further development of groundwater by continuing to over subscribe available supplies to the service area and is not considered a favorable alternative.

2.3.1.3 Further development of ground water.--This alternative would involve establishment of a system of wells in the rural and undeveloped portions of the service area where groundwater is presently available. A system of water lines would be needed to convey these supplies to areas where withdrawals are in excess of the levels of recharge within the watershed. The network of pipelines and the number of wells would be a likely impetus for scattered rural develop-

ment with the likely effects of local well interference, continued groundwater mining and further depletion of the resource. The impact of this alternative in addition to those discussed later indicate that its potential detriments would outweigh the potential benefit. In the absence of such a regional water supply system, the adverse environmental impact of developing a widely dispursed well system would be cumulatively significant. Further development of groundwater therefore is considered the least desireable water supply alternative for the area.

2.3.1.4 Lake Nockamixon.--The use of the Pennsylvania state-owned reservoir as a water supply alternative to the Neshaminy System would severely impair the regional recreational benefits provided by the facility. Water supply usage of the lake would result in large drawdowns that would reduce the usefulness of existing recreational facilities. For this reason, the use of Lake Nockamixon for water supply before the year 2000 is considered unfavorable unless no other viable alternative is available.

The most efficient use of the reservoir for public water supply would involve augmenting available supplies in the Delaware River during periods of low flow rather than drawing directly from the reservoir. This alternative would make use of the Delaware River for most of the year and include a downstream diversion such as the Point Pleasant Pumping Station. The result would be more water available for use at the reservoir during periods of peak demand.

Finally, the use of Lake Nockamixon for water supply would restrict the capacity of the reservoir to provide an emergency source

during periods of severe drought. The time during which the reservoir could serve as an emergency supply is limited, and regular use of the reservoir for water supply would reduce the available yield.

2.3.1.5 Withdrawals from the Schuylkill River.--The use of the Schuylkill River as an alternative source of water supply for Montgomery County is not considered adequate because of:

1. Lack of available supply due to heavy agricultural, power municipal, and industrial use within the watershed.
2. Limited opportunities for developing further water storage reservoirs due to geology, past mining activities in the upper reaches of the watershed and the location of communities in several technically usable reservoir sites.
3. Increased use of the Schuylkill River would lead to further quantity conflicts and increased reuse contributors to a further buildup of total dissolved solids and deteriorated water quality.

For these reasons the use of the Schuylkill River is not considered the most usable alternative solution to the problem of water supply in Central Bucks-Montgomery County Region.

2.3.2 Cooling Water For Electric Generating Stations

2.3.2.1 Nature of alternatives.--The Philadelphia Electric Company considered the following alternatives for water supply for cooling its Limerick Generating Station: Four different pipelines originating at different points on the Delaware River but each delivering water to the East Branch of the Perkiomen Creek, two different pipelines originating at the Delaware River and following different routes to a booster pumping station on the Perkiomen Creek near Graterford,

a pipeline from the Philadelphia Northeast Sewage Treatment Plant to a booster pumping station on the Perkiomen Creek near Graterford, reservoirs in the Schuylkill River Basin and groundwater underlying the area near the generating station. While the Blue Marsh project in the Schuylkill Basin was considered as an alternative to diverting water from the Delaware River, it was not a viable alternative because DRBC would not commit the full yield of a project built at public expense to a single private use. Also, the extraordinary consumptive use of water by the generating station would not allow reuse of most of this water.

2.3.2.2 Significant differences.--PECO noted that several significant differences exist between alternatives as a group and the proposed plan. Under the proposed plan others would construct a new intake/pumping station capable of delivering sufficient water to meet future public water supply requirements and to supply needs of the Limerick Generating Station. The alternatives assume PECO would act alone and construct facilities to supply only its own needs. These facilities would not be readily expandable in the future to serve the public. There would be no Bradshaw Reservoir constructed as part of any of the alternative plans.

2.3.2.3 Most desirable alternative.--After analysis of seven alternative pipelines from the Delaware River to the East Branch Perkiomen Creek, reservoir alternatives, and groundwater alternatives (PECO July 1979, pp III-3,4), PECO concluded that the joint facilities would result in annual cost savings of more than 20% for Bucks County and 10% for PECO as well as providing advantages in operating flexibility and reliability. Since the joint project also would require 2 fewer miles of total right-of-way than the combined individual facilities, the proposed project is superior to the most preferred alternate pipeline route. Also, the joint facilities would result in only one intake/pumping station on the Delaware River to serve several users rather than a series of

stations, each having a single purpose. A new reservoir in the Schuylkill River Basin would have a greater environmental impact, larger land use, and higher cost than the proposed pipeline system. The use of groundwater or existing reservoirs is not feasible since insufficient supplies of water to meet PECO needs are available.

2.4 Probable Impacts

2.4.1 General

This section of this assessment (Part II) deals with differences that would most likely occur in the existing environment with and without the proposed water supply system as it has been changed since the analysis was made in the Final Environmental Impact Statement prepared in 1973. The analysis is to determine whether the impacts that would be associated with changes in the project are significant enough to warrant updating portions of the FEIS with formal supplements.

The proposed project would affect, in varying degrees, such environmental elements as land, air, water, flora, fauna and the human habitat. With the exception of air, which would be relatively unaffected by the proposed project, the applicants' environmental reports deal with each of the relevant components of these environmental elements. This assessment draws upon the applicants' reports for much factual data but maintains its independent analysis.

The probable impacts of construction and operation of the proposed water supply system would relate to both structural components and natural components of the system; i.e. water for the system would flow through natural streams as well as through man-made conduits. Also, impacts would be associated with natural and man-made resources that would be common to all physical features of the water-supply system; therefore, this analysis includes those categories where applicable.

2.4.2 Neshaminy Water Supply System

2.4.2.1 General.--Short-term adverse environmental impacts would be associated with construction activities of the Point Pleasant Pumping Station, North Branch Treatment Plant, and related transmission mains as well as with natural waterways and man-made reservoirs. Such temporary impacts would include disruption of traffic and tourist usage, increased siltation of water bodies, and temporary disruption of the Delaware Canal.

The potential for long-term adverse environmental impacts involves withdrawal of water from the Delaware River, capability of upstream water supply reservoirs to provide a "back-up" supply during periods of drought, ecological impact on streams receiving additional water diverted from the Delaware River, ecological disruption related to construction and operation of transmission mains, and probable residential and commercial development in the service areas.

Environmental benefits are expected to accrue from the proposed water supply system by providing a regional solution to further deterioration of groundwater supplies and by providing a single source of supply for the combined needs of the Neshaminy Water Resources Plan and those of the Limerick Nuclear Generating Station.

Analysis of significant environmental effects that can be reasonably expected has found that the beneficial impacts would outweigh the adverse impacts associated with the proposed project and that the project would be a feasible and beneficial use of the water resources of the Delaware River Basin.

Chapter V of NWRA's Environmental Report (February 1979), examines in detail adverse and beneficial probable impacts, including matrixes for easy

reading, that would be associated with the proposed project. This assessment discusses only some of the more significant impacts that help provide the basis for conclusions reached in this analysis.

2.4.2.2 Point Pleasant Pumping Station.--Analysis of impacts in and around the proposed pumping plant site at Point Pleasant, Pennsylvania, as indicated in revised plans, supports the conclusions of the Final Environmental Impact Statement on the Point Pleasant Diversion (DRBC February 1973, p. 3) which states that:

> The proposed Point Pleasant Diversion will be beneficial to the Neshaminy and Perkiomen Watersheds and not detrimental to the Delaware River if the following precautions are observed:
>
> 1. Keep to a minimum the fluctuation of East Branch Perkiomen Creek and North Branch Neshaminy Creek caused by pumping.
>
> 2. Bury the pipelines from Point Pleasant Pumping Station to Bradshaw Road Pumping Station and from there to Neshaminy and Perkiomen Creeks using proper sedimentation controls and ground cover replacement to minimize the effect on the environment.
>
> 3. Design the above-ground facilities (control houses, transformers, sheds, etc.) to complement the structures found in the area.
>
> 4. Arrange schedules so as not to begin any construction during the wildlife reproductive season, roughly spring through mid-summer.
>
> 5. Develop operating schedules for change of pumpages to eliminate any rapid fluctuations.
>
> 6. Design intake structures (for velocities, fish screens, etc.) to prevent impingement and entrainment.

Operation of the pumping facility could adversely affect fish and invertebrates in the vicinity of the intake by impingement and entrainment and by periodic dredging of the intake channel. The severity of these effects would be mitigated to some extent by using protective traveling

screens and low intake velocities, and by avoiding spawning periods by scheduling dredging operations at other times of the year.

Adverse asthetic effects of the intake structure are not considered significant since the structure would have a low profile when set into the river bank. Asthetics at the pumping station site would not be adversely affected since the architectual design of the proposed structure is compatible with the character of the community.

Investigation of potential adverse impacts on cultural resources in the vicinity of the Pumping Station and remaining elements of the Neshaminy System has found no important historic or archaeologic sites that would be adversely affected (Pennsylvania Historic Commission October 1979) except for the Delaware Canal.

A short-term impact involves the pipeline of the intake structure crossing the Delaware (Pennsylvania) Canal near the Point Pleasant Pumping Station. The Canal is listed in the National Register of Historic Landmarks and has great value as a cultural and recreational resource. The flow of the canal would be by-passed during construction so there would be some interruption of tourists. Procedures for construction in and adjacent to the canal would be reviewed by the Pennsylvania Department of Environmental Resources and the National Advisory Council on Historic Preservation. An archaeologist would be retained to observe construction at the Canal. Consequently, there should be no long-term adverse impacts to the canal, due to the proposed project.

2.4.2.3 Delaware River.--The principal impacts of withdrawal of water from the Delaware River to supply the proposed project would relate to flow, quality of water, and aquatic ecology in the river.

2.4.2.3.1 Flow

The impact of withdrawing a maximum of 95 mgd from the Delaware River is judged to have less impact than withdrawing the approximate 150 mgd anticipated in the Point Pleasant Environmental Impact Statement in 1973. In basic terms, the maximum withdrawal of 95 mgd is approximately 5 percent of the minimum flow of the Delaware River at Trenton maintained at 1940 mgd (3000 cfs).

The water withdrawn for municipal water supply would be essentially a non-consumptive use, with almost total return to the Delaware River via the Neshaminy, Perkiomen, Pennypack and Wissahickon Creeks (NWRA November 1978). Evaporative losses of approximately 10 percent would occur during conveyance from the Delaware River to the North Branch Treatment Plant via the North Branch of Neshaminy Creek and in Perkiomen Creek.

The present proposal represents a 37 percent reduction in the maximum amount of water that would be withdrawn from the Delaware River. Also, there would be a reduction in the amount of water required from upstream storage to support the 95 mgd withdrawal at Point Pleasant and still maintain established flow criteria in the Delaware River.

The capability of the Delaware River is not adequate to meet the minimum flow requirement of 3000 cfs at Trenton during extreme drought conditions, with or without the Point Pleasant Diversion (DRBC, Level B, October 1979). During periods of low flow, water would be allocated among users according to the priorities listed in DRBC Resolution No. 76-18, November, 1976. As explained in Section 2.1.3.4, pp. 2-6,7, provision of cooling water for the Limerick Nuclear Generating Station is conditioned upon the availability of water. Utilities must develop their own water supply storage facilities to provide for their consumptive use requirements during low flow periods or they must curtail production of electricity.

2.4.2.3.2 Quality

The water quality of the Delaware River in the vicinity of Point Pleasant, Pennsylvania, is generally good. Data show it to have equal or better quality than either East Branch Perkiomen Creek or North Branch Neshaminy Creek. Importation of Delaware River water to these watersheds would improve water quality, particularly in degraded downstream areas. Withdrawal of water from the Delaware River should produce insignificant changes in water quality in the River (DRBC Appendix A, September 1979). However, there would be slightly increased siltation from excavation of riverbank areas during construction.

Water quality effects, that is, reduction of the total amount of flow in the Delaware available to dilute wastes as a result of withdrawal, would be negligible since the 46 mgd for consumptive use by the Philadelphia Electric Company would not be withdrawn if the flow of the Delaware River were to fall below 1940 mgd (3000 cfs), as required by DRBC Docket Decision D-69-210 CP (DRBC October 1979). Municipal withdrawals at Point Pleasant without the 46 mgd for Philadelphia Electric Company would account for approximately a two and one-half percent nonconsumptive use of total river flow, assuming a low flow in the Delaware of 1940 mgd, eventually being returned to the Delaware at the mouth of Neshaminy Creek and at its confluence with the Schuylkill River.

Reduction in the proposed maximum withdrawal based upon elimination of additional quantities for water quality augmentation in Neshaminy Creek and for additional supplies for industrial municipal purposes in Montgomery County via Perkiomen Creek would also tend to reduce the local impact of withdrawal, specifically on the Delaware River.

See Appendix B for more detailed discussion of water quality factors associated with the Point Pleasant Diversion.

2.4.2.3.3 Aquatic Ecology

Recent studies, contrary to the EIS description (DRBC 1973), indicate the Delaware River at the site of the diversion is a fairly productive pool (N.J. DEP 1979). Smallmouth bass, walleye pike, channel and white catfish, and possibly striped bass use the area as a nursery. Shad juveniles were concentrated in the area during the 1979 fall emigration. The area is likely to receive greater use as a nursery and possibly a spawning area, as fish react to the general improvement in water quality basin-wide.

The 35 percent reduction in water to be withdrawn from the Delaware River under the revised plan would be associated with a smaller adverse impact on the fishery in the river. Also, the lack of significant impingement and entrainment effects at two large up-river water users (Martins Creek and Gilbert generating stations), indicate no significant adverse effects. The flow reduction, the committment to use the latest screening design, the flush-to-the-bank alignment, and the 0.5 fps approach velocity, support the conclusion that there would be no significant adverse effects.

State and federal fishery managers should be satisfied that the final design of the intake structures is appropriate prior to construction. Also, the following recommendations should be accepted by the applicants: A monitoring study should be required to reduce further the possibility of unforeseen damage and to permit planning of mitigating steps if necessary. Construction and maintenance dredging should be performed between November and March (rather than September-April as stated in the EIS) to reduce the potential for impact on migrating juvenile and adult shad. If the applicants agree to implement these minor recommendations, the EIS conclusions would be unaffected.

In balance, withdrawal of water from the Delaware River for the proposed project would have only a slightly adverse effect on environmental resources in the Delaware River Basin. As indicated in other sections of this assessment, these small adverse effects would be more than offset by beneficial effects in the Neshaminy and Perkiomen watersheds.

2.4.2.4 Combined Transmission Main.--The Combined Transmission Main that would convey supplementary water supplies from the Point Pleasant Pumping Station for use by the Neshaminy Water Resources Authority and Philadelphia Electric Com- would involve blasting operations which could adversely affect existing wells in the area. There would be increased noise levels during blasting and construction operations, high potential for erosion of exposed surfaces, disruption of terrestrial and human environment in the construction area, and disruption of traffic on six local roads.

It appears that no significant long-term adverse impacts would occur since adequate remedial, protective, and mitigative measures would be taken by the applicant. For example, the Authority would compensate homeowners for damages resulting from blasting operations. Also, no major stream crossings are anticipated, and there would be minimum disruption to future land use, including return of wildlife habitat.

2.4.2.5 North Branch Transmission Main (Raw Water).--There would be no significantly adverse long-range impacts associated with construction of the North Branch Transmission Main. Unlike the steep and rocky environment of the Combined Main construction area, the North Branch Main right-of-way traverses relatively flat and largely undeveloped farm acreage

adjacent to the Bradshaw Reservoir site to the point of discharge to North Branch Neshaminy Creek near the Route 413 bridge. (See Figure 2-6). The North Branch Main would have no major stream crossings and would use a smaller diameter pipeline, approximately half the length of the Combined Main. An energy-dissipating structure would be constructed at the point of discharge to the North Branch Neshaminy Creek to reduce erosion. A temporary increase in erosion and sedimentation in the Creek would occur during construction of the dissipator. To reduce adverse impacts, construction should be scheduled to avoid spawning periods of resident fishes. No blasting is anticipated for the North Branch Main but one local road could be affected, in the short run, by construction.

2.4.2.6 North Branch Neshaminy Creek.--The impact of increased flow, especially on the existing ecology, would be significant in this watershed. Beneficial impacts would greatly outweigh adverse impacts.

2.4.2.6.1 Flow

Minimum flow requirements for Neshaminy Creek have been developed by consensus of State and Regional Water Resource Agencies to compensate the proposed decrease in the amount of supplemental water diverted from the Delaware River. Under the present proposal, natural flows in the North Branch of Neshaminy Creek and Pine Run, including natural storage at Lake Galena in addition to supplemental water obtained from the Delaware, would be used for water supply.

The minimum releases maintained below the treatment plant agreed to by the agencies were 5.3 mgd from March 1 to June 15, and 2.73 mgd for the remainder of the year. Average daily release for the year

would be 3.5 mgd. The Pennsylvania Fish Commission, participating in those discussions, has suggested that with establishment of minimum flow releases in the Neshaminy Watershed the trout stocking program could be expanded to include additional sections of Neshaminy Creek below the treatment plant (NWRA November 1978).

Some initial erosion of stream banks and areas of deposition within the stream bed causing temporarily higher turbidity levels would occur until operation of the system started on a regular basis. The additional flows, introduced during periods of low flow, would be contained within the banks and would not represent a significant change in volume when compared to peak flow. Because of relatively low stream gradient and the type of soils, stream velocities are expected to be less than 3 ft/sec and are not considered erosive.

2.4.2.6.2 Quality

Minimum flow requirements established for Neshaminy Creek, although less than earlier proposals, would have a moderately beneficial effect on water quality and on the existing ecology in this watershed. The additional water diverted to the Neshaminy Watershed is not intended to encourage a reduction in the level of treatment for waste water discharged to the Creek.

Water quality analysis for the Delaware and North Branch Neshaminy, shown in Appendix B, indicates that imported Delaware River water would be compatible with, and in some cases, of better quality than the water of North Branch Neshaminy Creek (DRBC September 1979). During periods of low flow in North Branch Neshaminy, addition of Delaware River water would provide further water quality benefit by maintaining a minimum flow with controlled releases from Lake Galena.

2.4.2.6.3 Aquatic Ecology

Biota in the upper reaches of North Branch Neshaminy are typical of small warmwater streams and are adapted to intermittent flow, and eutrophication. No rare types are present. In the vicinity of the intakes, the North Branch (and Pine Run) benthos is fairly diverse. Nineteen species of fish inhabit both streams in this area including panfish (bluegill, pumpkinseed, redbreast sunfish) and a small number of bass. Recreational fishing, which is limited, takes place at pools and bridge crossings.

Diversion of Delaware River water to North Branch Neshaminy would provide for increased aquatic productivity during normally dry periods. The character of existing biota would be altered as there would be an enhancement of organisms which favor higher flows and a decrease in slower moving water populations.

Structures would be placed in the stream bed to dissipate the force of pumped water and prevent erosion. Changes in the stream would be somewhat similar to those which naturally occur in a stream between headwaters and downstream reaches. Therefore, biotic productivity would be increased and the impact would be beneficial.

Maintenance of minimum stream flows below the intake dam on North Branch would benefit biota during periods of very low or no natural flow. At other times biota would be adversely affected by lower than normal flows. A high percentage of suspended invertebrate population would be removed by both intakes. Entrainment and impingement of fish would be high since intakes would not have protective screening and the percentage of stream flow (mean daily) to be removed would be about 62% (North Branch) and

about 95% (Pine Run) in an average flow year. The intake dams would also present barriers to upstream movement of fishes. Aquatic populations upstream and downstream of the intakes would be adversely affected by these local effects. Losses however would be very slight when considered against total biotic resources in the streams and the enhancement created by higher flows in headwater areas. The Pennsylvania Fish Commission, PaDER, and DVRPC have no objection to the proposed minimum release schedule.

Adverse effects created by turbidity during construction would be localized and temporary since spring and early summer spawning seasons would be avoided.

2.4.2.7 Lake Galena.--The principal impacts on Lake Galena would relate to its yield, water quality, aquatic ecology, and recreation potential.

2.4.2.7.1 Yield

Lake Galena (Reservoir PA-617), completed in 1972, would provide storage capacity of up to 1,629 million gallons for supplemental water supply and would control releases to North Branch Neshaminy Creek. Natural drainage into Lake Galena, the North Branch (above and below the reservoir), and the natural flow of Pine Run would be used as the initial source of water for the treatment plant. Releases from Lake Galena would be made during those times of the year when natural supplies are not available and would assure a minimum flow downstream of the treatment plant of 5.3 mgd from March 1 to June 15, and 2.73 mgd during the remainder of the year.

2.4.2.7.2 Quality

Introduction of Delaware River water into Lake Galena could increase loadings of phosphorus in that reservoir. However, there is also a potential

for eutrophication without the proposed project (Dresnack 1979). To reduce potential eutrophication would not necessarily result in less algal concentrations assuming the critical phosphorus criteria was still exceeded.

Increased loadings may be wholly or partially offset by the small hydraulic retention times resulting from the proposed method of operation of the water supply system, including operation of the reservoir.

Phosphorus uptake by plants or removal by settling would reduce the outflow of phosphorus that could accumulate in Lake Galena. With free-flowing water downstream of the reservoir and with no increased phosphorus concentrations over existing conditions downstream, it appears that phosphorus concentrations in the stream would not increase, due to releases of water from Lake Galena.

2.4.2.7.3 Aquatic Ecology

In response to water supply demands, the water surface elevation of Lake Galena would drop during the fall resulting in a loss of shallow area benthic organisms. Repopulation would be fairly rapid in the spring. Fish predation would also increase as cover for small fish is reduced.

Precautions should be taken to prevent a land-locked population of alewife to become established since that species could overpopulate the lake with forage fish. One way to control alewife, and other forage fish, would be to increase the predator population of sport fish.

2.4.2.7.4 Recreation

Lake Galena supports an important recreational fishery due to the Pennsylvania Fish Commission stocking a variety of sport fish over the last

few years. To accommodate recreational activities and other demands, the reservoir would be maintained at a constant level during the recreation season by water withdrawn from the Delaware River and discharged to North Branch Neshaminy Creek above the reservoir.

2.4.2.8 Pine Run.--The principal impacts on Pine Run would relate to flow, quality, aquatic ecology and alignment. The impacts would be similar to those associated with North Branch Neshaminy Creek, as discussed in Section 2.4.2.6.

2.4.2.8.1 Flow

Natural flow from Pine Run could provide up to 10 mgd to the Neshaminy Water Supply System. Water from the Run would flow from the Pine Run Pool into the intake and then by gravity to the North Branch Pump Station. The Intake Dam would be operated so that regulated flow would be maintained downstream. The intake dam is described in Section 1.2.3 of this assessment and the probable impacts are discussed in Section 1.4.2. Reservoir PA-616, located on Pine Run approximately 1.5 miles above the treatment plant, is an existing flood control reservoir which could not be used for water supply.

2.4.2.8.2 Quality

The water quality of Pine Run is similar to that of North Branch Neshaminy upstream of Lake Galena. Nutrients are not excessive and toxic compounds are not persistent. Water quality data indicate that relevant values were relatively constant from 1975 to 1978 (NWRA February 1979, p. III-25).

2.4.2.8.3 Aquatic Ecology

The text in Section 2.4.2.6.3, North Branch Neshaminy Creek, also covers most of the impacts that would be associated with biota in Pine Run since the creeks are in such close proximity and since each creek would have an intake dam where water would be withdrawn to supply water for the treatment plant. In addition to effects described in Section 2.4.2.6.3, about 350 feet of Pine Run would become intermittent from the intake to its confluence with the North Branch during low flow periods. This intermittent flow could have a serious effect on biota in the relatively short distance involved but the impact on the entire Run would be slight.

2.4.2.8.4 Alignment

Section 1.2.4 entitled "Rechannelization" describes the segment of Pine Run to be moved and Section 1.4.3 presents the probable impacts.

2.4.2.9 Groundwater.--With a continuation of established trends of development, groundwater shortages in parts of the service area can be expected, especially during drought years. In some areas over-pumping of groundwater is already in excess of dependable yield. Exceeding the water resource capability of an area could lead to water supply deficiencies where private wells are dried up by an increased number of deeper wells. Environmental quality under these conditions could be adversely affected by changing groundwater recharge patterns, inducing migration of inferior quality groundwater, and reducing flow levels in surface streams by lowering base flow. Base flow is derived from the groundwater table beneath streams and is the primary source of water available to support aquatic life and dilute potential pollutants in a stream during periods of low precipitation. If groundwater tables are substantially reduced, base

flow could be reduced or disappear completely due to heavy groundwater withdrawals in the area.

Some communities within the service area including Warminster, Warrington and Southampton Townships have experienced Trichloroeythlene (TCE) and Perchloroeythlene (PCE) contamination of their groundwater supplies. A number of wells in these areas have been shut down indefinitely until the source of contamination is located and brought within acceptable limits. Levels of contamination appear to be subsiding somewhat since the problem was first discovered (Hoag 1979). However, should these chemicals represent a significant health hazard, use of existing water supply interconnections with the City of Philadelphia, future connections with the Neshaminy Water Supply System, or use of areation treatment which can remove up to 80 percent of TCE and PCE from affected water supply appear to be the most likely alternatives to alleviate the adverse impact.

2.4.2.10 Social Conditions.--Impacts of the Neshaminy Water Supply System would be related to population, the per-capita use of water, development growth trends, and the interrelationship between growth and groundwater resources.

The forecast water demands to be met by the proposed project are based upon revised population projections. Although conservative, these estimates are in general accordance with the forecasts developed by Bucks and Montgomery Counties, and by the Delaware Valley Regional Planning Commission up to the year 2000.

For the year 2000, the proposed maximum treatment plant capability reflects a conservative estimate of water use when compared to projections cited in the Pennsylvania State Water Plan. Based upon an average per capita use of 115 gallons per day, the proposed project would be supporting approximately 77,000 persons in Central Bucks County and approximately 204,000 persons in Central Montgomery County by the year 2000. This would represent approximately 68 percent of a projected total service area population of 410,000 persons (NWRA February 1979).

Further demand comparisons of service areas forecast total sewage flow (both sewered and on-lot disposal) developed by recent COWAMP/208 studies (DVRPC April 1978) are in general agreement with the demand capacity of the proposed project (NWRA February 1979). The existing and future need for supplemental water supplies in the Central Bucks and Montgomery County region has been strongly supported by state, local and regional agencies responsible for planning and management of public water supplies.

