110th Congress, 1st Session – – – – – – – – – – – – – House Document 110–13

FLOOD DAMAGE REDUCTION PROJECT PLAN

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY FOR CIVIL WORKS, THE DEPARTMENT OF DEFENSE

TRANSMITTING

NOTIFICATION THAT THE SECRETARY OF THE ARMY SUPPORTS THE AUTHORIZATION AND PLANS TO IMPLEMENT THE FLOOD DAMAGE REDUCTION PROJECT FOR THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

FEBRUARY 9, 2007.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

MID-SESSION REVIEW OF THE BUDGET FOR FISCAL YEAR 2007

FLOOD DAMAGE REDUCTION PROJECT PLAN

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U.S. GOVERNMENT PRINTING OFFICE
33–171 WASHINGTON : 2007

DEPARTMENT OF THE ARMY, OFFICE OF THE ASSISTANT SECRETARY, CIVIL WORKS,
Washington, DC, January 9, 2007.

Hon. NANCY PELOSI,
Speaker of the House of Representatives,
U.S. Capitol Building, Washington, DC.

DEAR MADAM SPEAKER: In response to a resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives adopted September 12, 1996, and the feasibility study conducted by the U.S. Army Corps of Engineers, the Secretary of the Army recommends authorization of a flood damage reduction project for the Town of Bloomsburg, Columbia County, Pennsylvania. The project is described in the report of the Chief of Engineers dated January 25, 2006, which includes other pertinent reports and comments. The views of the Commonwealth of Pennsylvania, the Department of the Interior, the Environmental Protection Agency, and the Federal Emergency Management Agency are set forth in the enclosed report. The Secretary of the Army plans to implement the project through the normal budget process at the appropriate time, considering national priorities and the availability of funds.

The recommended flood damage reduction plan consists of a series of floodwalls and levees that provide protection from a Hurricane Agnes-level storm (440-year return frequency) to low lying areas of the Town of Bloomsburg between the Susquehanna River and Fishing Creek. The plan includes approximately 17,570 linear feet of levees and floodwalls with 14 drainage structures, limited road raisings, and 8 closure structures. Additional structural protection is provided against a 100-year storm to mitigate induced flooding to Fernville on Fishing Creek. As part of the recommended plan, upgrades to the existing flood warning system include a river gage along Fishing Creek, upgrading an existing river gage on the Susquehanna River upstream of the project area, rain gages (as needed) in the Fishing Creek watershed and radio towers and telemetry equipment to provide alerts regarding high-water events. These upgrades would serve to determine evacuation procedures and actions necessary to ensure closure structures are in-place and functional. This network would supplement and work in association with the existing flood warning network maintained by the Commonwealth.

Based on December 2006 price levels, the estimated total first cost of the project is $45,233,000. All of the project costs are allocated to the flood damage reduction purpose. Based on the cost sharing requirements of WRDA 1986, as amended, the Federal share of the project is approximately $29,402,000, and the non-Federal share is approximately $15,832,000, comprised of $12,258,000 for lands, easements, rights-of-way, relocations and dredged material disposal areas (LERRD), $2,262,000 as five percent cash and a remaining cash balance of $1,312,000. An additional cost of approximately $900,000 for remediation of hazardous, toxic, radioactive waste (HTRW) may be assigned to the non-Federal sponsor if detailed testing during Preconstruction Engineering and Design (PED) determines that disposal materials from the site are categorized as CERCLA hazardous substances. This would increase the non-Federal cost to $16,732,000. The annual cost for operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) of the recommended project is estimated at $185,000, which would be the responsibility of the non-Federal sponsor, the Town of Bloomsburg.

The recommended plan is the national economic development plan. Based on December 2006 prices and a Federal discount rate of 4.875 percent, the estimated average annual cost of the recommended plan is $2,615,000, which includes annual OMRR&R. The project yields average annual benefits of $3,700,000, and average annual net benefits of $1,085,000. The project's benefit-to-cost ratio is 1.4 to 1.0.

Construction of the NED plan will require the unavoidable filling of approximately 0.7 acres of wetlands. To offset this impact, approximately 1.1 acres of non-wetland area will be graded to retain surface water and planted with native wetland trees and shrubs. The replacement wetlands will be monitored up to five years. In addition, up to 3,000 linear feet of forested riparian bank will be permanently lost as a result of rip-rap placement along the banks of the creek. To offset this impact, the Corps is proposing to improve fish passage by removing a timber crib structure on Fishing Creek, about one mile downstream from the project area. This will restore anadromous fish access by reconnecting fish habitat in lower Fishing Creek with habitat in the Susquehanna River and will mitigate for 3,000 linear feet of lost riparian bank.

The plan recommended by the Chief of Engineers at a total cost of $45,233,000 includes $1,902,000 to mitigate for impacts to significant fish and wildlife resources. I have determined that while I support the District's conclusions regarding compensatory mitigation for fish and wildlife impacts, the cost estimate for accomplishing the recommended mitigation is not in accordance with policy; the cost of implementing the mitigation has been overestimated by about $1,585,000. The corrected total project cost which I support is $43,648,000, with Federal and non-Federal cost shares of about $28,371,000 and $15,277,000, respectively. After correcting the mitigation cost estimate, average annual costs are recalculated to be $2,530,000, and when compared with the project's average annual benefits of $3,700,000, the project's benefit-to-cost ratio increases to 1.5 to 1.0. Annual net benefits are recalculated as $1,170,000. All other project elements remain as proposed.

The Office of Management and Budget (OMB) advises that there is no objection to the submission of the report to Congress. The Administration will give initial construction a low budgetary priority, based on the most current performance-based budgeting guidelines and the benefits and costs of the project. A copy of the OMB letter is enclosed. I am providing a copy of this transmittal and the OMB letter dated December 20, 2006 to the House Subcommittees on Energy and Water Development, and Water Resources and Environment in accordance with the requirements of the Fiscal Year 2006 Energy and Water Development Appropriations Act (P.L. 109–103).

Very truly yours,

JOHN PAUL WOODLEY, Jr.,
Assistant Secretary of the Army (Civil Works).

ENCLOSURES

1. Report of the Chief of Engineers, Jan 25, 06
2. Copy of DOI letter to USACE, Nov 10, 05
3. Copy, PA DEP letter to USACE, Nov 14, 05
4. Copy, EPA letter to USACE, Nov 21, 05
5. Copy, FEMA letter to USACE, Dec 1, 05
6. Bloomsburg Record of Decision, dated January 5, 2007
7. OMB Clearance Letter, dated December 20, 2006
8. Feasibility Report, Aug 05

ENCLOSURE 1

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

JAN 25 2006

CEMP-NAD (1105-2-10a)

SUBJECT: Town of Bloomsburg, Columbia County, Pennsylvania

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on the study of flood damage reduction in the town of Bloomsburg, Columbia County, Pennsylvania. It is accompanied by the report of the district and division engineers. These reports are in response to a resolution of the Committee on Transportation and Infrastructure of the House of Representatives, adopted 14 September 1995. This resolution directs the Secretary of the Army to *"review the report of the Chief of Engineers on the Susquehanna River, New York, Pennsylvania and Maryland, published as House Document 702, 77th Congress, to determine whether flood damage reduction measures should be implemented in the town of Bloomsburg, Pennsylvania."* Preconstruction engineering and design activities, if funded, would be continued under the study authority cited above.

2. The reporting officers recommend a plan to reduce flood damages in the vicinity of Bloomsburg and Fernville, Pennsylvania, by protecting against flooding from the Susquehanna River and Fishing Creek. The recommended plan includes constructing approximately 9,600 linear feet of earthen levee, approximately 760 linear feet of mechanically stabilized earth floodwalls, approximately 1,150 linear feet of concrete floodwalls, nine drainage structures, five road raises, and seven closure structures to protect Bloomsburg. The recommended plan also includes constructing approximately 4,350 linear feet of earthen levee, approximately 710 linear feet of mechanically stabilized earth floodwalls, one road raise, two closure structures, two river stage gages, and rain gages to protect Fernville. Unavoidable environmental impacts would be fully compensated for by the creation of about 0.7 acre of emergent wetland and about 1.5 acres of forested wetland habitats, and the removal of a timber crib dam on Fishing Creek to enable fish passage. These mitigation features would be monitored for up to five years to ensure they perform as needed. All features are located in the Commonwealth of Pennsylvania.

3. The town of Bloomsburg is the non-Federal cost-sharing sponsor for all features. Based on October 2005 price levels, the total first cost of the plan is estimated at $43,302,000, all for flood damage reduction. Under cost sharing specified by the Water Resources Development Act (WRDA) of 1986, Public Law 99-662, as amended, the project would be cost shared 65 percent Federal and 35 percent non-Federal. The total first cost of the plan would be cost shared

$28,146,000 Federal and $15,156,000 non-Federal. The cost of lands, easements, rights-of-way, relocations, and dredged material disposal areas is estimated at $11,982,000. The total cost includes $1,784,000 for environmental mitigation. The town of Bloomsburg would be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project after construction, a cost currently estimated at about $185,000 per year. The total equivalent average annual costs are $2,629,000, including OMRR&R. The equivalent average annual benefits are $3,723,000 based on an interest rate of 5-1/8 percent and a 50-year period of analysis. The equivalent average annual net benefits are $1,094,000, and the benefit-cost ratio is approximately 1.4 to 1. In addition to the above, the town of Bloomsburg would be fully responsible for performing the investigation, cleanup and response of hazardous materials on the project site. The cost of hazardous material work is estimated at approximately $895,000 and is a non-Federal responsibility. The proposed plan is the national economic development plan.

4. The plan selected by the reporting officers is estimated to be 99.8 percent reliable in protecting the Bloomsburg area from a flood which has a 0.23 percent chance of occurrence in any year (440-year flood) and would reduce average annual flood damages by more than 98 percent. The selected plan is estimated to be about 99.5 percent reliable in protecting the Fernville area from a flood which has a 1.0 percent chance of occurrence in any year (100-year flood). The selected plan would reduce average annual flood damages by about 66 percent and would leave average annual residual damages estimated at $1,567,000.

5. The Washington level review indicates that the plan recommended by the reporting officers is technically sound, economically justified, and environmentally and socially acceptable. The plan complies with essential elements of the U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and land Related Resources Implementation Studies and complies with other administration and legislative policies and guidelines. Also, the views of interested parties, including Federal, State, and local agencies have been considered.

6. I concur with the findings, conclusions and recommendation of the reporting officers. Accordingly, I recommend construction of the proposed improvements for flood damage reduction in accordance with the reporting officers' plan with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing, and other applicable requirements of Federal and State laws and policies, including WRDA 1986, as amended by Section 202 of WRDA 1996. Federal implementation of the recommended project would be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

a. Provide a minimum of 35 percent, but not to exceed 50 percent of total flood damage reduction costs as further specified below:

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SUBJECT: Town of Bloomsburg, Columbia County, Pennsylvania

(1) Provide 25 percent of design costs allocated by the Government to flood damage reduction in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

(2) Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to flood damage reduction;

(3) Provide, during construction, a contribution of funds equal to 5 percent of total flood damage reduction costs;

(4) Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposing of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the flood damage reduction features;

(5) Provide, during construction, any additional funds necessary to make its total contribution for flood damage reduction equal to at least 35 percent of total flood damage reduction costs;

b. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefor, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;

c. Not less than once each year, inform affected interests of the extent of protection afforded by the project;

d. Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;

e. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project cooperation agreement, and implement the plan not later than one year after completion of construction of the project;

f. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

g. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance, or interfere with the project's proper function;

h. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

i. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

j. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

k. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

l. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

CECW-PC
SUBJECT: Town of Bloomsburg, Columbia County, Pennsylvania

m. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);

n. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

o. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;

p. Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

q. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

CECW-PC
SUBJECT: Town of Bloomsburg, Columbia County, Pennsylvania

7. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the sponsor, the Commonwealth of Pennsylvania, interested Federal agencies, and other parties will be advised of any modifications and will be afforded the opportunity to comment further.

CARL A. STROCK
Lieutenant General, USA
Chief of Engineers

ENCLOSURE 2

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

TAKE PRIDE IN AMERICA

ER 05/886

NOV 1 0 2005

Mr. Thomas W. Waters
Chief, Policy and Policy Compliance Division
Directorate of Civil Works
Headquarters, U.S. Army Corps of Engineers
CECW-P (SA)
7701 Telegraph Road
Alexandria, VA 22315-3860

Dear Mr. Waters:

As requested, the U.S. Department of the Interior has reviewed the Chief of Engineers' Proposed Report on the Flood Damage Reduction Project, Town of Bloomsburg, Columbia County, Pennsylvania.

The Department does not object to the proposed project and has no comments to offer. The point of contact is Ms. Loretta Sutton, 202-208-7565. We appreciate the opportunity to review the Chief's Proposed Report and supporting documents.

Sincerely,

Nancy Josie Blanchard

for Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

ENCLOSURE 3

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

November 14, 2005

Secretary 717-787-2814

Mr. Cliff Fitzsimmons
Headquarters
U. S. Army Corps of Engineers
CECW-P (SA)
7701 Telegraph Road
Alexandria, VA 22315-3860

Dear Mr. Fitzsimmons:

Thank you for the copies of the U. S. Army Corps of Engineers (USACE) report entitled "Final Integrated Feasibility Report & Environmental Impact Statement" for the Town of Bloomsburg, Columbia County, Pennsylvania. The Pennsylvania Department of Environmental Protection (DEP) has been actively involved with the formulation of this report and has partnered with the non-federal sponsor (Town of Bloomsburg) to help fund various components of the feasibility study.

DEP has reviewed the report and fully agrees with its content and supports a flood damage reduction project for the Town of Bloomsburg. Bloomsburg has experienced severe flooding on numerous occasions resulting in extensive damages and severe hardship to its residents. DEP will continue to work with the USACE to move this project through to construction and has made a financial commitment with Bloomsburg toward the non-federal costs of project construction. The Environmental Impact Statement (EIS) has been forwarded to our Northcentral Regional Office in Williamsport, Pennsylvania for further review. Any comments related to its EIS review will be forwarded to your office under separate cover.

If you have any questions, please do not hesitate to contact John Hines of Deputy Secretary Cathy Curran Myers' staff by e-mail at johines@state.pa.us, or by phone at 717-783-4693.

Sincerely,

Kathleen A. McGinty
Secretary

cc: Thomas W. Waters, USACE

ENCLOSURE 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

November 21, 2005

Jeff Trulick
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

RE: The Town of Bloomsburg, Columbia County, Pennsylvania Flood Damage Reduction Project Final Integrated Feasibility Report and Environmental Impact Statement, August 2005, CEQ # 20050430

Dear Mr. Trulick:

EPA has reviewed the subject document and your response to our June 27, 2004 letter on the Draft Environmental Impact Statement for this project. Based on this review, we have no objection to the proposed project and have no additional comments.

Please continue to work with the appropriate agencies during the design phase and mitigation for this project. Thank you for the opportunity to be involved with this process. If you have any questions, please contact Barbara Okorn at (215)814-3330.

Sincerely,

William Arguto
NEPA Team Leader

ENCLOSURE 5

Federal Emergency Management Agency
Region III
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

FIM

December 1, 2005

Thomas W. Waters
Chief, Policy and Policy Compliance Division
U.S. Army Corps of Engineers
Washington, DC 20314-1000

Dear Mr. Waters:

The Federal Emergency Management Agency (FEMA) received your Final Integrated Feasibility Report and Environmental Impact Statement for the Flood Damage Reduction Project in Bloomsburg, Pennsylvania. The notice describes the proposed creation of a series of flood controls, including levees, floodwalls, and drainage structures. Portions of the project site are located in an area designated as a Special Flood Hazard Area (SFHA), an area subject to flooding during the 1% annual chance (100-year) flood.

The National Flood Insurance Program (NFIP) is administered by FEMA and is designed to reduce flood losses through local floodplain management and the provision of flood insurance to property owners. The NFIP requires participating communities to adopt and enforce floodplain management ordinances with stipulations about modifications made to areas within SFHA. As such, each community has an ordinance requiring permits for all proposed construction within SFHA and also requiring that the flood-carrying capacity of an altered stream be maintained.

To prove that the flood-carrying capacity of an impacted stream will be maintained may require an engineering study and completion of a Conditional Letter of Map Revision Application. This application and related information can be found on FEMA's website at: www.fema.gov/mit/tsd/dl_mt-2.htm. Please coordinate with the Floodplain Management Officer of Bloomsburg to ensure that the project meets the requirements their floodplain management ordinance.

As this proposal involves Federal expenditure, it is subject to Executive Order 11988, which directs Federal agencies to "avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." Each Federal agency has issued regulations to comply with the Executive Order. These are administered by the involved Federal agency.

If you have any questions regarding this letter, or the NFIP in general, please call me at 215-931-5669.

Sincerely,

Eugene K. Gruber, P.E., Director
Federal Insurance & Mitigation Division

cc: Amy M. Guise, Acting Chief, Civil Project Development Branch, USACE- Baltimore District
Science Kilner, Regional Environmental Officer
Kerry Wilson, State NFIP Coordinator

ENCLOSURE 6

Record of Decision

Town of Bloomsburg, Columbia County, Pennsylvania
Flood Damage Reduction Project

The Final Integrated Feasibility Report and Environmental Impact Statement (FR/ EIS) for the Town of Bloomsburg, Columbia County, Pennsylvania, dated August 2005, documents the problems and opportunities relative to reducing damages from flooding in the study area. Based on this report, along with the views of interested agencies and the concerned public, and the review of my staff, I have determined that the plan described in the FR/EIS and recommended in the report of the Chief of Engineers to be economically justified, environmentally acceptable, technically feasible, and in the overall public interest.

The recommended plan consists of a series of floodwalls and levees which would reduce damages in the Town of Bloomsburg, Pennsylvania against flood which has a 0.23 percent chance of occurring in any given year (a 440-year return frequency storm). The plan includes approximately 17,600 linear feet of levees and floodwalls, 9 drainage structures, 8 closure structures, and 7 road raisings. Additional structural protection against flooding with a 1 percent chance of occurring in any given year (100-year return frequency storm) is provided on Fishing Creek to mitigate induced flooding to Fernville, Pennsylvania. The recommended plan would also include a flood warning system to operate in conjunction with structural protection system and the existing flood warning network maintained by the Commonwealth of Pennsylvania. Implementation of the recommended plan would require the permanent removal of an estimated 22 residences, 3 commercial structures, and 1 County building, as well as the relocation of a trailer park. The recommended plan would reduce average annual damages by about 66 percent.

Both structural measures and non-structural measures were considered to reduce flood damages. Structural measures that were considered included channel deepening and widening, modification of bridge and culvert openings, detention of flood waters, and construction of floodwater barriers such as levees, floodwalls, and mechanically-stabilized earth (MSE) walls. Non-structural measures included acquisition of flood-prone property, floodplain zoning, floodproofing, and flood warning systems. Floodwater barriers were the most viable and sustainable solution to meet defined objectives. Three alignments were evaluated in detail: (1) interior alignment, (2) fringe alignment, and (3) east Bloomsburg extension alignment. All of the potential construction alternatives (other than taking No Action) would have flood damage reduction benefits.

Alternative 4 - the Fringe Alignment and a Fernville Levee for Hydraulic Mitigation, is the National Economic Development (NED) Plan and the recommended plan. It is also one of two plans that can be identified as environmentally preferable. All practicable means have been adopted to avoid or minimize the adverse effects from implementing the recommended plan. However, this plan would result in minor temporary adverse effects on the human environment: Construction of the NED plan would require the unavoidable filling of approximately 0.7 acres of wetlands and the permanent loss of up to 3,000 linear feet of forested riparian bank as a result of rip-rap placement. To offset these impacts, approximately 1.1 acres of non-wetland area would be graded to retain surface water and planted with native wetland trees and shrubs. Additionally, a timber crib structure on Fishing Creek would be removed to restore anadromous fish access by reconnecting fish habitat in lower Fishing Creek with habitat in the Susquehanna River. A five-year post-construction monitoring phase would ensure replacement of wetland functions. This monitoring would consist of annual site visits to survey the wetland plants, hydrology and soil development, along with photo documentation of the wetland condition.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resource Council's *Principles and Guidelines.* All applicable laws, Executive Orders, regulations, and local plans were considered in evaluating the alternatives. The recommended plan is the least environmentally damaging alternative and incorporates features to avoid, minimize, rectify, reduce and compensate adverse environmental effects. Based on review of these evaluations, I find that the flood damage reduction benefits to be gained by construction of the recommended plan outweigh the costs and any adverse effects. This Record of Decision completes the National Environmental Policy Act process.

January 9, 2007
Date

John Paul Woodley Jr.
John Paul Woodley, Jr.
Assistant Secretary of the Army
(Civil Works)

ENCLOSURE 7

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

December 20, 2006

The Honorable John P. Woodley, Jr.
Principal Deputy Assistant Secretary of the Army (Civil Works)
108 Army Pentagon, Room 3E446
Washington, D.C. 20310-0108

Dear Mr. Woodley:

As required by Executive Order 12322, the Office of Management and Budget has completed its review of your recommendation of October 27, 2006, concerning the construction of a flood damage reduction project for the Town of Bloomsburg, Columbia County, Pennsylvania.

The Budget uses seven performance-based budgeting guidelines to allocate funding among Corps of Engineers construction projects to reduce the large construction backlog and improve the net economic and environmental return from the program. Under these guidelines, the project for the Town of Bloomsburg would not be designated a priority for funding in the Budget, because of its relatively low net economic benefits.

The Office of Management and Budget does not object to your submitting this report to Congress. However, when you do so, please advise the Congress that the Administration will give this project low priority for funding.

Sincerely,

Richard A. Mertens
Deputy Associate Director
Energy, Science, and Water Division

12/20/2006 15:23 FAX 202 395 4817 OMB WATER & POWER BRANCH 002

ENCLOSURE 8

NOTICE

BLOOMSBURG, FLOOD DAMAGE REDUCTION PROJECT, COLUMBIA COUNTY, PENNSYLVANIA

The Army Corps of Engineers does not request that the report be printed. If there are any questions about this, please call Cynthia Jester at Corps Headquarters. You can reach Cynthia Jester at (202) 761-1379.

US ARMY CORPS
OF ENGINEERS
BALTIMORE DISTRICT

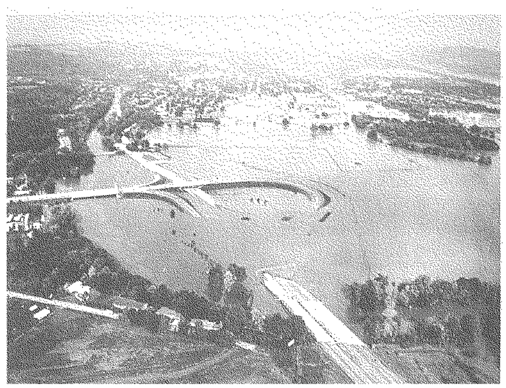
THE TOWN OF BLOOMSBURG,
PENNSYLVANIA

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

FLOOD DAMAGE REDUCTION PROJECT

FINAL INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL IMPACT STATEMENT

Volume 1



August 2005

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

FLOOD DAMAGE REDUCTION PROJECT

Integrated Feasibility Report & Final Environmental Impact Statement

Baltimore District
U.S. Army Corps of Engineers

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Cover Sheet

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Title: The Town of Bloomsburg, Columbia County, Pennsylvania Flood Damage Reduction Project Final Integrated Feasibility Report & Environmental Impact Statement

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Abstract:

This Final Feasibility Report (FR) and Environmental Impact Statement (EIS) analyzes the potential environmental consequences of implementing a flood damage reduction project in Bloomsburg, Pennsylvania. Alternative 4, consisting of a system of earthen levees, mechanically stabilized earth (MSE) floodwalls, concrete floodwalls, railroad and road closure structures and roadway relocations to provide ramps over the line of protection, was identified as the preferred alternative. The proposed action would provide approximately 9,600 feet of full levee embankment in the Town of Bloomsburg and, for the purpose of mitigating for increased flooding, approximately 4,350 feet of full levee embankment in Fernville. The other alternatives considered are a different alignment through Bloomsburg for the flood protection, non-structural solutions, and as required, the No Action alternative. The recommended flood damage reduction plan (Preferred Alternative) is the National Economic Development (NED) Plan with an Agnes (440-year) level of protection from Susquehanna River flooding, and 100-year level of protection from Fishing Creek flooding.

Public Comments:

Prior to preparation of the Final FR/EIS, public involvement was conducted through the publishing of a Notice of Intent in the Federal Register and holding public meetings. Additionally, coordination with resource agencies was conducted through agency coordination letters that solicited their comments. The U. S. Army Corps of Engineers considered these comments received by letter and statements made at public meetings. A 45-day comment period on the Final FR/EIS was held with the publication of the U.S. Environmental Protection Agency Notice of Availability in the Federal Register. A public hearing to discuss and receive comments on the Draft FR/EIS was held June 16, 2005 in Bloomsburg. Individuals and agencies were provided the opportunity to present written comments relevant to the Draft FR/EIS or request to be placed on the mailing list for announcements and for the Final FR/EIS. The comments received during the comment period were very limited, but were considered in the preparation of the Final FR/EIS.

Summary / Syllabus

This integrated feasibility report and environmental impact statement (FR/EIS) investigates the feasibility of alternative plans to address problems and opportunities associated with flood damage reduction along the Susquehanna River and Fishing Creek in the Town of Bloomsburg (Columbia County), Pennsylvania. The FR/EIS has been conducted by the U.S. Army Corps of Engineers (Corps) with the non-Federal sponsor, the Town of Bloomsburg, Pennsylvania and with the Pennsylvania Department of Environmental Protection (PADEP). The FR/EIS has been organized in a manner consistent with both Corps requirements for feasibility reports and with requirements established by the National Environmental Policy Act (NEPA).

The purpose of the project is to reduce the impact of flooding from the Susquehanna River and Fishing Creek on the Town of Bloomsburg. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. In addition, floods have disrupted major transportation systems, requiring closure of roads, railroads, and the municipal airport. Extensive portions of the Bloomsburg study area are within the 500-year floodplain of the Susquehanna River and Fishing Creek. The 500-year floodplain includes approximately 525 residential structures, and 75 businesses and local government buildings.

Flood damages are attributable to overbank flooding from the Susquehanna River and to flooding along Fishing Creek, which is exacerbated by backwater flooding from the Susquehanna River. In the vicinity of Bloomsburg, the river has very little slope and has shallow banks. As a result, the river flows more slowly in this reach. When the Susquehanna River overflows its banks, it hinders normal discharge from Fishing Creek to the mainstem of the Susquehanna, resulting in backwater flooding on Fishing Creek. When the Susquehanna River and Fishing Creek simultaneously rise above flood stage, overbank flooding can cover up to 33 percent of the landmass within the Town of Bloomsburg's boundaries.

The initial screening of flood damage reduction measures resulted in structural and nonstructural measures being carried forward for more detailed investigations to provide levee/floodwall systems along the right descending bank of the Susquehanna River to protect the eastern and western portions of Bloomsburg; and a levee/floodwall system along the left descending bank of Fishing Creek.

Based on the flooding history, the areas subject to inundation from the 100-year frequency flood, and local sponsor input, interior and fringe floodwater barrier alignments were evaluated as potential flood damage reduction measures in the Town of Bloomsburg. In addition to the structural protection for Fernville, nonstructural flood protection, consisting of a nearly complete residential buyout was also considered for Fernville.

The following alternative combination of measures was evaluated in detail:

- Alternative 1: No Action,
- Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation,
- Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation,
- Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation, and
- Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation.

Alternative 4, which includes the Fringe Alignment and a Fernville Levee for Hydraulic Mitigation, is the Recommended Plan Alternative 4 also is the National Economic Development (NED) Plan, which will provide a 440-year level of protection from Susquehanna River flooding, and 100-year level of protection from Fishing Creek flooding.

Alternative 4 consists of a system of earthen levees, mechanically stabilized earth (MSE) floodwalls, concrete floodwalls, railroad and road closure structures and roadway relocations to provide ramps over the line of protection. The proposed action would provide approximately 17,000 linear feet of levee and flood wall system (9,600 feet of full levee embankment in the Town of Bloomsburg and, for the purpose of mitigating for increased flooding, approximately 4,350 feet of full levee embankment in Fernville). In addition, the Alternative 4 would include fourteen drainage structures, and eight closure structures, five of which incorporate limited road raisings. Limited riprap will be used to protect the steep banks of Fishing Creek from bank crest to below the stream invert along the lower project reaches along Fishing Creek. The alignment of the line of protection was established based on physical, environmental, and economic criteria.

The Recommended Plan (the NED Plan) has a total average annual cost of $2,583,200, total average annual benefits of $3,565,200, a benefit-cost ratio of 1.38 to 1, and average annual net benefits of $982,000. The fully-funded cost of the project is $46,239,000. The Federal share of the project's total first cost is $30,055,350 and the non-Federal share of total project first costs is $16,183,650.

The Corps has determined that the current project alignment yields the most efficient investment for the federal government. Therefore, the NED plan is not expected to change substantially. The NED plan seeks to maximize benefits to the national economy by developing and executing a project that provides protection for Bloomsburg from flood events on the Susquehanna River and Fishing Creek.

However, within the NED plan, there is a chance to refine the current design. For example, the Town has asked if the Corps can extend the NED alignment to the Route 42 interchange. Also, where the NED plan shows earthen levee, the Town may request that concrete floodwalls be constructed instead. Thirdly, the Town has asked if levee tie-out details near the high school can be changed. In short, if proposed design changes provide positive enhancements, they will be considered for implementation during the pre-construction engineering and design (PED) phase. However, these changes, if significant, could result in the need for a re-evaluation report and potentially revised NEPA documentation during PED.

The preliminary implementation schedule is based on information available to date, and is largely dependent on when the project is authorized in the Water Resources Development Act (WRDA). The estimated implementation schedule is provided below:

- Complete Feasibility Phase: December 2005
- Project Construction Authorization: 2005 (assumed to be provided in the Water Resources Development Act of 2005, if signed into law)
- Design Agreement Executed: Late 2005/Early 2006
- Plans and Specifications Development: 2006 to 2008
- Project Cooperation Agreement Executed: 2008/2009

- Real Estate Acquisition: 2009
- Section 215 Agreement Executed (if needed): 2008
- Construction: 2010 to May 2013

Issues and Concerns

Public involvement was conducted through the publishing of a Notice of Intent in the Federal Register on November 23, 1999 (Volume 64, Number 225) and holding public meetings in Bloomsburg to receive comments. Additionally, coordination with resource agencies was conducted through agency coordination letters that solicited their input.

Except for the occasional transient species, no Federally listed endangered, threatened, or candidate species under U.S. Fish and Wildlife Service (USFWS) jurisdiction are known to exist in the project area (USFWS, 2000; USFWS, 2005). Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act is required with the USFWS. In addition, according to the Pennsylvania Game Commission, no state listed endangered or threatened species of birds or mammals are known to exist within the project area and no State Game Lands are located close enough to the project site to anticipate any impacts (Pennsylvania Game Commission, 2002; Pennsylvania Game Commission, 2005).

Coordination with the Pennsylvania Natural Diversity Inventory (PNDI) indicated that there are no known occurrences of plant species of special concern within the project area and no effects on endangered, threatened, or rare plant species would be anticipated from implementation of a flood damage reduction project (PNDI, 2002).

The Pennsylvania Fish and Boat Commission (PFBC) indicated in their species impact review (PFBC, 2002; PFBC, 2005) that none of the fishes, amphibians, or reptiles listed as endangered or threatened is known to occur at or in the immediate vicinity of the project area.

The potential effects of the proposed action are being coordinated with the Pennsylvania State Historic Preservation Officer (SHPO). The Corps intends to execute a Programmatic Agreement (PA) with the SHPO outlining the procedures to be followed by the Baltimore District in compliance with the responsibilities under Section 106 of the National Historic Preservation Act, in accordance with 36 CFR 800.14(b)(3).

It is currently anticipated that some quantity of fill materials containing hazardous substances, as defined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)(referred to in ER 1165-2-132 as hazardous, toxic and radioactive waste, or HTRW), may be encountered during construction based on past experience related to construction projects at similar sites and given the heterogeneity typical of dumpsites similar to those found within the Bloomsburg floodplain. If a portion of these hazardous substances are found at or above levels of concern, this will have cost sharing and project cost implications. Although the limited sampling program completed to date has identified no HTRW along the project alignment, it is assumed that approximately 4,500 cubic yards of material would require offsite disposal prior to project construction. As the financial responsibility associated with response costs for any CERCLA hazardous substances lies with the project non-Federal sponsor, these costs are important considerations as the project moves forward. The estimated CERCLA response cost is \$895,600 (escalated to the midpoint of construction) based upon the current estimate of 4,500 cubic yards. This cost is provided to the Town of Bloomsburg for planning purposes only. This cost has not been included in the fully-funded cost estimate for Bloomsburg Local Flood Protection Project, since it is not considered part of the cost-shared project. During the PED phase the Corps, Town of Bloomsburg, and PADEP will work to identify refinements to the project alignment that would minimize or avoid potential increased project costs. Consistent with the Planning Guidance (ER 1105-2-100) and also with ER 1165-2-132, a more detailed testing program will commence early in PED phase to determine if the current estimates will change. The draft design agreement will be structured to have a decision point once the test results are received from this sampling.

Major Conclusions and Findings

Implementing Alternative 4 as the preferred flood damage reduction for the Town of Bloomsburg would provide the level of flood protection necessary while minimizing the environmental consequences. The information developed in the EIS has led to alterations in project design, recommendation of mitigation measures, and an opportunity for public involvement in the decision-making process. It also has allowed the Corps to address compliance with other environmental laws as part of a single review process rather than through separate reviews, to reduce paperwork and ensure comprehensive compliance.

Protection of the environmental resources would be maintained wherever possible and economic benefits would be gained from the protection from flooding. Some of the proposed actions would extend into Fishing Creek. Therefore, in accordance with the Clean Water Act, a Section 404(b)(1) evaluation has been completed and is appended to this document. By way of this FEIS, and as required by the Planning Guidance (ER 1105-2-100, April 2000, page C-41), the District is seeking a Section 404(r) exemption from a Water Quality Certification by the Commonwealth of Pennsylvania.

Impact Analysis Summary

Detailed description and evaluation is found in Section 5, Environmental Consequences, but the following list is provided in summary. Implementing the Recommended Plan (Alternative 4) would result in the following environmental effects:

- There would be a temporary increase in traffic because of construction-related transportation.
- There would be a temporary increase in noise resulting from construction.
- Permanent, unavoidable adverse effects would occur to the visual resources. Views that currently include Fishing Creek from Bloomsburg or Fernville would be unavoidably obscured by the levee/floodwall system. Views from Fishing Creek (typically from recreational users) would be diminished, as would views from within the Fairgrounds property.
- Construction of the levee/floodwall system may require the excavation and off-site disposal of approximately 4,500 cubic yards of HTRW materials. The occupational risks of HTRW exposure and human health risks during transportation would be unavoidable.
- Approximately 11.5 acres of farmland designated as Prime Farmland or Additional Farmland of Statewide Importance would be permanently converted to non-agricultural use.

- Approximately 0.69 acres of existing Fishing Creek stream bottom habitat would be manipulated and altered for the placing of riprap. This impact will be offset by a mitigation project consisting of a fish passage project at Boone's dam in lower Fishing Creek.
- Approximately two acres of the vegetated Fishing Creek upland riparian area would be permanently stripped of vegetation, covered with riprap, and maintained free of woody vegetation. Further avoidance of this wetland system will be achieved during detailed design with the proposed impacts being minimized to the maximum extent practicable.
- Approximately 3.1 acres of wetlands will be impacted by the proposed plan. These consist of approximately 0.7 acres of mixed palustrine forested and shrub-scrub wetlands at the fairgrounds and about 2.4 acres of palustrine forested wetlands along Fishing Creek in Fernville. In-kind, on-site compensatory mitigation is proposed to offset these unavoidable impacts and these impacts will be further minimized in the detailed design phase of the project.
- The alignment of the flood protection under Alternative 4 would require the permanent removal of an estimated 22 residences, three commercial structures, one County building, and the relocating of a trailer park. The taking of residential homes and business structures within the levee/floodwall footprint, or for increased flooding mitigation, would be an unavoidable adverse effect on the community.

PERTINENT DATA

DESCRIPTION

The identified plan provides for flood damage reduction along Fishing Creek and the Susquehanna River in Bloomsburg (Columbia County), Pennsylvania.

LOCATION

Columbia County, Pennsylvania

FLOOD DAMAGE REDUCTION FACILITIES

Level of Protection from Fishing Creek (storm with probability of exceedance)	1% (100-year event)
Level of Protection from Susquehanna River (storm with probability of exceedance)	0.23% (440-year event)

The recommended flood protection project for Bloomsburg would include earth levees, MSE walls, concrete floodwalls, closure structures, and drainage structures.

Levees

The proposed project would provide approximately 9,600 feet of full levee embankment in the Town of Bloomsburg and, for purpose of mitigating for increased flooding, approximately 4,350 feet of full levee embankment in Fernville. The typical levee section would consist of a random material zone (for drawdown protection) on the riverside third, adjacent to a select fill zone, which would in effect be an impervious material. In sections without toe drains, a landside blanket drain would be used. In areas where riprap is determined to be necessary, a layer of riprap on 6 inches of bedding soil would be provided. Exterior levee slopes would be 2.5H:1V for areas receiving topsoil. Areas that would require riprap can be steepened to 2H:1V.

Mechanically Stabilized Earth Wall

Approximately 760 feet of double-sided MSE wall is proposed in the Town of Bloomsburg and is located between stations 20+00 and 27+60. Approximately 710 feet of double-sided MSE wall is proposed in Fernville, located between stations 34+25 and 41+35. The MSE wall would consist of modular concrete block facing, reinforcing elements, soil backfill, and drainage materials. The average height of the MSE wall would be approximately 14 feet above the existing ground surface, which varies along each section.

H-Pile Supported Concrete Floodwall

The concrete floodwall begins at the end of MSE wall from Sta. 27+60 to Sta. 39+13, at the beginning of the Route 11 stop log closure. The total length of concrete floodwall is 1,153 ft. An H-pile supported wall is more expensive than other types of flood protection, such as a MSE wall or earthen levee, in terms of comparing the cost per linear foot of flood protection. The main reason that this type of wall was selected is due to limited land for construction.