Growth trends in the service area that would be supplied by the North Branch Treatment Plant have, in some areas, over-extended the base-flow yield of available groundwater resources (DRBC, Level B, February 1979). For the most part, growth within the service area has been characterized by an increase in relatively low to medium density residential development. Such continued development that would place additional demands on groundwater resources through the use of individual and municipal wells could, without supplementary supply, further affect the quality and quantity of those resources and significantly affect the quality of the human environment. Communities such as Upper Dublin, Doylestown, and Worcester have already experienced an increase in residential development, accompanied by shortages in available groundwater supplies during periods of low groundwater recharge.

Bucks and Montgomery Counties will likely continue to experience growth and development with or without the Neshaminy Water Supply System. In the absence of water provided by the system, new residents would be forced to rely on groundwater as the only available source of supply, placing a greater demand on the limited water resources of the area. The disbursed well development that would result can be expected to encourage a checkerboard type of residential growth and thereby create a greater need for more roads, longer utility lines, and other services, than with higher density development (PaDER September 1979). The secondary impact of reducing groundwater recharge by creating more impervious surface and increasing stormwater runoff would contribute to the cumulative effects of this type of development.

The Neshaminy Water Supply System would, to some degree, curtail piecemeal development since further development would tend to concentrate at a higher density within reasonable distance of established lines of supply.

Providing water in specific areas cannot by itself, however, insure the integrity of the municipalities' natural resources. Each municipality has by virtue of its zoning powers, an effective mechanism to control growth within its boundaries. Proper administration and enforcement of these regulations would further protect environmental values of the community during periods of increased development.

2.4.3 Cooling Water For Electric Generating Station

2.4.3.1 General

The purpose of this section of this assessment is to review the environmental effects of the proposed water delivery system to be constructed by PECO, as described by DRBC's 1973 Environmental Impact Statement for the Point Pleasant Diversion Plan (DRBC February 1973). Components to be constructed entirely by PECO include Bradshaw Reservoir and the Perkiomen Transmission Main. East Branch Perkiomen Creek would also be part of PECO's transmission system. These are the components for which PECO updated its Environmental Report (PECO July 1979).

Impacts that would be associated with components of the Neshaminy Water Supply System which would be used jointly with PECO; i.e. the pumping station and the combined main between the Delaware River and Bradshaw Reservoir, are discussed in Section 2.4.2 of this assessment under the heading "Neshaminy Water Supply System".

The probable impacts of construction and operation of Bradshaw Reservoir and Perkiomen Transmission Main are discussed below, as are the impacts that would be associated with the ecology of East Branch Perkiomen Creek and Perkiomen Creek.

2.4.3.2 Bradshaw Reservoir.--The most significant effect of constructing the reservoir would be the change in land use of twenty eight acres of land in Plumstead Township from a mostly open agricultural site to a high-bank storage reservoir. Construction activities would include removal of a small stand of mixed deciduous trees and a small, cultivated coniferous forest on the north-western and south-western periphery of the reservoir resulting in loss of woodland habitat. Erosion and sedimentation would not be significant because of relatively level topography at the site.

The potential for creating a nutrient sink in the reservoir and the effect on the receiving streams is not considered significant (Dresnack 1979). Nutrient levels in water pumped to the reservoir from the Delaware River could create a water quality problem if stored water was allowed to remain in the reservoir for long periods of time.

As proposed, the detention time in the reservoir differs with the level of pumping into and out of the reservoir.

RESERVOIR CAPACITY (max)	PUMPING RATE	APPROXIMATE DETENTION TIME
70 mg	17.5 mgd (min)	96 hrs.
70 mg	22.3 mgd (ave)	72 hrs.
70 mg	46.0 mgd (max)	36 hrs.

The detention times anticipated would provide for some settling of suspended solids and are not considered long enough to allow for any significant biological productivity that would adversely affect either East Branch Perkiomen or North Branch Neshaminy Creeks. Also, the periods of maximum flow-through would correspond to times of greatest biological activity, further reducing the potential for creating a eutrophic condition in the reservoir.

The asthetics of the site would be affected by construction of the proposed reservoir. Visual quality in the vicinity of the reservoir site would be reduced by the presence of high earthern banks.

The anticipated benefits of constructing the reservoir in lieu of a direct pipeline discharge to East Branch Perkiomen include allowance for settling of suspended solids and provision of a one-day emergency supply capability.

2.4.3.3 Perkiomen Transmission Main.--The impacts of constructing the Transmission Main have been re-evaluated and judged as not having a significant effect on environmental quality along the proposed right-of-way. The pipeline would cross predominantly agricultural lands and would be placed below ground to minimum depth of three feet to allow for continued agricultural land use. One minor stream crossing of the headwaters of Deep Run, a tributary of Ionican Creek, would produce some temporary turbidity and sedimentation effects downstream of the pipeline crossing. Aquatic and terrestrial biota would be disturbed by construction activities without long-term adverse effect. No unique habitat or endangered species would be affected by this element of the water supply system.

2.4.3.4 East Branch Perkiomen Creek.--The principal impacts on East Branch Perkiomen Creek would relate to flow, quality, and aquatic ecology

2.4.3.4.1 Flow

There have been only minor changes in flows and channel alignments since release of the FEIS in 1973. Values of discharges, flow depths, and flow velocities under various conditions are listed in appropriate tables in PECO July 1979, p. IV-1 et seq. The stream channel would be subject to much

greater flow rates, depths, and velocities by natural flood flows than by the proposed pumpages from the Delaware River. Current evidence indicates that effects on the stream channel and on aquatic biota should be less than indicated in the 1973 EIS.

2.4.3.4.2 Quality

With the exception of ammonia concentrations, which appear to be lower, and nitrate concentrations, which appear to be higher, the quality of water in East Branch Perkiomen Creek is similar to that of the Delaware River. In balance, addition of water from the Delaware River to East Branch Perkiomen would be beneficial by augmenting low or intermittent flows and by diluting degraded water with good quality water (DRBC, Appendix B, September 1979).

2.4.3.4.3 Aquatic Ecology

The PECO Environmental Report (PECO July 1979) includes much more site specific data on the East Branch biota than the 1973 DRBC EIS contained, which would allow more definitive projections of probable impact. For example, the relationship of sunfish hybridization and the size of white suckers to low flows could be evaluated and the effects of the projected higher flows determined. There is little likelihood that the broad conclusions of the EIS would be altered however, following such detailed studies. There would definitely be changes in the aquatic biota which is now adapted to the prevailing flow conditions. The expanded habitat and nutrient base which would be created during the naturally low flow periods would mean enhanced productivity of the forms tolerant of higher flows. This effect is the principal reason for considering the diversion to be beneficial to the biota overall.

Recent studies cited in PECO's Environmental Report indicate that benthic macroinvertebrate populations near the inlet have improved (especially in diversity) since the DRBC's EIS was prepared. This reinforces the point made in the EIS that the biota downstream of Sellersville (where diversity is lowest) would be improved most. The 35 percent reduction* in water to be diverted to the East Branch would mean less fluctuation in stream flow and a comparable reduction in both the adverse and beneficial effects of the diversion. Under the revised plans, natural stream flows would also prevail when Limerick was not using Delaware River water. Previously, a minimum flow of 27 cfs was to be maintained by PECO. This change is undesireable because it would increase the potential for channel fluctuation and stress on the biota, and serve to off-set some of the increased productivity. To protect aquatic biota, PECO should make year-round releases.

2.4.3.5 Perkiomen Creek.--Since the impacts associated with the main stem of Perkiomen Creek would reflect those of its East Branch, no detailed analysis is made here for the main stem. Further, since the impacts on the East Branch are minimal as they relate to the proposed project, there would be even less impact on the short reach of the main stem between the confluence of the East Branch and the point of diversion downstream on the main stem.

2.4.4 Conclusions And Recommendations

As indicated throughout this part of this assessment (Part 2), documents prepared after DRBC's Final EIS on the Point Pleasant Diversion Plan, issued in 1973, support the conclusion that the proposed project would be a feasible and beneficial use of water resources in the Neshaminy and Perkiomen Watersheds and not detrimental to the Delaware River, provided that mitigating measures are implemented as listed in DRBC's FEIS under "Conclusion", page 3,

* The project as described in the 1973 EIS would have pumped about 71.3 mgd compared to about 46.2 mgd (ultimate) in the present plan.

(and as stated in this assessment). (See: NWRA February 1979; PECO July 1979; and other references listed in Section 5.0.) Consequently, this assessment recommends that no supplementary EIS be prepared.

2.5 Measures To Enhance The Environment And Mitigate Impacts

Chapter V of NWRA's Environmental Report (NWRA February 1979) discusses in text and lists in tables probable beneficial impacts, probable adverse impacts, and mitigating measures that would be associated with the Neshaminy Water Supply System. Some of these consequences are as noted in Sections 2.5, 2.6, 2.7, and 2.8.

Mitigating measures would include coordination and control of traffic, sprinkling to control dust, sediment and erosion control, mulching organic matter, landscaping, flood control, monitoring wells, dewatering and disposal of sludge, noise control, controlled releases of water to enhance aquatic ecology, consultation with qualified advisors - such as archaeologists, control of intake velocity and provision of screens to minimize impingement, control and muffling of blasting, compensation for damages, maintenance of water level in Lake Galena for recreation, design of structures to withstand accidents and natural catastrophes, standby power, interim raw water storage, and other necessary measures.

2.6 Probable Adverse Impacts Which Cannot Be Avoided

During construction there would be increased construction vehicle traffic with its inevitable dust, noise, and congestion. There would be dislocation and destruction of plant and wildlife in and near construction areas.

Some basic materials would be consumed and some utilities would be relocated. Some potentially hazardous chemicals would be introduced and sludge would accumulate. There would be additional demand on local energy resources. Some impingement and entrainment of biota would occur. Blasting may affect some wells. Natural catastrophes and accidents acting on project facilities could cause damages to property, risks to public health, economic losses, and interruption of community activities.

2.7 Irreversible And Irretrievable Committments Of Resources

Some natural habitat would be changed to man-made development. Wildlife displaced from timber-type environment would be replaced by creatures that use a grass-type environment in right-of-way areas. Chemicals used in the water treatment process would be mostly consumed but some residuals would be mixed with water in streams. Energy would be consumed and residuals would be released into land, air and water. About 10 percent of water in open channels would be evaporated.

2.8 Short-Term Use And Long-Term Productivity

The tradeoff of the resources that would be consumed or displaced by construction and operation of the proposed project should be compared with the benefits to be derived from the project. Sections 2.6 and 2.7 indicate adverse impacts that would occur even with mitigating measures. Beneficial impacts are noted throughout the assessment and, in summary, they amount to provision of water supply as a life-support resource comparable to food, clothing, and shelter. Since there is consensus that population in the project service area will continue to increase, additional water supply is necessary to preserve and enhance the welfare of present and future generations of people.

E X P L A N A T I O N

Sections 3-7 in the original Environmental Assessment have been renumbered as appendixes in the revised EA. Section seven in the original EA, entitled "Appendixes" has been integrated into the revised numbering system. The renumbering of these sections is as follows:

Original EA	Revised EA
Section 3	Appendix B
4	F
5	G
6	H
Section 7	
Appendix A	D
B	E

this assessment

PART IV

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DRBC STAFF RESPONSES TO ISSUES RAISED IN LETTERS RECEIVED CONCERNING THE ENVIRONMENTAL ASSESSMENT FOR NORTH BRANCH WATER TREATMENT PLANT AND RELATED COMPONENTS

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PART IV

DRBC STAFF RESPONSES TO ISSUES RAISED IN LETTERS RECEIVED CONCERNING THE ENVIRONMENTAL ASSESSMENT FOR NORTH BRANCH WATER TREATMENT PLANT AND RELATED COMPONENTS

A. Introduction

This Part responds to questions and comments received in response to a "Notice of Intent" to issue a Negative Declaration, released February 15, 1980, by the DRBC's Executive Director, based upon an Environmental Assessment, for the Proposed North Branch Water Treatment Plant, sponsored by the Neshaminy Water Resources Authority (NWRA), and a review of related components, sponsored by the NWRA and the Philadelphia Electric Company (PECO).

This Part summarizes significant issues raised in comments received, explains the scope of an environmental assessment, identifies information used in the environmental review since the 1973 EIS was prepared, and includes DRBC's staff's responses to substantive issues raised in the letters received by DRBC.

B. Nature of Comments Received

There were 409 communications (mostly letters) and 644 signatures* (written or accepted by telephone) received by the Executive Director of DRBC in response to his "Notice of Intent" to issue a finding of no significant adverse impact (negative declaration) for the North Branch Water Treatment Plant and Related Components, Bucks and Montgomery Counties, Pennsylvania. These communications were received by 5:00 p.m., March 12, 1980, the deadline set in the "Notice of Intent".

About 20 issues were mentioned frequently in the letters received. Of the 20 issues mentioned, 14 issues related to environmental factors and six related to procedural matters. The significant issues raised in comments received by DRBC are as follows:

Environmental Issues

1. Low Water in the Delaware River.--Would diversion of up to 95 million gallons per day (mgd) from the Delaware River cause low water and ecological damage to the river?
2. Need for additional reservoirs.--Would diversion of 95 mgd from the Delaware River for the proposed project require additional reservoirs and other storage facilities upstream and on tributaries to provide sufficient water during periods of low flow?
3. Impacts on aquatic biota.--Would the proposed diversion at Point Pleasant be detrimental to aquatic biota and to recreation, including fishing, in the Delaware River, East Branch Perkiomen Creek, and North Branch Neshaminy Creek?

*For those interested in the statistical distribution of issues in the comments received by DRBC, please see Appendix A. For these purposes, however, the Executive Director recognizes a responsibility to consider and address all significant substantive issues, whether raised by one or many commenters.

4. Water quality.--Would the project have an adverse effect on water quality throughout the service area? Specifically, would temperature, salinity, chlorine, trihalomethanes, trichloroethylene, and lead levels in and below Lake Galena be associated with adverse impacts?

5. Flood, erosion, and sedimentation.--Would the project impose significant adverse impacts on property in the flood plain or upon environmental values in the service area as they relate to flood, erosion, or sedimentation?

6. Growth inducement.--Would the proposed project promote more land development or induce more growth in the project service area?

7. Aesthetic impacts.--Would the proposed project be associated with aesthetic damage to the Village of Point Pleasant, to farmland, and to the general ecosystem throughout the service area?

8. Archaeological and historical.--Would archaeological artifacts or historical landmarks be disturbed by construction or operation of the proposed project?

9. Rock blasting impacts.--Would blasting hard rock during construction cause wide-spread damage to wells, foundations, utilities, and other structures?

10. Emergency services.--Would there be interference with emergency services because of road blocks and electric wires which would interrupt radio frequencies?

11. Conservation.--Should DRBC emphasize conservation of water resources, especially as outlined in DRBC's Level B Study, rather than approve the proposed project?

12. Alternatives.--Should there be further study of alternative sources of water supply and electricity?

13. Financial.--Should DRBC complete a detailed financial plan to construct and operate the project, including social and economic costs?

14. Water for Limerick Station.--Should water be diverted from the Delaware River for use by the Limerick Nuclear Generating Station?

Procedural Issues

1. Scope.--Should DRBC enlarge the scope of the study to include the Limerick Nuclear Generating Station or the Merrill Creek Reservoir or both? Also, should the scope include integration with DRBC's Comprehensive Plan and Level B Study?
2. Completion of related studies.--Should DRBC wait for completion of related studies such as the "Good Faith Negotiations", DRBC's groundwater study, COE's salinity study, and the Merrill Creek EIS?
3. Additional information.--Should DRBC provide the public more information, more time to respond, more references, more maps, and consult more agencies?
4. DRBC conflict of interest.--Does DRBC have a conflict of interest because it receives money for water sold and has promoted the project?
5. EIS by another agency.--Should an EIS be prepared by another agency, such as the U.S. Army Corps of Engineers or the Federal Environmental Protection Agency?
6. Prepare an EIS.--Should another EIS be prepared by any agency?

C. Scope of the Environmental Assessment

Many of the letters received reveal that the nature of the Environmental Assessment (EA) needs to be explained in three respects: 1) The purpose and limits of an EA in general; 2) Related matters, outside the scope of this EA, and 3) Physical components covered in this EA.

1. Purpose and Limits of an EA

In regulations issued November 29, 1978, the federal government Council on Environmental Quality (CEQ, F.R. Nov. 29, 1978) spelled out specific requirements for documents prepared in response to the National Environmental Policy Act of 1969. Section 1508.9 states that an Environmental Assessment is a "concise" document which "briefly" provides "sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or a finding of no significant impact". An EA is to include "brief discussions" of: "the need for the proposal of alternatives"; "the environmental impacts of the proposed action and alternatives"; and "a listing of agencies and persons consulted".

2. Related Matters, Outside the Scope of this EA

The frequent mention of the Limerick Generating Station and occasional mention of the Merrill Creek Reservoir, DRBC's Level B Study, the Yardley Pumping Station, and the Neshaminy Watershed Flood Control Reservoirs stated or implied that those elements should be included in this EA. The following explains why they are peripherally related and just generally covered within the scope of this EA.

a. Limerick Nuclear Generating Station.--Philadelphia Elctric Company's plan to pump a portion of the water diverted from the Delaware River, via Bradshaw Reservoir to the Perkiomen Creek Basin for eventual consumptive use at the proposed nuclear powered Limerick Electric Generating Station, has been thoroughly

reviewed by both the Atomic Energy Commission and the DRBC. The manner in which the environmental analysis of the total water supply plan (i.e. the sequential use of Perkiomen Creek, Schuylkill River and Delaware River water) was performed has been reviewed by a federal court and judged to be appropriate. PECO has been granted approval by the DRBC to draw a specified volume of water from the Delaware under certain conditions for use at Limerick. (One condition is that PECO must compensate for its consumptive water use when the flow at Trenton reaches 3,000 cfs, or shut down the Limerick Station.) Consequently, there is no basis for conducting further environmental analysis of the conceptual plan to use Delaware River water in this fashion. The environmental effects associated with physical changes in PECO's proposed project (and the environment), have been addressed in the original EA, and changes to that project have not occurred since the last EIS. The specific actions referred to above are discussed later in this part of this revised EA, starting on page IV-98 .

b. Merrill Creek Reservoir Project.--A small percentage of the letters contend that diversion of 95 mgd from the Delaware River would require additional reservoirs and other storage facilities upstream and on tributaries to provide sufficient water during periods of low flow. Many of these letters contend that the Merrill Creek Project (the reservoir proposed by the Basin's Utilities to compensate for consumptive water use) should be included as part of this Environmental Assessment. Sources of water are discussed in this revised assessment under the heading "Low Water In The Delaware River", starting on page IV-14. The following comments are to indicate why the Merrill Creek Project is not included in this EA but is mentioned peripherally.

DRBC completed preparation of an EA for the Merrill Creek Project in March 1978 and completed a preliminary draft Environmental Impact Statement for that project in October 1979. The preliminary EIS has been circulated among

the cooperating agencies* who are coordinating with DRBC as lead agency to complete a draft EIS for release to the public. Water from the Merrill Creek Reservoir would service more than just the Limerick Station. Most letter writers seemed unaware of this fact. (See the stations listed in Appendix C.)

Although Resolution 76-13 by its terms applied only to the Limerick and Hope Creek Generating Stations, the Delaware River Basin Commission has long advocated the concept of a Basin-wide comprehensive approach to planning for the use of the Basin's water resources. In its decision in Docket No. D-69-210CP, the Commission stated "...effective use of the resources of the Basin demands that supplementary storage as needed for all other generating stations should be coordinated and planned with reference to the Master Siting Study...". Accordingly, in complying with the Commission's mandate in Resolution 76-13, Philadelphia Electric Company and Public Service Electric & Gas Company have coordinated their efforts with other members of the Merrill Creek Owner's Group (MCOG)**. As a result of this coordination, the Application for Section 3 8 approval of Merrill Creek is a joint Application filed

*Cooperating Agencies Include:
1. U.S. Army Corps of Engineers, Philadelphia District.
2. U.S. Environmental Protection Agency, Region III.
3. U.S. Department of the Interior, Fish and Wildlife Service.
4. New Jersey Department of Environmental Protection.
5. Pennsylvania Department of Environmental Resources.
6. Pennsylvania Fish Commission.

Consultants Include:
1. Weston Environmental Consultants-Designers.
2. Historic Sites Research.
3. O'Brien and Gere, Justin and Courtney Division.

**The Merrill Creek Owner's Group (MCOG) is made up of:
1. Atlantic City Electric Co.
2. Delmarva Power and Light Co.
3. Metropolitan Edison Co.
4. Jersey Central Power and Light Co.
5. Pennsylvania Power and Light Co.
6. Philadelphia Electric Company.
7. Public Service Electric and Gas Co.

on behalf of these MCOG companies, and addresses a storage reservoir to supply the anticipated compensation requirements of these member companies of MCOG rather than only the needs of the Limerick and Hope Creek Stations.

c. Level B Study.--Several letters asked that DRBC's Level B Study be used as the basis of a systematic evaluation in a single, updated, interdisciplinary EIS, integrating all of the component parts of DRBC's Comprehensive Plan.

DRBC's Level B Study was written in enough detail to satisfy the analytical requirements of an EIS for that study. Chapter Eight of the Level B Study outlines how NEPA requirements were incorporated in the course of formulating the Level B plan. With the completion of that study, a Final EIS is to be prepared covering the recommended Level B Plan and Alternatives.

In assessing the probable impact of the water treatment plant and related components, both the Level B findings and the existing water resources development plan have been considered. The scope of this EA was determined with full knowledge of the scope of the Level B environmental analysis. This approach is consistent with CEQ regulations on "tiering" (Sections 1502.20 and 1508.28) as a means to eliminate repetition and to reduce paperwork.

d. Yardley Pumping Station.--There is no application before DRBC for approval to construct a Yardley Pumping Station. NWRA has stated that it appears unlikely that this station will ever be needed. Although DRBC incorporated elements of the Bucks County Master Plan for Water Supply, including a pumping station near Yardley, in its Comprehensive Water Management Plan, in 1978 the County, acting through NWRA, advised DRBC that the need for the Yardley pumping facilities for general water supply uses had been eliminated from the Bucks County Plan. However, NWRA retained the concept of a Yardley

pumping facility for possible implementation at a future, undesignated date to maintain a full recreational pool in Lake Luxembourg at Core Creek Park. According to NWRA*, if needed, the facility would be limited to a capacity of five mgd in accordance with the 1975 amendments to the Bucks County Master Plan for Water Supply.

e. Flood Control Reservoirs.--In April 1976, the United States Department of Agriculture, Soil Conservation Service, released its Final Environmental Impact Statement for the Neshaminy Creek Watershed. The Plan includes a program of conservation land treatment, eight floodwater retarding dams, two multiple purpose dams (municipal water supply, recreation and flood prevention) and two sets of water-based recreation facilities.

Six floodwater retarding dams and both multiple purpose dams (PA-617 and PA-620) have been completed. Recreation facilities at Peace Valley and Core Creek County Parks located at PA-617 and PA-620, respectively, are also installed. Remaining to be installed are two floodwater retarding dams.

Since these reservoirs are substantially completed, relatively non-controversial, and under jurisdiction of the U.S. Department of Agriculture, they were mentioned only as background information in DRBC's EA, except for Lake Galena (PA-617), which acts as a storage reservoir for the North Branch Water Treatment Plant.

3. Physical components covered by this EA

The physical components covered by this EA include those of the Neshaminy Water Supply System as it relates to Bucks and Montgomery Counties'

*Letter from Mr. Robert A. Flowers, Executive Director, NWRA, to Mr. Herbert A. Howlett, Chief Engineer, DRBC, April 9, 1980.

public water supply service areas and those that relate to cooling water for the Limerick Nuclear Generating Station; i.e.:

Components for Bucks and Montgomery Counties' water supply:

- Delaware River
- Groundwater
- Point Pleasant Pumping Station
- Combined Transmission Main
- North Branch Neshaminy Transmission Main
- North Branch Neshaminy Creek
- Lake Galena
- North Branch Water Treatment Plant
- Pine Run
- Sludge Lagoons
- Intake Dams (North Branch Neshaminy and Pine Run)
- Service Area Transmission Mains (West, South, East, North)

Components for cooling water for the Generating Station:

- Bradshaw Reservoir
- PECO Pumping Station
- Perkiomen Transmission Main
- East Branch Perkiomen Creek
- Perkiomen Creek

D. Updating of Analysis in 1973 EIS

Most of the letters requesting a new EIS contend that the studies upon which the 1973 EIS was based and the EIS itself are outdated. A number of recent studies were used in the EA of the water treatment plant and provided the foundation for the updated review of the related components.

The "revisitation" of the other components of the Neshaminy Water Supply System, covered in DRBC's Final EIS prepared in 1973, was undertaken to see if studies made subsequent to that FEIS indicated any significant changes that would require supplementing that EIS. It should be clear that DRBC used more than a dozen recent studies to compare the impacts that might occur with the project as proposed in 1973, when the proposal was to divert 150 million gallons per day, with the project as proposed in 1979 when the proposal was to divert 95 million gallons per day, or about 37 percent less. Also, DRBC staff reevaluated earlier studies that were used as references for the 1973 EIS. Studies reviewed that were made during 1980, 1979, 1978, and 1977 include the following:

1980

1. Converse Ward David Dixon, Inc. Report on Evaluation of Rock Excavation and Impact of Blasting for the proposed Point Pleasant Pumping Facilities, Point Pleasant, Pennsylvania. Prepared for the Delaware River Basin Commission, Project No. 80-7140-01, 20 May 1980.

2. Lupine, Arthur (N.J. DEP, Fish, Game and Shellfisheries). Personal Communication. May 1980.

1979

1. Delaware River Basin Commission. Water Quality Factors Associated with the Point Pleasant Diversion. September 1979.

2. Delaware River Basin Commission. Final Report and Environmental Impact Statement of the Level B Study. The Delaware River Basin Comprehensive (Level B) Study. October 1979.

3. Dresnack, Dr. Robert. "Impact of Delaware River Flow Augmentation on the Trophic State in Lake Galena." November 1979.

4. Environmental Protection Agency (EPA). Letter from James L. LaBuy (EPA, West Virginia) to Pennsylvania Power & Light (Martins Creek), July 7, 1978; Letter from James L. LaBuy to Metropolitan Edison Company (Portland Stantion), March 27, 1979.

5. Neshaminy Water Resources Authority. Environmental Report on Neshaminy Water Supply System. February 1979.

6. Neshaminy Water Resources Authority. Transcript of Public Hearing Re: Draft Environmental Report on Neshaminy Water Supply System. May 30, 1979.