Closure Structures and Ramps

In order to maintain protection at the road and bridge crossings, a closure structure or ramp would be required at each crossing. Seven structures are proposed in Bloomsburg and one in Fernville. The following summary data provides the approximate dimensions for each structure:

Bloomsburg

Location	Width	Height
Railroad Street (Sandbag)	35'	3.3' above grade
Route 11/W. 2nd St. (Stoplog)	52'	11.9' above grade
River Road/Fair Ground Entry (2 Ramps/Sandbag)	110'	3.0' above ramps
River Road (Ramp/Sandbag)	26'	2.0' above ramp
Fairground Ramp (Semi-Permanent)	40'	3.0' above ramp
Railroad (Miter Gate)	24'	11.25' above grade
W. 11th St. (Ramp/Sandbag)	40'	3.0' above ramp

Fernville

Location	Width	Height
Bloom St. (Ramp/Stoplog)	24'	5' above ramp

The heights shown are distances over and above any ramp structure that requires closure.

Drainage Structures

Construction of the levee system would require construction of nine drainage structures in Bloomsburg, and five in Fernville. These drainage structures would permit surface runoff and pipe flow from the existing storm water sewer and low areas to cross the line of protection. The drainage structures would consist of a concrete outlet structure with a flap gate, a control manhole with a sluice gate, and reinforced concrete pipe. One drainage structure would drain into a riverside manhole, rather than an outlet structure. The two largest drainage structures would be 84-inch diameter pipes. The remaining drainage structures would have pipes varying in diameter from 12 to 36 inches.

REAL ESTATE REQUIREMENTS

	Total Acquisitions	Total Acres
Fee Simple Acquisition (27 residential, 4 commercial, 1 trailer park)	32	13.1
Perpetual Flood Protection Levee/Floodwall Easements (59 residential, 3 commercial)	62	31.3
Residential Flowage Easements	4	1.2
Temporary Work Area Easements (59 residential, 3 commercial)	62	9.4

ECONOMICS

Initial Project Cost (March 2004 price level, includes Interest During Construction)	$41,356,900
Annualized Initial Cost (discounted at 5.375 % over a 50-year period)	$2,397,900
Operations and Maintenance (O&M) Costs	$185,300
Total Annual Cost (discounted at 5.375 % over a 50-year period)	$2,583,200
Average Annual Benefits	$3,565,200
Average Annual Net Benefits	$982,000
Benefit-to-Cost Ratio	1.38

COST APPORTIONMENT (Fully-Funded Cost Estimate)

Federal Project Cost (65%)	**$ 30,055,350**
Non-Federal Project Cost (35%)	
5% Cash	$ 2,311,950
LERRD	$ 12,833,000
Cash Balance	$ 1,038,700
Non-Federal Project Cost Total	**$ 16,183,650**
Total Project Cost	**$ 46,239,000**

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* Section headings in this document marked with an asterisk indicate consistency with requirements of National Environmental Policy Act (NEPA) Environmental Impact Statements.

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GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

APE	Area of Potential Effect
BCR	Benefit-to-Cost Ratio
CEQ	Council On Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code Of Federal Regulations
cfs	Cubic Feet Per Second
Corps	United States Army Corps of Engineers
CRS	Community Rating System
DA	Design Agreement
dBA	Decibels
EFH	Essential Fish Habitat
EGM	Economic Guidance Memorandum
EIS	Environmental Impact Statement
EM	Engineer Manual
EPA	United States Environmental Protection Agency
EPW	Evaluation of Planned Wetlands
ER	Engineer Regulation
FCSA	Feasibility Cost Sharing Agreement
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
FR/EIS	Feasibility Report/Environmental Impact Statement
FTA	United States Federal Transit Administration
GI	General Investigations
H:V	horizontal to vertical
HABS/HAER	Historic American Building Survey/Historic American Engineering Record
HEC-FFA	Hydrologic Engineering Center – Flood Frequency Analysis
HEC-IFH	Hydrologic Engineering Center – Interior Flood Hydrology
HEC-RAS	Hydraulic Engineering Center – River Analysis System
HTRW	Hazardous, Toxic, and Radiological Wastes
IFLOWS	Integrated Flood Observing and Warning System
JRA	Susquehanna Economic Development Association Council of Government Joint Rail Authority
KAR	Kittatinny Archeological Research
LERRD	Lands, Easements, Rights-of-Way, Relocations and Disposal/Borrow Areas
LOS	Level of Service
MCACES	Microcomputer Aided Cost Estimating System
MSE	Mechanically Stabilized Earth
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act

NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NOx	Oxides of Nitrogen
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
O&M	Operations and Maintenance
OMRR&R	Operation, Maintenance, Repair, Replacement, or Rehabilitation
P&G	Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies
P&S	Plans and Specifications
PADEP	Pennsylvania Department Of Environmental Protection
PFBC	Pennsylvania Fish and Boat Commission
PNDI	Pennsylvania Natural Diversity Inventory
PCA	Project Cooperation Agreement
PCB	Polychlorinated Biphenyls
PED	Preconstruction Engineering and Design
PennDOT	Pennsylvania Department of Transportation
PMP	Project Management Plan
PSP	Project Study Plan
RCRA	Resource Conservation and Recovery Act
S&A	Supervision And Administration
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SRBC	Susquehanna River Basin Commission
TIA	Takings Implication Assessment
TSD	Treatment, Storage, and Disposal
TWAE	Temporary Work Area Easements
USACE	United States Army Corps Of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish And Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compounds
WES	U.S. Army Corps of Engineers, Waterways Experiment Station
WRDA	Water Resources Development Act

THE TOWN OF BLOOMSBURG COLUMBIA COUNTY, PENNSYLVANIA

FLOOD DAMAGE REDUCTION PROJECT

INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL IMPACT STATEMENT

1. INTRODUCTION

This integrated feasibility report and environmental impact statement (FR/EIS) investigates the feasibility of alternative plans to address problems and opportunities associated with flood damage reduction along the Susquehanna River and Fishing Creek in the Town of Bloomsburg (Columbia County), Pennsylvania. This FR/EIS has been prepared by the Baltimore District of the U.S. Army Corps of Engineers (Corps) under the General Investigations Program of the Corps. The Town of Bloomsburg is the non-Federal sponsor for this study and for any subsequent project implementation. The Pennsylvania Department of Environmental Protection (PA-DEP) is providing 50 percent of the non-Federal share of project costs, under a sub-agreement with the Town of Bloomsburg. This document has been organized in a manner consistent with both Corps requirements for feasibility reports and with requirements established by the National Environmental Policy Act (NEPA). The integrated report reflects an integrated planning process where adverse environmental effects associated with flood damage reduction have been avoided, minimized, and mitigated.

1.1 Study Authority

The Bloomsburg, Pennsylvania, Flood Damage Reduction Feasibility Study is being conducted under the Corps General Investigations Program. The study was authorized by a resolution of the Committee on Transportation and Infrastructure of the U.S. House of Representatives, adopted 14 September 1995. The resolution states:

> *Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, that, the Secretary of the Army review the report of the Chief of Engineers on the Susquehanna River, New York, Pennsylvania and Maryland, published as House Document No. 702, 77th Congress, to determine whether flood damage reduction measures should be implemented in the town of Bloomsburg, Pennsylvania...*

Under this study authorization, a reconnaissance report was completed in May 1998. The reconnaissance study concluded that there is Federal interest in addressing flooding problems in the Town of Bloomsburg. Based on preliminary analysis, the reconnaissance report identified at least one project that would be in the Federal interest. On the basis of these findings, the Corps and the Town of Bloomsburg, Pennsylvania entered into an agreement to perform a cost-shared feasibility study for a flood damage reduction project.

1.2 Study Purpose

The purpose of the Bloomsburg Flood Damage Reduction Feasibility Study is to evaluate the feasibility of Federal participation in implementing solutions to problems and opportunities of flood damage reduction along the Susquehanna River and Fishing Creek. More specifically, the study:

- identifies flooding problems associated with periodic flooding from storms along the Susquehanna River and Fishing Creek, particularly in the Town of Bloomsburg;
- evaluates the technical, economic, environmental, and institutional feasibility of Federal participation in the implementation of a flood damage reduction project; and
- determines if there is local support for implementation of the recommended plan.

As part of the plan formulation process, reconnaissance phase plans were re-evaluated, and other potential flood damage reduction measures were formulated in order to evaluate and select the plan that maximizes net contributions to National Economic Development (NED).

Contributions to NED include increases in the net value of the national output of goods and services expressed in monetary units. Direct benefits (e.g., prevented damages, reduction of emergency services costs) that accrue in the planning area from implementation of a flood damage reduction project are contributions to NED. Direct costs (e.g., construction costs, real estate acquisition costs, operations and maintenance costs) of project implementation are deductions from NED. A positive difference of project benefits minus project costs becomes a net contribution to NED. Similarly, if the result of project benefits divided by project costs exceeds 1.0, the project is said to have a positive benefit-to-cost ratio (BCR).

The Federal objective of water resources development is to identify a plan that maximizes net contributions to NED consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. This plan is referred to as the NED plan, and becomes the basis for Federal cost-sharing in any project for flood damage reduction.

In this document, the NED plan has been developed to a level of engineering, economic, and environmental detail sufficient to proceed to the preconstruction engineering and design (PED) phase, pending recommendation by the Baltimore District, support by Corps Headquarters and the Assistant Secretary of the Army (Civil Works), and authorization of project construction by Congress.

1.3 Prior Studies, Reports, and Existing Water Projects

The Susquehanna River Basin is subject to frequent and severe flooding. As such, the Corps has conducted numerous studies to identify comprehensive solutions to reduce flood damages throughout the basin. Each of the prior studies was reviewed to identify any and all information that could be used in the current feasibility study.

1.3.1 Corps Studies and Reports

Bloomsburg has a long history of flooding. The first known Corps report documenting Bloomsburg's flood problems was submitted to Congress in December 1934. A flood control project for Bloomsburg consisting of levees along the Susquehanna River was authorized by the Flood Control Act of 1936. The authorized plan was reevaluated in April 1942 and found to lack economic justification. As a result, the Corps recommended abandonment of the authorized project.

The Bloomsburg area was evaluated again in 1956, 1970 and 1980 as part of Susquehanna River basin studies conducted by the Corps. Flooding from Fishing Creek was not considered in any of the studies mentioned. Additionally, all of the studies reported a lack of economic justification to proceed with construction of a Federal flood damage reduction project at Bloomsburg.

Section 205 Reconnaissance Study Report – Bloomsburg, Pennsylvania Local Flood Protection, December 1983

The Baltimore District conducted a Section 205 reconnaissance study[1] in 1983. Previous Corps studies had found that providing flood protection for the entire town lacked economic justification, and that nearly all of the expected annual damages for the Town were found to occur in the area between Fishing Creek, the Susquehanna River, and Railroad Street. Therefore, the Corps 1983 reconnaissance study focused on providing protection for this more downstream, western end of the Town. The study evaluated three structural alternatives, including two levee and floodwall alternatives that each provided 100-year level of protection, and a third alternative that provided 500-year level of protection. However, none of the three plans evaluated as part of the reconnaissance study were found to be economically feasible, with the highest BCR being 0.6 to 1.

Section 205 Initial Appraisal – Bloomsburg, Pennsylvania, August 1994

By the early 1990s, changes to existing conditions in the study area since the time of the 1983 reconnaissance study prompted the Town of Bloomsburg to request a new Corps study to evaluate flood damage reduction measures. In 1994, the Corps completed an initial appraisal study under the Section 205 Continuing Authorities Program. With anticipated increased benefits and decreased construction costs, conservative preliminary calculations indicated that a BCR would range from 0.7 to 1.1. The expected improvement in the BCR warranted another, more thorough, investigation of a flood control project for the Town.

Based on the 1994 study, the cost for construction of a flood control project for Bloomsburg was estimated to range from \$6.5 to \$10 million (1994 dollars). In light of the \$5 million dollar Federal cost-sharing limit at the time for Section 205 projects, it was anticipated a project could not be pursued through the Section 205 Program. Therefore, the 1994 Initial Appraisal Report stated that further study to determine the feasibility of constructing a Federal flood damage reduction project at Bloomsburg was warranted, but recommended that the reconnaissance study

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[1] Section 205 of the Flood Control Act of 1948 (PL 80-858), as amended, authorizes the Corps to plan, design, and construct flood control projects without additional and specific congressional authorization. Section 205 activities (studies and construction) are conducted under the Continuing Authorities Program (CAP). Projects implemented under this authority are formulated in accordance with policies and procedures governing projects which are specifically authorized by Congress. Project cost sharing requirements also are identical to projects implemented under specific congressional authorization. The main difference between a Section 205 project and a project that is specifically authorized by Congress is that Section 205 projects have a Federal cost limit, whereas specifically authorized projects do not.

be pursued under the General Investigations (GI) Program, which is not subject to the cost limits of the Section 205 Continuing Authorities Program.

Section 905(b) (WRDA 86) Analysis – Bloomsburg Pennsylvania Flood Protection Reconnaissance Study, May 1998

A General Investigations reconnaissance study for Bloomsburg, Pennsylvania, flood damage reduction was authorized by a resolution adopted by the Committee on Transportation and Infrastructure of the United States House of Representatives on 14 September 1995. Federal funds were provided in 1998 for the Corps to undertake the reconnaissance phase evaluation.

The objectives of the reconnaissance phase are to:

1. determine if the water resource(s) problems warrant Federal participation in feasibility studies,
2. define the Federal interest,
3. complete a 905(b) Analysis (refers to Section 905(b) of the Water Resources Development Act of 1986) or a reconnaissance report,
4. prepare a project management plan (PMP) that outlines tasks and responsibilities for the feasibility phase of study,
5. assess the level of interest and support from non-Federal entities, and
6. negotiate and execute a feasibility cost sharing agreement (FCSA).

Achievement of the six objectives determines whether or not planning to develop a project should proceed to the more detailed feasibility stage. The reconnaissance phase is 100-percent Federally funded and the target for completion is 6-12 months from initial obligation of reconnaissance funds to a signed FCSA.

Past projects were examined with an emphasis on flood protection along the Susquehanna River. The 905(b) analysis evaluated structural alternatives previously considered in past reports, with nonstructural measures evaluated at a lower level of protection. Existing Corps dams that contribute to the reduction of Susquehanna River flooding at Bloomsburg were taken into consideration during this reconnaissance level evaluation. Flood forecast and warning systems for the Susquehanna River just upstream of Bloomsburg were already under consideration as part of the Wyoming Valley Levee Raising Project, so were not specifically examined as part of the Bloomsburg 905(b) Analysis. Further analysis of potential flood forecast and warning system modifications or improvements will be completed during the next phase of the project, preconstruction engineering and design phase (PED).

The 905(b) reconnaissance study determined that there was a Federal interest in proceeding to the feasibility phase of study for Bloomsburg, based on the strong likelihood that flood damage reduction measures for the Town would be economically justified. Following the successful Section 905(b) analysis, the Town of Bloomsburg and the Corps completed negotiations on the feasibility phase project study plan (PSP) in March 1999. The FCSA was executed in June 1999 and the Bloomsburg Flood Damage Reduction Feasibility Study was initiated in August 1999.

1.3.2 Prior Studies by Others

Other Federal Agency Studies

The Federal Emergency Management Agency's Federal Insurance Administration (FIA) completed a flood insurance study of Bloomsburg in 1979 in order to convert Bloomsburg to the regular program of the National Flood Insurance Program (NFIP).

Local Studies

In 1979, the Fernville-Scottown Survival Committee, a citizens' flood control group in Bloomsburg, hired a consulting engineer to develop a flood control plan for the Bloomsburg side of Fishing Creek. The consultant recommended construction of an open-ended levee and floodwall along the Bloomsburg side of Fishing Creek and the removal of the Route 44 bridge in order to provide a 100-year level of protection. In 1980, the citizens group asked the same consultant to develop a plan to provide additional flood protection for the Town of Bloomsburg. The consultant developed a combination road and levee plan to provide 100-year protection for additional areas of the Town, primarily on the west side. This plan was designed to tie into the Corps previously-proposed open-ended levee and floodwall plan for the Bloomsburg side of Fishing Creek in order to provide a continuous system of protection. Projects described in both of these local studies were found to lack economic justification in the Corps 1983 Reconnaissance Study.

1.3.3 Existing Water Projects

Nine upstream Corps dams detain floodwaters from the Susquehanna River:

- Almond Dam, located about 2 miles northwest of Hornell, New York, on Canacadea Creek;
- Arkport Dam, located in Steuben County, New York, on the Canisteo River about 1 mile west of the village of Arkport and 5 miles upstream of Hornell, New York;
- Aylesworth Creek Lake, located on Aylesworth Creek in Lackawanna County, Pennsylvania, about 10 miles upstream from Scranton, Pennsylvania.
- Cowanesque Lake, located on the Cowanesque River approximately 2 miles above the confluence with the Tioga River at Lawrenceville, Pennsylvania.
- East Sidney Lake, located on Ouleout Creek in Delaware County, New York;
- Stillwater Reservoir, located about 9 miles north of Carbondale, Pennsylvania, on the Lackawanna River;
- Tioga-Hammond Dams (two structures); located about 20 miles southwest of Elmira, New York, on the Tioga River and Crooked Creek; and
- Whitney Point Dam, located on the Otselic River in Broome County, New York.

In addition to the upstream dams, thirty-two local flood protection projects have been constructed (or are currently being constructed) by the Corps along the North Branch of the Susquehanna River basin in New York and Pennsylvania.

The Wyoming Valley lies along the Susquehanna River in Luzerne and Lackawanna Counties in northeastern Pennsylvania. From 1891 to 2003, the Wyoming Valley experienced 57 significant floods along the Susquehanna River. In response to recurrent flood damages, Federally authorized flood damage reduction projects were constructed in the Wyoming Valley during the late 1930s, 1940s, and 1950s to protect against the flood of record up to that time (March 1936). The Federal flood damage reduction projects significantly reduced flood damages along this reach of the Susquehanna River

In June 1972, Tropical Storm Agnes struck and established a new flood of record for the Susquehanna River basin. During this flood, the Susquehanna River overtopped the levee system in the Wyoming Valley, causing severe damage in the City of Wilkes-Barre and in other communities along the river.

Following Tropical Storm Agnes, the U.S. Congress authorized a project to increase the level of flood protection provided by the existing Wyoming Valley levee system, with limited additional project upgrades. The purpose of the Wyoming Valley Levee Raising Project is to provide protection against a recurrence of the storm of record, Tropical Storm Agnes. The project consists of raising existing levees and floodwalls between three and five feet; modifying closure structures, drainage structures, and pumping stations; relocating utilities; adding minor recreation facilities; and providing additional levees, closure structures, and floodwalls to maintain the integrity of the existing flood damage reduction system. The project includes a mitigation plan for 32 identified communities (one of which is Bloomsburg) subject to adverse flood impacts related to the Wyoming Valley Levee Raising Project. The current mitigation plan calls for the removal of an abandoned railroad bridge and embankment on the Susquehanna River at Bloomsburg. Construction of the levee raising project was initiated in Spring 1997. The levee and floodwall raising to provide Agnes level flood protection was completed in January 2003, but construction of related project elements is ongoing.

Construction is ongoing for a project to provide a 100-year level protection for the Borough of Olyphant, Pennsylvania, located along the Lackawanna River upstream of Scranton. The Olyphant project was authorized by the Water Resources Development Act of 1992 (WRDA 1992).

A flood control project at Scranton, Pennsylvania is currently in the construction phase. The Scranton project will provide a 100-year level of protection from flooding on the Lackawanna River, a major tributary to the Susquehanna River. The first reach of the Scranton project provides protection for the Albright Avenue area of Scranton, and was completed in 2003. Real estate acquisition is underway for the remaining two project reaches to provide flood protection for the Plot and Green Ridge neighborhoods. Construction of these project reaches is scheduled for completion in 2007.

1.4 Study Scope

This FR/EIS investigates the feasibility of Federal action to address flooding problems and flood damage reduction opportunities for the Town of Bloomsburg. It is consistent with Federal water resources policies and practices, including *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G, 1983), the Corps *Planning Guidance Notebook* (ER-1105-2-100, 22 April 2000), and *Procedures for Implementing NEPA* (ER 200-2-2, 4 March 1988). Throughout this investigation, the Corps has worked closely with the non-Federal sponsor, the Town of Bloomsburg, as well as the Pennsylvania Department of Environmental Protection (PA-DEP), to (1) describe the range of potential Federal participation in flood damage reduction projects and (2) explain the roles and responsibilities of the Corps and the non-Federal partner in project planning and implementation.

As an integrated report, this FR/EIS also fully complies with requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.). The integration of the NEPA documentation with the feasibility report is consistent with NEPA guidance to combine required documents with other documents, when practicable.

1.5 National Environmental Policy Act (NEPA) Requirements

Unlike other single-topic environmental laws (e.g., Clean Air Act, or Clean Water Act), NEPA encourages protection of all aspects of the environment. The President's Council on Environmental Quality (CEQ) has pointed out that "NEPA is distinguishable, purposefully so, from other environmental statutes. It targets no specific pollution sources or human health risks for treatment, prescribes formulation of no abatement techniques or remedial actions, and establishes neither milestones nor timetables for achieving its goals" (CEQ, 1990). Instead, NEPA requires that agencies take a hard look at the potential effects of their decisions through a systematic, interdisciplinary approach to agency decision-making that will ensure the integrated use of the natural sciences, social sciences, and design arts.

NEPA also established the President's CEQ and empowered it to develop regulations by which all Federal agencies would comply with NEPA. These regulations are published in the Code of Federal Regulations (CFR) at 40 CFR 1500-1508. The Corps has promulgated their own Procedures for Implementing NEPA (ER 200-2-2) to provide guidance for the procedural provisions of NEPA. ER 200-2-2 supplements, and is used in conjunction with, the CEQ regulations.

Within the CEQ NEPA regulations and ER 200-2-2, a process is set forth where all agencies must assess the environmental impact of proposed Federal actions and consider reasonable alternatives to their proposed actions. For those actions with the greatest potential to create significant environmental effects, the consideration of the proposed action and alternatives is presented in an Environmental Impact Statement (EIS).

The primary purpose of an EIS is to serve as an action-forcing device to ensure that the policies and goals defined in the Act are infused into the ongoing programs and decision making of Federal agencies. An EIS must provide full and fair discussion of significant environmental impacts and inform decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment.

The CEQ NEPA regulations contain a detailed discussion regarding the format and content of an EIS (40 CFR 1502.10). The EIS is to be prepared using an interdisciplinary approach, and must include a discussion of the following:

- purpose of and need for action;
- alternatives, including the proposed action;
- the affected environment; and
- the environmental consequences.

The EIS must also include a list of the preparers and a list of agencies, organizations, and persons to whom copies of the EIS are sent.

The CEQ Regulations permit Federal agencies to combine any environmental document in compliance with NEPA with any other agency document to reduce duplication and paperwork (40 CFR 1506.4). For the Bloomsburg Flood Damage Reduction project, the Corps is combining the EIS with the feasibility report to integrate the environmental review into the planning and decision-making process. This integrated FR/EIS reflects the Corps' integrated planning process.

The Corps has incorporated environmental values into its decision-making process in accordance with Executive Order 11514. This EO directs the agencies of the federal government to provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. The information developed in the EIS has led to alterations in project design, implementation of mitigation measures, and an opportunity for public involvement in the decision-making process. It also has allowed the Corps to address compliance with other environmental laws as part of a single review process rather than through separate reviews, to reduce paperwork and ensure comprehensive compliance.

1.6 Study Process

The Baltimore District is responsible for conducting the overall feasibility study in cooperation with the non-Federal project partner, the Town of Bloomsburg, as well as PADEP. The feasibility study and eventual implementation of the project continue to receive strong support from the Town of Bloomsburg and PADEP, both of whom are committed to working with the Corps to address the Town's flooding problems along Fishing Creek and the Susquehanna River.

As will be explained in detail, plan formulation for mitigation of adverse environmental effects of this project was conducted in close coordination with Federal and Commonwealth of Pennsylvania regulatory and resource agencies, including: U.S. Fish and Wildlife Service (USFWS), PADEP, the Pennsylvania Fish and Boat Commission (PFBC), and the Pennsylvania State Historic Preservation Officer (SHPO).

1.7 Report Organization

The main report summarizes the results of feasibility studies and contains sections appropriate for EIS documentation. Technical appendices, which present details of technical investigations conducted during the feasibility study, are provided in separate volumes. Some section headings in this document are marked with an asterisk to indicate consistency with the requirements of NEPA documents.

2. *BASELINE CONDITIONS / AFFECTED ENVIRONMENT

The study area for this project includes the Town of Bloomsburg, Fernville, and Montour, Pennsylvania. Within the study area, the areal extent of lands that would have physical disturbance is considered the project area. This section describes existing conditions and most probable future without-project conditions in the study area. The description provides a baseline for measuring expected changes in the physical, environmental, cultural, social, and economic settings that would result from implementation of a flood damage reduction project in the study area.

The Town of Bloomsburg, Pennsylvania is located in Columbia County within the Middle Susquehanna River subbasin. The Susquehanna River forms the Town's southern boundary, and Fishing Creek forms the northern and western boundary. Figure 2-1 provides a study area regional overview, and Figure 2-2 provides a study area local overview.

Early in the feasibility phase, scoping and public meetings, and site visits were held with the Town of Bloomsburg, PADEP, and area residents to determine the extent of flooding problems in the study area. It was determined from this coordination and initial evaluation that flood damages are comprised of damages to residential, industrial, commercial, and public property.

2.1 Physical Setting

The physical characteristics of the study area are profiled below. Discussions address physiography, geomorphology, topography, soils, and climate.

2.1.1 Physiography and Geomorphology

The study area is located within the Valley and Ridge Province of the Appalachian Mountains. The Valley and Ridge province extends from upstate New York through Pennsylvania and southward to Alabama. The width varies from about 14 miles at the New York – New Jersey state line to 80 miles along a line between Harrisburg, Pennsylvania and Williamsport, Pennsylvania.

The Valley and Ridge complex exhibits the geomorphic features of: (1) marked parallelism of ridges and valleys due to folding; (2) conspicuous influence of alternating strong and weak strata upon topographic forms; (3) several major transverse surficial waters (i.e., Susquehanna River) with notable development of subsequent streams forming a distinctive trellis drainage pattern; (4) many ridges which display enough accordance (similar height) of summit level to suggest that their crests may represent former erosional surfaces; and (5) hundreds of water gaps and wind gaps which indicate frequent past cases of natural stream diversion.

Much of Bloomsburg consists of a low terrace, where glacial meltwaters and more recent floodwaters deposited material up to boulder-size. Published geologic reports indicate that this material is stratified and moderately to poorly graded. The thickness of these deposits is 3 to 50 feet near Bloomsburg.

Most of the bedrock beneath the study area is part of the Wills Creek Formation but the northeast end is underlain by Bloomsburg Formation rocks. The strike of bedrock bedding at the Railroad Street Bridge outcrop is north 65° east; dip is 28° to the south. That bedding dip is within the range measured in test boring cores.

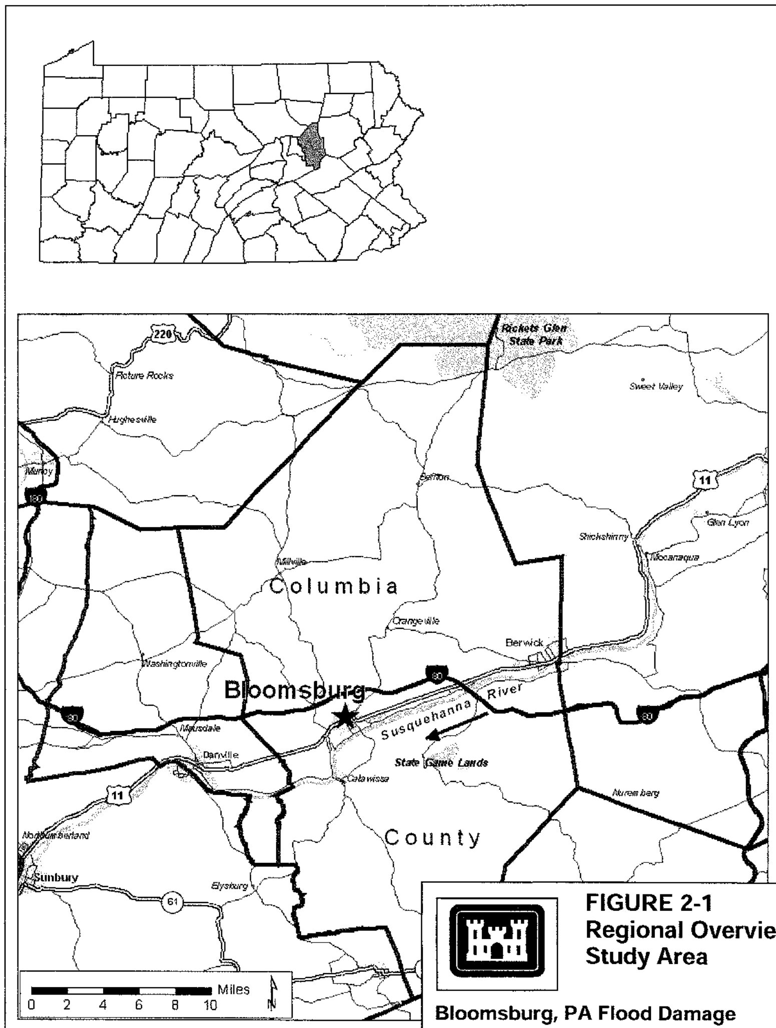
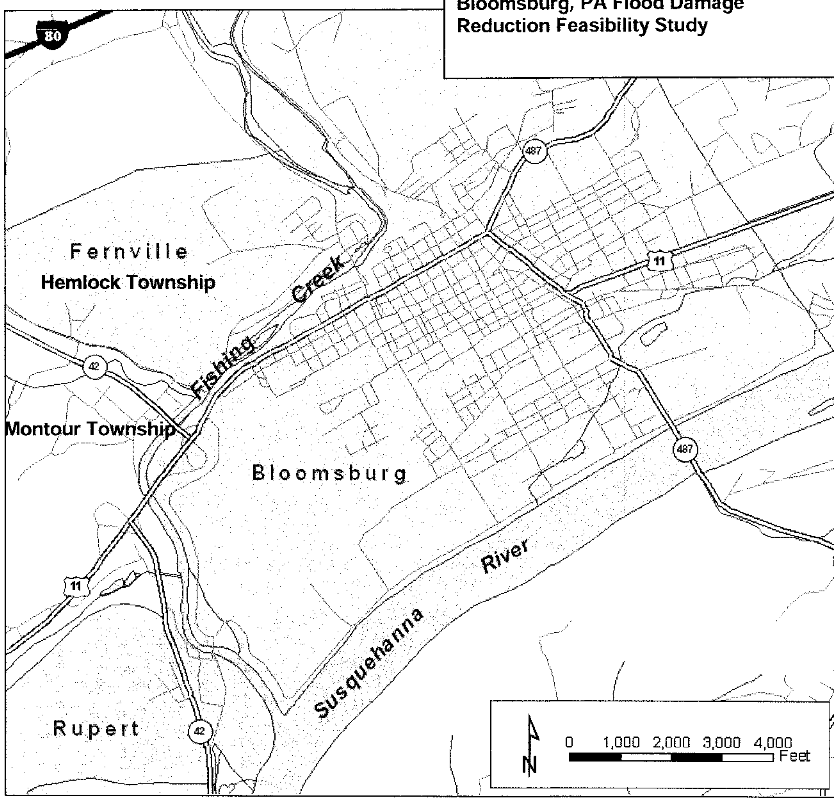


FIGURE 2-1
Regional Overview of Study Area

Bloomsburg, PA Flood Damage Reduction Feasibility Study

FIGURE 2-2
Local Overview of Study Area

Bloomsburg, PA Flood Damage Reduction Feasibility Study



The Wills Creek Formation is mostly calcareous claystone or shale, but also consists of calcareous limestone and dolostone. Laminated to thin bedding predominates in Wills Creek rocks. Wills Creek rocks are usually highly weathered to a moderate depth, due to lithology, bedding characteristics, joints, and calcareous content.

The Bloomsburg Formation is mostly claystone and shale, with abundant siltstone and sandstone interbeds. The claystones and shales are medium to thick-bedded. Sandstones and siltstones are thin to medium-bedded. Bloomsburg Formation rocks are also highly susceptible to weathering, but not to the extent that Wills Creek rocks are.

2.1.2 Soils

Alluvium and glacial outwash represent the surficial geology throughout much of the project area (PADEP, 1997). The existing floodplain/low terrace consists of stratified deposits of silt, sand, gravel and cobbles. There is evidence that bulldozers have moved some of the soil. The Soil Conservation Service, now the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), mapped four soil units that occur throughout the project area: Chenango, Tioga, Braceville and Holly units. The Chenango unit also occurs along Fishing Creek.

The Chenango soil unit is the dominant soil northeast of the North Shore rail lines. Grayish brown to yellowish brown silt loam (SM) grading to gravelly sandy loam (GM) is typical of this unit. These deep well-drained soils, developed in the glacial outwash, are very permeable with groundwater occurring at a depth greater than three feet.

South of the North Shore rail lines, the Tioga soil unit is dominant. This is a silt loam that has formed in alluvium on the floodplain. It is a deep, well-drained soil consisting of olive brown silt overlying stratified silt and sandy clay loam and gravel. Permeability of the Tioga soil ranges from moderately rapid to rapid with groundwater being deeper than three feet. Bedrock is typically six to 15 feet in depth. Unlike Chenango soils, Tioga soils formed in alluvium that was recently deposited on floodplains. The potential productivity of Tioga soils is rated as excellent, while that of Chenango silt loam is described as good. The NRCS has identified and mapped these areas of Tioga soils as Prime Farmland or Additional Farmland of Statewide Importance (USDA, 2002).

According to the 1981 Farmland Protection Policy Act (PL 97-98), important farmland includes all land that is defined as prime, unique, or farmlands of statewide or local importance. The identification of Important Farmlands is determined based on currently published or interim soil survey maps and data produced and certified by the NRCS through its National Cooperative Soil Survey Program. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water).

Near the southeastern end of the project area is a relatively small area of Holly soil. It is a silt loam with some silty clay and sandy loam. Locally, the unit may consist of reddish-gray silt (ML) and gravelly sandy loam (SM) with mottling. The Holly unit is deep, poorly drained and is typically found in floodplains. Groundwater is generally less than two feet deep in most areas and depth to bedrock ranges from four to 30 feet.

22 limate and Weater

Bloomsburg is located in a humid continental climate region with precipitation evenly distributed throughout the year. Normal precipitation ranges between 40 and 44 inches per year with approximately 58 percent of the annual precipitation occurring from April through September. Thunderstorms, which are generally the most frequent and damaging storms, may occur during any month of the year, but are most frequent from May through September. Hurricanes and tropical storms, which usually occur during June through November, can produce heavy rainfall and significant flooding. The coldest month of the year is January with a mean temperature of 24° Fahrenheit and the warmest month of the year is July with a mean temperature of 70° Fahrenheit.

23 Water Resources

Below is a description of the existing water resources (surface water and groundwater) in the study area.

23 Surace Waters

Bloomsburg is within the Middle Susquehanna River subbasin. In the upper part of the subbasin, the Susquehanna flows southeast through high, flat-topped plateaus separated by steep-sided valleys. Midway down the basin, the Lackawanna River joins the Susquehanna River before turning and flowing southwest towards Bloomsburg.

The Susquehanna River forms Bloomsburg's southern boundary and is the most prominent drainage feature, draining an area of approximately 10,576 square miles. Fishing Creek forms the northern and western boundary of the Town and drains an area of approximately 385 square miles at its confluence with the Susquehanna River. Fishing Creek and its tributaries - Huntington, Greene, Little Fishing, Spruce, and Hemlock Creeks - drain the northern nine townships of Columbia County southward to the bend of the Susquehanna River between Bloomsburg and Catawissa.

The middle Susquehanna River sub-basin is a mixture of urban and rural lands that include forest, agriculture, abandoned mines, and urban development. A section of this subbasin was heavily mined and remnants of mining activities (e.g., coal slag piles, abandoned mines, and acid mine drainage) still impact the water quality of many miles of streams and rivers throughout the Wyoming Valley (SRBC, 2002).

The U.S. Environmental Protection Agency (EPA) lists the reach of the Susquehanna River through Bloomsburg as "impaired water" because of high metals due to acid mine drainage (USEPA, 2003). Recent sampling and analysis reported by the Susquehanna River Basin Commission (SRBC, 2002) confirms the water quality of the middle Susquehanna River is similar to the water quality measured approximately 10 years ago (SRBC, 1997). Sampling results indicated the primary source of severe impairment was acid mine drainage. Urban influence was another source of impairment, while impairment from agriculture was not significant (SRBC, 2002).

Various reaches of Fishing Creek are listed on the PA-DEP 303(d) Impaired Streams and Rivers List (PADEP, 2002). Several reaches are listed for violations of Aquatic Life Use based on siltation from agriculture, road runoff, and removal of vegetation. Additionally, one reach of Fishing Creek (#20020111-1226-FIT) was listed for violations of Human Health Uses due to mercury. Little Fishing Creek, which flows into Fishing Creek at Bloomsburg, was also listed for violations related to Recreational Use due to pathogens.

2.3.2 Hydrogeology and Groundwater

The soils of the Fishing Creek and Susquehanna River floodplains are moderately pervious to very pervious with little to no impervious blanket above. Throughout much of the project area, a layer of dense gravel was encountered in most borings at a depth of approximately 10 feet. Varying amounts of fines were found in the soils, but most of the soils were classified as sands and gravels. As such, the groundwater under much of the project area is directly connected hydraulically to the surface waters. In portions of the project area farther from the water's edge, groundwater levels are less influenced by the surface waters. Throughout most of the project area, groundwater levels would be expected at depths of more than three feet below the ground surface.

2.4 Biological Resources

2.4.1 Vegetation

Habitat in the project area is characterized as low quality and significantly disturbed, as the project area passes through residential areas with mowed lawns. Open spaces in the project area also include the lawn of the Bloomsburg Fairgrounds, a low quality wetland adjacent to the North Shore rail lines, and cultivated agricultural fields.