7. Neshaminy Water Resources Authority. "Responses to Significant Concerns At and After Public Hearing of Environmental Report." August 28, 1979.

8. Neshaminy Water Resources Authority. 3.8 Application to Delaware River Basin Commission. Prepared by E. H. Bourquard Associates, Inc. June 1979.

9. Philadelphia Electric Company. Environmental Report, Bradshaw Reservoir, Transmission Main, East Branch Perkiomen, and Perkiomen Creeks. July 1979.

1978

1. Bucks County Planning Commission. "The Vegetation and Wildlife of the Delaware River Corridor." Draft Report by Tom Backhouse. June 1978.

2. Delaware Valley Regional Planning Commission. Draft COWAMP/208 Water Quality Management Plan. April 1978.

3. Didun, Andrew, Jr., A Study of the Fishes of the Delaware River in the Vicinity of the Portland Generating Station of Metropolitan Edison Company - Final Report. Ichthyological Associates, Inc. Ithaca, New York. August 1978.

4. Pennsylvania Fish Commission. Letter from Richard W. Marshall, Area Fisheries Manager to Robert G. Flowers, Executive Director, Neshaminy Water Resources Authority. August 11, 1978.

5. Pennsylvania, Commonwealth of, Department of Environmental Resources, Bureau of Water Quality Management. Report on the Application of Neshaminy Water Resources Authority from Pine Run, North Branch Neshaminy Creek, and Delaware River. November 1, 1978.

6. RMC-Ecological Division, Kahnle, Andrew W., Reisinger, H. James, Rutter, Robert and Assoc., "Neshaminy Water Supply System, Delaware River at Point Pleasant and North Branch Neshaminy Creek. Environmental Report. Water Quality-Aquatic Biota", Pottstown, Pennsylvania. November 1978.

1977

1. Betz Environmental Engineers Water Supply Study for Montgomery County, Pennsylvania, 1977.

2. Ichthylogical Associates, Inc. Willis, Terry B. and Harmon, Paul L., "Gilbert Generating Station Biological Monitoring Program Final Report" for Jersey Central Power and Light Company July 1977.

3. Johnson, T.D. and Phoenix, D.R. An Ecological Study of the Effects of the Martins Creek S.E.S. Cooling Water Intake for Pennsylvania Power and Light Company. Roy F. Weston, Inc., West Chester, Pa. November 18, 1977.

E. Response to Specific Issues Raised in Letters Received by DRBC

The above discussion has been to put the scope of this EA in perspective. In doing so, partial answers to some of the specific issues have been provided. The six procedural issues are addressed in Part II Summary/Conclusions of this revised EA. The 14 environmental issues are addressed in this Part (IV). Since it is impractical to respond to repetitive questions and comments listed in individual letters, these responses are aimed at general answers to cover specific issues. However, specific questions that are particularly relevant in given letters are used as the basis for making a general response.

1. Low Water in the Delaware River

Issue: Would diversion of up to 95 million gallons per day (mgd) from the Delaware River cause low water and ecological damage to the river?

Response:

Low water.--The key concern expressed by many of the comments received was whether the requested withdrawal would substantially reduce low flows in the river below Pt. Pleasant or increase the frequence of such low flow occurances.

DRBC currently has a minimum flow objective in the mainstem at Trenton of 3,000 cfs (1940 mgd). This flow objective is fundamentally based on requirements for salinity control in the lower estuary. It is also the basis for current wasteload allocations and water quality standards in the Estuary.

A withdrawal of 95 mgd (147 cfs) of water from the Delaware River is equivalent to approximately 5% of the minimum flow objective at Trenton. However, it must be understood that 95 mgd is the maximum allocation requested by the combined applicants for withdrawals at Pt. Pleasant, assuming full utilization of the water supply system in the year 2010 coupled with peak withdrawals for Limerick (assuming no flows were available in the Perkiomen or Schuylkill watersheds for power plant uses). The proposed withdrawal would not significantly change the incidence (the number of times, or relative risk) of low flow conditions being experienced at or below Pt. Pleasant.

The flow of the Delaware River mainstem is substantially a "managed flow." The level and incidence of low flow conditions is basically governed by the capacity of the New York City Reservoirs (Pepacton, Neversink and Cannonsville), coupled with Beltzville Reservoir and several State and hydroelectric facilities, to maintain target flows at Montague and Trenton.

In almost all conditions, including a repetition of the 1930's drought, sufficient capacity now exists to maintain or exceed the minimum flow objective of 3,000 cfs at Trenton. The 1930's drought is estimated to have a recurrence interval, or risk, of once in 15-20 years. Sufficient capacity does not exist to maintain the current Trenton flow objective in a repetition of the worst drought of record, the event of the 1960's. That drought has an estimated incidence of once in 100 to 300 years.

While the drought of record is of serious concern to the basin, particularly in planning for the future reliability of basin water supplies and needs for emergency operating programs, three points must be made:

a. The incidence of a drought of record type is rare, and its risk is fundamentally dependent on relatively extreme climatic conditions--not on withdrawals.

b. The proposed withdrawal is already conditioned upon meeting the flow objectives at Trenton. The major consumptive use involved, that is the withdrawal for Limerick cooling water, will not be allowed to reduce flows when extreme drought conditions cause Trenton flows to fall below 3,000 cfs, unless augmented flows from a utility-owned reservoir are available.

c. Both the Commonwealth of Pennsylvania and DRBC, in previous actions, have already imposed on the applicants conditions limiting the rates and circumstances of withdrawals at Pt. Pleasant during low flow periods.

About one-half of the maximum diversion would be for the Limerick Nuclear Generating Station. The amount of water diverted from the Delaware to Limerick during drought emergencies (35 to 46 mgd) could only be diverted if the flow at Trenton was above 3,000 cfs or, if it was not, water would be released from an off-main-stem reservoir constructed and operated to provide for consumptive losses from Limerick as for other steam electric facilities in the basin. Therefore, since the generating station is--in effect--neutralized in its impact on low flow in the river, only about 2.5 percent of the river flow would be diverted from the river to the Bucks/Montgomery Counties' service area when the flow at Trenton is 3,000 cfs.

About 90 percent of the water diverted at Point Pleasant for municipal water supply needs in Bucks and Montgomery Counties would return to the basin's hydrologic system either by treated sewage effluents or on-lot systems which help recharge the ground water aquifers. Much of the water diverted at Point Pleasant for public water supply would be returned to the Delaware via Neshaminy and Pennypack Creeks. The net loss to the Delaware River is in the range of 1/5 of one percent, which is less than can be accounted for at the gauges.

The measurement on the Trenton gauge is about 8.030 feet when the flow of the river is 3,000 cfs. The measurement is about 8.079 feet when the flow is 3147 cfs. The difference on the gauge would be between 8.079 feet and 8.030 feet or about 0.049 foot, which is about 6/10 of an inch. Considering that the flow would probably be diminished by only about 2.5 percent or about 75 cfs, the difference on the gauge would be more in the order of 3/10 of an inch.

When the average flow of the river is running about 7637 cfs, the measurement on the Trenton gauge is about 9.255 feet. Adding 147 cfs to that flow, for a total of 7784 cfs, would register 9.287 on the gauge. The difference between the two flows, as registered on the gauge, would be about 0.032 foot or about 4/10 of an inch. The percentage differences in river flow (less than five percent) and fractions of inches in river levels are both insignificant.

Ecological Damage.--As discussed above, the net loss of water to the Delaware System is probably too low to measure. Consequently, the impact on the ecology of the river would likely be negligible. The approximately 42-mile reach of the river from Point Pleasant (mile 157.2) to the mouth of the Neshaminy

(mile 115.36) would lose about 2.5 percent of its volume of water at a flow of 3,000 cfs at Trenton but natural fluctuations tend to be more than that. Since about 90 percent of the municipal water would return to the Delaware below Neshaminy Creek and thus be available to help control the salt front, oyster beds in the estuary would be unaffected by this project, as would other aquatic biota in that area. (See response to "Impact on Aquatic Biota", starting on page IV-23 of this revised EA.)

2. Need for Additional Reservoirs

Issue: Would diversion of 95 mgd from the Delaware River for the proposed project require additional reservoirs and other storage facilities upstream and on tributaries to provide sufficient water during periods of low flow?

Response: DRBC manages both the surface and ground water in the Delaware River Basin in accordance with State and Federal laws. The flow of the Delaware River at Point Pleasant reflects natural runoff plus U.S. Supreme Court* directed reservoir releases to maintain a flow level at Montague, New Jersey, plus releases called for by DRBC from Beltsville Reservoir on a tributary to the Lehigh River in Carbon County, Pennsylvania. Notwithstanding upstream water uses, the Commission's Water Management Plan has a Delaware River flow at Trenton, New Jersey, sufficient to protect downstream users from sea water intrusion during low flow periods. Currently, this flow objective is 3,000 cubic feet per second (approximately two billion gallons per day). As the downstream water uses increase in the future, the flow required at Trenton to meet these uses and also to hold the sea water in check must increase. Further, due to the slowly rising sea level, an additional 10 cfs (approximately) of fresh water must enter the estuary each year to hold the sea water at the designated location.

The lowest four-month flow of record (at Trenton) occurred during June, July, August and September 1965, averaging about 2,000 cfs (approximately 1.3 billion gallons) per day. Hence, DRBC's present operational goal provides

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*Decree of the United States Supreme Court in New Jersey v New York, 347 U.S. 995 (1954).

for flows 50 percent greater than those experienced during the low-flow months in 1965. Flows in other months would be higher, reflecting seasonal variations in precipitation. For instance, flows at Trenton this year reached more than 100,000 cfs in March.

DRBC's Level B Report (page 33 and Figures 5-12 and 5-13, p.35), (Figure No.IV-1 in this revised EA) discusses monthly flows at Trenton which would have occurred under "natural" conditions over the drought period of the 1960's, actual flows which were achieved during that period by operation of available reservoirs (including hydroelectric impoundments), flows which might be achieved using present reservoir capacity in an optimal way, and various proposed impoundments. The analysis also explores the use for flow maintenance of other existing impoundments (routinely or under emergency conditions), conjunctive use of surface and groundwater, and of strong conservation measures to reduce depletive uses.

Figure 5-12 of the Level B Report, indicates the relationship among natural flows, observed flows, and flows that could be attained with present management capacities. Figure 5-13 indicates the percent difference from natural flows that were observed during the 1964-65 drought years and from the present management capacity.

Even though the lowest one-month observed flow of record at Trenton averaged only about 1548 cfs (July 1965), it was about 28 percent higher than it would have been if the river flow had not been managed; i.e. the natural low flow for July 1965 would have been about 1210 cfs. With the Cannonsville reservoir on line since the drought of the 60's, thus making possible maintenance of 1750 cfs minimum flow at the Montague Gauge, and with Beltsville on line, managed flow could be increased about 114 percent over natural flows at Trenton, or to about 2,600 cfs.

FIGURE NO. IV-1

FIGURE 5-12 (In Level B Study)

FLOW AT TRENTON - CALENDAR YEARS 1964-1965

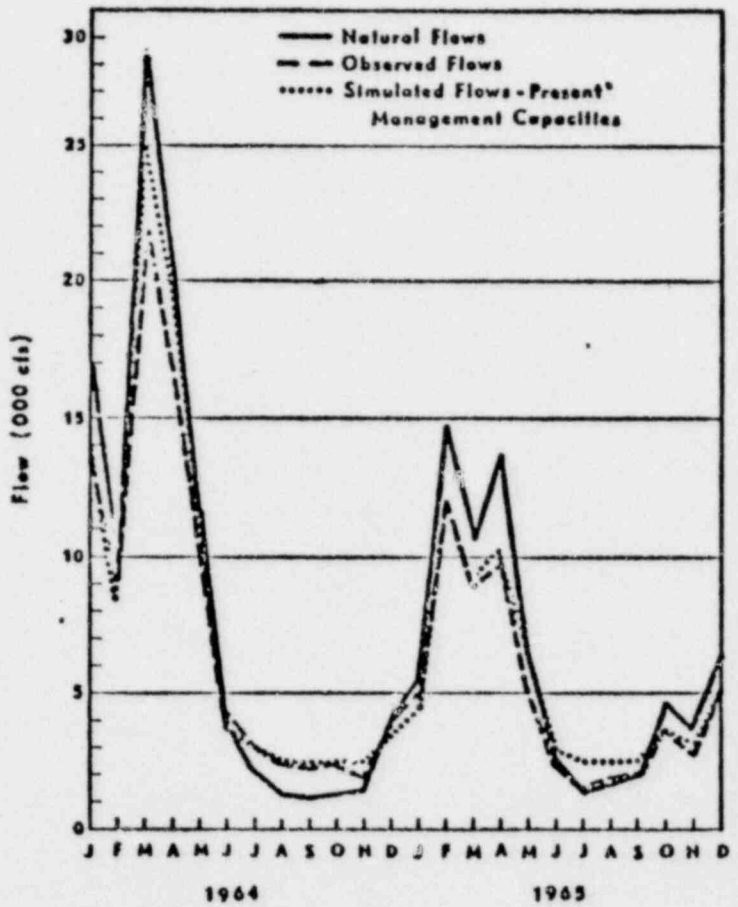
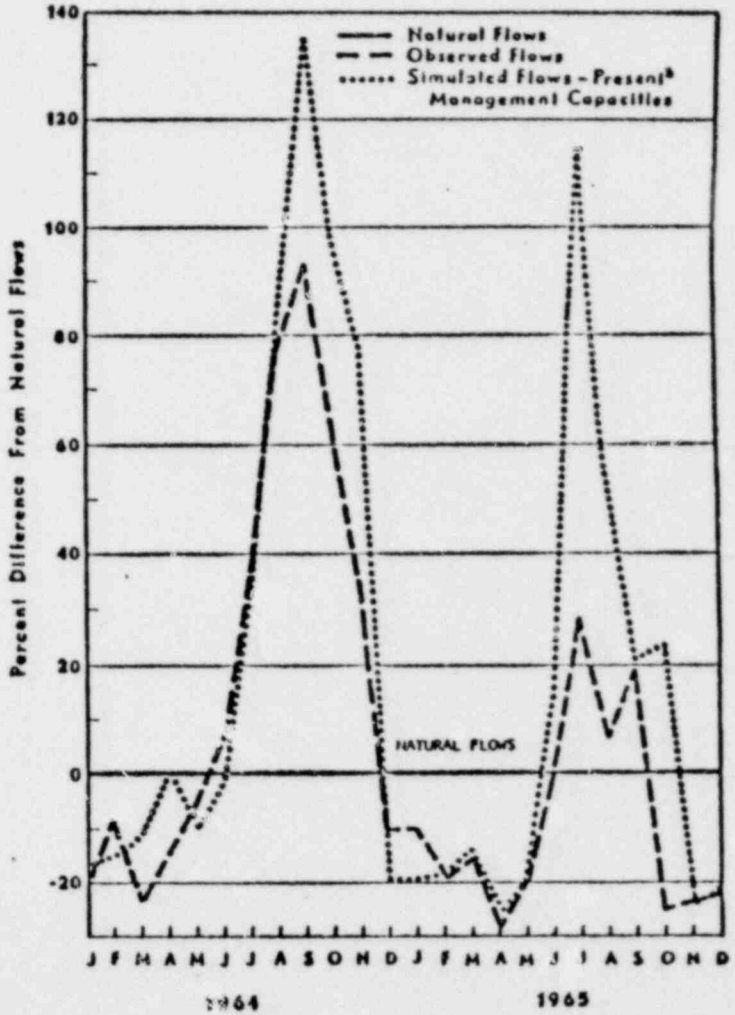


FIGURE 5-13 (In Level B Study)

EFFECT OF MANAGEMENT ON FLOW AT TRENTON
CALENDAR YEARS 1964-1965



Source: USGS natural and observed data, DRBC staff calculations

* includes operation of Neversink, Pepacton, Cannonsville, Beltzville, Blue Marsh, with 1750 cfs flow maintained at Montague gaging station.

The difference between the flow objective of 3,000 cfs at Trenton and the present possible flow of about 2,600 cfs during periods of drought (400 cfs) might be made up by water conservation practices, more intensive management practices, additional off-main-stem reservoir storage, or a combination of any two or all three of these measures. The measures taken would be necessary for water management throughout the basin, with or without the proposed diversion at Point Pleasant.

3. Impact on Aquatic Biota

Issue: Would the proposed diversion at Point Pleasant be detrimental to aquatic biota and to recreation, including fishing, in the Delaware River, East Branch Perkiomen Creek, and North Branch Neshaminy Creek?

Response: Many of the comments expressed concern for potential adverse impacts on aquatic organisms (fish primarily) inhabitating the Delaware River, North Branch Neshaminy, East Branch Perkiomen and Lake Galena, as well as for sport fishing which depends on adequate fish stocks. The original Environmental Assessment (February 15, 1980) stated that existing aquatic biota would be both enhanced and adversely affected by the proposed project. The main task for this revised EA then is to supply more information to test the judgments presented in the original EA. Specific questions have been raised regarding water intakes, changes in water velocity and volume, water levels, upstream reservoir releases, etc., as they would affect fish and wildlife. These are addressed below.

Delaware River.--The major concerns are that the diversion would kill fish by extreme physical forces (impingement on the intake screen or entrainment with the water through the pump), or would reduce the volume of water needed to maintain fish (and shellfish) in a healthy condition, or would disrupt fish habitats as a result of upstream reservoir releases.

a. Impingement and Entrainment. Subsequent to the February 15, 1980 EA, representatives of the U.S. Fish & Wildlife Service (Department of the Interior) and the Pennsylvania Fish Commission, discussed the project with NWRA representatives and agreed to prepare a list of standards or criteria for a safe intake design. The NWRA Excutive Director restated the applicants' intention of constructing an intake which would equal or surpass the most modern, EPA approved

intake design. NWRA representatives also introduced a new intake design ("well-screen") they are considering, which would draw water directly from the bottom of the river through a manifold of screened intakes. The "well-screen" design might cause less impingement and entrainment than the conventional flush-to-the-bank, traveling-screen intake originally proposed because juvenile fish, which are most susceptible to impingement, are more abundant in near-shore surface waters.

The judgment in the EA that a bank-flush intake facility would not have a significant adverse impact on Delaware River biota, was based on a comparison with three existing water intake facilities: Martins Creek, Gilbert, and Portland Electric Generating Stations. The facilities which are all located on the non-tidal, fresh-water section of the Delaware River (within 49 miles of Point Pleasant), presently withdraw from 144 mgd to 274 mgd as a maximum. See Table IV-1 for a comparison of the physical features of the three intakes with the proposed Point Pleasant intake. Major analytical studies of the impact of the three intakes on Delaware River fish were completed over the last few years (Dudun 1978; Willis and Harmon 1977; Johnson and Phoenix 1977).

In May and June 1976 at the Martins Creek Electric Generating Station, from 3,737 to 28,000 fish eggs and larvae per day were entrained during pumping of 172 mgd. Under flow conditions at that time (assuming uniform dispersion of the organisms), less than 2.1% of the daily total larval population in the river at that point was entrained (Johnson and Phoenix 1977). Typically a high proportion (but not all) of the organisms entrained are killed by extreme physical forces during passage through the pump.

Sampling during April-August 1976 at Gilbert Station revealed the maximum estimated number of larval fish entrained equalled 602,604 fish for the month of June. Less than 2% of the river was withdrawn at this time. While

Table IV-1

Comparison of Physical Design Features--Existing Portland, Martins Creek and Gilbert Electric Generating Stations and the Proposed Point Pleasant Pumping Station.

Feature	Portland Station[K]	Martins Creek Intake Units 1 and 2	Martins Creek Intake Units 3 and 4	Gilbert Station	Point Pleasant
Delaware River Mile Location	206	190.9		171.3	157.20
Installation Date	1958; 1962	1954; 1956	1975; 1977	1930; 1949	
Number of Pumps	4	4	4	4	4
Rate of Water Withdrawal (gpm)	218,000	119,389[A]	17,600 (Total=136,989 max.#1-4)	100,000[D]	
Rate of Water Withdrawal (mgd)	313 max.	172	25.3 (Total=197.3 avg. #1-4)	144 max.	95 max.
Percentage of River Flow Withdrawn (__cfs river flow)	Avg.6% (at 7,980 cfs) 25% (at 1,920 cfs-critical low flow)	13.6% (at 1,961 cfs)[C] (44% at 609 cfs-'minimum')[B]	2.0% (at 1,961 cfs) (Total 15.6% at 1,961 cfs #1-4)[C]	7.4% (at 3,000 cfs)	5% (at 3,000 cfs)
Intake Location	flush to river bank	flush-to-river bank	on small cove	flush to river bank	flush to river bank
Riverbottom Modification					dredged channel 150'long x 50'wide x 13'deep (max); rip-rap[J]
Screening	4 traveling	bar screen plus 4 traveling[E]		4 traveling	3 traveling[I]
Screen Dimensions (feet)	2' wide x 50' high	8.3' wide x 21' high[E]		2-2' wide x 22' high 2-2' wide x 25' high	10' wide[I]
Screen Mesh Size (inches)	3/8	3/8[E]		3/8	
Screen Rotation Time (minutes)	5-10	9-18.5		12-34	
Water Velocity Through Intake Screen (feet/second)	0.75 (1.03 at intake tunnel)	0.24 - 0.80 0.64 (during avg.flow)[F] 1.62 (max)[G]	0.5	Screen 1. 0.81 Screen 2. 0.92 Screen 3a, 3b. 2.30[H]	0.5 max

Table IV-1 (Continued): REFERENCES

A. Final EIS - Proposed Martins Creek Electric Generating Station Expansion Units 3 and 4. DRBC, February 28, 1974; page 56

B. 316(b) Report - Martins Creek Generating Station, Roy F. Weston, Inc. November 1977; page 2-3.

C. Martins Creek EIS, op cit; page 55.

D. 316(b) Report - Gilbert Generating Station, Icthyological Associates, August 1977; page 29.

E. 316(b) Report - op cit; page 1-5.

F. Ibid; page 1-7.

G. Martins Creek EIS, op cit; page 61.

H. 316(b) Report - op cit; page 29.

I. Neshaminy Water Resources Authority, Environmental Report, February 1979; page A-5.

J. Neshaminy Water Resources Authority, Sec. 3.8 Application, June 1979.

K. All data supplied by Metropolitan-Edison Company, May 1980.

larval fish density showed a 10 fold decrease at the discharge relative to the intake, density of larval fish at 3 mid-river downstream stations was unchanged (Willis and Harmon 1977).

Entrainment of fish eggs and larval fish during 9 hours of evening sampling ranged from zero to 269,438 at the Portland Station in May-August 1977. On one evening 47.7% of the ichthyoplankton passing the station was estimated to have been withdrawn (Didun 1978). Roughly 6% of the eggs and larvae entrained at Portland Generating Station were American shad with a maximum of 34,600 shad larvae possibly entrained on the evening of May 26, 1977. Didun judged these values to be insignificant since a single shad female produces between 116,000 and 639,000 eggs, and the major nursery and spawning areas are further upriver.

All three studies concluded that the water withdrawals had an insignificant impact on the river's fish eggs and larvae. A major reason for this finding is the fact that the three stations are located on the non-tidal portion of the river. Lofton (1976) documents the low rate of impingement and entrainment in non-tidal sections. The Point Pleasant Diversion would likely entrain far less eggs and larvae because it would withdraw a maximum of 5% of the river flow for short periods.

The number of fish impinged against the 3/8" mesh intake screens of the three generating stations was also found to be very low, in the above cited studies. The rate of impingement was: 7 fish in 26 hours (Martins Creek); 58 fish in 420 hours (Gilbert); 41 fish in 170 hours (Portland--see Metropolitan-Edison (1977)). The percentage of impinged fish which were alive when collected was 26% at Portland and 95% at Gilbert. The most common fish impinged were: spottail shiner (34% at Gilbert); alewife (50% at Portland) and the anadromous

shad--an important sport fish during migration (2 out of 7 or 29% at Martins Creek). Shad represented 0 and 10% of the impinged fish at Gilbert and Portland. In contrast, during July-November 1973, shad juveniles made up approximately 25% (and ranked first) of the total juvenile fish sampled by seine in the fresh water non-tidal sections (Point Pleasant to Little Falls, N.Y.); see Table 21 in J. P. Miller, J. W. Friedersdorf et al, December 1975. At Point Pleasant shad juveniles accounted for 28% of the total sampled. This information suggests that the frequency with which shad juveniles are impinged by the areas-intakes is less than their relative abundance in the river. In another study, Lofton (1976) described the impingement of anadromous species in the free flowing (non-tidal) portion of the river as "infrequent" and "often rare."

The ability of a fish to swim away from a water intake is related to the size of the fish. During the juvenile fish sampling in 1973, shad ranged from 1" to 4-3/4" at Point Pleasant which, at the high range certainly, is sufficient for them readily to escape the 0.5 feet per second water velocity at the proposed intake.

As part of an assessment of water intake systems under Section 316(b) of the Water Quality Act, the Pennsylvania Fish Commission, Pennsylvania Department of Environmental Resources, and the Environmental Protection Agency reviewed both the impingement and entrainment studies for Martins Creek and Portland Stations. The three agencies concurred that the intakes were "not adversely affecting the (balanced) indigenous community of aquatic organisms in the Delaware River" (EPA 1978;1979). A similar judgment is likely for the Gilbert Station (Roche, 1980).

Considering the maximum rate of water withdrawal at the three generating stations studied is from 1.5 to 3 times the proposed diversion, and at

a higher velocity, it is safe to conclude that, all things equal, the impingement of Delaware River fish by the Point Pleasant diversion would be less than that experienced at the existing generating stations which have deemed to be not significant.

The large number of shad juveniles (64.6 per haul) taken during 1979 sampling across the river from Point Pleasant, at Byram, N.J. (Lupine, 1980), may mean that the entire Point Pleasant pool area is used as a nursery area; or that there was exceptionally high shad reproduction in 1979; or that it can only be explained by any one of several other causes. While the analysis presented above indicates that shad juveniles are not impinged at the relative frequency at which they exist in the river, it would be prudent to monitor the proposed intake so that, in the unlikely event of an adverse impact, corrective measures could be undertaken. Such measures might include altering pumping schedules, or modifying the intake facility itself to reduce impingement or to increase survival following impingement. This element of the impingement and entrainment issue would not be illuminated by further analysis at this time, therefore, the EA recommended that an intake monitoring study be required as a permit condition, should the application be approved.