The riparian corridor along Fishing Creek generally consists of a shrubby understory including Japanese knotweed (*Polygonum cuspidatum*), honeysuckle (*Lonicera sp.*), and poison ivy (*Toxicodendron radicans*). Herbaceous species at the water's edge include water willow (*Justicia americana*), touch-me-not (*Impatiens capensis*), and small black willow (*Salix nigra*). Mature trees including cottonwood (*Populus deltoides*) and sycamore (*Platanus occidentalis*) were found along the right descending bank of Fishing Creek. Although very steep, the left descending bank of Fishing Creek is relatively stable throughout the reach and supports sparse vegetation. Bedrock is exposed along much of the left descending bank of Fishing Creek, and vegetation persists where root masses may grow in the interstitial spaces between rocks. Highly erosive flows, little soil, and little direct sunlight (north-facing slope) restrict vegetation growth.

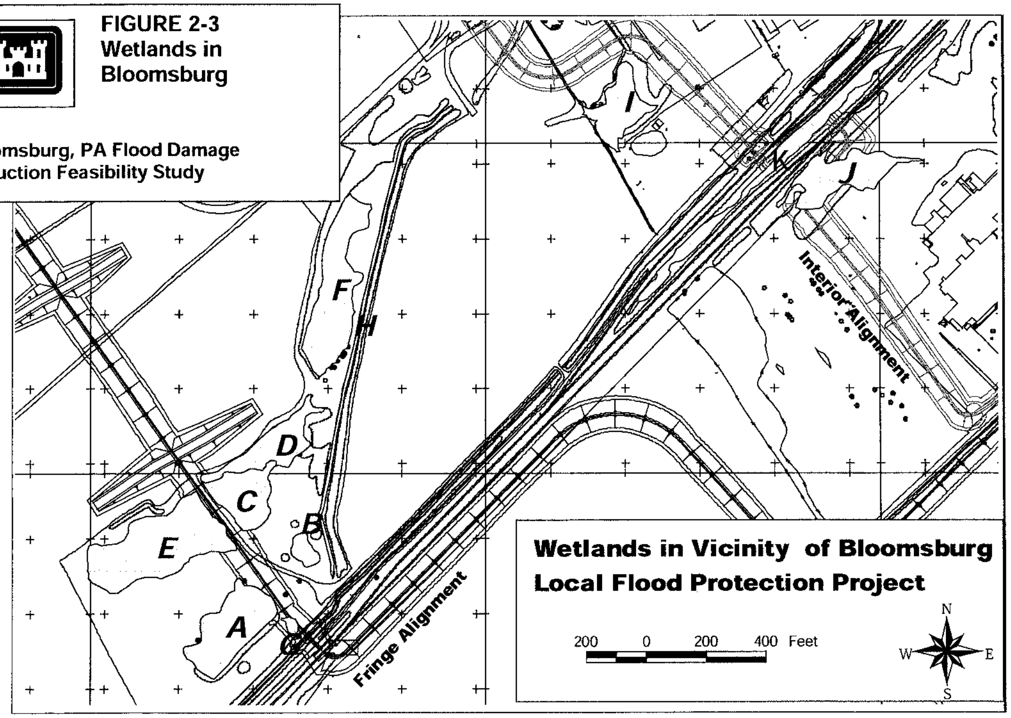
2.4.2 Wetlands

Field investigations were conducted along the project area in June 2003 to assess and determine the presence/absence of wetlands. The specific area investigated included the footprints and vicinities of two levee alignments under consideration. The wetlands investigation was conducted in accordance with the "Corps of Engineers Wetland Delineation Manual," Technical Report Y-87-1, and specific regulatory guidance modifications subsequently issued.

Within the expected areas of disturbance, wetlands were identified only along the southeastern side of the Fairgrounds property and delineated using a global positioning system unit. The 11 mapped wetlands (labeled A through K) are shown in Figure 2-3. The wetlands were further

FIGURE 2-3
Wetlands in Bloomsburg

Bloomsburg, PA Flood Damage Reduction Feasibility Study



characterized as palustrine emergent wetland (PEM), (wetlands A, B, C, E, G, H, and J), palustrine shrub-scrub wetland (PSS) (wetland K), and palustrine forested wetland (PFO) (wetlands D, F, and I) according to their cover type (Cowardin, 1979). Hydrologic source for these wetlands appears to be from local surface runoff (from parking lots and landfills) and a surface and groundwater connection to Snyder's Run. Construction activities for either levee alignment would affect jurisdictional wetlands, but in each case, construction would be expected to disturb less than one acre.

In November 2004, a forested wetland system was identified along Fishing Creek's floodplain across the creek from the water treatment plant. This is a typical palustrine forested floodplain wetland (PFO) several acres in size with hydrology from both groundwater and overbank flooding from the Creek. (See Figure 2-4). This wetland currently serves several important functions in this area. A functional assessment of the wetlands in the project area was prepared by District wetland scientists and is included in the Planning Appendix to this report. The River floodplain wetland system is low value based on this functional assessment. The Creek floodplain wetland system is high value. The levee around the Fernville area will likely impact this wetland. These impacts are discussed in Section 5.

2.4.3 Wildlife

Mammals such as whitetail deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), Eastern cottontail (*Sylvilagus floridanus*) Eastern red squirrel (*Sciurus vulgaris*), Eastern gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), and Eastern chipmunk (*Tamias striatus*) would be expected within the residential areas of the project area. Along Fishing Creek, physical evidence of beaver (*Castor canadensis*) activity has been observed (e.g., branches with bark stripped and gnaw marks).

Avifauna characteristic of culturally influenced areas [i.e., mourning dove (*Zenaida macroura*), house sparrow (*Passer domesticus*), rock dove (*Colomba livia*), blue jay (*Cyanocitta cristata*), and American robin (*Turdus migratorius*)] were observed within the residential areas of the project area.

Along Fishing Creek, wading birds such as great blue heron (*Ardea herodias*) and waterfowl such as Canada goose (*Branta canadensis*) and mallard (*Anas platyrhynchos*) are common. Within dense riparian thickets and adjacent to wetlands in the Fairgrounds, gray catbirds (*Dumetella carolinensis*), yellow warblers (*Dendroica petechia*), red-winged blackbirds (*Agelaius phoeniceus*), common yellowthroat (*Geothlypis trichas*), and song sparrow (*Melospiza melodia*) are common summer residents. The mowed grass areas of the Fairgrounds are frequently utilized as grazing areas for summer resident Canada geese.

There are 38 species and subspecies of amphibians and 38 species, divided among eight families and 28 genera, of reptiles in Pennsylvania (PAF&BC, 2003). Among those likely represented within the project area include spring peeper (*Pseudacris crucifer*), bullfrog (*Rana catesbeiana*), American toad (*Bufo americanus*), Eastern garter snake (*Thamnophis sirtalis sirtalis*), northern water snake (*Natrix sipedon sipedon*), snapping turtle (*Chelydra serpentina*), and wood turtle (*Clemmys insculpta*).

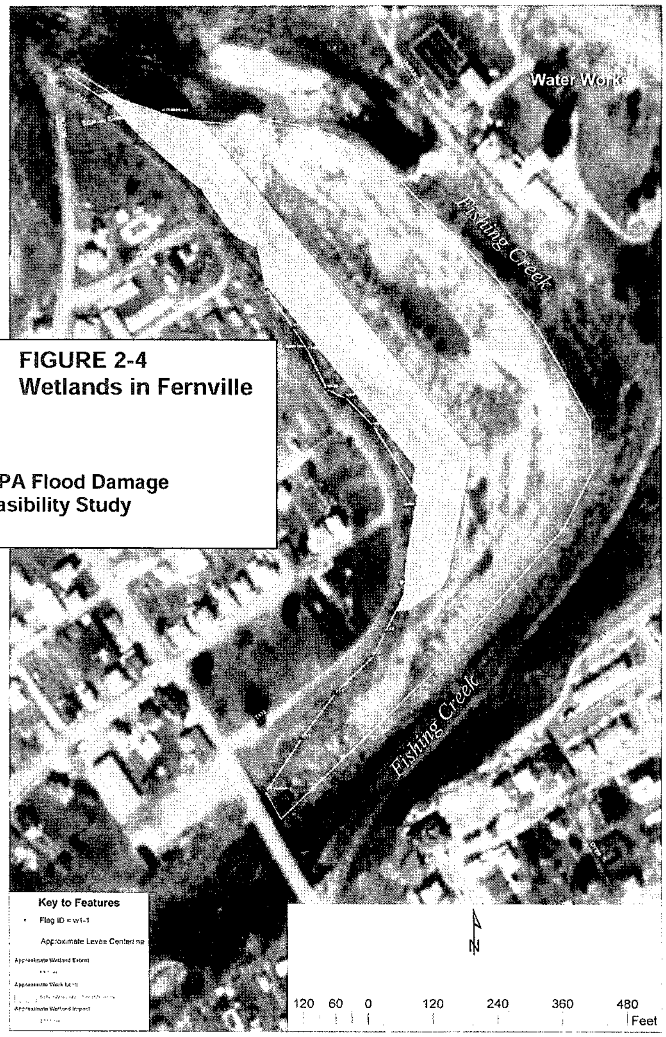


FIGURE 2-4
Wetlands in Fernville

Bloomsburg, PA Flood Damage Reduction Feasibility Study

2.4.4 Fish

Bloomsburg's location near the confluence of Fishing Creek and the Susquehanna River gives its residents access to both the cool water upstream stocked trout sections of Fishing Creek upstream of Light Street as well as the varied warmwater / coolwater fishery in its lower end and in the Susquehanna River (PAF&BC, 1999). Direct communication with the Pennsylvania Fish and Boat Commission (PAF&BC) (Moase, 2003) revealed that the PAF&BC has monitored Fishing Creek two times within the past 30 years. The first effort was in the 1970s, and the second effort was in 1998. Table 2-1 provides a list of fish collected during the last (1998) survey of Fishing Creek.

Table 2-1
Fish Collected During 1998 Survey of Fishing Creek

brown trout	white sucker
brook trout	margined madtom
rainbow trout - hatchery fish	shield darter
brown trout - hatchery fish	sculpin spp.
brook trout - hatchery fish	northern hog sucker
chain pickerel	greenside darter
central stoneroller	creek chub
cutlips minnow	banded darter
spottail shiner	fallfish
rosyface shiner	smallmouth bass
blacknose dace	tessellated darter
longnose dace	rock bass
river chub	bluegill
	common shiner

The species list indicates that a cool/coldwater fishery exists at the site, and that the cold water fish, (e.g., trout) are stocked (unknown if natural reproduction is occurring). Macroinvertebrate data has been collected but has not been analyzed nor is in a format available for distribution. Additionally, no habitat assessments of Fishing Creek were performed (Moase, 2003).

On 11 April 2001, Pennsylvania issued a general, statewide health advisory for recreationally caught sport fish. The advisory states that people should eat no more than one meal (one-half pound) per week of sport fish caught in the Commonwealth's waterways. This general advisory was issued to protect against eating large amounts of fish that have not been tested or may contain unidentified contaminants (PF&BC, 2003). The PF&BC has issued specific warnings regarding the consumption of fish taken from the Susquehanna River in the project area (PF&BC, 2003). Anglers are cautioned about smallmouth bass (two meals/month); channel catfish, quillback/carp, and walleye (one meal/month); and suckers (no meals). These limits are imposed because of elevated levels of mercury in smallmouth bass and polychlorinated biphenyls (PCBs) in all other fish.

Recommendations specific to Fishing Creek are to eat no more than two meals per month of smallmouth bass because of elevated mercury levels (PF&BC,2003). The National Marine Fisheries Service does not designate any Essential Fish Habitat (EFH) in the project area (NOAA, 2003).

2.5 Threatened and Endangered Species

Except for the occasional transient species, no Federally listed endangered, threatened, or candidate species under U.S. Fish and Wildlife Service (USFWS) jurisdiction are known to exist in the project area (USFWS, 2000; USFWS, 2005). Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act is required with the USFWS. The U.S. Fish and Wildlife Service also indicated (USFWS, 2005) that requirements under the Fish and Wildlife Coordination Act have been met. The Fish and Wildlife Coordination Act provides that whenever the waters or channel of a body of water are modified by a department or agency of the U.S., the department or agency first shall consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur, with a view to the conservation of wildlife resources. In addition, according to the Pennsylvania Game Commission, no state listed endangered or threatened species of birds or mammals are known to exist within the project area and no State Game Lands are located close enough to the project site to anticipate any impacts (Pennsylvania Game Commission, 2002; Pennsylvania Game Commission, 2005).

Coordination with the Pennsylvania Natural Diversity Inventory (PNDI) indicated that there are no known occurrences of plant species of special concern within the project area and no effects on endangered, threatened, or rare plant species would be anticipated from implementation of a flood damage reduction project (PNDI, 2002).

The PF&BC indicated in their species impact review (PF&BC, 2002; PF&BC, 2005) that none of the fishes, amphibians or reptiles listed as endangered or threatened are known to occur at or in the immediate vicinity of the project area.

2.6 Air Quality

The EPA Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards for six principal pollutants, called "criteria" pollutants. They include carbon monoxide, nitrogen dioxide, ozone, lead, particulates, and sulfur dioxide. For Columbia County, the only parameter that does not attain the air quality standard is the ozone standard (USEPA, 2003).

Ozone is a gas that forms in the atmosphere when three atoms of oxygen are combined (O_3). It is not emitted directly into the air, but at ground level. It is created by a chemical reaction between oxides of nitrogen (NO_x), and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC, also known as ozone precursors. Strong sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. Areas that are designated in nonattainment of the ozone standard are further classified, in order of increasing severity, as Incomplete Data, Marginal, Moderate, Serious, Severe, and Extreme. The designation for Columbia County is Marginal (PA-DEP, 2003). Columbia County is further subclassified as an ozone transport region. Many urban areas tend to have high levels of ozone, but other areas are also subject to high ozone levels as winds carry NO_x emissions hundreds of miles away from their original sources. Columbia County is considered an ozone transport region.

2.7 Cultural Resources

Cultural resource investigations conducted for this feasibility study were designed to consider the potential effects of the project on archeological and architectural resources, including visual impacts to these resources. Cultural resource Investigations were conducted by Kittatinny Archeological Research (KAR), of Stroudsburg, PA, and T. Jones of Groenendal and Jones, architectural historians. Initially, these investigations consisted of a geomorphological study of the project area and a Phase I-level architectural resource survey.

2.7.1 Archeological Investigations

Phase IA archaeological investigations were conducted by KAR in 1999 along the project area. The investigated portion runs from the Route 11 / Route 42 interchange, southeast across the Bloomsburg Fairgrounds parking area, and then generally northeast to the area adjacent to Bernardi Foods. KAR concluded that there was a high potential for significant archaeological resources in the tested area. The findings were reported to the PA-DEP and the Pennsylvania State Historic Preservation Officer (SHPO) in a letter report, dated 16 July 1999 (KAR, 1999). The report recommended Phase IB testing of all undisturbed portions of the tested area.

The Phase IB investigation of the undisturbed portion of the Phase IA-tested area included a series of excavation units dug along two parallel transects within the project area in the vicinity of the Fairgrounds. Tests along each transect were spaced at 60 meter intervals and were staggered so that there was a test every 30 meters along the alignment. Additional test units were dug whenever archaeological materials were identified.

Forty units of the systematic sample were completed, plus five additional units to examine locations that produced archaeological materials. None of the latter has been found to meet minimum criteria for an archaeological site, as defined by the Bureau for Historic Preservation. The recovered materials include two chert flakes and one apparently worked piece of chert, found in the plow zones of three separate units in the systematic sample. None of the supplemental tests recovered any additional cultural material.

Further Phase I investigations of additional portions of the project area were conducted in spring 2005. Results of these investigations are document in Section 5.7. The remaining portions of the project area requiring testing include an area northeast of Bernardi Foods, and an area adjacent to the left descending bank of Fishing Creek.

2.7.2 Architectural Investigations

During the initial planning stages for this study, the Corps, PADEP and the SHPO agreed that due to the uncertainty of the Area of Potential Effect (APE) for the project, it would be necessary to document, at least through a Phase I Level survey, all of the potentially affected historic properties up to a level of flooding equal to the 500-year event.

The following architectural resources were identified in or near the project's APE: the identification and documentation of National Register districts for the West Main Street portion of Bloomsburg, the Village of Fernville, and thirty individual structures located throughout the APE. Additionally, other new potential historic districts were identified, including the North Branch Canal workers housing district, a potential district of post-World War I housing, a potential district encompassing the village of Rupert, and individual properties including bridges, rail, and canal resources, the Bloomsburg Airport, the Irondale water treatment plant, and the Bloomsburg Fairgrounds.

While most of the identified historic properties and potential historic properties are not located within the project's APE, the Irondale water treatment plant (currently owned and operated by United Water Pennsylvania) is located immediately upstream of the project area. Impacts to this resource are discussed in Section 5.7.

2.8 Hazardous, Toxic, and Radioactive Waste

A preliminary HTRW investigation was conducted to identify areas within the project area that could affect construction activities due to the presence of contamination[2]. The scope of investigation was limited in nature and not designed to fully delineate the extent of contamination. However, the data collected were suitable for identifying potential constituents of concern, establishing guidelines for the handling of material generated during construction, and providing generalized recommendations for the subsequent phases of the project.

Based on the results of the investigation, sites of potential concern along the project area were identified. Sampling results revealed elevated concentrations of heavy metals in excess of acceptable levels throughout the project area and volatile organics contamination within one segment of the area that passes through an inactive landfill (URS, 2003). Since the heavy metals that were detected are likely a local background condition and since much of the contaminated soil along the project area is considered historic fill, it is likely suitable for reuse during the construction of the flood protection elements from a regulatory perspective (URS, 2003).

Contaminated soil in the landfill area is unlike the material found elsewhere within the project area due to the presence of large amounts of debris and is unsuitable for reuse during construction.

The potential impact of underground storage tanks adjacent to the project area along Fishing Creek must be further defined to determine whether relocation or removal is necessary. There is little concern about potential human exposure to contaminants from drinking groundwater because nearly all residences near the proposed alignment are believed to utilize drinking water delivered by United Water Pennsylvania (USACE, 2003). It should be noted, however, that several structures located on the left descending bank of Fishing Creek along River Road likely use groundwater.

[2] Corps policy regarding HTRW actions for civil works projects is defined in Engineer Regulation ER-1165-2-132. At this point in the discussion, it is important to point out that the non-Federal sponsor (i.e., the Town of Bloomsburg) will bear the legal and financial responsibility for assuring that lands provided for the project are free of any materials listed as a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulated HTRW. The cost of the response will not be included in the calculation of total project costs, and will be considered a non-Federal expense for which the sponsor will receive no credit toward its share of total project costs. More information relating to HTRW, ER-1165-2-132, and cost sharing is provided in Sections 4 and 6 of this document.

2.9 Socioeconomics

The Town of Bloomsburg is a rural and moderate density community characterized by attractive single-family residential neighborhoods, tree-lined streets and limited agricultural and industrial land use on the outskirts of town. Bloomsburg is the Columbia County seat and is the only incorporated town in Pennsylvania. The Town has a land area of 4.4 square miles and approximately 4,400 housing units. The 2000 population density was 2,812.5 persons per square mile, a slight decrease from the 1990 population density of 2,827.0 persons per square mile.

Census 2000 population data for Pennsylvania, Columbia County, and Bloomsburg are shown in Table 2-2. Table 2-3 summarizes data from the Pennsylvania State Data Center regarding population projections through 2020 for the study area.