As far as cumulative effects are concerned, the aquatic life which would be killed would obviously be added to the constant mortality occurring at every intake in the basin. The information which has been reviewed, however, indicates that at three of the largest existing intakes, the impact on aquatic life is insignificant. The Point Pleasant diversion would mean the addition of another facility with an even smaller, less significant, effect. Up river from Trenton, the existing fish population is quite varied and supports a good (if underutilized) sport fishery. Shad sport-fishing activity has been increasing yearly. There is no reason to believe that these conditions would be affected

by impingement and entrainment at Point Pleasant.

As a final note of clarification, the Point Pleasant intake would not require a dam or impoundment of any kind on the Delaware. Present plans require a 150 foot long trough to be dredged in the river bottom, from the river bank out to the deepest part of the river, to insure a supply of water during periods of low river flow. Dredged materials would be used for back-fill in the construction of the intake facility or stockpiled for later use as top soil. The intake design will not be completed until the state and federal fishery managers' design criteria or standards have been considered.

b. Instream Uses. The effect of altering the river flow on the river's aquatic organisms is a concern of many reviewers. The Environmental Assessment judged this effect to be very slight for the following reasons:

The maximum withdrawal of 95 mgd is equivalent to 5% of the river's flow during a period when the river is at 3,000 cfs at Trenton, which is the current DRBC minimum flow objective. Section IV-E of this revised EA presents data showing that the river level would be lowered about 6/10 of an inch under these conditions. Based on records from 1955 - 1975, a flow of 3,000 cfs or less at Trenton occurred approximately 10% of the time (U.S. Geological Survey, 1980). The frequency in the future would depend on: the "natural" river flow, the minimum flow objective selected for the Montague gauging station, the flow at Trenton selected to trigger releases from storage reservoirs and new depletive uses.

The amount of shoreline, and aquatic plants and animals, that would be exposed to the air as the water level dropped would depend upon the stage of the river at the time. Under minimum river flow conditions, the slope of the shore-line would be at its lowest, hence the area exposed would be the maximum. While

certain aquatic plants and animals would be stressed and succumb, other marsh and wetland forms would be enhanced. In a pond environment, daily water level fluctuations of up to 3.5 feet a day were not found to affect significantly the success of fish-spawning in shallow water, while emergent vegetation was enhanced (Baren, C.F.,R.C. Kausch, 1971). The effect of an infrequent lowering of the water level by 0.10 of an inch in a naturally variable, riverine environment would be insignificant.

Release of water from upstream reservoirs, to compensate for the water diverted by Point Pleasant during periods of very low river flow, would have a beneficial impact on aquatic biota in the reach upstream of Point Pleasant. Any increase in water level would be larger than the decrease projected to occur below Point Pleasant, as the river would naturally be at a lower stage in the upstream reaches.

The proposed project would have a very slight adverse impact on downstream water quality because there would be less water flowing into the estuary to dilute existing wastewater discharges. As an illustration, under extreme conditions of low river flow (2,780 cfs) and maximum diversion (95 mgd) the level of dissolved oxygen (a vital substance for aquatic organisms), would be reduced by approximately 0.08 mg/l in the Trenton to Philadelphia reach (Zone 2)*. The effect is nearly halved further down river. There would be an even smaller reduction in oxygen when the river has a higher flow or when lesser volume of water is diverted.

Biological impact could result if the oxygen level was caused to fall significantly below a critical threshold level causing organisms to move, cease migration or die. In this case, however, with the infrequent, slight effect

*Based on data used in Figure C-2 "Dissolved Oxygen and Flows-Preliminary Runs Delaware Estuary Model" p.56, Level B Draft Final Report, DRBC.

on oxygen levels projected, the probability of significant adverse effect on resident biota is judged to be very low to nil. Spring and fall shad migrations, similarly, should not be significantly affected as the maximum oxygen reduction would tend to occur during mid-summer periods when the shad are not migrating in the estuary.

As explained in Section IV-E, Water Quality - Salinity, the diversion would not significantly affect the concentration of chlorides in the estuary since only 4.5 mgd of the water diverted to the Neshaminy Creek basin, would not be returned to the Delaware under low-flow conditions--when the movement of the ocean salinity front is of concern. Year-round diversion of water would not cause a detectable change in salinity levels. Consequently, the oyster industry in Delaware Bay could not be affected by the proposed project.

Periodic maintenance dredging of the submerged channel leading to flush-to-the-bank intake facility would have a very slight adverse impact on the river's benthic organisms because of the small area involved. Recolonization would be fairly rapid, also making this a temporary impact. As the orginal Assessment notes, by dredging in the November-March period, migrating shad would not be affected. (As noted earlier, a possibility exists that a river bottom intake facility may be found more desirable by the fishery managers and NWRA, eliminating the need for maintenance dredging.)

North Branch Neshaminy and Pine Run.--Some reviewers request additional information concerning possible changes in stream morphology, hydrologic conditions, intake design and operation, and water quality as those factors might affect aquatic biota.

a. Water Flow. The median flow in the 19,000 foot reach of the North Branch, beginning at the proposed point of inflow of the Delaware River water down to Lake Galena, is from 1.3 to 4.6 cubic feet per second (cfs). The average annual minimum discharge, which lasts for 7 days with a 2-year recurrence

interval, is less than 0.05 cfs. For a 10 year recurrence interval, the minimum flow is zero. The proposed project under maximum pumping conditions would cause the flow in this reach to be about 76 cfs. The water depth at this time would range from 0.5 to 1.0 ft., with a velocity of 2.0 to 2.2 feet per second. These latter figures compare to a median flow depth at present of 0.1 to 0.15 ft. and a velocity of 0.5 to 0.7 fps and the mean annual flood (670 cfs) with a depth of 4.7 ft. and a velocity of 3.5 fps. (Table IV-9).

Existing aquatic biota in the upper reaches of the North Branch reflect the small stream size and occasional periods of little or no flow--the populations are small and diversity is low. The proposed project would benefit existing populations by substantially increasing the size of the habitat (living space, niches) allowing greater productivity and higher survival while, at the same time, reducing the seasonal mortality caused by insufficient flow. Adverse effects which could result from large and rapid fluctuations of stream flow would be prevented in this case because: (1) the proposed augmented flow regimen would be well below the lower range of ordinary flood flows; (2) the diversion would only be curtailed when the natural stream flows were adequate --preventing a large drop from augmented flows down to the natural low flows; and (3) the start-up and stopping of pumping would be done gradually over several days. Because the outflow of Lake Galena, through which the North Branch passes, is regulated, the effect of the increased flow on the creek's biota would be primarily limited to the 19,000 foot-long reach above the Lake. Pine Run biota would not be affected at all by the water diversion.

By pumping into the creek during periods of low flow, the yearly minimum and maximum flow pattern would be reversed and the adverse biological effects normally associated with low stream flows during the productive late spring and summer periods, would not occur. The actual pattern of pumping can be seen in

Table IV- 2 which shows the number of days per month the diversion would be necessary during an average flow year for the North Branch and Pine Run. For an average production of water (20 mgd) at the North Branch water treatment plant, the Delaware would be tapped a total of 56.8 days/year--occurring in April-August; there would be no pumping from September-March. Monthly values are also given for periods of maximum production which, it should be noted, could not be maintained for long periods; therefore, an annual total is not included.

Table IV-2 Schedule of Pumping from Point Pleasant into North Branch Neshaminy Creek for Three Levels of Production (10, 20, 40 mgd) at the North Branch Water Treatment Plant. (In days.)

MONTH	10 mgd	20 mgd	40 mgd
Jan.	0	0	0
Feb.	0	0	0
Mar.	0	0	7.4
Apr.	0	3.1	15.4
May	4.2	13.4	15.2
June	8.5	14.3	15.9
July	12.0	13.2	18.4
Aug.	11.5	12.8	17.9
Sept.	0	0	0
Oct.	0	0	14.7
Nov.	0	0	15.6
Dec.	0	0	10.5
ANNUAL TOTAL	36.2	56.8	(See text)

SOURCE: E. H. Bourquard, 1980.

b. Water Quality. Aquatic biota would further benefit from improvement in water quality which would result from a higher volume of water for dilution, and from the quality of diverted water. Downstream of the Chalfont Water Treatment Plant, water flow and quality would be improved by establishment of a minimum release of 5.3 mgd during March 1 through June 15 and

2.73 mgd during the rest of the year, which the diversion would make possible. The Pennsylvania Fish Commission, which recommended the minimum release flows, believes the flow increase "should significantly improve water quality conditions and therefore represent an enhancement to any future fishery" (Pennsylvania Fish Commission, 1978).

Turbidity levels in the North Branch may increase temporarily during construction and during establishment of the new flow regime. However, because modified flows would be well within the lower range of ordinary flood flows and the velocity at 2.0 to 2.2 fps would generally be below erosion limits of the existing channel materials--alluvial sand and gravel, rock outcroppings in steeper areas, and Bowmansville silt loam in the stream banks, (the limits being 1.5-2.0 fps for coarse sand, and 2.5 fps for loose gravelly soil and ordinary loam)--the impact on biota is likely to be very slight. Use of an energy dissipator at the point of in-flow to the North Branch would mitigate the erosional force of the water where it would be highest and serve to limit turbidity.

The level of phosphorous in the Delaware River at Point Pleasant is lower than the level in the North Branch Neshaminy, therefore, the diversion would not cause rapid growth of undersirable vegetation downstream of Lake Galena.

c. Water Intakes. The original plan for intake structures on the North Branch Neshaminy and on Pine Run included bar screens to protect pumps and other equipment from trash, but lacked a fish screening device. During final engineering design, it was decided also to include vertical, traveling screens to reduce the likelihood of entrainment of aquatic organisms. NWRA's consultant has indicated that the screening would meet EPA's latest criteria

(E.H. Bourquard, 1980). Adverse effects on fish projected in the Environmental Assessment (February 15, 1980) would not occur as a result of this design change.

Lake Galena.--Some reviewers question the effect on the aquatic biota of changes in the hydraulic characteristics of Lake Galena, caused by the diversion.

a. Water Level. According to the current plan of operation for Lake Galena, up to half the water in the lake could be utilized for water supply (1.63 billion gallons out of 3.26 billion gallons.) With no means to maintain the lake's water level at present, fishing and boating would be adversely affected during the spring and summer seasons as water supply needs were being met. Under the proposed project plan, water pumped from the Delaware would allow water supply demand to be met while maintaining an optimum water level for recreation. Therefore, the diversion project would have a beneficial impact on recreation in Lake Galena.

Under the proposed plan, diversion would be cut back during periods of low recreational use (fall and winter) causing the water level in Lake Galena to drop. The impact of drawdown on biota would depend on the condition of the fishery at the time. A drop in water level could be beneficial if the lake contained populations of "stunted" sunfish caused by over-population. Fishery managers often use this technique to increase predation on small fish in improving a sport fishery. On the other hand, the impact could be harmful if the juvenile fish populations were unusually small at the time. (Present fish populations have good growth rates indicating a well-balanced fishery (Pennsylvania Fish Commission, 1980).) If prolonged drawdowns led to a reduction or loss of aquatic weed beds which were providing cover for juvenile fish, various kinds of artificial habitats could be used readily in mitigation. Overall, the beneficial

effect on biota and recreation provided by stable water levels in spring and summer would probably off-set any slight adverse effects caused by fall and winter drawdowns.

b. Water flow. Diversion of Delaware River water, although of similar quality to the North Branch, would substantially change the total amount of a particular material entering the lake, because of the increased flow; for example, total solids (dissolved and suspended) would increase from 1,463 pounds/day when the North Branch is flowing at 1.2 cfs to 24,442 pounds/day when 20 mgd is diverted from the Delaware; alkalinity would go from 129 pounds/day to 7,409 pounds/day; and iron from 3 to 115 pounds/day (Acton, 1976). These changes would be less than those generated by natural storm events, as explained elsewhere; however, the frequency of such changes would be greater as a result of the diversion.

Increased flow into the reservoir, caused by the diversion, combined with the proposed schedule of releases from the lake would reduce the detention time of phosphorous, a key plant nutrient. The potential for eutrophication in Lake Galena would be reduced as a result, although the level of phosphorous would still be high enough to support high levels of algae productivity. (See Dresnack (1979) for a discussion of the effect of hydraulic retention on phosphorous levels in Lake Galena.)

Diversion of Delaware River water into the North Branch Neshaminy would cause a significant change in the rate of water movement through Lake Galena. At present, it has been estimated that the lake water is completely replaced or flushed out once every 151 days as an average over a year, under average stream flow conditions. With maximum pumping from Point Pleasant the average would drop to 43 days. At present the shortest detention period occurs during March when the natural in-flow from North Branch would cause a turn-over

in 61 days. With the proposed diversion of Delaware River water into the North Branch Neshaminy, the shortest detention period would occur in November with a turn-over rate of 14.5 days (Dresnack, 1979).

Increase in water velocity through the lake would be substantial when maximum and minimum rates are compared, but the highest velocity generated by the diversion would be too low to impact significantly the aquatic biota. As a rough illustration, a natural North Branch low flow of 3.56 cfs at present would generate a velocity of 0.0004 feet per second (fps) (based on a lake of 17.8 feet deep by 1,500 feet wide and assuming the main flow passes through 1/3 of the cross-sectional area), whereas a flow of 53 cfs (partially generated by the diversion) would produce a velocity of only 0.016 fps during a November draw-down (dimensions=10 ft.deep by 1,000 ft. wide) with the detention time of the lake at 14.5 days. A current of 0.016 fps is far less than the velocity of even small streams in the area, where velocity would typically be measured in the range of several tenths fps on up to one plus fps. The change in the hydraulic character of Lake Galena induced by the proposed project would be large, but would not create a riverine habitat.

The proposed project, therefore, would generate both an increased loading of the natural materials contained in water and, at the same time, would reduce the residence time of those materials in the lake. Because of the complexity of physical, chemical and biological inter-actions naturally occuring within a lake, it is not possible to predict the precise effect of the induced changes in hydraulics and water chemistry on Lake Galena's biota. The Pennsylvania Fish Commission's fishery management plan for Lake Galena, now under development, would have to recognize the potentially beneficial and adverse effects which could result from the diversion. Fish sampling and management studies would very likely have to be increased. To mitigate completely any potential adverse effects, the DRBC, as a condition of a Section 3.8 approval, could require the NWRA to assure that

the lake's fishery resource would be maintained at an equal or higher level than would exist without the diversion. NWRA could be required to utilize the expertise of the Pennsylvania Fish Commission and the U.S. Fish and Wildlife Service in managing the fishery resources.

East Branch Perkiomen.--The magnitude of change in the stream's morphology and the impact on aquatic habitats has been questioned. The effect on the creek's flow, depth and velocity is tabulated in Tables 1 and 2 of Section IV Flows of PECO's Environmental Report (July, 1979). The average values of 15 channel sites are:

Table IV-3

Natural Conditions (No Pumpage)			Average Pumpage			Maximum Pumpage		
Flow(cfs)	Depth(ft)	Velocity(fps)	Flow(cfs)	Depth(ft)	Velocity(fps)	Flow(cfs)	Depth(ft)	Velocity(fps)
			7 Day - 2 Year Low Flow Period					
0.69	0.05	0.19	34.7	0.59	1.13	65.7	0.80	1.57
			Median Stream Flow Period					
12.6	0.36	0.71	52.6	0.67	1.40	83.6	0.88	1.68

The average water depth in the East Branch, while receiving Delaware River water, would be less than one foot (0.88 ft) and the average velocity 1.68 fps. The change in depth and velocity would represent slightly less than a two and a half fold increase over natural, median flow periods.

The flow, depth and velocity under maximum pumpage and median stream flow conditions would be far below what occurs naturally during flood periods; see below. There would be no pumping from the Delaware during maximum stream flow (flood) periods.

Table IV-4

	Flow (cfs)	Depth (ft)	Velocity (fps)
1 Year Flood	870	3.2	3.8
Mean Annual Flood	2,484	5.0	5.4
5 Year Flood	3,627	6.0	6.2
50 Year Flood	7,453	8.4	7.6

The higher velocity generated by pumping would also be below the erosion limits of the stream materials as discussed in the section on the North Branch Neshaminy. Therefore, the habitat of the native biota will not be significantly affected, although as described in the EA (February 15, 1980), undoubtedly there would be subtle changes in the kinds of aquatic biota present over time. The increased volume of water in the channel would provide more space for organisms to carry out their life cycles and would allow for increased production. The migration, hibernation, predation, desiccation and other responses of aquatic organisms to lack of water which would normally occur in the East Branch during low flow conditions, would not occur as a result of the diversion project. This effect is considered a beneficial impact on the existing biota.

To clarify a statement on page 2-53 of the original EA, PECO would assure a minimum flow of 27 cfs in the East Branch throughout the normal low flow period, once pumping started. The 27 cfs would be 51% of the median stream flow during average pumping and 32% of the median flow during maximum pumping. In addition, DRBC staff have informed PECO of the need to augment the flow of the East Branch on a year-round basis, up to 10 cfs, for the protection of the aquatic biota. A 10 cfs minimum stream flow would be equal to 19% of the median stream flow during average pumping. The existing 7 day - 2 year low-flow of 0.69 cfs is only 3.7% of the median stream flow, and occurs in the summer.

Recent studies suggest that base flows during productive periods should be 30% of the average flow to sustain "good" survival conditions for most aquatic life forms (Tennant, 1976). Lower base flow can be tolerated (20% rather than 30% for "good" survival conditions) during the October-March period, a period of reduced biological activity. The proposed schedule of minimum flows (i.e. 27 cfs during naturally low flow periods and 10 cfs for the remainder of the year), therefore, would be a considerable improvement over existing conditions because the resulting minimum stream flow would be a greater fraction of the average stream flow and would occur during the winter.

PECO would draw from the Delaware River when the flow in the Perkiomen and Schuylkill fell below specific threshold levels already established by the DRBC. Based on a simulation of stream flow and power needs during 1974-1977, Table IV-5 indicates the frequency of withdrawal from the three sources. The Delaware would have been drawn on 40% of the time or a mean of 21 weeks per year. It would not have been utilized during December, January, February or March. Pumping would have been required during only one of the 19 April weeks and three of the 16 November weeks.

Perkiomen Creek.--Questions have been raised concerning the design of the intake structure which would supply water to Limerick. As noted in Part IV, Section E (item 14) of this Revised Environmental Assessment, the design and operation of the Limerick station, including the Graterford intake on the Perkiomen, is not within the scope of DRBC's environmental analysis. The proposed Limerick station was the subject of an Environmental Impact Statement which was completed in 1973 (U.S. Atomic Energy Commission).

Upstream Storage.--Additional information is sought concerning the impact on the aquatic biota in upstream storage reservoirs during those periods when the reservoirs are drawndown to compensate for the water diverted by the proposed project.

As noted elsewhere, under present plans, water withdrawn by PECO for use at Limerick would be compensated by releases from the proposed Merrill Creek reservoir, whenever the flow at Trenton reached 3,000 cfs. The Merrill Creek reservoir would be owned by a consortium of electric utility companies and operated for the sole purpose of supplying water during low flow periods, to compensate for the water consumed during generation of

Table IV-5

SIMULATION OF
ESTIMATED WEEKLY WATER WITHDRAWALS DURING TWO-UNIT,
FULL-POWER GENERATION,
1974-1977[1]

Month	Total Weeks	WEEKS WATER WITHDRAWN FROM			Estimated Withdrawal From Delaware, CFS
		Schuylkill	Perkiomen	Delaware	
January	16	16	0	0	0
February	16	16	0	0	0
March	17	17	0	0	0
April	19	18	0	1	43.5
May	16	6	4	6	23.8
June	17	3	0	14	46.2
July	19	0	3	16	39.4
August	16	0	0	16	45.1
September	20	0	3	17	40.7
October	16	3	3	10	27.6
November	16	12	1	3	37.5
December	20	20	0	0	0
TOTAL	= 208	111	14	83	
% of Total	100%	53%	.7%	40%	
Mean, Weeks/ Year		28	3	21	

[1]Based on weekly means of 1) daily Perkiomen Creek flows (Graterford), 2) daily Schuylkill River flows and temperatures (Pottstown), and 3) hourly meteorology from LGS Tower No. 1. Concentration factor equals 3.34 and drift equals 0.017 percent of circulating water and service water flows.

SOURCE: Section IV Flows (Table 1) Environmental Report. Philadelphia Electric Company, July 1979.

electricity. The environmental impact of the Merrill Creek project, including the impact of drawdown on resident biota, will be fully evaluated by the DRBC and described in an EIS, now in preparation.

With Merrill Creek replacing 46 mgd of the 95 mgd total to be diverted at Point Pleasant, 49 mgd (as a maximum, for short periods) would need to be added to the Delaware from another source to maintain a flow of 3,000 cfs at Trenton or any other flow objective, as compensation for the NWRA withdrawal. This is less than the 102 mgd which would have been required originally to offset the water diverted for water supply and water quality augmentation. If releases from storage were triggered by the extent of salt movement up the estuary rather than by a flow objective at Trenton, the need for compensating releases from storage would virtually disappear in this instance because the consumptive loss from the NWRA portion would be on the order of only 5 mgd. The precise effect on reservoir water levels and biota of releasing 49 mgd is uncertain. Under the present analytical scheme, for a repeat of the 1960's drought, the reservoir operation would be unchanged (i.e. the rate of drawdown would be the same with or without Point Pleasant), however, the maximum sustainable level of flow would be lowered.

In a mathematical modeling exercise in which the conditions experienced during the worst years of the 1960's (drought of record) were analyzed, Beltzville reservoir in the Lehigh River Basin would have been drawndown 25 feet over six months (including 20 feet within two months) during one year, and 49 feet over four months the next year to maintain a flow of 2,529 cfs at Trenton.* The average monthly release from the reservoir ranged from 37 cfs

*Releases from the New York City owned reservoirs in the Upper Delaware would have provided a flow of 1,600 to 1,750 cfs at Montague during the period, under this simulation.

up to 281 cfs during this period. In comparison, 76 cfs would be required to offset water withdrawn by NWRA for potable water supply. In both years the reservoir level would rise to its initial level within four to seven months.

A drop in a lake's surface water elevation at the rate projected in the above exercise would have a serious impact on aquatic biota. The entire ecosystem could be unbalanced with important shallow-water flora and fauna being the most affected. Most fish (juvenile and larger) would simply migrate with the receding water level, while predator fish would benefit by increased concentration of prey. While a precise effect on upstream storage reservoir biota cannot be determined, diversion would be damaging to the extent that it contributed to large drawdowns in those impoundments. Several points must be considered in weighing this impact: the main purpose of a storage reservoir is for it to be drawn down to augment river flows when necessary, therefore they are designed to permit recreational use during the period of drawdown; the 40 mgd (76 cfs) to be diverted by the NWRA is a short-term maximum under the absolute worst conditions and would not be maintained for any long period; a flow at Trenton of 3,000 cfs (which would trigger releases from storage) occurred only 10% of the time during 1955-1975--which covers the 1960's drought of record--and that flow did not always occur in the most biologically productive periods; and the volume of water which would now have to be compensated for by reservoir releases is less than half the amount originally proposed.

4. Water Quality

Issue: Would the project have an adverse effect on water quality throughout the service area? Specifically, would temperature, salinity, chlorine, trihalomethanes, trichloroethylene, and lead levels in and below Lake Galena be associated with adverse impacts?

Response: Adverse impacts on water quality in the service area would be minimal because DRBC, individual states, and federal agencies would require the project to be operated in compliance with provisions of the Compact, of State laws, and the Federal Water Pollution Control Act Amendments of 1972.

Section 3.10.2.B of DRBC's Water Code (July 1978), specifies that the quality of Basin waters shall be maintained in a satisfactory condition for use by agricultural, industrial, and public water supplies; wildlife, fish and other aquatic life; recreation; navigation, waste assimilation, and other uses provided by DRBC's Comprehensive Plan.

Chapter Five of AEC's Final Impact Statement (AEC 1973) discusses environmental effects of operating the Limerick station. The discussion includes planned discharges of waste including radioactive, chemical, thermal, and sanitary wastes. The chapter also discusses the effect of the project on terrestrial and aquatic biota associated with various water bodies, such as Perkiomen Creek and the Schuylkill River. AEC recognized DRBC's water quality standards and management practices, which have been updated as necessary.

More specific answers to questions concerning water quality are as follows:

Temperature.--Section 3.20.6, C,2 stipulates that, except in designated

heat dissipation areas, temperature shall not: a) exceed 5°F (2.8°C) rise above ambient temperature until stream temperature reaches 87°F (30.6°C) and b) natural temperature will prevail above 87°F (30.6°C).

Section 3.3 of AEC's EIS, discusses heat dissipation systems. It diagrams major heat and water paths, including the Limerick natural draft hyperbolic cooling tower (Figures 3.4 and 3.5, pages 3-6 and 3-7). Temperatures of the water are indicated for various points in the cycle, including an exit discharge from a cooling tower of 88.9°F with 463,950 gpm.

AEC considered a case where the Schuylkill River flow of 230 cfs with a temperature of 83.8°F, with blowdown temperature 88.9°F (summer conditions); and a case where a river flow of 440 cfs with a temperature of 35.3°F, with a blowdown temperature of 60°F (winter conditions). The resulting increases in temperature were, respectively: 1) one degree F and 2) 2.1 degrees F.

The AEC staff considered the problem of river temperature after mixing for the combination of low flow and maximum temperature differences between the blowdown and Schuylkill River water. For this most severe but highly improbable condition, the calculated temperature increase is 5°F and will quickly decrease downstream from the discharge due to further mixing with the rest of the river and heat loss to the atmosphere.

The results of both the staff's and the applicant's analyses indicate that with respect to temperature and affected area the discharge is within allowable limits. The Delaware River Basin Commission has specified a zone of allowable surface temperature excess as being 150 feet wide by 3500 feet long with 5°F temperature difference at the edge of the zone. The Commonwealth of Pennsylvania regulates water quality in accordance with its

Clean Stream Law, and has reviewed the applicant's proposed discharge scheme and found it acceptable. The Pennsylvania regulation, applicable to industrial water users, prohibits the discharge mixing zone from encompassing more than one-half of the river cross section at the discharge point. The analyses reported above clearly demonstrate compliance with applicable regulations of the Delaware River Basin Commission and the Commonwealth of Pennsylvania.

Salinity.--DRBC Water Quality Standards for interstate tidal streams, Section 3.30 (DRBC Regulations, 1978), contains required chloride levels for each Estuary Zone. A key requirement is the 250 mg/l maximum required at the mouth of the Schuylkill River. The control of chloride during low flow drought conditions has been and is a primary objective of the DRBC's comprehensive water resources planning and regulatory process.

The proposed project would withdraw up to 95 mgd (147 cfs) from the non-tidal Delaware River. Up to 49 mgd would be introduced into the Neshaminy system by 2010. Up to 40 mgd would be used for public water supply, about 4.5 mgd would be lost in transit, and the remainder, about 4.5 mgd, would be released to Neshaminy Creek below the treatment plant. Up to approximately 36 mgd of the water treated at the Chalfont Plant would be returned to the Neshaminy as treated wastewater (a projected 90% return). Therefore, of the original 49 mgd pumped to the Neshaminy Watershed, only about 4.5 mgd (7.0 cfs) would not be returned to the Delaware River to assist in retardation of salinity. This lost freshwater flow is insignificant.

Up to 46 mgd would be pumped from the Delaware River at Point Pleasant into the Perkiomen Watershed. During power generation, up to approximately 42

mgd would be consumed and thus unavailable for salinity retardation. For this reason during drought conditions (when Delaware River flows at Trenton, N.J. are less then 3,000 cfs), pumpage of water for power generation would be suspended unless compensated by off-stream storage. Salinity control is not an issue during non-drought conditions.

Chlorine and Trihalomethanes.--Chlorination of potable water for disinfection is a recent concern due to the formation of trihalomethanes and other carcinogens. That some type of disinfection is required is not arguable. Even the purest sources of public drinking water require disinfection for protection of the public. The past history of widespread incidents and epidemics of water-borne disease justify disinfection.

The issue of alternatives to chlorination is largely outside the purview of this project. The issue is national in scope and currently the subject of research. The subject of alternatives to chlorination was summarized in a recent article*:

> "It is too early to draw any firm conclusions as to which alternative disinfectant would pose a lesser health hazard than chlorine."

Introduction of organic chemical precursors which lead (with chlorination) to formation of possible carcinogenic compounds in water treatment or direct introduction of these compounds into the Neshaminy Watershed from the Delaware River has been raised as an issue. If this is a valid issue for

*Bull, R. J. "Health Effects of Alternate Disinfectants and Their Reaction Products", Journal of the American Water Works Association, Vol. 72, No. 5, May 1980.

the proposed project, it is equally valid for the systems now serving Lower Bucks County, the Trenton Metropolitan Area and the City of Philadelphia and its Suburban customers as well as most systems across the nation. Data do not indicate levels of these compounds to be significantly higher in the Delaware River. The issue is, therefore, also considered outside the purview of this project and is logically the subject of national research and regulation, including establishment of future treatment requirements which could include the NWRA Treatment Plant if appropriate.

Trichloroethylene (TCE).--TCE is a known problem in some areas of Bucks County and some other areas of the Delaware River Basin. The problem is largely one of groundwater contamination and the improper use or disposal of a degreasing agent. Although TCE is a widespread problem, the problem will not be aggravated by the proposed project because TCE levels are insignificant in the Delaware River at Point Pleasant. The availability of this uncontaminated water in the Neshaminy Watershed will provide an alternative water supply to homeowners with contaminated wells and provide dilution of contaminents leached into the Neshaminy Creek system.

Lead.--The U.S. EPA primary drinking water standard calls for lead levels of less than 0.05 mg/l. Lead is of concern in the Neshaminy Watershed because of naturally occurring deposits, that once were mined. During construction of Lake Galena, these mine shafts were pumped out, filled and sealed.

A review of available water quality data indicates that most samples of the Neshaminy contain concentrations of less than 0.05 mg lead/liter. A set of samples taken by the Bucks County Planning Commission in 1971 (one sample)

and 1973 (11 samples) averaged 0.05 mg/l. More recent samples have not exceeded these values.

The introduction of Delaware River water with its low background levels of lead should serve to dilute any lead concentration in the Neshaminy System. As a precaution, lead should be monitored in the early days of operation of the proposed treatment plant and appropriate treatment steps should be taken if warranted.

General.--The water pumped from the Delaware River would mix with water from the North Branch and the chemical makeup of the combined waters would depend upon the chemical constituents and proportions of each. Tabulated on Table IV-6 are the average test results from monthly samplings from the two streams during the period from September 1971 through December 1975. The Delaware River water samples were taken at the site of the Point Pleasant Pumping Station and the North Branch water samples at Silo Hill Road which is about 0.4 mile downstream of State Route 611, and at the Treatment Plant site.

Tabulated on Table IV- 7 are the test results of single samples or short term sampling analyses for additional parameters. In this tabulation the North Branch water samples were taken only at the Treatment Plant site.

A review of Tables IV- 6 and 7 reveals that introduction of the Delaware River water should generally produce a slightly higher quality of water. However, it appears that the differences between the chemical makeup of the two waters are not of significant magnitude to produce major changes.

Pa.DER (Nov.1, 1978, pp 17-20) "...finds that the raw water quality of the Delaware River, Pine Run, and North Branch Neshaminy Creek are all of satisfactory quality to be used for water supply." The study concludes that

"...because of the plan to pump water over from the Delaware River, an adequate quantity of water will be available at all times. Therefore, the public safety will be protected both as to quality and quantity of the water supply." DRBC's staff's evaluation of the water quality aspects of the proposed project agrees with Pa.DER's conclusions.

WATER QUALITY PARAMETER VALUES *

Average of Monthly Sampling

Sept. 1971 thru Dec. 1975

(MG/L unless otherwise shown)

Parameter	Delaware River	North Branch Silo Hill	North Branch Tr. Plant
Bacteriological			
Total Plate Count - No./ML@37°	2,855	2,626	2,358
Total Coliform - No./100 ML	5,977	4,174	6,003
Physical			
Turbidity	9.7	12.5	7.7
Odor	1.1	1.0	1.1
Color	15	17	19
Conductivity	187	313	---
Solids - Total	147	222	144
-Dissolved	149	214	145
-Suspended	28	19	19
-Volatile	58	79	---
-Fixed	104	120	---
Inorganic Chemicals			
pH	7.5	7.2	7.6
Alkalinity	44.4	72	52.7
Carbon Dioxide	5.5	9.9	---
Dissolved Oxygen	10.6	10.4	---
Nitrogen -Ammonia	0.26	0.22	0.35
-Albuminoid	0.10	0.08	0.14
-Nitrite	0.033	0.040	0.017
-Nitrate	0.94	1.61	1.25
Hardness	78	107	85
Phosphate - Ortho-Phosphate	0.8	1.3	---
Poly-Phosphate	<0.1	0.8	---
Total-Phosphates	0.90	1.63	1.9
Chloride	13	23	15
Fluoride	0.25	0.21	0.14
Sulfate	25	41	25
Iron	0.71	0.48	0.57
Manganese	0.15	0.1	0.21
Phenol	0.020	0.010	0.047
Heavy Metals			
Mercury	<0.001	<0.001	<0.001
Lead - Total	0.025	0.040	0.01
Suspended	0.01	0.01	0.01
Dissolved	0.01	0.01	<0.01
Cadmium	<0.01	<0.01	<0.01
Chromium (Hexavalent)	<0.01	<0.01	<0.01

*Source: Extracted from Exhibit No.27 and No.28, Environmental Report, NWRA.

Table IV-7

WATER QUALITY PARAMETER VALUES *

Results of Single Sample, or Short Term Sampling Analyses

1971 - 1978

(MG/L unless otherwise shown)

Parameter	Delaware River	North Branch
Inorganic Chemicals		
Arsenic	0.001	0.001
Barium	<0.01	<0.01
Copper	0.005	0.004
Selenium	<0.001	<0.001
Silver	0.002	0.005
Zinc	0.006	0.006
Organic Chemicals		
Pesticides		
Chlordane	0.007	0.007
Endrin	0.005	0.005
Heptachlor	0.005	0.005
Heptachlor Epoxide	<0.0001	<0.0001
Lindane	<0.03	0.007
Methoxychlor	0.06	0.06
Toxaphene	0.008	0.008
Herbicides		
2,4-D	<0.001	0.005
2,4,5-TP (Silvex)	<0.01	<0.01
Cyanide	0.08	0.09
MBAS	0.0	0.0

*Source Extracted from Exhibit No.29, Environmental Report, NWRA.

5. Flood, Erosion, and Sedimentation

Issue: Would the project impose adverse impacts on property in the flood plain or upon environmental values in the service area, as they relate to flood, erosion, or sedimentation?

Response: This response answers specific questions posed relating to release of project water into receiving streams, specifically North Branch Neshaminy and East Branch Perkiomen. As noted, partial answers are in other sections of this revised EA.

a. How does the depth of water in streams now compare with what it would be with the project?

Answer:

North Branch Neshaminy Creek.--Table IV-8 indicates average monthly characteristics of the North Branch stream flow at a channel section upstream of State Route 611, with the advent of a wet year, a normal year, and a dry year. The flow records of Neshaminy Creek at Langhorne were examined and daily flows of the year having the maximum annual flow, 1973, were used for the wet year; and daily flows of the year having the least annual flow, 1965, were used for the dry year. The normal year consists of selected months from various years which months are the closest to the mean monthly flow of record for each specific month. Table IV-8 compares flow characteristics under the "Nat." condition which is prior to installation of any component of the Neshaminy Water Supply System, with the "W.S." condition which is with Reservoir PA-617 and the Point Pleasant Pumping Facilities in operation and with the North Branch Water Treatment Plant producing 20 mgd, the projected need of about the year 2000. It will be noted that only during certain months of the year do the flow characteristics differ; these are the months when water would be pumped from the Delaware River into the North Branch.

Table IV-8

AVERAGE MONTHLY STREAM FLOW CHARACTERISTICS

NORTH BRANCH AT STATE ROUTE 611

Month of Year	WET YEAR						NORMAL YEAR						DRY YEAR					
	Q in cfs		D in ft.		V in fps		Q in cfs		D in ft.		V in fps		Q in cfs		D in ft.		V in fps	
	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.	Nat.	W.S.
January	19	19	1.0	1.0	1.1	1.1	12	16	0.9	1.0	1.0	1.0	4	49	0.5	1.4	0.5	1.5
February	22	22	1.1	1.1	1.1	1.1	19	19	1.0	1.0	1.1	1.1	17	28	1.0	1.2	1.0	1.2
March	12	12	0.9	0.9	1.0	1.0	19	19	1.0	1.0	1.1	1.1	10	10	0.8	0.8	0.9	0.9
April	30	30	1.2	1.2	1.3	1.3	13	13	0.9	0.9	1.0	1.0	7	7	0.7	0.7	0.7	0.7
May	13	13	0.9	0.9	1.0	1.0	6	24	0.7	1.1	0.7	1.2	1	39	0.3	1.3	0.3	1.4
June	25	38	1.1	1.3	1.2	1.4	3	28	0.4	1.2	0.4	1.2	1*	40	0.1*	1.3	0.1*	1.4
July	10	26	0.8	1.1	0.9	1.2	1	32	0.2	1.2	0.2	1.3	1*	38	0.1	1.3	0.1	1.4
August	12	35	0.9	1.3	1.0	1.4	2	32	0.3	1.2	0.3	1.3	1*	38	0.1	1.3	0.1	1.4
September	1	1	0.3	0.3	0.3	0.3	1	1	0.2	0.2	0.2	0.2	1*	1*	0.1*	0.1*	0.1*	0.1*
October	3	3	0.5	0.5	0.5	0.5	2	2	0.3	0.3	0.3	0.3	1*	1*	0.1*	0.1*	0.1*	0.1*
November	1	1	0.1	0.1	0.1	0.1	6	6	0.6	0.6	0.6	0.6	1*	22	0.1*	1.1	0.1*	1.1
December	33	33	1.2	1.2	1.3	1.3	10	10	0.8	0.8	0.9	0.9	1*	35	0.1*	1.3	0.1*	1.3

Legend:

"Q in cfs" is North Branch flow at Rt. 611 to nearest cubic feet per second (cfs), developed from discharge records of Neshaminy Creek at Langhorne.

"D in ft." is depth of flow in feet above low point in channel.

"V in fps" is average velocity of flow in feet per second.

"Nat." is the condition prior to installation and operation of the Neshaminy Water Supply System.

"W.S." is the condition when Reservoir PA-617 is in operation and the Treatment Plant is producing 20 MGD.

* indicates "less than".

The channel section, located 150 feet upstream of State Route 611, is about midway between the terminus of the North Branch Transmission Main and Lake Galena, and is considered representative of the North Branch channel above this reservoir. The drainage area of the North Branch at Route 611 is 5.8 square miles, which is about one-third of the 15.8 square-mile watershed of Reservoir PA-617.

The stream flows used for the "Nat." condition were developed from the daily stream flow records of Neshaminy Creek near Langhorne, Pennsylvania and, for the "W.S." condition, daily pumpages from the Delaware River developed by flow routing computations were added. As may be expected, the increases in stream flows by the pumpages are least in the wet year and greatest in the dry year. However, under all conditions, the combined natural flow and pumpage do not constitute a major flow and will have flow depths well within the channel.

Table IV- 9

NORTH BRANCH NESHAMINY CREEK CHARACTERISTICS
DURING NATURAL FLOOD FLOWS[a] AND DURING MAXIMUM DIVERSION

Flood	Q in cfs	D in ft.	V in fps
Mean Annual	670	4.7	3.5
5-Year	980	5.8	3.9
10-Year	1,270	6.6	4.2
50-Year	2,010	8.2	4.6
Max. Water Supply Flow[b.]	76.	0.5	2.2

a. Source: Bourquard, E.H. Associates, Inc. Personal Communication, August 6, 1980.

b. 49 mgd pumped in from Point Pleasant under minimum stream flow conditons.

Table IV-9 presents information on flow, depth and velocity of the North Branch Neshaminy during natural high-flow periods (mean annual flood; 5-year flood; 10-year flood and 50-year flood) near Route 611, upstream of Lake Galena. Also shown are the stream characteristics that would occur under maximum diversion from the Delaware.

East Branch Perkiomen Creek.--Table IV-10 indicates characteristics of the median stream flow, plus average pumpages from the Delaware River, for 15 channel sections along the East Branch which are shown on Figure IV-2 Examination of the columns on Table IV-10 titled "Median Flow Plus Average Pumpage" reveals that flow depths are one foot, or less, well within the normal flow channel.

The possibility of pumping taking place during a flood may be considered by comparing the two sets of mean annual flood flow characteristics. It will be noted that even with the maximum pumping rate, the depths and velocities of the Mean Annual Flood increase only about 0.1. Such an increase in water level would not be discernable during a flood and a 0.1 fps increase in velocities ranging from 4.6 - 7.0 fps would not be measurable. Also, for larger floods, increases due to pumping would be even more minute. In any case, the probability of any pumping occurring during a flood is very remote. A stream

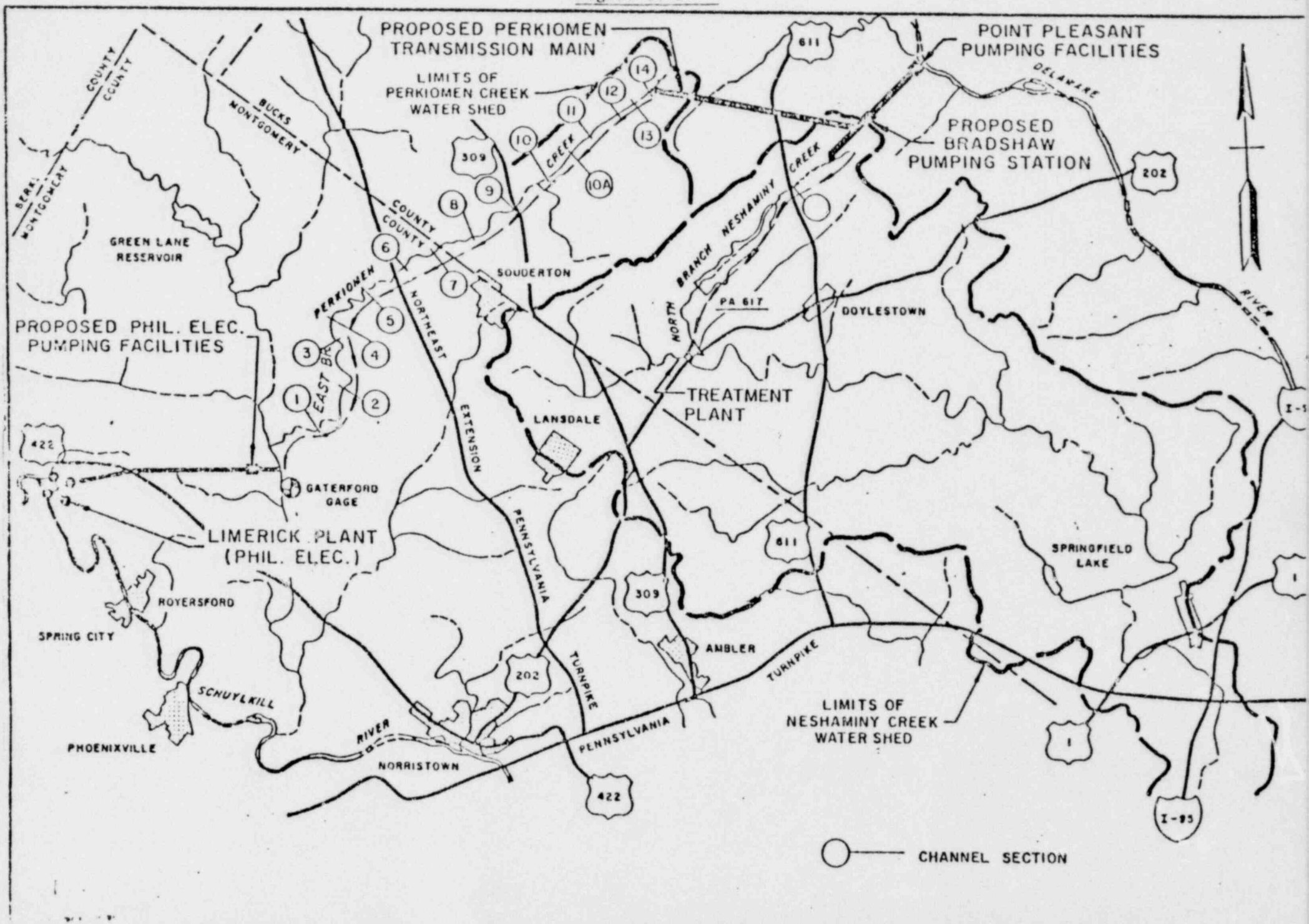
Table IV-10

MEDIAN FLOW AND FLOOD FLOW CHARACTERISTICS

EAST BRANCH OF PERKIOMEN CREEK

	Median Flow			Median Flow Plus Average Pumpage			Mean Annual Flood			Mean Annual Flood Plus Max. Pumpage			5-Year Flood			50-Year Flood		
Section No.	Q cfs	D ft.	V fps	Q cfs	D ft.	V fps	Q cfs	D ft.	V fps	Q cfs	D ft.	V fps	Q cfs	D ft.	V fps	Q cfs	D ft.	V fps
1	34	0.7	0.7	68	0.9	1.1	4,200	9.0	5.2	4,271	9.1	5.3	6,130	11.0	6.0	12,600	15.6	7.3
2	32	0.4	0.6	66	0.5	1.0	4,000	5.3	5.2	4,071	5.3	5.3	5,840	6.6	6.1	12,000	9.1	7.5
3	30	0.4	0.9	64	0.5	1.4	3,700	4.9	7.0	3,771	4.9	7.0	5,400	6.2	8.4	11,100	9.2	10.7
4	29	0.3	0.8	63	0.5	1.3	3,600	4.6	6.3	3,671	4.7	6.4	5,260	5.8	7.6	10,800	8.5	9.7
5	27	0.3	0.7	61	0.4	1.1	3,500	3.9	5.3	3,571	3.9	5.3	5,110	4.9	6.4	10,500	7.3	8.3
6	25	0.3	0.7	58	0.4	1.1	3,300	4.0	5.6	3,371	4.1	5.7	4,820	4.9	6.5	9,900	7.0	8.2
7	22	0.4	0.7	56	0.6	1.2	3,000	5.2	5.4	3,071	5.3	5.5	4,380	6.3	6.3	9,000	9.1	8.0
8	21	0.4	0.6	55	0.6	1.0	2,700	5.6	4.7	2,771	5.7	4.8	3,940	6.7	5.3	8,100	9.3	6.6
9	16	0.4	0.9	50	0.7	1.6	2,300	5.5	6.3	2,371	5.6	6.4	3,360	6.5	7.0	6,900	8.7	8.6
10	12	0.4	0.7	47	0.8	1.5	1,950	6.1	5.4	2,021	6.2	5.5	2,850	7.1	6.1	5,850	9.5	7.4
10A	10	0.4	0.8	44	0.9	1.6	1,650	5.8	5.1	1,721	5.9	5.2	2,410	6.9	5.8	4,950	8.9	6.9
11	9.1	0.4	0.7	43	0.8	1.4	1,400	4.7	4.7	1,471	4.8	4.8	2,040	5.4	5.2	4,200	7.1	6.2
12	5.4	0.3	0.6	39	1.0	1.6	965	4.9	4.6	1,036	5.0	4.7	1,410	5.6	5.0	2,900	7.3	6.0
13	3.4	0.2	0.6	37	0.7	1.8	680	3.2	5.0	751	3.3	5.1	990	3.5	5.3	2,040	4.8	6.1
14	1.4	0.2	0.6	35	0.9	2.4	320	2.6	5.1	391	2.8	5.3	470	3.2	5.7	960	4.1	6.6
Average	18.6	0.4	0.7	53	0.7	1.4	2,484	5.0	5.4	2,555	5.1	5.5	3,630	6.0	6.2	7,450	8.4	7.6

Figure IV-2


PROPOSED PERKIOMEN TRANSMISSION MAIN
LIMITS OF PERKIOMEN CREEK WATER SHED
POINT PLEASANT PUMPING FACILITIES
PROPOSED BRADSHAW PUMPING STATION
DELAWARE
GREEN LANE RESERVOIR
PROPOSED PHIL. ELEC. PUMPING FACILITIES
SOUDERTON
PERKIOMEN
EAST BR.
NORTHEAST EXTENSION
NORTH BRANCH NESHAMINY CREEK
PA 611
DOYLESTOWN
TREATMENT PLANT
LANSDALE
GATERFORD GAGE
LIMERICK PLANT (PHIL. ELEC.)
ROYERSFORD
SPRING CITY
SCHUYLKILL RIVER
PHOENIXVILLE
NORRISTOWN
PENNSYLVANIA TURNPIKE
AMBLER
SPRINGFIELD LAKE
LIMITS OF NESHAMINY CREEK WATER SHED
CHANNEL SECTION
COUNTY
BUCKS
MONTGOMERY
BERKS
422
309
202
611
I-95

gaging station would be installed on the East Branch at Bucks Road (Section No.13) which would be connected by telemetry to the control center handling the pumping operations. With the advent of higher than normal flow in the East Branch, an alarm would be activated and the booster pumps at Bradshaw Pumping Station would be shut off.

b. How much additional area would be covered by flood water if project water was pumped into receiving streams during flood periods?

Answer:

There would be no need for pumping water into receiving streams if there was adequate flow to serve demands on the water system. It is not likely that water would be pumped into flooded streams for several reasons. First, the Treatment Plant is only 5-6 miles from the portion of the watershed above Reservoir PA-617 and all releases will be controlled at the Plant. As any release increases operating costs, the plant operators will be expected to maintain a constant vigil of rainfall in both the North Branch and the Pine Run watersheds. Heavy rainfalls sufficient to produce floods would be of particular interest as they may affect operation of the supply facilities. The plant operators would have to be unusually alert during periods of potentially heavy rainfall in order to assure that no unnecessary releases are made, that appropriate treatment techniques and dosages are utilized, and water supply costs remain at a minimum. Also, if such releases did occur during a flood the effect would be minimal. Even with the maximum projected release of 49 mgd which is based on both the North Branch and Pine Run being dry, a minimum flow release of 5.3 mgd downstream of the Plant, and the maximum water production rate of 40 mgd in the Year 2010, the water surface of the Mean Annual Flood above State Route 611 would only be 0.2 ft. higher and with the 5-Year, 10-Year, and 50-Year Floods,

only 0.1 ft. higher. This would be hardly measurable during any of these floods. Furthermore, the possible concurrence of this maximum release and production rate with a flood is extremely remote. Even if project water was pumped into these streams during flood periods, there would be very little additional area covered by project water; for example, the 0.1 ft. or 0.2 ft. increase in height would cover 10 percent and 20 percent of a one-foot contour interval, respectively.

c. What would be the likely damage to property due to flood associated with addition of project water to the receiving streams?

Answer:

If project water was added to the receiving streams when flow is less than flood stage, the project water would be well within the stream channel and so would not damage property. If project water was added to receiving streams during flood flows, it would be such a small percentage of the total flow that damage that could be traced to it would likely be insignificant. Again, pumping would not be needed if flood conditions existed.

d. What would be the extent of erosion in streams that receive project water?

Answer:

North Branch Neshaminy Creek.--Turbidity levels in the North Branch may increase temporarily during construction and during establishment of the new flow regime. However, modified flows would be well within the lower range of ordinary flood flows and velocity at 2.0 to 2.2 fps would generally be below erosion limits of existing channel materials--alluvial sand and gravel, rock outcroppings in steeper areas, and Bowmansville silt loam in stream banks, (limits being 1.5-2.0 fps for coarse sand, and 2.5 fps for loose gravelly soil and ordinary loam).[a,b] Use of an energy dissipator at the point of in-flow to the North Branch would mitigate the erosional force of the water where it would be highest and serve to limit turbidity.

Flood flows generally establish the channel geometry of a stream so the mean annual flood and certain frequency floods have been computed for the North Branch at State Route 611. These flood flows and their hydraulic characteristics are tabulated below. The velocities shown for these floods are average for the entire section, including the overbank areas, and velocities in the main channel would be higher.

Table IV-11

Flood Flows and Hydraulic Characteristics

Flood	Q in cfs	D in ft.	V in fps
Mean Annual	670	4.7	3.5
5-Year	980	5.8	3.9
10-Year	1,270	6.6	4.2
50-Year	2,010	8.2	4.6

a. King and Brater, Handbook of Hydraulics, 5th Edition.
b. American Society of Civil Engineers. Sedimentation Engineering, M and R, No.54, 1975.

Comparison of the above flows, depths and velocities with those of the average flows, even including the pumpages, make it readily apparent that floods are the channel-makers. Flood flows have the mass, energy and velocity to erode and move materials, which the low and average flows do not possess. A typical example may be demonstrated by showing that by doubling the velocity from 2 to 4 fps, the sediment increased 33 times; tripling the velocity from 2 to 6 fps, increased the sediment 133 times; and quadrupling the velocity from 2 to 8 fps increased the rate 280 times. The effect of velocity is certainly made evident by this comparison.