The age distribution of Pennsylvania, Columbia County, and Bloomsburg are shown in Table 2-4. The table shows a high proportion of persons in the 18 to 24-year old category, which would be expected in a town with a moderately sized university.

The median household incomes for the study area communities are presented in Table 2-5. As indicated in this table, Bloomsburg has a significantly lower median household income ($24,868) than either Columbia County or Pennsylvania.

Employment by economic sector for Bloomsburg is summarized in Table 2-6. The sectors with the largest shares of employment in the Town are Education, Health, Social Services (34.3 percent); Arts, Entertainment and Recreation (16.5 percent), and Retail Trade (13.1 percent). Bloomsburg University, Bloomsburg Hospital, and Magee Rieter Automotive Systems represent some of the larger employers in their respective categories.

Bloomsburg is well served by a variety of transportation facilities. Interstates 80 and 81 are located north and east of Bloomsburg, respectively, providing access to the rest of Pennsylvania and other metropolitan areas on the Eastern Seaboard. The City of Philadelphia is approximately 135 miles from Bloomsburg/Fernville via Interstate 476. Scheduled passenger and cargo airlines serve the nearby Wilkes-Barre/Scranton International Airport, which is jointly operated by Luzerne and Lackawanna Counties. Also, the Bloomsburg Municipal Airport offers daily incoming and outgoing flights on small aircraft.

The Susquehanna Economic Development Association Council of Government Joint Rail Authority (JRA) is a Pennsylvania Municipal Authority that owns a 200-mile regional rail system in Central Pennsylvania. The JRA serves Centre, Clinton, Columbia, Lycoming, Montour, Northumberland and Union Counties through the Nittany and Bald Eagle Railroad, North Shore Railroad, Shamokin Valley Railroad, Lycoming Valley Railroad, White Deer and Reading Railroad, and the Juniata Valley Railroad.

Table 2-2
Populations of Study Area Jurisdictions 1980, 1990, 2000

	1980 Population	1990 Population	% Change 1980-1990	2000 Population	% Change 1990-2000
Commonwealth of Pennsylvania	11,864,720	11,881,643	0.1%	12,281,054	3.4%
Columbia County	61,967	63,202	2.0%	64,151	1.5%
Town of Bloomsburg	11,717	12,439	6.2%	12,375	-0.5%

Source: U.S. Bureau of the Census.

Table 2-3
Population Forecasts for Study Area Jurisdictions 2000 – 2020

	2000	2005	2010	2015	2020
Commonwealth of Pennsylvania*	12,281,054	12,328,348	12,407,523	12,490,248	12,569,017
Columbia County*	64,151	61,880	61,280	60,615	59,798
Town of Bloomsburg**	12,375	12,243	12,125	11,993	11,831

* Sources: Pennsylvania State Data Center
** 2005-2025 Forecasts Estimated Using County Growth Rates

Table 2-4
Age Distribution of Study Area Populations 2000

Age Distribution	Under 18	18-24	25-44	45-64	65 and Over	Median Age
Commonwealth of Pennsylvania	2,922,221 (24%)	1,094,449 (9%)	3,508,562 (29%)	2,836,657 (23%)	1,919,165 (16%)	38
Columbia County	13,352 (21%)	9,162 (14%)	16,644 (26%)	14,791 (23%)	10,202 (16%)	37.5
Town of Bloomsburg	1,520 (12%)	5,629 (45%)	2,302 (19%)	1,567 (13%)	1,357 (11%)	22.4

Source: U.S. Bureau of the Census.

Table 2-5
Median Household Income of Study Area Jurisdictions – 1999

Commonwealth of Pennsylvania	$40,106
Columbia County	$34,094
Town of Bloomsburg	$24,868

Source: U.S. Bureau of the Census

Table 2-6
Employment by Sector (2000), Bloomsburg

	Employees	Percent
Agriculture, Forestry, Fishing/Hunting, Mining	16	0.3
Construction	197	3.6
Manufacturing	696	12.7
Wholesale Trade	105	1.9
Retail Trade	722	13.1
Transportation	64	1.2
Information	160	2.9
Finance, Insurance, and Real Estate	136	2.5
Professional, Scientific, Mgmt	205	3.7
Education, Health, Social Services	1,888	34.3
Arts, Entertainment, Recreation, Accommodation, Food Service	910	16.5
Other Services (except Public Administration)	246	4.5
Public Administration	155	2.8
Total	5,500	100.0

2.9.1 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations* (Executive Order, 1994), directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority population and low-income populations. When conducting NEPA evaluations, the Corps incorporates environmental justice considerations into both the technical analyses and the public involvement in accordance with EPA and Council on Environmental Quality guidance (CEQ, 1997). The CEQ guidance defines "minority" as individual(s) who are members of the following population groups: American Indian or Alaskan native, Asian or Pacific Islander, Black, not of Hispanic origin, and Hispanic (CEQ, 1997). The Council defines these groups as minority populations when either the minority population of the affected area exceeds 50 percent of the total population, or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis. According to the Census 2000 Demographic Profiles (U.S. Bureau of the Census, 2004), the population within the Town of Bloomsburg was 94.4 percent white, 2.6 percent black or African American, and 1.7 percent Hispanic or Latino.

Low-income populations are identified using statistical poverty thresholds from the Bureau of the Census Current Population Reports, Series P-60 on Income and Poverty (U. S. Bureau of the Census, 2000). In identifying low-income populations, a community may be considered either as a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. The threshold for the 2000 census was an income of $17,761 for a family of four (U.S. Bureau of the Census, 2000). This threshold is a weighted average based on family size and ages of the family members. Based on the 2000 Census, Bloomsburg has approximately 10.5 percent of families below the poverty level (U.S. Bureau of the Census, 2004). The areas within Bloomsburg with the highest concentration of persons below the poverty level are not in proximity to the potential project area (U.S. Bureau of the Census, 2004).

2.10 Noise

Noise affects on the public in a residential setting such as Bloomsburg and Fernville are dominated by transportation sources such as buses, delivery and construction trucks, private vehicles, and emergency vehicles. Noise from occasional commercial aircraft crossing at high altitudes is indistinguishable from the natural background noise of the city. Noise ranging from about 10 dBA (A-weighted sound level measured in decibels) for the rustling of leaves to as much as 115 dBA (the upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration) is common in areas where there are sources of industrial operations, construction activities, and vehicular traffic.

The project area includes residential, industrial, and agricultural areas with varying degrees of associated noise. The primary sources of noise within the project area include everyday vehicular traffic along nearby roadways (typically between 50 and 60 dBA at 100 feet), and maintenance of roadways, bridges, and the other structures (typically between 80 and 100 dBA at 50 feet). Noise during events at the Bloomsburg Fairgrounds is substantial due to increased traffic, crowd noise, open-air concerts or events (e.g., tractor pull), and amusement park rides.

The U.S. Federal Transit Administration (FTA) has established noise impact criteria founded on well-documented research on community reaction to noise based on change in noise exposure using a sliding scale (USFTA, 1995). The FTA Noise Impact Criteria groups noise sensitive land uses into the following three categories:

- Category 1: Buildings or parks where quiet is an essential element of their purpose,
- Category 2: Residences and buildings where people normally sleep (e.g., residences, hospitals, and hotels with high nighttime sensitivity), and
- Category 3: Institutional buildings with primarily daytime and evening use (e.g., schools, libraries, and churches).

Lands adjacent to the project area do not include any Category 1 properties, but there are Category 2 properties (residences in Fernville and in Bloomsburg adjacent to Fishing Creek) and

Category 3 properties (Bloomsburg High School and Middle School) across West 11th Street from the project area.

2.11 Traffic

In 2000, the Pennsylvania Department of Transportation (PennDOT) conducted the Bloomsburg Area Wide Traffic Study (PennDOT, 2000). At the time, PennDOT was examining the possibility of incorporating a roadway into the design of the flood protection project. The integration of the roadway into the design was not feasible and PennDOT elected to not build the roadway. However, the baseline data accumulated for the Bloomsburg Area Wide Traffic Study remains relevant for characterizing the existing traffic conditions in Bloomsburg. Unless otherwise noted, all information contained in this section is taken from the PennDOT study.

The traffic study area[3] was bounded by Interstate 80 to the north, the Susquehanna River to the south, PA Route 42 in the west and the eastern boundary of the Town of Bloomsburg. Primary routes within the study area included U.S. Route 11 (Main Street), PA Route 42, PA Route 487, Railroad Street, 11th Street, 5th Street, 6th Street, and Fort McClure Boulevard. The evaluation of existing conditions within the study area included data collection (e.g., manual and automated traffic counts, travel time studies, and an origin-destination survey), analysis of the study area crash history, analysis of roadway deficiencies, a major trucking/traffic generator survey, and an operational assessment of the study intersections.

Traffic counts were conducted at 14 critical intersections as well as 26 mid-block locations. The count data showed that the morning peak hour was 7:00 to 8:00 AM while the evening peak hour was 3:00 to 4:00 PM. In general, the evening peak hour traffic volumes were at least 20 percent higher than morning peak hour traffic volumes, with only the roadways in the immediate vicinity of the high school showing a decrease in traffic volume. As expected, Saturday traffic volumes were generally lower than weekday daily traffic volumes except where recreational opportunities exist. No significant areas of congestion were noted.

Approximately 60 to 70 percent of trips were "local" (either beginning and/or ending within the study area). The remaining passenger vehicles were passing through Bloomsburg. Commercial traffic was predominantly (65 to 90 percent) through trips.

Operational conditions at critical study area intersections were characterized through a level of service (LOS) analysis. Level of service is a qualitative letter grade evaluation of an intersection measuring how long the delay is for vehicles entering the intersection (i.e., "A" indicating good operations through "F" indicating poor conditions). LOS is measured for both signalized and un-signalized intersections with the level of service being based on the average delay (measured in seconds) at the intersection. Tables 2-7 and 2-8 show the level of service and expected delays for un-signalized and signalized intersections. The analysis was conducted for the morning and evening peak hours to determine what LOS was during the most demanding times of the day.

Results indicated that there was no level of service problem ("E" or "F" level of service) during the morning peak hour. However two approaches operate at "D" level of service: the Red Mill Road south/east-bound intersection with U.S. Route 11 and the Railroad Street northbound intersection with U.S. Route 11 were both rated with a "D" LOS.

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[3] References to a study area in this section are for the traffic study area only.

During the peak evening hour, five of the twelve intersections studied have movements or lane groups that operate at unacceptable levels of service. Both intersections at LOS "D" during the morning rush (Red Mill Road south/east-bound intersection with U.S. Route 11 and the Railroad Street northbound intersection with U.S. Route 11) were degraded further, to "F" and "E" respectively, during the evening rush hour. Other intersections exhibiting problematic levels of service were concentrated in the eastern part of Bloomsburg (east of U.S. Route 487). Transportation of materials to and from the construction site would avoid the eastern parts of Bloomsburg and utilize the Route 42 interchange off of U.S. 80 to access U.S. Route 11 and the project area.

Table 2-7
Level of Service and Expected Delay for Un-Signalized Intersections

Level of Service	Expected Traffic Delay	Average Total Delay (seconds per vehicle)
A	Little or No Delay	0.0 to 5.0
B	Short Traffic Delays	5.1 to 10.0
C	Average Traffic Delays	10.1 to 20.0
D	Long Traffic Delays	20.1 to 30.0
E	Long Traffic Delays	30.1 to 45.0
F	Very Long Traffic Delays	Greater than 45.0

Source: Transportation Research Board, 1994.

Table 2-8
Level of Service and Expected Delay for Signalized Intersections

Level of Service	Expected Traffic Delay	Average Total Delay (seconds per vehicle)
A	Very low delay; most vehicles do not stop at intersection	0.0 to 5.0
B	Generally good signal progression and/or short cycle length; more vehicles stop than level "A" service	5.1 to 15.0
C	Fair progression and/or longer cycle length; significant number of vehicles stopped at intersection	15.1 to 25.0
D	Congestion becomes noticeable; individual cycle failures; long cycle length or high volume to capacity ratio; most vehicles stop at intersection	25.1 to 40.0
E	Usually considered limit of acceptable delay indicative of poor progression, long cycle length, or high volume to capacity ratio; frequent individual cycle failures	40.1 to 60.0
F	Could be considered excessive delay in some areas, frequently an indication of over saturation (i.e., arrival flow exceeds capacity). Capacity is not necessarily exceeded under this level of service	Greater than 60.0

Source: Transportation Research Board, 1994.

2.12 Aesthetics

The Upper Susquehanna-Lackawanna Watershed[4], as delineated by the U.S. Geological Survey, comprises nearly 1,800 square miles of land and almost 1,600 miles of perennial rivers and streams, including Fishing Creek. The corridor begins along the Lackawanna River at Thompson, proceeds to the confluence of the Lackawanna with the Susquehanna at Pittston, and follows the Susquehanna through the Wyoming Valley, past Bloomsburg to Sunbury, Pennsylvania. The watershed includes the Wyoming and Lackawanna Valleys, plus adjoining mountainous areas that provide headwaters for the numerous streams that flow to the Susquehanna.

The landscape within the project area includes residential, industrial, and rural features where human elements are prevalent and significant landscape modifications exist. The project area does not have any unique landscapes that exhibit distinctive and memorable visual features (e.g., landform, rock outcrops, scenic vistas), although Fishing Creek to the confluence with the Susquehanna River represents an important aesthetic resource. Indoor workers in the project area are considered to have a low visual sensitivity because their activities typically limit awareness/sensitivity to visual changes outside the workplace. Highway and local travelers crossing or coming into proximity with the project area are considered to have moderate visual sensitivity. Residential and recreational viewers, as well as viewers congregating in public gathering places (e.g., Bloomsburg Fair) are considered to have comparatively higher visual sensitivity to changes.

2.13 Land Use

Land use in Columbia County is primarily forest. Of the 311,040 acres of land in Columbia County, forests cover 164,300 acres. Crops cover another 22 percent. Most of the developed or urban land is found along the floodplain corridor of the Susquehanna River. Eighty-five percent of the forestland is privately owned, while 12 percent is public land. Another 3 percent is owned by the forest industry. Future development in the study area is based on development of approved projects not yet built. It is not anticipated that any radically different land use concepts would dramatically change the character of the community.

2.14 Parks and Recreation

Several State, local, and private park facilities are located near the study area. The following provides a list of the most prominent sites and short descriptions of the facilities available.

Bloomsburg Town Park is a community park located along the banks of the Susquehanna River in Bloomsburg. The park complex provides facilities for swimming, tennis, basketball, softball, baseball, picnicking, and a children's park.

Susquehanna Riverlands Park, located approximately 20 miles north of Bloomsburg on Route 11, includes 1,200 acres along the west and east banks of the Susquehanna River. The park

[4] Executive Order 13061 listed the Upper-Susquehanna River Watershed as an American Heritage River on 11 September 1997.

offers facilities for hiking, boating, fishing, and wildlife observation. A 700-foot bluff at the park provides a view of the entire valley.

Briar Creek Lake Park is a located between Orangeville, Pennsylvania and Berwick, Pennsylvania that offers fishing and recreational opportunities. The park includes a 50-acre lake and a picnic area. Fish species found in the lake include trout, bass, muskellunge, pan fish, pickerel and walleye.

Ricketts Glen State Park is located 30 miles north of Bloomsburg on Route 487. The park offers fishing, boating, swimming, family or group camping, cabins, winter sports, bridle trails, hiking, environmental education, hunting and the waterfalls of the Glens Natural Area.

The Bloomsburg Fairgrounds is a 248-acre facility located within Bloomsburg's town limits, and includes a grandstand with an 8,000 person seating capacity, 78,000 square feet of exhibition buildings, an indoor arena, a covered band shell, a half-mile race track, and other large outdoor event amenities. The Bloomsburg Fair begins the third Saturday after Labor Day and draws over 650,000 people (2003 estimate) from all along the Eastern Seaboard. The Fairgrounds also attracts many trade shows and conventions throughout the year. A partial listing of additional events from 2003 includes the Early Bird Sports Expo, the Central Susquehanna Builders Show, Antiques at Bloomsburg, the 14th Annual International Harvester Roundup, and the Four-Wheel & Off Road Jamboree.

2.15 Future Without-Project Conditions

Future without-project conditions were determined by projecting conditions in the study area over a 50-year period of analysis (2004-2054). In the absence of Federal action, flooding problems associated with storms in the study area are expected to continue.

2.15.1 Flood Damages[5]

The no-action alternative reflects the continuation of existing economic, social, and environmental conditions and trends within the affected area. Implicit in taking no action would be enforcement of local floodplain management ordinances, and the continuation of flood insurance coverage for properties within the 100-year flood plain, as is currently available to property owners through the National Flood Insurance Program (NFIP). Bloomsburg also participates in the Community Rating System (CRS), an incentive program within the NFIP that rewards communities with discounts on flood insurance policies based on pro-active steps the community takes to reduce flooding within its boundaries. For CRS participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, while a Class 9 community would receive a 5 percent discount (a Class 10 is not participating in the CRS and receives no discount). The CRS classes for local communities are based on 18 creditable activities, organized under four categories: (1) Public Information, (2) Mapping and Regulations, (3) Flood Damage Reduction, and (4) Flood Preparedness. Bloomsburg is rated as a Class 8 community, and flood insurance policyholders receive a 10-percent premium discount.

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[5] Damage estimates from floods of various magnitudes are provided in Section 3 of this document and throughout the Economics Appendix.

Failure to provide flood damage reduction measures could, in the predictable occurrence of a significant flood, contribute to the loss of life, as well as physical and environmental damage. Significant flooding can result in the overtopping of sewage treatment works, contamination of drinking water supplies, dispersion of HTRW and dispersion of large quantities of solid waste. Experience has shown that vast quantities of debris (homes, vehicles, mobile homes, etc.) and sediment must be removed from the floodplain after a flooding event. The physical removal of the debris from the floodplain typically involves large, heavy equipment and requires the removal of trees and vegetation to provide points of ingress and egress for the cleanup equipment. Hauling the collected debris to the local municipal landfill requires significant transportation resources, and involves huge quantities of solid waste that deplete available landfill space. In addition to debris removal, the preparation, placement and removal of sandbags in an attempt to reduce damages from flood events requires hundreds of volunteer and municipal man-hours at significant cost to the community.

Previous floods in Bloomsburg and its surrounding communities have caused widespread damage to residential and commercial structures, industrial facilities, publicly-owned facilities, municipal infrastructure, and vehicles. In areas with recurring flooding, homes tend to become more degraded over time because money that could be used for general improvements is used for flood repairs. Over time, the market value of real property diminishes and negatively impacts local tax revenues. Recurring flooding also requires the expenditure of local tax revenues for flood-fighting, clean-up, infrastructure repair and emergency response. This diverts local revenues from infrastructure and recreation improvements from all of Bloomsburg, not just the flooded areas. Damage to commercial and industrial facilities ripple through the economy when businesses are forced to close, lay-off workers, and cease production for several weeks. In the long-run, permanent tax and employment losses would occur if owners of commercial and industrial facilities are no longer willing to endure recurrent flooding.

2.15.2 Study Area Conditions That Are Unlikely To Change

Some existing conditions are not expected to undergo significant change during the period of analysis (2004-2053). For example, most aspects of the physical setting are expected to remain largely unchanged over the planning period, specifically: geology, physiography, topography, and soils. In addition, no significant changes are anticipated for cultural and historic resources, air quality, noise, HTRW, aesthetics, and infrastructure.