As indicated on Table IV- 8, shown in answer to question "a" above, the highest of the stream flow velocities that would exist in the North Branch channel during pumpages from the Delaware River would be below erosion level and several times less than those that would occur during floods each year. It is anticipated that there would be some one-time adjustment of the stream channel due to the increased flow but this would be minor and take place over a long period of time. There would be no comparison with the erosion, sediment transport, and bed shifting that presently takes place several times annually during floods. In fact, the effect of the increased flow would be to stabilize the channel and make it better able to withstand aggressive flood flows.

East Branch Perkiomen Creek.--All of the channel sections listed on Table IV- 10, (page IV-58), except section 14, indicate that for median flow plus average pumping velocities would be in the 1.0 - 2.0 fps range; the average velocity would be about 1.4 fps. Except for a short reach near Perkasie, the East Branch channel is cut through Bowmansville silt loam which was described previously in connection with the North Branch Neshaminy channel. Materials along the short reach near Perkasie are classified as Rowland silt loam which

is about the same as Bowmansville except slightly coarser, and Urban Land-Lansdale complex which is a mixture of several types of soils. It is expected that there would be minor enlargement of the low flow channel at the upper limit of the East Branch but the remainder of the reach would be only slightly, if at all, affected by the pumpages. Flow velocities of the three floods shown on Table IV-10 show averages ranging from 5.4 fps to 7.6 fps. It should be evident that the channel geometry on the East Branch would be established by floods - not by pumped flows, except for minor one-time adjustment at the upper end.

e. What would be the extent of increased sedimentation of receiving streams?

Answer: Based on suspended solids measurements of Delaware River water at Point Pleasant and at Trenton, New Jersey, it was calculated that in the 25-Year period from 1985 to 2010 the pumped water would contain suspended solids which would occupy a volume of 410,000 cu. ft., or 9.4 ac. ft. Utilizing particle size data from the U.S.G.S. tests on suspended materials in the Delaware River at Trenton, about 55% or 5.2 ac.ft., would settle out in Bradshaw Reservoir which would have 6 ac.ft. of sediment storage capacity. The remaining suspended material, 4.2 ac.ft. in volume, would pass through Bradshaw Reservoir; approximately 1.0 ac.ft. is expected to go to the North Branch and 3.2 ac.ft. to the East Branch. For comparison, Reservoir PA-617 contains 366 ac.ft. of space for sediment storage. Accordingly, even if there were 100% settlement of the suspended materials remaining in the Delaware River water, the effect on the North Branch and on Reservoir PA-617 would be almost nil.

As mentioned above, it is estimated that about 3.2 ac.ft. of suspended material in the pumped Delaware River water would enter the East Branch Perkiomen

during the 25-year period from 1985 to 2010. This material would consist of the finer particles, less than 0.008 mm, and very little should settle out in the moving waters of the East Branch. However, even if all this material settled out in the 22.2 miles of East Branch channel, which has an average width of about 70 feet, the depth of sediment would average out to only 1/5 inch - this is the total over a 25-year period.

f. What would be the chemical makeup of sediment in the receiving streams, including Lake Galena, compared to what it is now?

Answer:

Receiving streams.--DRBC's response to the "Water Quality" issue, starting on page IV-45 of this revised EA, discusses temperature, salinity, chlorine, trihalomethanes, trichloroethylene, and lead levels in streams likely to be impacted by project water. The discussion applies to the chemical makeup of sediments as well as to the general condition of the streams.

We do not have any data on the chemical makeup of suspended materials in Delaware River water but, in view of the maximum amount that might be deposited in the North Branch channel in the 25-year period from 1985 to 2010 (about 1 ac.ft.) and the 1/5 inch that would settle in the East Branch Perkiomen Creek over that 25-year period, the effect on receiving streams would certainly be very minor at most. (See answer to question "e" concerning sedimentation, p. IV-64).

Lake Galena.--As discussed in the section on aquatic biota, starting on page IV-36, diversion of Delaware River water, although of similar quality to the North Branch, would substantially change the total amount of a particular material entering Lake Galena because of the increased flow and volume; for example, total solids (dissolved and suspended) would increase from 1,463

pounds/day when the North Branch is flowing at 1.2 cfs to 24,442 pounds/day when 20 mgd is diverted from the Delaware; alkalinity would go from 129 pounds/day to 7,409 pounds/day; and iron from 3 to 115 pounds/day (Acton, 1976). These changes would be less than those generated by natural storm events, as explained elsewhere; however, the frequency of such changes would be greater as a result of the diversion.

g. Will water added to streams cause flooding in areas where the water table and soil mantle is already saturated?

Answer: Where the water table and soil mantle is saturated, the natural flow of a particular stream would be adequate, or nearly adequate, to provide the flow necessary for operation of the water supply system. If the natural flow was not completely adequate, only enough water would be pumped into the system to provide the necessary flow. Pumping to provide the necessary flow would stop well short of flood stage.

h. Would the combination of maximum pumping and a sudden thunderstorm create flooding along streams where pumped water is released?

Answer: Since the monitoring system would anticipate rainstorms, and automatic equipment--backed up by human monitoring--would discontinue pumping when natural flows were adequate, there is little likelihood of pumping during periods of heavy rainfall. Consequently, pumping should not contribute to flooding of receiving streams. That is not to say that natural flows may not reach flood stage, as they could without the project.

i. What is the impact on flooding when project water is released into frozen streams? Do the released waters go under, over, or through ice on the stream?

Answer: Factors that would influence the impact of water pumped into ice-covered receiving streams would include: 1) strength of ice cover, 2) timing of ice-sheet formation, 3) temperature of water entering stream, 4) volume of water entering stream as a percentage of total water in stream, 5) shear stress on ice cover, 6) forces of ice moving in stream channel, and 7) velocity of water and ice in a given stream.

As with unfrozen water, the impact on flooding would be related to the amount of water in the receiving stream when project water is added. When a stream is relatively full and frozen solid on top, the water added would be a small percentage of the total flow and would go under the ice with a "venturi effect" where the flow is speeded up in a confined space to accommodate the increased volume. At the other extreme, if the stream was relatively low, the space under the ice might not accommodate the increased volume so it would go over the top. If the volume of flow was between the extreme stages, added water would erode the ice and establish its own channel through the course of least resistance.

As indicated on table IV-8 (page IV-55), not much pumping would take place during the winter months; the principal reason for such pumpages, when it would occur, would be to start the refilling of Reservoir PA-617 so that it could be brought up to normal pool for the recreation period with minimum pumping rates. The introduction of pumped water into the North Branch, or the East Branch, during periods of freezing weather should be beneficial. Pumped water would be coming from an underground piping system and an open reservoir

having an average depth of 13 feet. The temperature of this water would approach that of groundwater, about 50° F, and when flowing in a stream channel the effect would be to open up and maintain a small waterway sufficient for passage of the pumped water and normal stream flow.

As with unfrozen water in a receiving stream, project water would not be added if sufficient flow existed to meet demand for water supply. When the flow in a receiving stream is low enough to require project water to be added, the added water would be within the stream channel.

j. Would cutting into the top of the cliff overlooking the Village of Point Pleasant expose the Village to additional flood threat?

Answer: There is no cliff, only a steep slope well stabilized with overburden containing many small to large stones and boulders. Cutting into this slope would be limited to excavation of a trench for installation of a 66-inch pipe, after which the trench would be backfilled and the ground surface restored to the orininal contours. Where the pipe crosses water courses, the backfill would be concrete or a soil-cement mix for erosion protection.

k. Will flood maps be revised to show the change in likelihood of flooding along streams into which project water is pumped?

Answer: Each Flood Insurance Study prepared by HUD includes a flood boundary map. Such boundaries were delineated in FIA-FEMA's (formerly HUD) study of Sellersville in 1977. Since, as indicated in the answers to questions No."a" and No."b", there would be no significant change in the flood boundaries, due to addition of project water, there would be no need to revise flood maps for this reason.

l. Who would be responsible for correcting damage associated with release of project waters into receiving streams?

Answer: The sponsoring agency of a particular portion of the project (NWRA, PECO, or both) would be responsible for its specific facilities and operational procedures--including correction of damage judged by administrators of competent jurisdiction to be caused by the project.

m. Has a fail-safe flood control method been devised for:

i. North Branch Neshaminy Creek?

ii. East Branch Perkiomen Creek?

iii. Perkiomen Creek (from confluence of East Branch, downstream)?

Answer: In a strict sense, there is always a risk associated with vagaries of weather and other natural phenomena as well as with man-made facilities and management associated with floods on streams. Therefore, there is no completely "fail-safe" flood control method. However, as indicated in answers to questions above, especially "a" and "b", there would be no significant change in the flood boundaries, due to addition of project water to receiving streams. Managers of project water supply would monitor flows in streams and would not add water to already overloaded streambeds.

n. Are models available that show:

i. Monitoring of flow, erosion, sedimentation, and water quality in receiving streams?

ii. Flood control methods to be used on each stream?

Answer: Rather than models, per se, engineering studies have been conducted, including hydrologic and hydraulic analyses of the stream and lake

system to calculate the expected impact of the project on existing conditions. The data shown in answers to questions "a" and "b" were determined from these studies.

o. How could people and property be evacuated during flood warnings and during flood conditions?

Answer: As shown in the responses to questions "a" and "b", above, flooding caused by pumping project water into receiving streams is very unlikely. Even if pumping continued during a flood period (which would be unnecessary since the streams would have adequate flow for water supply), the percentage of the total flow would be insignificant (i.e. about one percent during a 50-year frequency flood). Consequently, the necessity to evacuate people or property from flooded areas, due to project water being pumped into receiving streams, is highly unlikely. Evacuation warnings and procedures are, of course, necessary for floods likely to occur without the proposed project; development of these procedures is beyond the scope of this revised EA.

p. Who would monitor environmental effects of adding project water to receiving streams?

Answer: As noted in the answer to question "l" above, the sponsoring agency of a particular portion of the project would be responsible for its specific facilities and operational procedures, including prevention of inflicting adverse impacts on the environment. Regulatory agencies at local, state, and federal levels would continue to be responsible for preventing environmental damage related to their jurisdiction and so would monitor as necessary to fulfill their responsibilities.

6. Growth Inducement

Issue: Would the proposed project promote more land development or induce more growth in the project service area?

Response: DRBC used the same basic assumption used by U.S. EPA, Region III, in its FEIS for the Horsham - Warminster - Warrington, Pennsylvania Wastewater Treatment Facilities, May 1980, relative to population growth and land development in the proposed service area. That is, DRBC staff assumed that the comprehensive plans and growth management plans of the affected municipalities (and utilities) represent the policies and objectives practiced and sought by the municipalities in their efforts to guide future growth. The alternative systems presented by DRBC in its original EA and in this revised EA therefore were assessed to determine the extent of conformance with these municipal policies.

Impacts of the proposed project on land development and growth would be related to changes in population, per-capita use of water, inducement to develop undeveloped or agricultural land for residential, commercial, or industrial uses, and conformance with county and regional plans for the water service area. Changes in these factors would reflect in changes in land value, changes in use of the area's natural resources, changes in the socio-economic status of people in the area, and changes in the aesthetic aspects of the service area.

In addition to considering original reports by the county planning commissions and by the Delaware Valley Regional Planning Commission, DRBC reviewed carefully the report prepared by Pa.DER, Bureau of Water Quality Management, Division of Dam Safety and Waterworks, entitled "Report on the Application of Neshaminy Water Resources Authority for Water Allocation from Pine Run, North Branch Neshaminy Creek and Delaware River", November 1, 1978.

Among the several determinations evaluated in the report was whether "Water and water rights proposed are reasonably necessary for the present purpose and future needs of the public water supply agency making application."

In considering the applicant's need for more water (Pa.DER, Nov. 1, 1978, pp 8-16), the report analyzed population and water use by NWRA's consulting engineer, the Delaware Valley Regional Planning Commission, and Pennsylvania's State Water Plan. In text, tables, and a detailed map, by townships, the Pa.DER study "...finds that the DVRPC and the State Water Plan both agree with (NWRA's) consultant that there is a clear and pressing need for additional (or supplemental) water." PaDER's study "...concludes that the requested allocation of 40 mgd to the Chalfont treatment plant is needed to provide bulk water to meet the supplemental demands of the existing water supply systems. Just when more water is needed to meet the expanding development of the area, the existing sources (mostly wells) are deteriorating due to a declining groundwater table."

PaDER's study cited Section 7 of the Water Rights Act which "... requires that before granting an allocation, the Department (Pa.DER) determine that the proposed taking or exercise of water rights will not cause substantial injury to the Commonwealth." After analysis in text, tables, and a detailed map, pages 20 through 32, the Pa.DER study "...concludes that the present proposed allocation will not have a substantially adverse effect on the environment or cause substantial injury to the Commonwealth. Other agencies contacted essentially agree with this conclusion."

NWRA's Environmental Report (NWRA, Feb. 1979), evaluates public water supply demands, pages IV-1/IV-21. As noted above, NWRA's conclusions agreed closely with those of other responsible planning agencies in the area. Table 32,

pages IV-9/IV-11, tabulate the various population and water demand projections contained in each of the identified studies. The table presents the supplemental water demand that cannot be met by groundwater and which must be supplemented by surface water supplies within the NWRA service areas.

For the purpose of DRBC's EA for the proposed project, the projections used and the water demands derived by the several agencies listed above and consolidated in NWRA's Environmental Report are reasonable and consistent with the planning objectives of the agencies involved. Also, since the availability of groundwater in much of the service area has become even more severe since trichlorethylene was discovered in numerous municipal wells, it appears that the most feasible alternative to supply supplementary water to meet the demand in the service area would be importation of surface water from the Delaware River. This conclusion is consistent with the "Responce to Issue 3", page 40, of EPA's Horsham - Warminster - Warrington FEIS, (EPA, May 1980) that states:

> "A long-range potential for water supply lies with the Point Pleasant pumpover from the Delaware River to the Schuylkill River for the Limerick Nuclear Power Station. If this project is approved and implemented, Warminster Township and other Bucks and Montgomery County municipalities would benefit by being able to receive water along the conveyance route."

Chapter V of NWRA's Environmental Report, pages V-1/V-46, evaluates probable impacts of the proposed project. Tables No.35,36,37,38, and 39 discuss beneficial impacts, adverse impacts, and remedial, protective and mitigating measures as they relate to a list of factors, including land use, economics, aesthetics, wildlife, recreation, and social considerations.

NWRA's Environmental Report concludes that "...local control by each muncipality through its zoning powers can ensure controlled growth within its

boundaries." NWRA recognizes "...these proper municipal powers...and will continue to (recognize these powers) in their future planning process." (p.V-32).

The potential for the project to encourage land development has been a major concern of the sponsors and of DRBC. For example, DRBC docket number D-65-76 CP (3), March 17, 1971, allocated a finite amount of water to Central Bucks and Montgomery counties with the expectation that any request for an increased allocation of water in the future would be subject to a thorough analysis of water demand and supply situation at that time.

It should be clear that NWRA is seeking approval to divert less water than the sponsor originally requested. For example, NWRA is seeking approval to divert up to 40 mgd, which is the ultimate capacity of the North Branch Water Treatment Plant in 2010. This is a substantial reduction from the 72.6 mgd which was originally requested and approved by DRBC in 1971.

If growth of development is associated with supply of water provided, it follows that the growth previously anticipated and approved has been reduced by about 50 percent. This indicates that the size of the proposed project has been revised to correlate with the population and growth of development expected for the water service area.

DRBC staff agrees with EPA and NWRA that the growth management plans of the affected entities represent the objectives sought by those entities in their efforts to guide future growth and that local control by each municipality through its zoning powers can ensure controlled growth within its boundaries. DRBC staff assumes that the applicants (NWRA and PECO) have requested water supply to meet demands of their respective service areas after consultation with entities affected in their respective service areas. References cited indicate that the applicants have given full consideration of the impacts

of the proposed project on those factors that would change, for better or for worse, in the service areas and that the consequent land development and inducements for growth that may be associated with the proposed project are consistent with the wishes of the policymakers in the service areas.

7. Aesthetic Impacts

Issue: Would the proposed project be associated with aesthetic damage to the Village of Point Pleasant, to farmland, and to the general ecosystem throughout the service area?

Response: Chapter V of NWRA's Environmental Report (February 1979) lists and discusses "Remedial, Protective, and Mitigating Measures" for each of the component parts of the Neshaminy Water Supply System. Those measures pertain to disruptions during the construction period (short term) and impacts that would persist after construction ceases (long term).

On pages V-18/V-20 of its ER, NWRA outlines mitigating measures for dealing with short term and long term impacts related to the Point Pleasant Intake and Pumping Station. The measures speak to noise, traffic, endangered and threatened species of plants and animals, siltation, and effects on spawning - nursery areas for fishes. NWRA proposes to meet the latest EPA design criteria to minimize adverse impacts. For example, water velocity at the traveling screens on the water intake structure would be limited to no more than 0.5 foot per second; the structure covering the pumping facilities would be a barn-like design that would blend with the surrounding environment and pump noise would be muted by enclosing the pumps which would be built into the terrain. Since the bulk of the pumping facilities would be underground or underwater and those above ground would be landscaped to minimize their visual impact, there seems to be little likelihood of significant aesthetic damage to the Village of Point Pleasant in the long term.

As indicated on pages V-3 through V-30 of NWRA's ER, alignment of future rights-of-way were selected with consideration to minimize disruption of communication to residential or service developments; wildlife habitats would be re-established; mains, when crossing streams, would be installed below stream beds; rights-of-way would be seeded where practicable and agriculture in appropriate areas could continue over the pipelines which would be buried at least three feet underground. Since there would be minimal disruption of aesthetic qualities during construction and operation and as complete restoration as practicable after construction, there appears to be an acceptable tradeoff if the project is completed and adverse impacts are mitigated as planned.

It is very unlikely that any vibration will be noticed by persons even when close to the pumping area. All five pumps, as they are installed individually, will be required to meet the vibration tests specified by the Hydraulic Institute of Cleveland, Ohio, which are the standard tests for installation of pumps nation-wide.

The verticle turbine pumps, with an electric motor on top connected by a shaft to the pump underwater, would be relatively slow speed (about 1185 rpm). They will be mounted vertically on a specially designed concrete floor with a steel ring around the base of each pump. Vibrations, if any, would be transmitted through the floor and the wall support structure well down into the solid rock substructure.

The pumps would be connected to a concrete-embedded manifold by flexible-joint Dresser Couplings. The manifold would be connected to the transmission main by an additional flexible-joint Dresser Coupling. This arrangement would effectively isolate the pumping units from the transmission main.

8. Archaeological And Historical

Issue: Would archaeological artifacts or historical landmarks be disturbed by construction or operation of the proposed project?

Response: The Pennsylvania Office of Historic Preservation has re-examined the proposed project and by letter, April 3, 1980, informed DRBC staff that "the proposed project will have an adverse effect on the Delaware Canal, and the potential historic district". This judgment conflicts with an October 10, 1979 letter from that Office which was referenced in the EA and stated that no important historic or archaeologic sites would be adversely affected, except for the Delaware Canal.

In the April 3, 1980 letter, Edward Weintraub (State Historic Preservation Officer, SHPO) directs DRBC, as the lead federal agency, to request a determination of eligibility for listing the historic district on the National Register of Historic Places, and to submit a preliminary case report to the Advisory Council on Historic Preservation. Staff of the Historic Preservation Office have verbally indicated their belief that the project could ultimately proceed once the proper review procedures are followed and appropriate mitigation (similar to that proposed in the NWRA Environmental Report and the EA) instituted.

The district proposed by the SHPO, which includes the village of Point Pleasant and portions of adjacent Plumstead and Tinicum Townships, contains approximately 190 structures--85 of which are pre-1900. According to a report of the Bucks County Conservancy, submitted by the SHPO in support of the historical significance of the area, an 18th and early 19th century atmosphere is merged with a mid-19th century setting in the district.

DRBC staff is negotiating with the staff of the U.S. Army Corps of Engineers, Philadelphia District, to implement the procedures necessary to determine if the project area is eligible for nomination and inclusion in the National Register. Broadly, these procedural steps are as follows:

a. With technical assistance and agreement from the Pennsylvania Historic Preservation Office, COE would make formal application to the Keeper of the National Register that the area cited in the SHPO's documentation be declared eligible for addition to the National Register.

b. The Keeper of the National Register has 10 days to respond to the application. If he does not respond within 10 working days, the area is automatically eligible.

c. If the Keeper determines the area is eligible or included in the National Register, the Rules and Regulations* of the federal Advisory Council on Historic Preservation (ACHP) become binding on the Corps.

d. ACHP would review the nomination form and would require determination of the probable effects of the proposed project on the eligible area. If there would be adverse impacts that could not be avoided, ACHP would determine mitigating measures necessary to minimize the adverse effects associated with the presence of the project.

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*Federal Register, Vol.44, No.21, January 30, 1979, pages 6068 et. seq. Part 800 - Protection of Historic and Cultural Properties.

In its Environmental Report, Section IX, (PECO July 1979) PECO presents results of a detailed study and field investigation in late 1978 to determine if the proposed facilities would destroy or encroach on any items of archaeologic value. The investigation relates to Bradshaw Reservoir and the entire route of the Perkiomen Transmission Main. The investigators found nothing that would be eligible for nomination to the Historic Register.

DRBC staff agrees with the conclusion of the Pennsylvania State Historic Preservation staff that the project could proceed once the proper review procedures are followed and appropriate mitigation measures instituted. If the mitigative measures outlined in NWRA's Environmental Report are implemented, there should be no significant adverse impact on archaeological artifacts or historical landmarks associated with construction and operation of the project.

9. Rock Blasting Impacts

Issue: Would blasting hard rock during construction cause widespread damage to wells, foundations, utilities, and other structures?

Response: In a letter to Mr. Gerald Hansler, Executive Director, DRBC, dated May 14, 1980, Mr. Robert Flowers, Executive Director, NWRA, stated "The NWRA intends to take all necessary measures to protect the safety and property of all residents near the proposed construction." Enclosed with Mr. Flowers' letter was a letter dated May 9, 1980, from Mr. Robert H. Davis, Blasting Consultant, to Mr. E.H. Bourquard, E.H. Bourquard Associates, Inc., and specifications for blasting for construction of the Point Pleasant Pumping Station.

Among other specifications, in the three pages of specifications, are instructions to:

> "Design all blasts to a minimum powder factor of one (1) and a maximum peak particle velocity of 0.5 inches per second and a minimum scaled distance of 50. The blast hole diameter shall be 2-1/2 inch maximum. The noise level shall not exceed 132 decibels linear peak."

Additional specifications cover seismograph readings, stemming material, notification of blasting operations, safety precaution measures, pre-blasting surveys, written reports and a survey to determine whether the excavating or mining would affect the water wells in the area.

In his covering letter, Mr. Davis cites his 14 years of experience in this field which has revealed that particle velocities less than 0.5 inches per second do not cause structural damage. Mr. Davis' only concern pertained to existing relatively shallow wells where excavation may lower the groundwater tables temporarily during construction. He expressed the opinion that

blasting operations would not affect these wells and that the excavation would not be to sufficient depth to have a drastic effect.

DRBC also retained consultants to perform a geotechnical investigation relating to the impact of using explosives in construction of the proposed project.

The study for DRBC by Converse Ward Davis Dixon, Inc., entitled "Report On Evaluation Of Rock Excavation And Impact Of Blasting For The Proposed Point Pleasant Pumping Facilities, Point Pleasant, Pennsylvania", dated May 20, 1980, concluded that:

> "...with minor exception, the rock (argillite and diabase) will require blasting in order to install the pumping station and the pipe lines. However, it is our opinion that the blasting can reasonably be controlled in both rock types so as to result in no noticeable damage to the nearby structures or water wells."

Among specific conclusions and recommendations in DRBC's consultant's report (page 16) are the following:

> "3. For no noticeable damage to the residential structures, the ground vibrations produced by blasting should not exceed 1.0 in./sec. at the structure nearest to the blast.
>
> 4. Based on our evaluation, we conclude the following concerning wells:
>
> a. If peak velocities at the nearest house are kept at 1.0 in./sec. or lower, adverse effects on well yield are highly unlikely.
>
> b. If sealing grouts of wells are currently functional and uncracked, the potential for cracks developing as a result of controlled blasting and inducing surface pollution is highly unlikely."

DRBC's consultant's recommendations are conservative compared to some of the references listed in their report. For example, the U.S. Department of the Interior, Bureau of Mines, recommends a safe blasting criterion of 2 in./sec. for structures similar to those in the subject project area. The Commonwealth of Pennsylvania (Regulation 715.19, Reference No.7 on Table One) recommends a criterion of one in./sec. or less with a minimum scaled distance of 60. The most conservative of the references cited is the New Swiss Standard (Reference No.6 on Table One) which recommends 0.5 in./sec. for buildings with wooden ceilings and masonry walls, in the frequency range of 10-60 Hertz.

The specifications proposed by NWRA's consultant (Mr. Robert H. Davis, cited above) are well within the criteria set by DRBC's consultant (Converse Ward Davis Dixon, cited above). Mr. Davis' recommended specifications are similar to the New Swiss Standard which is the most conservative of the references cited by Converse Ward Davis Dixon. Since both consultants agree that no significant damage would occur if blasting is performed according to the prescribed specifications, we conclude that this part of construction would not impose an unacceptable adverse impact on the environment.

10. Emergency Services

Issue: Would there be interference with emergency services because of road blocks and electric wires which would interrupt radio frequencies?

Response: Page V-23 of NWRA's Environmental Report (February 1979) states:

> "There will be detours available for local roads affected by construction of the main. At intersections of major roads, construction will be designed so that one lane of traffic will be maintained and kept open all the time."

This assurance is repeated in the tables throughout Chapter V which document beneficial and adverse impacts and mitigating measures to alleviate adverse impacts. Also, a spokesman* for Pa.DER indicated that the River Road would be kept open at all times during construction, with a temporary road installed when pipes are laid.

Mr. John Mo[illegible]l, PECO (telephone call 30 April 1980), stated that the electric wires installed to power the pumping station would be standard in all respects and that such installation would not interfere with normal operation of household appliances, citizen band radios, and the like. He said that any unusual problem that might arise would be dealt with promptly by PECO so that interference, if any, would not persist.

In light of the applicants' willingness and ability to prevent interference with emergency services, there appears to be little likelihood of such interruption.