3. PLAN FORMULATION

Plan formulation for the Bloomsburg, Pennsylvania, Flood Damage Reduction Feasibility Study has been conducted in accordance with the six-step planning process described in *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (1983) and the *Planning Guidance Notebook* (ER 1105-2-100, dated April 2000). The six steps in the iterative plan formulation process are:

1. Specify water and related land resources problems and opportunities;
2. Inventory and forecast existing conditions;
3. Formulate alternative plans;
4. Evaluate alternative plans;
5. Compare alternative plans; and
6. Select the recommended plan.

The basis for selection of the recommended plan for the Bloomsburg feasibility study is fully documented below, including the rationale used in plan formulation and plan selection.

It should be noted that this feasibility study evaluated flood damage reduction measures for the Town of Bloomsburg, and Bloomsburg only, in accordance with the study resolution as authorized by Congress. This study does not address existing flood damages incurred by neighboring communities or areas along the Susquehanna River or Fishing Creek, except to the extent that any proposed flood damage reduction measure(s) at Bloomsburg would increase existing flood levels in those neighboring areas. In those cases only, this study has evaluated measures to mitigate or protect neighboring areas from increased flood levels and associated flood damages. The Corps has identified these measures as elements of proposed Bloomsburg flood damage reduction alternatives, as detailed in this report. More information on increased flood impacts and mitigation is provided later in this section.

3.1 *Problems and Opportunities / Purpose and Need

The purpose of the project is to reduce the impact of flooding from the Susquehanna River and Fishing Creek on the Town of Bloomsburg. The primary water resources problem along the Susquehanna River at Bloomsburg is recurrent flooding. Flood damages are attributable to overbank flooding from the Susquehanna River and to flooding along Fishing Creek, which is exacerbated by backwater flooding from the Susquehanna River. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. In addition, floods have disrupted major transportation systems, requiring closure of roads, railroads, and the municipal airport. As indicated in Figure 3-1[6], extensive portions of the Bloomsburg study area are within the 500-year floodplain of the Susquehanna River and Fishing Creek. The 500-year floodplain includes approximately 525 residential structures, and 75 businesses and local government buildings.

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[6] Figure 3-1 is based on the current FEMA Flood Insurance Rate Map. Discharge estimates used in this feasibility study are compared to the discharge estimates on which this map is based. The comparison is shown in Table 3-1, provided later in this section's discussion on hydrology and hydraulic analyses.

TOWN OF BLOOMSBURG FLOOD MAP

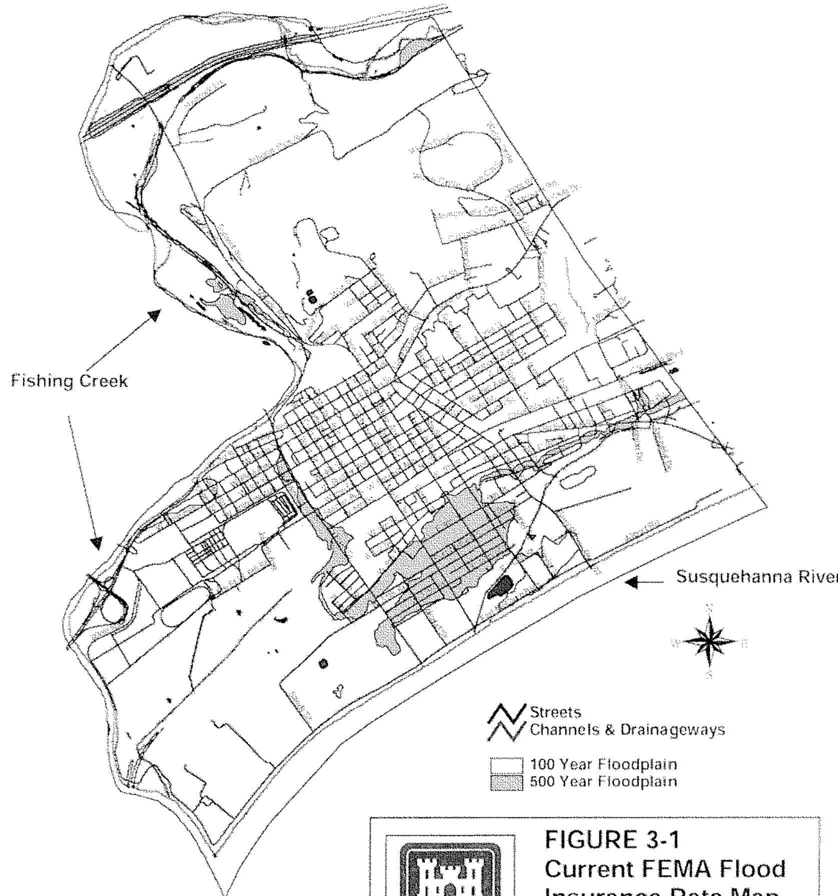


FIGURE 3-1
Current FEMA Flood Insurance Rate Map

Bloomsburg, PA Flood Damage Reduction Feasibility Study
(not to scale)

Recurrent flooding that occurs in the Bloomsburg study area is a result of the morphology of the Susquehanna River and the regional topography. In the vicinity of Bloomsburg, the river has very little slope and has shallow banks. As a result, the river flows more slowly in this reach. During heavy rainfall events (or rapid snowmelts), the river quickly swells and overflows its banks. Additionally, the main stem Susquehanna River is more prone to ice-jam related flooding than any other river east of the Rocky Mountains (SRBC, 2004). When winter ice breaks up, the slow-moving flow causes the ice to jam easily, creating obstacles and impounding water.

Floods along Fishing Creek, as well as along the Susquehanna River, are slow to recede due to the flat topography, thereby isolating areas and exacerbating property damage. When the Susquehanna River overflows its banks, it hinders normal discharge from Fishing Creek to the mainstem of the Susquehanna, resulting in backwater flooding on Fishing Creek. When the Susquehanna River and Fishing Creek simultaneously rise above flood stage, overbank flooding can cover up to 33 percent of the landmass within the Town of Bloomsburg's boundaries. Monitoring of existing stream gages upstream of Bloomsburg typically provides at least 4-hours advance warning of potential Susquehanna River floods; however, flooding on Fishing Creek can happen quickly with little or no warning.

The official flood stage (where flooding starts to cause property damage) is reached when the Susquehanna River water level at the Bloomsburg gage on the Route 487 bridge exceeds a stage of 19 feet, which equates to 470 feet above mean sea level. The base flood (a flood that has at least one chance in 100 of occurring in any given year – also called the 100-year flood) is reached at a stage of 28 feet, or 479 feet above mean sea level at the Route 487 gage.

3.1.1 History of Past Flooding

Communities along the Susquehanna River have experienced floods of devastating proportions. Native Americans first told of serious floods occurring about every 14 years along the Susquehanna River. Since the early 1800s the main stem Susquehanna River has flooded on average once every 20 years.

Historical Susquehanna River crests recorded at Bloomsburg were reached on the following dates:

(1) 32.7 feet on 9 March 1904
(2) 31.2 feet on 25 June 1972
(3) 27.8 feet on 19 March 1936
(4) 27.5 feet on 27 September 1975
(5) 26.9 feet on 3 March 1902
(6) 26.8 feet on 20 January 1996

The following is a summary of the most significant Susquehanna River and Fishing Creek floods that affected Bloomsburg and surrounding communities. The events are described in a time sequence, beginning with the most recent significant event.

3.1.1.1 January 1996 Event

Torrential rains and massive snowmelt from the Blizzard of 1996 caused the Susquehanna River to crest at 26.76 feet at Bloomsburg in January. The blizzard covered much of Pennsylvania with 4 to 5 feet of snow by 13 January. All Pennsylvania counties were included in a Presidential Disaster declared on 21 January in response to flooding from rapid melting of the snow. The flooding forced hundreds of Bloomsburg and Fernville residents to be evacuated, and flooding of the water treatment pumping plant left residents without water for several days. The Federal Emergency Management Agency (FEMA) estimated that the agency provided over $2.2 million (1996 dollars) in aid to Columbia County as a result of the blizzard and subsequent flooding.

3.1.1.2 September 1975 Event

The September 1975 flood was caused by Hurricane Eloise, one of the deadliest Category 3 hurricanes ever recorded. The storm weakened rapidly after landfall and was downgraded to a tropical storm while over east central Alabama, and further downgraded to a tropical depression while over eastern Tennessee. The storm was downgraded to an extratropical depression while located over West Virginia, but the remnants of the storm merged with a stationary front over New York, Pennsylvania and Maryland on 23 September, producing major flooding throughout the Susquehanna River Basin. Bloomsburg's gage registered a crest of 27.50 feet on 27 September, and parts of Main Street were covered with two feet of water.

3.1.1.3 June 1972 Event

Devastating floods occurred across the Mid-Atlantic region due to the remnants of Hurricane Agnes in late June 1972. Hurricane Agnes came onshore over the Florida Panhandle during the afternoon of 19 June. The storm weakened to a tropical depression over the Carolinas, only to re-intensify to tropical storm strength as it reached the Virginia coast on 21 June. The storm then moved north, weakening to extra-tropical strength as it passed just west of New York City, and before curving to the west across central New York. The storm then looped back to the east, crossing northern Pennsylvania before dissipating.

The remnants of the storm moved slowly across Pennsylvania. Rainfall amounts throughout central Pennsylvania for the four-day period of 20 June to 24 June typically ranged from 8 to 10 inches. The heaviest rain (12 to 16 inches) fell in a corridor from Williamsport, Pennsylvania, south through Harrisburg and York. The heaviest reported 24 hour rainfall was recorded at Harrisburg, Pennsylvania, where 12.53 inches fell between 8:00pm on 21 June and 8:00pm on 22 June.

The heavy rains from Tropical Storm Agnes followed a relatively wet May, in which 3 to 4 inches of rain fell across the area, and grounds were nearly saturated. As a result, the Susquehanna River at Bloomsburg crested at 31.20 feet on 25 June, with an estimated discharge of 350,000 cubic feet per second (cfs).

Fifty deaths were attributed to Tropical Storm Agnes in Pennsylvania alone. In 1972 dollars, total damages from Tropical Storm Agnes reached over $3 billion dollars nationwide, with over $2 billion dollars in losses occurring in the Susquehanna River basin. Adjusted to March 2004 dollars, damages from Agnes would exceed $11.5 billion nationwide and $7.8 billion in Pennsylvania.

Agnes forced large-scale evacuations in Bloomsburg and produced widespread destruction of personal property. Residents returned to their homes one week after the flood crest to find flooded basements, saturated first and second floor drywall, ruined flooring and furnishings, no working utilities, rats and snakes, raw sewage, and looming threats from electrical and natural gas fires. Curfews were in place, requiring the closure of some businesses. Fuel leakage and the threat of fire forced the Town to institute a smoking ban from the top of Scottown hill around to the 12th Street shopping area. Refuse disposal and burning was another storm-related problem that was compounded by flood-related closure of the Town's landfill.

3.1.1.4 March 1936 Event

The March 1936 flood required massive rescue and relief efforts in the Bloomsburg region. Heavy snow accumulations melted rapidly as temperatures suddenly warmed in February. In addition to the rapid snowmelt and ice flows on the river, 17 March brought 24 hours of heavy rains. The flood crested at 27.8 feet on 19 March in Bloomsburg with an estimated peak flow of 232,000 cfs. Rail traffic was suspended. Magee Carpets was severely flooded, and damage was extensive, despite efforts to move more than 50 motors to the second floor and 24-hour operation of 14 large pumps. Widespread flooding that caused major damage in several large river basins, including the Susquehanna and Ohio River basins in 1936, led Congress to pass the Flood Control Act of 1936, and later, the Flood Control Act of 1938.

3.1.1.5 March 1904 Event

Bloomsburg has experienced only two floods that were higher than the base flood (100-year flood) as defined in Section 3.1: the 1904 flood was five feet higher (a stage of 32.7 feet), and the flood caused by Hurricane Agnes in 1972 was three feet higher.

Although the 1904 flood is not included in the gage record for the U.S. Geological Survey (USGS) gage at Bloomsburg, this flood is recognized as the flood of record for Bloomsburg. The March flood was a culmination of flood events that began in January of that year. The river was clogged with ice in January, and the rapid rise of water flooded low lands all along the Susquehanna. Two weeks later, the river rose again. On 9 February, the Berwick Bridge was ripped away by floodwaters and portions were carried downstream to Mifflinville. Flood conditions eventually improved and area residents believed that warm rains would help to disperse the ice and prevent further ice jam flooding. However, March gave rise to a third, and even more disastrous flood for the region. A notable impact of this flood was the deposition of multi-ton ice blocks in fields as far as one half-mile from the Susquehanna's banks.

3.1.1.6 Additional Events

Other notable floods have been recorded at the Bloomsburg, Susquehanna River gage in 1850, 1865, 1902, 1904, 1913, 1940, 1943, 1946, 1948, 1960, 1964, 1979, and 1984. Based on the magnitudes of the floods and the flood-prone areas within the Town, it is likely that the study area would have been impacted.

Figures 3-2 through 3-6 provide photo-documentation of the extent of flooding and destruction from some of the Town's major flood events. Figure 3-2 provides an aerial overview of Bloomsburg on which the views of Figures 3-3 through 3-6 are marked.

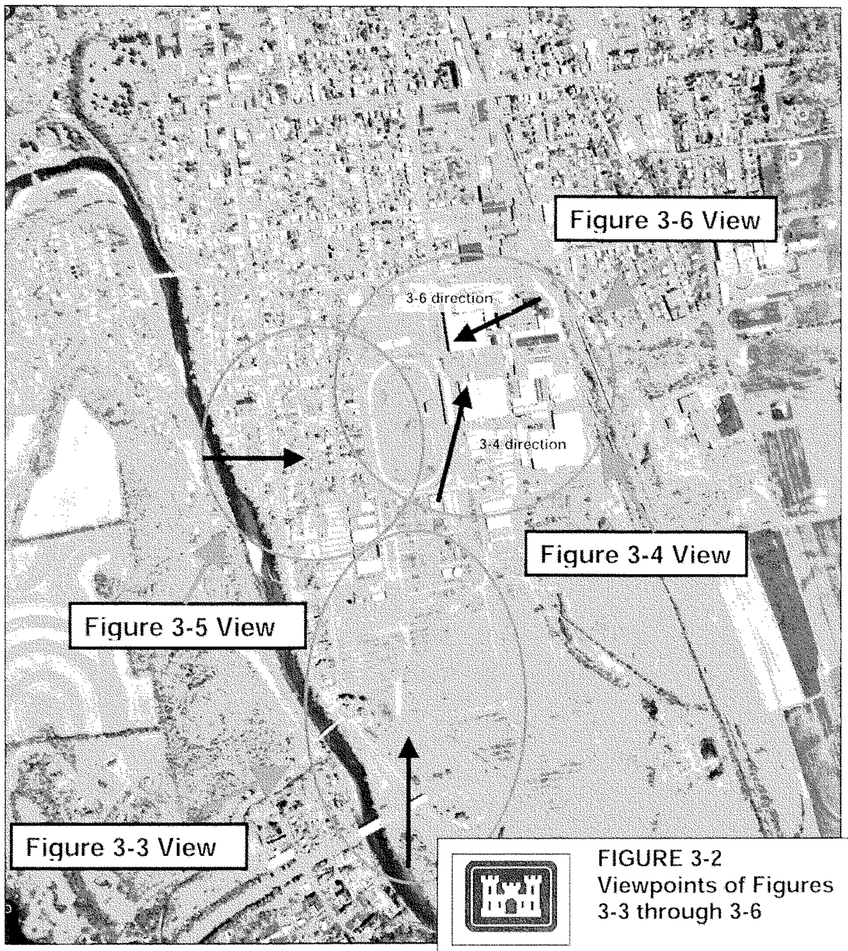


FIGURE 3-2
Viewpoints of Figures 3-3 through 3-6

Bloomsburg, PA Flood Damage Reduction Feasibility Study
(not to scale)

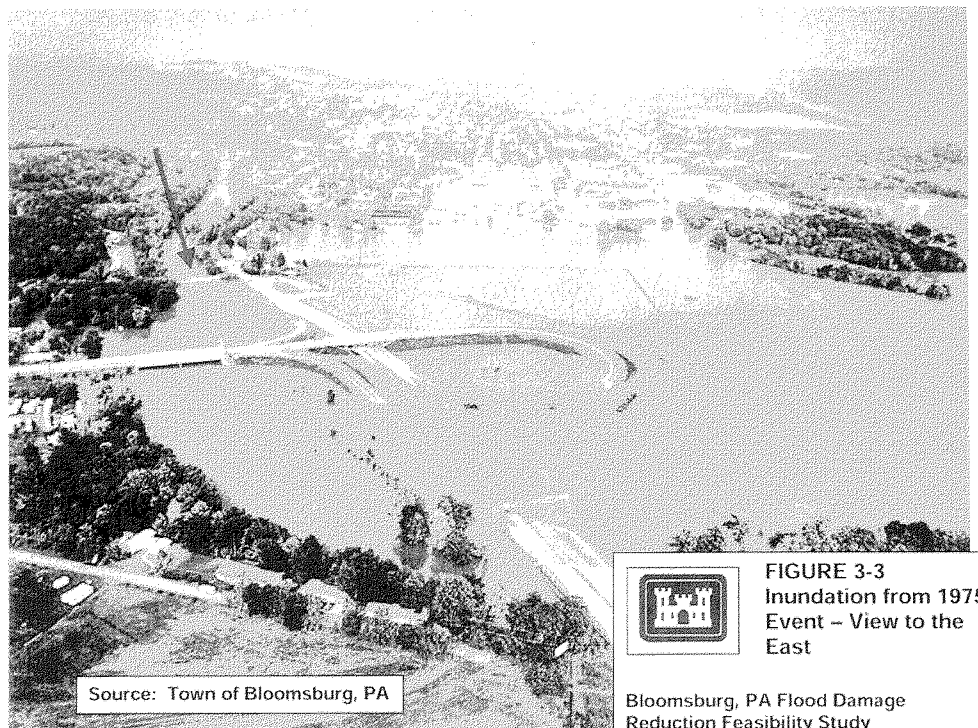
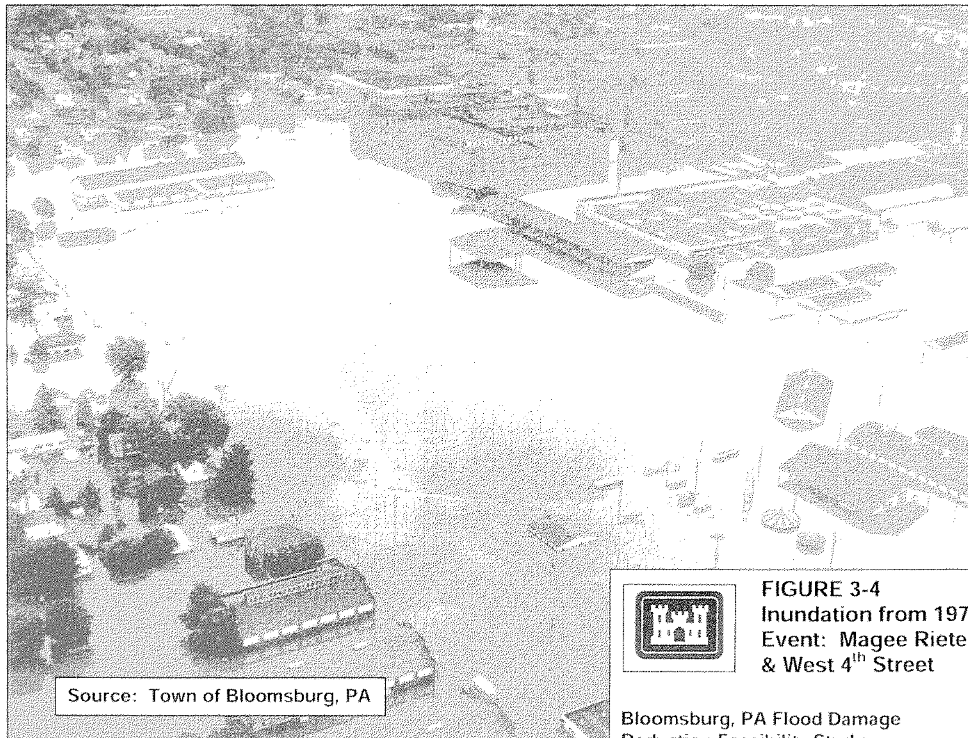