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*Oral communication from R. Timothy Weston, Associate Deputy Secretary for Resources Management, Pa.DER, to [illegible]. M. Hansler, Executive Director, DRBC.

11. Conservation

Issue: Should DRBC emphasize conservation of water resources, especially as outlined in DRBC's Level B Study, rather than approve the proposed project?

Response: DRBC's Water Code, Delaware River Basin, July 1978, Article 2, outlines DRBC's policy concerning conservation, development, and utilization of Delaware River Basin Water Resources. Section 2.1.1 of the Code states that DRBC will undertake a long-range continuing program to reduce water use throughout the basin. Specifics of this policy are spelled out in DRBC's Resolution No. 76-17 which amends DRBC's Comprehensive Plan by addition of policy on the conservation of water, as follows:

> "1. The Commission will undertake a long range continuing program to reduce water use throughout the basin for the purposes of:
>
> (a) reducing the likelihood of severe low stream flows that can adversely affect fish and wildlife resources and recreational enjoyment;
>
> (b) assisting in the maintenance of good water quality by the provision of minimum dilution flows and repulsion of salinity; and
>
> (c) deferring the need for construction of new storage reservoirs and other water supply structures.
>
> 2. It shall be the policy of the Commission (a) to require maximum feasible efficiency in the use of water by new industrial, municipal and agricultural users throughout the basin, and (b) to require eventual application of those water-conserving practices or technologies that can feasibly be employed by existing water users."

Section 2.5.2 of the Code states that during drought emergencies DRBC will give first priority to those uses which sustain human life, health, and safety, and second priority to water needed to sustain livestock. The remaining water will be allocated among producers of goods and services, food and fibers, and environmental quality in a manner designed to sustain the general

welfare of the basin and its employment at the highest practical level.

DRBC dockets include the following standard conditions for municipal wells and surface water and for industrial wells and surface water:

> "(PA. and N.J. MUNICIPAL WELLS AND SURFACE WATER)
> The applicant shall develop a program to monitor all water supply facilities including storage and distribution systems for leakage. The program must be approved by the Commission and the monitoring results shall be submitted within six months of this approval and thereafter as requested by the Commission. The applicant shall proceed expeditiously to correct leakages identified by the monitoring.
>
> The applicant shall adopt and implement, to the satisfaction of the Commission, a continuous program to encourage water conservation in all types of use within the area served by this allocation permit. The applicant will report to the Commission on the actions taken pursuant to this program and the impact of those actions, on or before March 31 of each year in Pennsylvania and within six months of this approval in New Jersey."

> "(PA. and N.J. INDUSTRIAL WELLS AND SURFACE WATER)
> The applicant shall develop a program to monitor all water supply facilities including storage and distribution systems for leakage and to review all water uses for possible reduction. The program must be approved by the Commission and the monitoring results shall be submitted within six months of this approval and thereafter as requested by the Commission. The applicant shall proceed expeditiously to correct leakages and unnecessary usage identified by the monitoring.
>
> The applicant shall adopt and implement, to the satisfaction of the Commission, a continuous program to encourage water conservation in all types of use within the facilities served by this allocation permit. The applicant will report to the Commission on the actions taken pursuant to this program and the impact of those actions, on or before March 31 of each year in Pennsylvania and within six months of this approval in New Jersey."

In its "Report on the Application of Neshaminy Water Resources Authority for Water Allocation...", page 33, (Pa.DER, Nov.1, 1978), Pa.DER cites Section Seven of Pennsylvania's Water Rights Act which requires consideration of the extent of conservation development and use to the best advantage of existing sources of water supply before an allocation request is approved. The report also considers controls that would tend to encourage conservation of water,

such as charges for water, metering, control of leakage, public relations programs, and other conservation practices.

DRBC, in its preamble to Resolution No.76-17, states goals of a balanced program of water management with measures to reduce water demand and cites the Compact which seeks to bring about "increasing economies and efficiencies in the use and reuse of water resources" (Section 1.3(d)) and to "encourage and provide for the conservation...of the water resources of the basin" (Section 1.3(e)).

Since DRBC already emphasizes conservation of water throughout the basin and since conservation clauses would be included in the dockets for both NWRA and PECO applications for the subject project, further emphasis on water conservation would not eliminate the applicants' expressed need for water supply.

12. Alternatives

Issue: Should there be further study of alternative sources of water supply and electricity?

Response:

Water Supply.--Some of the letters contend that there is adequate groundwater to supply the service area if it is properly managed and if land development does not accelerate.

In recent years the Delaware River Basin Commission has received numerous objections or expressions of concern regarding new or existing ground-water diversions, especially to wells located in Bucks, Montgomery and Chester Counties. The complaints have come from a variety of sources: private citizens, civic associations, environmental groups, state agencies, county governments, township governments, water authorities, water companies, watershed associations and state and federal representatives. In response to various allegations, the Commission or its staff have held lengthy advisory hearings, public hearings, and investigations; and also have required prolonged pumping tests, monitoring programs, and preparation of complex reports by applicants.

In 1970, Mr. Henry C. Barksdale prepared a report for the DRBC entitled "A Program for the Investigation and Management of Ground Water in the Delaware River Basin" in which he identified the Triassic portion of the basin as being one of the highest priority areas in need of quantitative ground-water resources investigation. Also previous and ongoing reports,

such as: the Pennsylvania State Water Plan, the Pennsylvania Comprehensive Water Quality Management Plan, the New Jersey Statewide Water Supply Master Plan, the Mercer County 208 Study, the DRBC Level B Study, and studies prepared for or by various county and local governments, have identified the Triassic Lowlands section of the basin as a region in which well pumpage is approaching development limits.

On September 22, 1976, Mr. Edward J. Welch, Manager, North Wales Water Authority, in a letter to Mr. Joseph V. F. Clay, III, Water and Sewer Coordinator, County of Montgomery, Public Facilities Department, stated:

> "...we are able to rest a few of our wells for three (3) or four (4) hours in early morning hours. ...as the ground water level drops we are forced to cut back on the pumping rate.... ...should anything happen to any of our wells or pumping equipment we would be in an immediate crisis situation with no reserve capacity.... ...problems are cropping up in a summer of minimum rainfall, but should severe drought conditions be brought on by a complete lack of rainfall, then very strong and urgent actions would be required, approaching...rationing and lack of water in the mains...."

On January 24, 1977, Mr. Harry J. Borchers, Jr., Executive Manager, North Penn Water Authority, in a letter to Mr. Joseph V. Clay, III, Water and Sewer Coordinator, County of Montgomery, Public Facilities Department, stated:

> "The...Authority cannot stress enough the seriousness of the present water situation. Well capacities, between January 1, 1976, to January 1, 1977, dropped approximately 40%. The water table is still dropping at an alarming rate. ... Anything the County can do to encourage the interconnection with a surface supply will be greatly appreciated."

On March 24, 1980, DRBC started studies of ground waters throughout the four-state basin area with special emphasis that includes sections of Montgomery and Bucks Counties that have experienced periodic lowering of water tables, dry wells, and water quality problems.

On April 25, 1980, DRBC proposed to designate a "ground water protected area" that would include all of Montgomery County and a large portion of Bucks County where new restrictions and regulations would be imposed to reverse recent over-depletion trends. In the proposed protected area, DRBC would expand its permitting powers to cover any wells drawing 10,000 gallons or more daily. Two of the program's major goals are to protect owners of existing wells from infringement, and to prevent reduction of flow in perennial streams.

About one million persons live in the proposed protected areas and groundwater withdrawals there either exceed, or threaten to exceed, sustainable yield of local groundwater basins. For example, in some areas dry-year recharge rates can support only two to four persons per acre, but population density in many parts of the region ranges to 14 persons.

The protected area designation would be an interim measure expiring July 1, 1983, or one year following conclusion of investigations. Evidence at hand indicates a clear need for additional surface supplies to augment ground-water supplies in the Montgomery/Bucks Counties' service area that would be supplied by the Neshaminy Water Supply System. The basin-wide investigations are to help DRBC produce a four-state management program for all subsurface water supplies, including those where the protected area designation is under consideration.

Section 2.3, page 2-26 of DRBC's EA, summarizes alternatives considered by both the Neshaminy Water Resources Authority and the Philadelphia Electric Company for their respective water supplies. More detail is presented

in the applicants' respective reports. In NWRA's environmental report (February 1979) all 53 pages of Chapter VI are devoted to this subject. In PECO's environmental report update (July 1979), Section III is devoted to this subject. Alternatives to the proposed project are also discussed in the testimony of Mr. Timothy Weston, Assistant Attorney General, Pa.Der, at the public hearing held by NWRA, in Warrington, Pa. on May 30, 1979 (NWRA, Transcript, May 30, 1979). A summary of alternatives covered in the above references is as follows:

No action.--Water users in these service areas would be forced to rely on existing water supplies for present and future water needs. There would be essentially the same adverse impact on the environment as with further development of groundwater by continuing to over-subscribe available supplies to the service area, so "no action" is not considered a favorable alternative.

Further development of ground water.--If ground water is to be managed as a replenishable resource, withdrawals must not exceed ground water recharge. Much of the subject service area is already overpumping ground water. A water system dependent upon wells could lead to further exacerbation of the expanding ground water mining problem. New wells are likely to create local interference with existing homeowner wells. Artificial recharge in this service area does not appear feasible since water to do so is only available when the water tables are high. Storage in the ground is only available during dry periods, which is when there is no water available to put into the ground water basin. For these reasons, and others discussed in detail in references cited, further development of groundwater is not considered a desirable water supply alternative for the area.

Lake Nockamixon.--Water supply usage of the lake would result in large drawdowns that would reduce the usefulness of existing recreation facil-

ities. Also, use of this lake for water supply would restrict its capacity to provide an emergency source of water during periods of severe drought. So long as recreation use of the lake has first priority, it is not considered a viable alternative for water supply for the subject service area.

Schuylkill River.--Water from this river is used and resused close to its practical limits. Agricultural, industrial, municipal, and other uses limit supply available for the subject service area. Opportunities for developing additional storage to increase flow is very limited. Increased use of the river's water would contribute to deterioration of the quality of the water. For these reasons, among others discussed in the references, the Schuylkill River is not considered a viable alternative for water supply for the subject area.

Evansburg Reservoir --This reservoir has not been authorized or funded but if it were built it could serve some of Montgomery Countys' water service area. However, the reservoir would supply only 13 mgd which would not meet the demand of the service area. Considering the stage of planning for this reservoir, its relatively small yield, and the high cost of its water, Evansburg Reservoir is not a viable alternative.

Susquehanna Basin.--Because this water would need to be imported from another major river basin, and because of the great distance the water would need to be transported, and the complicated legal obstacles related to inter-basin transfer of water, as well as high costs involved, this is not a viable alternative for water supply for the subject service area.

Independent Water Supply Projects.--The Central Montgomery County Water Supply Study, by Gannett Fleming Corddry and Carpenter, Inc. (GFCC, Jan.1980), page 102, recommends that North Penn Water Authority and North Wales Water Authority "...jointly adopt an independent Montgomery County water supply project."

If Montgomery County withdraws from the project, as it is described in NWRA's application to DRBC (NWRA, June 1979, DRBC EA), two more options are possible: 1) Bucks County and PECO could join forces to build a project to supply water to those two entities or 2) each of these entities could also adopt an independent water supply project.

Well publicized negotiations among officials of Bucks and Montgomery Counties indicate that they have not reached final agreements on contracts for water supply from the proposed project. However, Bucks County and PECO have reached such agreements. The outcome of final agreements among the three potential applicants could indicate what options they prefer to follow.

As indicated in DRBC's EA, pages 2-30 and 2-31, after analysis of several alternative pipelines from the Delaware River to the East Branch Perkiomen Creek, reservoir alternatives, and groundwater alternatives (PECO July 1979, DRBC EA, pp III-3,4), PECO concluded that the joint facilities would result in annual cost savings of more than 20% for Bucks County and 10% for PECO as well as providing advantages in operating flexibility and reliability. Since the joint project also would require 2 fewer miles of total right-of-way than the combined individual facilities, the proposed project is superior to the most preferred alternate pipeline route. Also, the joint facilities would result in only one intake/pumping station on the Delaware River to serve several users rather than a series of stations, each having a single purpose. A new reservoir in the Schuylkill River Basin would have a greater environmental impact, larger land use, and higher cost than the proposed pipeline system. The use of groundwater or existing reservoirs is not feasible since insufficient supplies of water to meet PECO needs are available.

Since the source of water for each of these options appears to be the Delaware River, DRBC staff prefers to develop a single regional plan that would impose fewer adverse impacts on the total environment. Also, it seems clear that the hydrologic and geologic factors point to joint use of water aquifers and surface stream watersheds by water users in Bucks and Montgomery Counties. For these reasons, to say nothing of additional total financial cost of building separate systems, independent water supply projects for the subject service area is not considered a viable alternative.

Electricity.--Since the application before DRBC is for water supply to cool PECO's Limerick Nuclear Generating Station, DRBC's Environmental Assessment addresses alternative water supply for that purpose. The issue of alternative sources of electricity to supply PECO's service area was a proper subject in AEC's original EIS, as were other issues related to the Limerick Station. The issue will be reviewed in the hearings to be held by NRC in relation to its consideration of issuing an operating license for the station.

Alternative energy sources and sites are covered in Section 10 of AEC's original EIS (U.S. AEC, Nov. 1973). These sources and sites include alternatives not requiring creation of new generating capacity; alternatives requiring creation of new generating capacity; and evaluation of site and energy-source options such as site selection, hydroelectric generation, coal, oil, gas, and nuclear fuel. These subjects, plus others related to recent energy production controversies, are likely to be subjects aired in public hearings to be held by NRC.

13. Financial Plan

Issue: Should DRBC complete a detailed financial plan to construct and operate the project, including social and economic costs?

Response: Since DRBC is a wholesaler of water, it does not have jurisdiction over retailing of water which, in the case of the Neshaminy Water Supply System, is the prerogative of the applicant, the Neshaminy Water Resources Authority. The Delaware River Basin Compact states, in Section 4.5, that "... the commission shall have power to provide storage, treatment, pumping and transmission facilities, but nothing herein shall be construed to authorize the commission to engage in the business of distributing water." Consequently, financial arrangements negotiated by an applicant for construction and operation of its facilities, or for retail sale of its water are beyond the jurisdiction of DRBC. However, NWRA has documented data and analyzed financial arrangements that DRBC considered in its analysis of the proposed project.

Construction And Operation Costs.--Included in DRBC's EA, Table 2-2, page 2-16, is Document No.22 from NWRA's 3.8 application to DRBC for the proposed project; it shows installation costs, past expenditures, and future costs at the April 1979 price level. For convenience, that table is also included in this revised EA. The Agreement between NWRA and PECO, 12 February 1980, spells out the computation of service charges in part six. Operating costs of the project are defined in 6,E and are listed in Attachment II, Schedule of Costs. The numbers are not in the agreement because sharing of costs is to be based upon proportions of actual cost, now unknown.

TABLE NO. IV-12*

NESHAMINY WATER SUPPLY SYSTEM

ESTIMATED INSTALLATION COSTS

April 1979 Price Level

Name of Facility	Installation Costs	Past Expenditures	Future Costs
Point Pleasant Pumping Facilities			
Pt. Pleasant Pumping Station	$ 4,365,000		
Combined Transmission Main	3,015,000		
North Branch Trans. Main	795,000		
Total	$ 8,175,000	$ 370,000	$ 7,805,000
Reservoir PA-617			
Water Supply Cost	2,100,000	2,100,000	0
North Branch Water Treat. Plt.	19,010,000	1,230,000	17,780,000
Western Transmission Main	1,235,000	70,000	1,165,000
Southern Transmission Main	2,825,000	20,000	2,805,000
Administration & Overhead	620,000	420,000	200,000
TOTAL ALL ITEMS	$33,965,000	$ 4,210,000	$29,755,000

*DOCUMENT NO.22 From NWRA's 3.8 Application To DRBC For The Proposed Project

Social and Economic Costs.--Table No.35, page V-6 through V-11, of NWRA's Environmental Report (NWRA, February 1979) lists in detail beneficial impacts, adverse impacts and remedial, protective and mitigating measures associated with the N.B. Water Treatment Plant. The items evaluated include natural resources and man-made resources--including employment, traffic, noise, land, hunting, energy, aesthetics, lighting, historic and archaeological features.

Tables 36, 37, 38 and 39 evaluate the beneficial and adverse impacts associated with the Service Area Transmission Mains, Point Pleasant Intake and Pumping Station, Combined Transmission Main, and North Branch Main and North Branch Neshaminy Creek.

All of the other options for water supply were more expensive than the project proposed by NWRA and PECO and none of the other options had less environmental impact than the proposed project.

Applicants' Financial Arrangements.--The Delaware River Basin Compact is silent on whether the Commission will evaluate economic justification (benefit/cost analysis), determine financial feasibility (obtaining and repaying money for financial costs), or negotiate cost allocations (division of costs among beneficiaries) for those projects which come before the Commission in its function as a regulatory agency. In absence of specific directives, it has been the practice of DRBC to confine its analysis of the applicants' proposed action to conformance with DRBC's Comprehensive Plan and the project's impact on the environment and not to evaluate those internal financial arrangements which are the responsibility of the applicant and its related entities.

14. Water for Limerick Nuclear Generating Station

Issue: Should water be diverted from the Delaware River for use by the Limerick Nuclear Generating Station?

Response: Under the heading "Scope of The Environmental Assessment", starting on page IV-5 of this revised EA is a discussion of DRBC contention that the Limerick Nuclear Generating Station is not an issue in this EA because of past decisions that have the effect of law and cannot be changed arbitrarily by DRBC staff. Also, the fact remains that, except for inefficient and prohibitively expensive dry cooling towers*, water will be necessary for cooling large electric generating stations regardless of the fuel used or their location in the basin.

DRBC staff also contends that concerns regarding further construction and operation of the Limerick Station should be addressed to the Nuclear Regulatory Commission since it is the agency that would issue a license to operate the station and will hold hearings and conduct investigations regarding that licensing.

Specific regulatory actions that have been taken that relate to the Limerick Nuclear Generating Station include the following:

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* EPA has indicated that dry cooling towers cannot generally be applied to large electrical generating units due to the significant loss of plant efficiency which results. (Sec: 39 Federal Register 8296, October 8, 1974)

a. Delaware River Basin Commission. Final Environmental Impact Statement on the Point Pleasant Diversion Plan, Bucks and Montgomery Counties, Pennsylvania. February 1973.

This Final EIS concluded that the proposed project would be beneficial to the Neshaminy and Perkiomen watersheds and not detrimental to the Delaware River provided that specific, listed mitigating measures were observed.

b. Delaware River Basin Commission. Docket No. D-69-210CP; Philadelphia Electric Company, Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania. March 29, 1973.

This Docket deferred including the project in the Comprehensive Plan or Section 3.8 review pending completion of an environmental impact statement as required by law. It conditionally approved, within the limitations of the findings of the docket, the water supply features of the project subject to a specific list of conditions.

c. United States Atomic Energy Commission, Directorate of Licensing. Final Environmental Statement related to the proposed Limerick Generating Stations, Units 1 & 2. Philadelphia Electric Company. November 1973.

After weighing environmental, economic, technical and other benefits of the Limerick Generating Station Units 1 and 2 against environmental and other costs and considering available alternatives, the AEC concluded (page v, item 8) that the action called for under the National Environmental Policy Act of 1969 and Appendix D to 10 CFR Part 50 is the issuance of construction permits for the Limerick facility subject to a specific list of conditions for protection of the environment.

d. Delaware River Basin Commission. Resolution No. 76-13. A Resolution to initiate provision for supplementary water supply storage by certain atomic-fueled plants. September 30, 1975.

This Resolution resolved:

"1. Pursuant to the provisions of the conditions of Docket No. D-69-210CP and Docket No. D-73-193CP, the Commission has determined that provision of supplementary water supply storage is required as described in those conditions.

2. The applicants are hereby required to proceed to develop, or cause to be developed, an application under Section 3.8 of the Compact, supported by an environmental report in compliance with the Commission's rules and regulations, for the construction of the required supplemental storage. The application and accompanying environmental report shall be submitted by October 1, 1977."

e. Delaware River Basin Commission. Docket No. D-69-210CP (Final); Philadelphia Electric Company, Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania. November 5, 1975.

This docket approved the proposed project, as described in Docket No. D-69-210CP and as supplemented in this docket, for addition to DRBC's Comprehensive Plan pursuant to Section 3.8 of the Compact, subject to a list of specific mitigating measures and conditions. The decision, sheet 15, II, c requires:

"If...the storage will not be adequate for all projected needs of the Basin, the applicant will build or cause to be built, at its own expense, at a location approved by the Commission, a reservoir of sufficient storage capacity to assure the water supply needed for consumptive use by the Limerick plant, during periods when such use would reduce the flow in the Delaware River at the Trenton gage below 3,000 cfs. Storage and release of water in such facility will be under the Commission's regulation, at the expense of the applicant."

f. United States Court of Appeals for the Third Circuit. No. 75-1421, ENVIRONMENTAL COALITION OF NUCLEAR POWER, LIMERICK ECOLOGY ACTION, and DELAWARE VALLEY COMMITTEE FOR PROTECTION OF THE ENVIRONMENT, Petitioners, v. NUCLEAR REGULATORY COMMISSION and PHILADELPHIA ELECTRIC COMPANY, Respondents. On Petition to Review an Order of the Nuclear Regulatory Commission. Argued November 10, 1975, Before: ALDISERT, HUNTER and GARTH, Circuit Judges. Decided November 12, 1975.

That Court held invalid the contentions of the petitioners that the "...analysis by the Nuclear Regulatory Commission was incomplete and that the environmental effects associated with that mode of operating the Limerick Generating Station were not analyzed in accordance with the National Environmental Policy Act...." As a result, the water supply element of the Limerick Project may not be reviewed de novo within the scope of this environmental assessment unless there has been a major change in that element of the project. In fact, there has been no significant change in the design and proposed operation of the Limerick water supply element since the decision of the Third Circuit Court of Appeals.

The actions of the DRBC, ASLC and Third Circuit Court of Appeals, cited above, established the right of PECO to draw water from the Delaware for consumptive use at Limerick. As a result, there is no basis to include this element of the Limerick project in the scope of the EA.

Concerns regarding further construction and operation of Limerick should be addressed to the Nuclear Regulatory Commission (NRC) who must review and decide on any remaining permits. As scheduled, PECO intends to submit its safety analysis report to NRC in August 1980. The report must be submitted 30 months prior to NRC's issuance of an operating license. That schedule indicates that interested parties may have until early 1983 to be heard concerning operation of the station. Construction of the multi-billion dollar Limerick Station is more than half complete.

PART V.

APPENDIXES

APPENDIX A

SUMMARY OF PUBLIC COMMENTS
NORTH BRANCH WATER TREATMENT PLANT
AND RELATED COMPONENTS

This chart summarizes the most frequently mentioned issues in responses received in 409 communications concerning the Executive Director's intention to issue a finding of no significant adverse impact (negative declaration) for the North Branch Water Treatment Plant and Related Components, Bucks and Montgomery Counties, Pennsylvania. These communications were received by 5:00 p.m., March 12, 1980, the deadline set in the "Notice of Intent".

There were 409 communications (mostly letters) and 644 signatures (written or accepted by telephone). The number of letters and signatures related to a given issue are listed by number and as a percentage of the total number. The issues are ranked according to the frequency mentioned. For example, 197 letters, or 48.2% of the total, requested a new EIS; 253 signatures, or 39.3% of the signatures requested an EIS. By percentage of letters written this was the number one issue; by percentage of signatures, this was the number three issue.

	Number and Percentage of Responses					
	Letters		Signatures			
	No.	%	No.	%		
Responses Received	409	100	644	100		
ISSUES DISCUSSED					RANKING	
	No.	%	No.	%	Letters	Signatures
1. PREPARE AN EIS Request a new EIS.	197	48.2	253	39.3	1	3
2. LOW WATER IN DELAWARE RIVER Diversion would cause low water and ecological damage to the Delaware River.	167	40.8	294	45.6	2	1
3. NO WATER FOR NUCLEAR STATIONS Do not want water diverted for use by Nuclear Generating Station.	163	39.8	188	29.2	3	5
4. ADVERSE IMPACT ON AQUATIC BIOTA Project would be detrimental to aquatic biota and to recreation, including fishing, in the Delaware River, East Branch Perkiomen Creek, and North Branch Neshaminy Creek.	149	36.4	286	44.4	4	2
5. AESTHETIC DAMAGE Project would generate aesthetic damage to village of Point Pleasant, to farmland, and to general ecosystem throughout the service area. Would also create noise.	116	28.4	223	34.6	5	4
6. ALTERNATIVES Need further study of alternatives for electricity and water supply.	92	22.5	113	17.6	6	7
7. FINANCIAL PLAN Need a complete and detailed financial plan to construct and operate the project including social and economic costs, changes in the tax structure, payments for liability, and mistakes related to generation of nuclear power.	59	14.4	116	18.0	7	6

ISSUES DISCUSSED	Number and Percentage of Responses				RANKING	
	Letters		Signatures			
	No.	%	No.	%	Letters	Signatur
8. EIS BY ANOTHER AGENCY Request EIS by another agency, such as U.S. Army COE or EPA.	56	13.7	96	14.9	8	8
9. ARCHAEOLOGICAL & HISTORICAL The Delaware Canal (Roosevelt State Park), a national historic landmark would be compromised. Also, archaeological artifacts and historical landmarks would be disturbed.	50	12.2	57	8.9	9	10
10. ADDITIONAL INFORMATION The public needs more information, more time to respond, more references, more maps, and some agencies were not consulted.	37	9.1	61	9.5	10	9
11. DRBC CONFLICT OF INTEREST DRBC has a conflict of interest because it receives money for water sold and has promoted the project.	33	8.1	37	5.8	11 (tie)	12
12. ADDITIONAL RESERVOIRS The project would require additional reservoirs and other facilities upstream and on tributaries to provide water during periods of low flow.	33	8.1	33	5.1	11 (tie)	13
13. WATER QUALITY The project would have an adverse impact on water quality throughout the service area. Specifically, studies should be made regarding temperature, salinity, chlorine, trihalomethanes, trichloroethlene, and lead levels in and below Lake Galena.	32	7.8	33	5.1	12	13

ISSUES DISCUSSED	Number and Percentage of Responses				RANKING	
	Letters		Signatures			
	No.	%	No.	%	Letters	Signatur
14. LAND DEVELOPMENT Project would promote more land development, including housing and industry.	29	7.1	39	6.1	13	11
15. DAMAGE FROM BLASTING Blasting the hard rock during construction would cause widespread damage to wells, foundations, utilities, and other structures.	26	6.4	30	4.7	14	14
16. AWAIT COMPLETION OF RELATED STUDIES DRBC should wait for completion of related studies such as the "Good Faith Negotiations", DRBC's groundwater study, COE's salinity study, and the Merrill Creek EIS.	23	5.6	23	3.6	15	16
17. EMERGENCY SERVICES There would be interference with emergency services because of road blocks, electric wires which would interrupt radio frequencies, powerlines for pumping stations, etc.	19	4.7	24	3.7	16	15
18. FLOOD DAMAGE DRBC should study related flood damage and stormwater runoff.	18	4.4	20	3.1	17	17
19. SCOPE OF NEW EIS DRBC should enlarge the scope of the study to include the Limerick Nuclear Generating Station or the Merrill Creek Reservoir or both. Also, the scope should include integration with DRBC's Comprehensive Plan and Level B Study.	10	2.4	18	2.8	18	18
20. CONSERVATION DRBC should emphasize conservation of water resources, especially as outlined in DRBC's Level B Study.	9	2.2	9	1.4	19	19

APPENDIX B

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Headquarters Library By Appointment (609) 883-9500

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D-65-76CP (3)	Mar.17, 1971	Point Pleasant Pumping Station, Bucks County, Pennsylvania, Bucks County Commissioners.
D-69-210CP	Mar.29, 1973	Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania, Philadelphia Electric Company.
D-73-193CP	June 17, 1975	Hope Creek Generating Station, Lower Alloway Creek Township, Salem County, New Jersey, Public Service Electric and Gas Company.
D-69-210CP (final)	Nov.5, 1975	Limerick Nuclear Generating Station, Limerick Township, Montgomery County, Pennsylvania, Philadelphia Electric Company.

APPENDIX C

CONSUMPTIVE USE DATA FOR ELECTRIC GENERATING STATIONS IN THE DELAWARE RIVER BASIN FOR WHICH MERRILL CREEK RESERVOIR RELEASES WILL BE MADE WHEN THE FLOW AT TRENTON IS LESS THAN 3,000 CFS (YEAR 2000)

Electric Generating Station	Enter at Model Node	Avg. Cons. Use cfs	Merrill Creek Res. Replacement Flow cfs	Merrill Creek Res. Replacement Flow at Trenton cfs
Martins Creek #3 & #4	Riegelsville	10.4	10.4	0
Gilbert #8 & #9	Pt. Pleasant	16.5	16.5	0
Limerick #1 & #2	Pt. Pleasant	54.0	54.0	0
Eddystone #3 & #4	Chester	3.5	3.0	3.0
Chester #10 & #11	Chester	23.4	18.7	18.7
Edgemoor #5	Del. Memorial Bridge	3.2	1.9	1.9
Deepwater #10 & #11	Below Del. Memorial Bridge	9.4	.7	4.7
Summit #1 & #2 (or alternative)	Below Del. Memorial Bridge	19.8	6.4	6.4
Salem #1 & #2	Below Del. Memorial Bridge	23.0	5.0	5.0
Hope Creek #1 & #2	Below Del. Memorial Bridge	35.0	6.3	6.3
Total		203.2	126.9	46.0 1/

1/ Although this water from Merrill Creek Reservoir passes through the Trenton gage, its net effect is zero, since it merely offsets the consumptive use listed for the stations downstream.

APPENDIX D

PERTINENT DATA FOR NESHAMINY
WATER SUPPLY SYSTEM COMPONENTS, 1979

North Branch Water Treatment Plant

Location	Chalfont Borough
Design Output	
Initial	20 MGD
Ultimate	40 MGD
Site Area	29 acres
Structures	
North Branch Intake Dam	7 ft. high 95 ft. long
Pine Run Intake Dam	4 ft. high 55 ft. long
Storage Reservoirs	
Finished Water	5 MG 80 ft. high, 100 ft. dia.
Filter Wash Water	5 MG 80 ft. high, 100 ft. dia.
Sludge Storage Lagoons (3)	ea. 1.125 MG 140 ft. x 220 ft.
Buildings	
Raw Water Pumping Station	Chemical Feed & Storage Building
Pine Run Intake	Filter Gallery Building
Process & Administration Building	High Lift Pumping Station
Minimum Release Below Plant	5.3 MGD from 3/1 to 6/15 2.73 MGD Remainder of Year

Finished Water Transmission Mains

Western (See Exhibit No. 12 for the alignment)

The Municipalities Served are all in Montgomery County, except as indicated in Bucks County.

Boroughs

Chalfont (Bucks County)	Hatboro
Soudertown	North Wales
Hatfield	Schwenksville
Lansdale	Green Lane
Ambler	

Townships

New Britain (Bucks County) (Part)	Montgomery	
Marlborough	Horsham	
Salford	Upper Gwynedd	
Hanover	Lower Gwynedd	
Upper Frederick	Towamencin	
Lower Frederick	Worcester	(Part)
Upper Salford	Whitpain	(Part)
Lower Salford	White Marsh	(Part)
Perkiomen	Upper Dublin	(Part)
Skippack	Upper Moreland	(Part)
Franconia		
Hatfield		

Main Size — 36" and 30" dia. - 13,350 ft.

Northern (See Exhibit No. 15 for the alignment)

Municipalities Served (Bucks County)

Boroughs

Trumbauersville	Perkasie
Richlandtown	Telford
Quakertown	Silverdale

Townships

Milford (Part)	East Rockhill (Part)
Richland	Hilltown (Part)

Main Size 24" dia. - 21,500 ft. long

Southern (See Exhibit No. 13 for the alignment)

Municipalities Served (Bucks County)

Boroughs

Ivyland

Townships

Warwick	Doylestown (Part)
Warrington	Warminster

Main Size 30" dia. - 30,300 ft. long

Eastern (See Exhibit No. 14 for the alignment)

Municipalities Served (Bucks County)

Boroughs

Doylestown	New Britain

Townships

New Britain	Plumstead (Part)
Doylestown (Part)	Buckingham (Part)

Main Size 18" dia. - 25,200 ft. long

Reservoir PA-617 (See Exhibit No. 4)

Drainage Area	15.8 sq. miles
Lake Area, normal or recreational, also top of water supply pool	365 acres
Storage	
Flood Control	1,128 MG
Water Supply	1,629 MG
Conservation	382 MG
Total	3,139 MG
Embankment	Earth fill, 66 ft high, ½ mile long

North Branch Neshaminy Creek (See Exhibit No. 8)

Stream length from Reservoir PA-617 to North Branch Water Treatment Plant	
Length	11,200 feet
Drainage Area	4.4 sq. miles

Pine Run (See Exhibit No. 8)

Reservoir PA-616

Drainage Area	9.9 sq. miles
Lake Area	39 acres
Storage	
Flood Control	661 MG
Conservation	75 MG
Total	736 MG
Embankment	Earth fill, 30 ft. high, 2,600 ft. long

Point Pleasant Pumping Facilities

Delaware River Intake (See Exhibit No. 16)

Design Capacity	95 MGD
Type	Shoreline structure with trash racks and 3-10' wide traveling screens
Intake Conduit	60" dia. - 390 ft. long

Pumping Station (See Exhibit No. 16)

Design Capacity	95 MGD
Building	1 story, 65 x 45 ft. with gambrel roof, vertical board and batten aluminum siding and stone-faced walls
Pumping Units	4 vertical turbine rated at 24 MGD each

Combined Transmission Main (See Exhibit No. 16)

Design Capacity	95 MGD
Main Size	66" dia. - 12,850 ft. long

North Branch Transmission Main (See Exhibit No. 16)

Design Capacity	49 MGD
Size	42" dia. - 5,600 ft. long
Energy Dissipator	
Size	11 ft. high x 18 ft. long x 15 ft. wide
Construction	Reinforced concrete w/rip-rap erosion protection

North Branch Neshaminy Creek (See Exhibit No. 16)

Stream length utilized to Reservoir PA-617 (Lake Galena)	19,000 ft.

APPENDIX E

WATER QUALITY FACTORS ASSOCIATED WITH THE POINT PLEASANT DIVERSION (DRBC, September 1979)

I. Summary

The water quality of the Delaware River in the vicinity of Point Pleasant, Pennsylvania, is generally good. Data show it to have equal or better quality than either the East Branch, Perkiomen Creek or the North Branch, Neshaminy Creek. The net effect of introducing Delaware River water to these watersheds should be one of improvement, particularly to degraded downstream areas.

Withdrawal of water from the Delaware River should produce insignificant changes to water quality of that River.

II. Compatibility of Delaware River water.

The representative water quality of the Delaware River was developed by examining data from about 75 samples taken in the 1976 to 1978 period, and is presented in Table 1. Sampling locations were Frenchtown, N.J., Lumberville, Pa., and Lambertville, N.J. These data, in turn, were compared to the 1975 to 1978 data summary of Delaware River data taken by Philadelphia Electric at Point Pleasant (Table 5, reference 6). Overall the Delaware River in the vicinity of Point Pleasant exhibits good water quality.

Trends in water quality have been analyzed in previous DRBC reports (1-5). These reports indicate possible declines in phosphorus over time with other parameters relatively stable. A general trend towards better water quality, however, was indicated by a water quality index computed with 1973 to 1977 data from Trenton, N.J.

A. Compatibility with Perkiomen Creek

A comparison of Delaware River water quality with that available for the Perkiomen Creek headwaters (6) supports Philadelphia Electric's conclusion (6) that the quality of the upper East Branch is similar to that of the Delaware River.

One exception is noted. Generally ammonia concentrations appear to be lower and nitrate concentrations higher in the Perkiomen than in the Delaware River. This could suggest greater nitrification occurring in the former. Nothing suggests, however, that the introduction of a new source of ammonia (the Delaware River) will present problems, particularly with the increased flow. Oxygen consumption associated with the nitrification of this ammonia (if it occurs) is not likely to cause problems because of the low ammonia levels.

The previously cited Philadelphia Electric report and the recent COWAMP/208 Plan (7) analyses of the watershed cite degraded water quality from the Sellersville/Perkasie area to down stream. The introduction of Delaware River will undoubtedly be beneficial by augmentating low or intermittent flows and by diluting degraded water with good quality water.

Table 1

Representative Water Quality of the Delaware River

Dissolved Oxygen:

- Range: 3.4 to 14.3 w/mean of 10 mg/l. (only one value is less than 4.0 mg/l)
- "Typical" summer D.O. = 7.0 mg/l
- standard of not less than 4.0 mg/l
- Philadelphia Electric range: 6.2 to 14.4 mg/l with summer average of 7.5 mg/l

Temperature:

- Range: 0 to 27.5°C.
- standard is a maximum of 30.6°C

pH:

- Range: 6.4 to 8.7 w/mean of 7.7
- 5 values or 7% of total are greater than 8.5 (attributable to natural causes)
- standard requires values between 6.0 and 8.5

Fecal coliform:

- Range: 0 to 2400/100 ml w/geometric mean of 84.5/100 ml
- Number of standards violations undeterminable because of insufficient sampling frequency

Ammonia-nitrogen:

- Range: 0 to 0.75 w/mean of 0.19 mg/l (49 values)
- Philadelphia Electric range: 0 to 1.0 mg/l with 3 month medians of 0.26 (Dec-Feb), 0.10 (Mar-May), 0.03 (Jun-Aug) and 0.06 (Sepr-Nov) mg/l.

Nitrate-nitrogen:

- Range: 0.[illegible] 1.68 w/mean of 1.01 mg/l (42 values)
- Philadelphia Electric range: 0.11 to 1.54 with three month medians (see above) 0.89, 0.64, 0.96, and 0.75 mg/l.

Phosphorus - P:

a. Ortho-phosphate
   - Range: 0.02 to 0.13 w/mean of .07 mg/l (32 values)
   - Philadelphia Electric range: 0 to 0.18 mg/l

b. Poly-phosphate
   - Range: 0.03 to 0.16 w/mean of 0.10 mg/l (32 values)

c. Total phosphorus
   - Range: 0.03 to 0.16 w/mean of 0.12 mg/l (15 values)
   - Philadelphia Electric range: 0 to 0.46 mg/l w/3 month means (see above) 0.09, 0.07, 0.12 and 0.13 mg/l

With increased flows and no impoundments, nutrient concentrations and subsequent eutrophication would not appear to be of concern. In the COWAMP/208 Plan, however, photosynthesis is cited as causing pH violations. Since the phosphorus content of Delaware River water is less than downstream Perkiomen locations, the net effect of Delaware River water will be to decrease phosphorus concentrations by dilution

B. Compatibility with Neshaminy Creek

Available data for the North Branch of the Neshaminy is limited to the summary of 1971 through 1975 data developed by the Neshaminy Water Resources Authority (8). Delaware River data also presented in this report is comparable to the data presented in Table 1 except that high phosphate values appear in the 1971 to 1975 data set.

The report concluded that the Delaware River water quality at Point Pleasant is relatively better than that of the North Branch. As the water quality of the Delaware River has not declined since that time, the report conclusions remain valid.

III. Affect of withdrawal on the Delaware River

The Point Pleasant Pump project will divert from 37.0 mgd (1981 daily average withdrawal) to 95.0 mgd (year 2010 maximum daily withdrawal) from the Delaware River. With the maximum projected diversion of 95 mgd (147 cfs) and maintenance of the 3000 cfs flow objective at Trenton, the Diversion will amount to about 4.6 percent of the available freshwater flow. This percent flow is within the statistical accuracy of the Trenton flow gage.*

Measurement of change in water quality due to the diversion is even less precise. While subtle changes are theoritically possible, the degree of change will not be measurable from a practical sense. This is particularly true at low flows where a variety of stresses will be affecting ambient water quality.

In any event, concentrations of conservative substances which are delivered to Point Pleasant from upstream drainage should not be modified since concentrations of these parameters will be removed proportionately with flow. Less flow will be available to dilute substances introduced below Point Pleasant, however. The Lambertville wastewater treatment plant and non-point sources are the only such sources.

The factors which dictate the concentration of non-conservative substances, particularly BOD, dissolved oxygen and fecal coliform, will be modified by the slightly reduced flow. In the dynamic river system these changes will be indistinguishable.

*Discharge records at Trenton are rated excellent. 'Excellent' means that 95 percent of the daily discharges are accurate to within 5 percent. Diversion percent computed by 147 cfs/3147cfs = 4.6%.

IV. Reservoir Considerations

Eutrophication of Lake Galena and Bradshaw Reservoir are possible concerns. The introduction of Delaware River water into the Perkiomen and Neshaminy watersheds above these impoundments should not, however, result in increased phosphorus concentrations. In fact ambient phosphorus concentrations are likely to decrease since the Delaware River concentrations are less.

Loadings of phosphorus will, however, increase because of the increased influent flows. On the other hand it can be reasoned that the increased loadings may be wholly or partially offset by the small hydraulic retention times resulting from the proposed method of operation.

Analysis of the Eutrophication potential of Lake Galena was performed by Dr. Robert Dresnack, consultant to the Neshaminy Water Resources Authority, using accepted lake analysis techniques. The analyses* determined (1) that the eutrophication potential of Lake Galena was high without the project and (2) that the introduction of Delaware River water would not aggravate the situation, i.e., increase the eutrophication potential. (It should be pointed out that the method predicts the eutrophication potential and not actual algal concentrations. Reducing the potential does not necessarily result in less algal concentrations assuming the critical phosphorus criteria still exceeded.)

The above cited analysis suggested that the proposed system offers opportunities for reducing the potential of eutrophication through proper reservoir operations. Some of these techniques include lowering the level of lake during the winter months to expose bottom muds, use of a multi-level outlet structure, and the use of algae control chemicals.

Analyses using the above methodology were performed for Bradshaw Reservoir. The conclusions of the analyses were that while a eutrophication potential could be demonstrated the small reservoir size and retention time placed the reservoir "out of the ball park" in terms of the methology involved. The short retention time of 3 or less days would appear to preclude the build-up of algal concentrations in any event.

The significant aspect of Bradshaw Reservoir is that it may potentially act as a phosphorus sink due to the settling of suspended materials. Less phosphorus may be delivered downstream if this is the case.

For the same reason it is difficult to predict the effects, if any, below Lake Galena. Phosphorus uptake by plants or removal by settling actions will serve to reduce the outflow of phosphorus. It can be assumed that in the free flowing situation with no increased phosphorus concentrations over existing conditions downstream problems, if any, will not increase.

The water will be taken out at treatment plant so that the stretch of North Branch Neshaminy Creek will act as a water conveyance.

---

* Impact of Delaware River Flow Augmentation on the Trophic State in Lake Galena, 1979.

References

1. DRBC 305(b) Report 1975

2. DRBC 305(b) Report 1976

3. DRBC 305(b) Report 1977

4. DRBC 305(b) Report 1978

5. DRBC 305(b) Report 1979 (in-Press)

6. Environmental Report, Bradshaw Reservoir, Transmission Main, East Branch Perkiomen, and Perkiomenent Creeks, prepared by the Philadelphia Electric Company, July, 1979.

7. Draft COWAMP/208 Water Quality Management Plan; Delaware Valley Regional Planning Commission, April, 1978.

8. Environmental Report on Neshaminy Water Supply System, prepared by the Neshaminy Water Resources Authority and consultants, February, 1979.

APPENDIX F

AGENCIES CONSULTED

The following governmental agencies were consulted concerning various technical analyses required to prepare this assessment.

1. Bucks County Planning Commission
2. Delaware Valley Regional Planning Commission
3. Montgomery County Planning Commission
4. New Jersey Department of Environmental Protection
5. Pennsylvania Department of Environmental Resources
6. Pennsylvania Fish Commission
7. Pennsylvania Historic and Museum Commission
8. U.S. Army Corps of Engineers (Philadelphia District)
9. U.S. Department of the Interior, Fish and Wildlife Service (Anadromous Fish Coordination Project)
10. U.S. Environmental Protection Agency (Region III)

APPENDIX G

PUBLIC OBJECTORS

Projects considered in this revised assessment have been the subject of considerable controversy for more than ten years. Many arguments for and against the projects and countless questions have been presented in that time. This assessment has endeavored to address significant concerns which have been raised.

The following list contains names of public agencies and private groups which have recently opposed the projects (or elements), or who have reservations concerning procedural matters. Not included are names of those who fully support the projects or those who, while they have great concern and have raised many questions, have not taken a position for or against.

The names were compiled from letters, from the transcript of a public hearing held by NWRA and from newspaper articles. Except for legislators, names of individuals are not included.

1. Air and Water Pollution Patrol
2. Alley Friends Architects
3. Banning, Rita, Montgomery County Commissioner
4. Bedminster Township Board of Supervisors
5. Blythewood-Briarwood Civil Group
6. Bordentown City, New Jersey
7. Bridgeton Township Supervisors
8. Buckingham Township Board of Supervisors
9. Buckingham Township Civic Association
10. Bucks County Conservancy
11. Bucks County Conservation Alliance
12. Bucks County Land Use Task Force
13. Burlington, City of, New Jersey
14. Central Bucks Clean Energy Collective
15. Chalfont Borough Council, Bucks County
16. Clean Energy Collective
17. Clean Water Action Project
18. Consumer Action in the Northeast
19. Consumers Education and Protective Association International, Inc.
20. Cooks Creek Watershed Association
21. Delaware River Shad Fishermans Association
22. Delaware Valley College of Science and Agriculture
23. Delaware Valley Conservation Association
24. Delaware Valley Protective Association
25. Delaware Water Emergency Group
26. Federation of Sportsman's Clubs, Bucks County
27. Federation of Sportsman's Clubs, Northampton County
28. Four-County Task Force on Tocks Island Dam
29. Friends of the Earth in the Delaware Valley
30. Giammarco, Henry J., Pennsylvania State Representative
31. Green Valley Association
32. Hutton Recycling Circle, U.S.A.
33. Island Civic Association

34. Keystone Alliance
35. Kostmayer, Peter, Congressman, 8th District, PA
36. League of Conservation Voters
37. Lehigh River Restoration Association
38. Lenape Land Association
39. Limerick Ecology Action
40. Lower Makefield Township Park & Recreation Board
41. Merrill Creek Coalition
42. Montgomery County Commissioners
43. Montgomery County Well Owners Association
44. Morrisville Borough Planning Commission
45. National Audubon Society, Bucks County Chapter
46. New Britain Township, Bucks County
47. New Jersey Dept. of Environmental Protection, Div. of Fish and Wildlife
48. New Jersey Dept. of Environmental Protection, Div. of Water Resources
49. New Jersey Federation of Sportsmen's Clubs
50. Northwestern Lehigh Citizens Coalition
51. Oak Lane Neighbors for a Nuclear Free World
52. Open Space, Inc.
53. Paunacussing Watershed Association
54. Pennsylvania Air & Water Pollution Patrol
55. Pennsylvania Federation of Sportsmen's Clubs
56. Pennsylvania Fish Commission
57. Philadelphia Federation of Sportsmen's Clubs
58. Plentiful Energy from Non-Nuclear Sources
59. Plumstead Township Civic Association
60. Point Pleasant Fire Company Ambulance Corps
61. Pollution Control Group of Lower Bucks County
62. Salvatore, Frank A., Pennsylvania State Representative
63. Save the Delaware Coalition
64. Sellersville, Borough of
65. Sierra Club, Eastern Pennsylvania Group
66. Social Concerns Committee, Lower Bucks Unitarian Fellowship
67. Solebury Township Board of Supervisors
68. Students for Human Rights, Bucks County Community College
69. Susquehanna Environmental Advocates
70. Tinicum Civic Association
71. Tinicum Township Board of Supervisors
72. Trout Unlimited, Southeastern Pennsylvania Chapter
73. Tullytown Borough Council
74. Unami Sunburst Alliance of the Upper Perkiomen Valley
75. U.S. Dept. of Interior, Fish and Wildlife Service
76. U.S. Environmental Protection Agency, Region III
77. Upper Makefield Township Board of Supervisors
78. Warren County Planning Office
79. Wilson, Benjamin H., Pennsylvania State Representative
80. Yardley Borough Council

APPENDIX H

PREPARERS

DRBC staff members listed below made significant contributions to this assessment. While the final judgments are those of DRBC staff, they reflect expert opinions of personnel in agencies and individuals consulted by DRBC and findings in reports prepared by applicants and their consultants.

Lead Agency
Delaware River Basin Commission

Gerald M. Hansler, P.E., Executive Director ——: General Supervision

J.W. Thursby, M.S., Economics ——————————: Environmental Impact Analysis

Fred W. Schultz, B.S., Environmental Science*—: Environmental Impact Analysis

Robert C. Kausch, B.A., Biology ——————————: Environmental Impact Analysis

Herbert A. Howlett, P.E. ——————————————: Water Resources Engineering

Seymour D. Selzer, P.E. ——————————————: Water Resources Engineering

Robert L. Goodell P.E. ——————————————: Water Resources Engineering

Richard C. Albert, M.S., Environmental Science and Engineering ———: Water Quality Analysis

H. Pace Fielding, B.S., Geology——————————: Geological Impact Analysis

Heidi L. Cobb, Anna Mae Auch, Judy Scouten ——: Secretaries

Cooperators

Contributors from outside DRBC are listed in Appendix B entitled "References" and in Appendix F entitled "Agencies Consulted."

*Mr. Schultz was project manager until he left DRBC, November 29, 1979.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

31 MAR 1980

IN REPLY REFER TO
NAPEN-E

Mr. Gerald M. Hansler
Executive Director
Delaware River Basin Commission
P.O. Box 7360
West Trenton, New Jersey 08628

Dear Mr. Hansler:

This office has reviewed the environmental assessment (15 February 1980) prepared by the Commission as lead agency for the "Proposed North Branch Water Treatment Plant and a Review of Related Components."

Attached are our detailed comments on the environmental assessment as requested in your public notice of intent to issue a Negative Declaration. I suggest that the completed assessment include consideration of all comments received. Emphasis should be placed on indicating the specific sources used for the updating data.

We have no objection to the issuance of this Negative Declaration. Please notify us of your decision concerning the preparation of an EIS in this matter.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copy Furnished/with Incl:
Honorable Sherman W. Tribbitt
U. S. Commissioner
Washington, D.C. 20240

PRIMARY COMMENT

1. Several Corps permits may be needed:

1. Point Pleasant Intake	Uncertain
2. Bradshaw Reservoir	Philadelphia Electric
3. Outlet N. Branch Neshaminy Creek	Neshaminy Water Resources Authority
4. North Branch Intake Dam	"
5. Pine Run Intake Dam	"
6. Pine Run Channelization (1,500')	"
7. Neshaminy Creek Crossing (South Transmission Main)	"
8. Mill Creek Crossing (South Transmission Main)	"
9. Perkiomen Transmission Main Outlet Structure	Philadelphia Electric

It is suggested that this tabulation be included in the EA document.

2. As many important documents (33 Reference) are incorporated by reference in the Notice of Intent, it would be appropriate to emphasize this within the body of the assessment itself.

SECONDARY COMMENTS

Page 1-9 The effect of filling 29 acres of floodplain on storm flows should be discussed. An analysis of such floodplain impacts caused by this filling is required by Presidential Executive Order 11988.

Page 1-10, Par. 2 The amount of detention pool behind the intake dams should be given. Periodic sediment removal appears necessary and the disposition of such sediments should be discussed. The number types of fish whose movement may be inhibited should be added.

Page 1-11, Par. 1 Methods to minimize fishery habitat loss through channel alteration and bank stabilization need to be added. The Pennsylvania Fish Commission has developed several methods to promote fishery rehabilitation; they can offer advice in this regard.

Page 1-11, Par. 1 The rechannelization should be quantified.

Page 1-11 & 1-12 Approximation by habitat types of the acreage to be altered by Service Area Transmission Mains should be added.

Page 2-7, Par. 1 A word appears missing at line 5.

Page 2-27, Par. 1 Delete as this is a repeat of last paragraph page 2-26.

Page 2-33, Sub-item 4 The scheduling cited may not be attained in all instances; this should be considered in estimating the impacts.

Page 2-27, Par. 3 The discussion could be expanded to clarify what impacts might follow if this scheduling goal could not be met and which WIS Conclusions would be affected and to what extent.

Page 2-41, Par. 4&
Page 2-42, Par. 1 An explanation of what prevents screening at the North Branch and Pine Run intakes. An indication of whether increased headwater flow enhancement may increase entrainment and impingement downstream at the two water withdrawal points may be given.

The detailed operating strategy and related impacts for project operations could be expanded for clarification.