FIGURE 3-3
Inundation from 1975 Event – View to the East

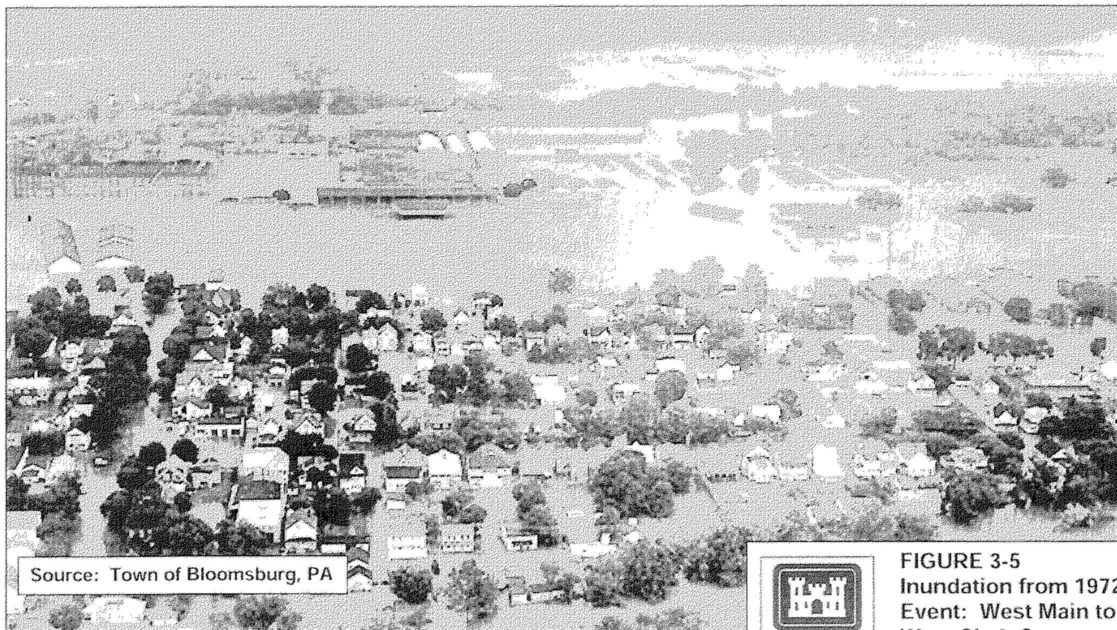
Bloomsburg, PA Flood Damage Reduction Feasibility Study



Source: Town of Bloomsburg, PA

FIGURE 3-4
Inundation from 1972
Event: Magee Rieter
& West 4th Street

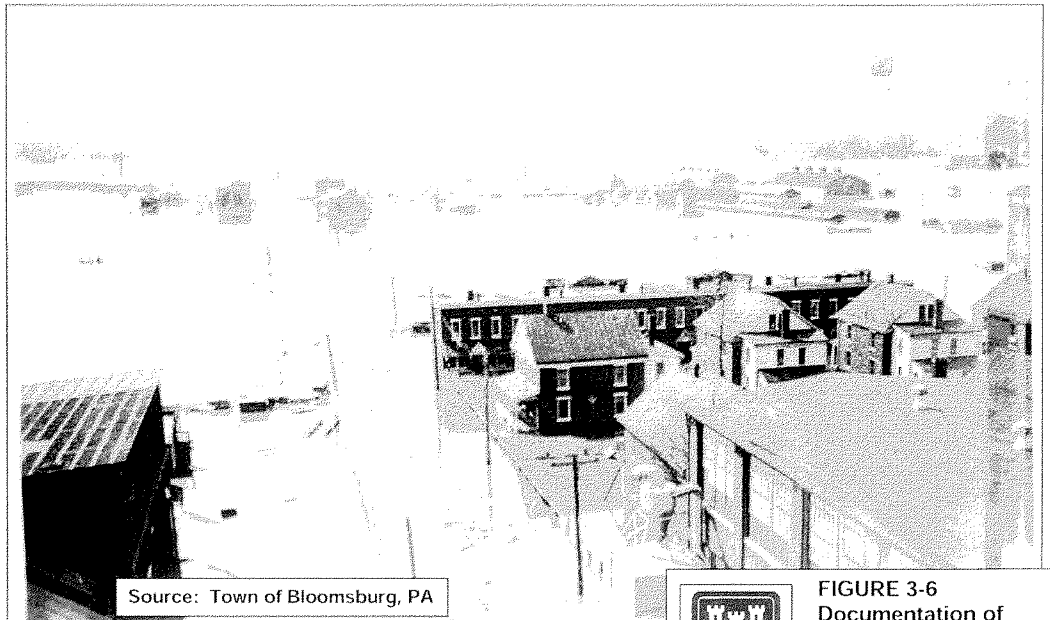
Bloomsburg, PA Flood Damage
Reduction Feasibility Study



Source: Town of Bloomsburg, PA

FIGURE 3-5
Inundation from 1972 Event: West Main to West Sixth Streets

Bloomsburg, PA Flood Damage Reduction Feasibility Study



Source: Town of Bloomsburg, PA

FIGURE 3-6
Documentation of
1936 Event at Magee
Plant with View West

Bloomsburg, PA Flood Damage
Reduction Feasibility Study

3.2 Planning Objectives, Constraints, and Key Assumptions

The following discussions identify the planning goals, objectives, constraints, and key assumptions used to formulate and evaluate Federal interest in alternative plans to alleviate flooding in Bloomsburg, Pennsylvania.

3.2.1 Planning Goals and Objectives

The goal of the project is to reduce the impact of flooding from the Susquehanna River and Fishing Creek on the Town of Bloomsburg. The Federal objective is to implement water resources projects that contribute to National Economic Development (NED). A definition of NED is provided in Section 1 of this document. The text is repeated below as an aid in following the discussion of NED costs and benefits provided later in this section.

> *Contributions to NED include increases in the net value of the national output of goods and services expressed in monetary units. Direct benefits (e.g., prevented damages, reduction of emergency services costs) that accrue in the planning area from implementation of a flood damage reduction project are contributions to NED. Direct costs (e.g., construction costs, real estate acquisition costs, operations and maintenance costs) of project implementation are deductions from NED. A positive difference of project benefits minus project costs becomes a net contribution to NED. Similarly, if the result of project benefits divided by project costs exceeds 1.0, the project is said to have a positive benefit-to-cost ratio (BCR).*
>
> *The Federal objective of water resources development is to identify a plan that maximizes net contributions to NED consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. This plan is referred to as the NED Plan, and becomes the basis for Federal cost sharing in any project for flood damage reduction.*

Planning objectives were developed to be consistent with Federal, State and local laws and policies, and technical, economic, environmental, regional, social, and institutional considerations. The objectives will help formulate and evaluate plans to avoid, minimize, and then mitigate, if necessary, adverse project impacts to the environment. They will also provide a decision framework to maximize net economic benefits, avoid adverse social impacts, and meet local preferences to the fullest extent possible.

In pursuit of the project goal, the following planning objectives were established:

- Provide protection from frequent, low-level recurring floods.
- Reduce the frequency and severity of flood damages incurred as a result of backwater flooding from the Susquehanna River through Fishing Creek.
- Reduce the frequency and severity of flood damages incurred as a result of mainstem flooding from the Susquehanna River.
- Mitigate for any hydraulic impacts.

- Maintain community cohesion.
- Limit alignment impacts to closed landfills.
- Limit impacts to prime and unique farmland.
- Avoid and minimize adverse environmental impacts.

3.2.2 Planning Constraints

The formulation and evaluation of alternative plans was constrained by a variety of technical, economic, environmental, and institutional considerations. Additional constraints were developed based on local knowledge of the flooding problem and local understanding of the consequences of previously investigated flood control alternatives. The following planning constraints were developed to guide the formulation of alternative plans:

Technical constraints include the need for plans to be:

- sound, safe, and acceptable solutions,
- in compliance with sound engineering practice,
- realistic and state-of-the-art,
- consistent with existing local plans, and
- complete and not dependent on future projects.

Economic constraints include:

- the need for flood damage reduction features to be efficient (*i.e.*, average annual NED benefits exceed average annual costs); and
- the requirement to select the flood damage reduction plan that maximizes net excess NED benefits (*i.e.*, the NED plan).

Environmental constraints include the need for plans to first consider avoidance followed by minimization, mitigation, and replacement.

Regional and social constraints include the need for plans to:

- weigh the interests of State and local public institutions and the public at large, and
- consider the potential impacts of the project on other areas and groups.

Institutional constraints include the need for plans to:

- be consistent with existing Federal, State and local laws,
- be locally supported,
- provide public access to the project in accordance with Federal and State laws and regulations, and
- find overall support in the region and State.

3.2.3 Key Assumptions Guiding Plan Formulation

Based on the project goal, objectives, and constraints the following key assumptions were developed to guide plan formulation of flood damage reduction features.

- The economic feasibility of alternative plans will be evaluated using a 50-year period of analysis and the prevailing Federal discount rate (5.375 percent).
- A preconstruction engineering and design (PED) phase that will include preparation of a design documentation report, and plans and specifications (P&S) will follow the feasibility phase.
- The line of protection and interior drainage features are separately formulated and optimized.

3.3 Hydrologic and Hydraulic Analyses

Hydrologic, hydraulic, and statistical analyses were performed to develop existing conditions stage-frequency curves. Risk and uncertainty analyses were then conducted to quantify the uncertainty in discharge-frequency, stage-discharge, and stage-damage functions. The Hydrology and Hydraulics attachment to Engineering Appendix contains additional detail relating to the analysis. Below is a brief discussion of each of the steps used in the analysis.

3.3.1 Statistical Analysis of Stream Gage Records

Flood frequency analyses were updated for two gaging stations in the study area. The Fishing Creek gage is located 5.5 miles upstream of Bloomsburg, and has a period of record of 61 years. The drainage area at the gage is 274 square miles. The Susquehanna River gage at Danville is located 10.3 miles downstream of Bloomsburg, and has a period of record of 99 years. The drainage area of the Susquehanna River at the Danville gage is 11,220 square miles. A USGS gaging station was located at Bloomsburg from 1902 to 1996, but the instrumentation did not include a recording gage and the station has since been removed.

Eight Corps flood control reservoirs have been placed in operation on Susquehanna River tributaries during the period of record for the Danville gage, including: Almond, Arkport, Aylesworth, Cowanesque, East Sidney, Stillwater, Tioga-Hammond, and Whitney Point. Therefore, flood peak data for Danville was adjusted to account for floodwater retained in these reservoirs.

Tropical Storm Agnes (June 1972) was determined to have an existing conditions discharge of 322,600 cubic feet per second (cfs) on the Susquehanna River at Bloomsburg upstream of the Fishing Creek confluence. The frequency curve for the Susquehanna River upstream of Fishing Creek indicates that the recurrence interval of the June 1972 event is 440 years.

The June 1972 event was determined to have an existing conditions discharge of 39,900 cfs on Fishing Creek at Bloomsburg. The frequency curve for Fishing Creek at Bloomsburg indicates that the recurrence interval of the June 1972 event is 53 years. The frequency curve for Fishing Creek was developed for independent events on the creek, and does not take into account any backwater effects from the Susquehanna River should a highwater event occur on Fishing Creek while the Susquehanna River is also in a highwater condition.

The differing recurrence interval assigned to the June 1972 (Agnes) flood event on the Susquehanna River at Bloomsburg (440-year) as compared to Fishing Creek at Bloomsburg (53-year) was a key consideration as the Corps completed this feasibility evaluation. Assignment of the different recurrence intervals is discussed in greater detail in the Hydrology & Hydraulics Attachment to the Engineering Appendix. The difference in recurrence intervals also is incorporated into the formulation of alternative protection levels, and formulation of the recommended plan presented in Sections 4 and 6 of this report.

3.3.2 Existing Conditions Flow Frequency

The Corps Hydrologic Engineering Center – Flood Frequency Analysis (HEC-FFA) program was used to estimate flood frequencies for Fishing Creek at Bloomsburg and for the Susquehanna River above the confluence with Fishing Creek at Bloomsburg. HEC-FFA is a standard Corps computer model that is used to compute flood frequencies in accordance with Corps guidelines. The flood frequencies that were produced are comparable to those shown in other agency studies. The HEC-FFA model results are shown in Tables 3-1 and 3-2. To check validity of the model results, they were compared to estimated flood flows computed by other agencies for three other studies:

- *Flood Insurance Study, Town of Bloomsburg, Pennsylvania.* FEMA, 1979. Methodology is based on flood flow statistics.
- *Comparison of Methods for Computing Streamflow Statistics for Pennsylvania Streams.* U.S. Geological Survey (USGS), 1999. Methodology is based on flood flow statistics.
- *Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams.* USGS, 2000. Methodology is based regression equations.

Because methods for estimating flood peaks vary based on numerous factors, including methodology and completeness of data, the various studies do not yield the same results. However, in each case, the estimated flows from other agencies were within the 5 percent and 95 percent confidence limits associated with the current HEC-FFA results.

Table 3-1
Comparison of Estimated Peak Discharges (cfs) for Fishing Creek at Bloomsburg

Recurrence Interval	Current Corps Analysis (385 sq. mi. drainage area)	1999 USGS Report (355 sq. mi. drainage area)	2000 USGS Report (355 sq. mi. drainage area)	1979 FEMA FIS (385 sq. mi. drainage area)
2 years	10,700	-	-	-
5 years	17,600	-	-	-
10 years	23,300	22,400	22,100	24,300
25 years	31,800	28,400	29,600	-
50 years	39,100	33,000	36,000	45,700
100 years	47,400	37,800	43,300	58,500
500 years	71,600	49,300	64,000	102,000

Table 3-2
Comparison of Estimated Peak Discharges (cfs) for the Susquehanna River Above the Fishing Creek Confluence

Recurrence Interval	Current Corps Analysis (10,560 sq. mi. drainage area)	1979 FEMA FIS (10,576 sq. mi. drainage area)
2 years	116,000	-
5 years	152,000	-
10 years	177,000	173,000
25 years	209,000	-
50 years	234,000	243,000
100 years	260,000	274,000
500 years	326,000	356,000

3.3.3 Development and Calibration of Existing Conditions Hydraulic Model

The Corps Hydraulic Engineering Center – River Analysis System (HEC-RAS) computer model was used to develop water surface profiles for the Susquehanna River and Fishing Creek in the study area. Cross section geometry for the floodplains, main channel, and bridges were surveyed and incorporated into the model. The existing conditions HEC-RAS model was calibrated to high water marks from the June 1972, September 1975 and January 1996 events. Details of this analysis are presented in the Hydrology and Hydraulics attachment to the Engineering Appendix.

3.3.4 Uncertainty Analysis of Hydraulic Data

Risk-based analyses for flood control projects require the quantification of the uncertainty in discharge-frequency, stage-discharge, and stage-damage functions. The uncertainty in stage was assessed for 3 scenarios: Expected Stage, High Stage, and Low Stage. Parameters changed to develop the High Stage and Low Stage scenarios included the coefficients of contraction and expansion, debris at the bridges, Manning's "n" (a friction coefficient) in channels and overbanks, and discharge values using the 95-percent and 5-percent confidence limits on peak flow. Risk-based analyses followed the procedures outlined in Corps Engineer Manual EM 1110-2-1619, *Risk-Based Analysis for Flood Damage Reduction Studies.*

After calibration was complete, the hydraulic model was used to develop the water surface profiles for 28 Susquehanna River, and 51 Fishing Creek HEC-RAS river stations for all design storm events, using discharge values determined by the flood frequency analysis and HEC-FFA model. Water surface elevations for eight modeled design storm events (also known as return intervals) at 18 sample river stations along Fishing Creek are provided in Table 3-3. Water surface elevations for eight modeled design storm events at 18 sample river stations along the Susquehanna River are shown in Table 3-4. Locations of select river stations for Fishing Creek and the Susquehanna River are shown in Figures 3-8 and 3-9, respectively.

Table 3-3
Water Surface Elevations for Modeled Storm Events
Fishing Creek: Without-Project Conditions

	Water Surface Elevation (Units = Feet NGVD[7])							
River Station	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**	**200-Yr**	**500-Yr**
15996	480.6	483.2	485.1	487.5	489.7	491.8	493.9	496.3
14222	478.2	481.3	483.2	485.6	487.7	489.6	491.6	493.6
13531	476.8	479.9	481.8	484.0	485.8	487.5	489.5	491.3
12804	475.2	478.7	480.7	482.9	484.7	486.4	488.5	490.0
12366	474.6	478.2	480.2	482.3	483.9	485.5	488.1	489.8
11844	474.0	477.5	479.3	481.0	482.0	482.6	485.3	487.7
11811	474.0	477.5	479.4	481.0	482.0	482.7	485.4	487.8
10921	473.1	476.5	478.3	479.6	480.0	483.1	486.0	488.5
10246	472.9	476.3	478.1	479.4	479.7	483.0	485.9	488.4
9849	472.7	476.1	477.8	479.0	479.7	482.9	485.8	488.3
9439	472.6	476.0	477.8	478.9	479.8	482.9	485.8	488.3
8447	472.3	475.7	477.4	478.4	479.8	482.9	485.8	488.3
8443	471.9	475.2	476.9	478.7	479.8	482.9	485.8	488.3
7843	471.6	474.7	476.0	478.7	479.8	482.9	485.8	488.3
6468	470.8	473.6	475.3	478.6	479.6	482.8	485.7	488.2
4439	469.7	472.1	473.8	476.1	479.3	482.6	485.6	488.1
958	469.2	471.2	472.7	474.5	476.6	478.7	480.9	484.0
0	469.2	471.2	472.7	474.5	476.6	478.8	480.9	484.0

[7] National Geodetic Vertical Datum

Table 3-4
Water Surface Elevations for Modeled Storm Events
Susquehanna River: Without-Project Conditions

	Water Surface Elevation (Units = Feet NGVD)							
River Station	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	200-Yr	500-Yr
27280	473.1	475.8	477.6	479.7	481.6	483.3	485.2	487.9
19450	471.5	473.9	475.6	477.6	479.5	481.3	483.3	486.2
17910	471.0	473.4	475.0	476.9	478.8	480.8	482.9	485.8
16407	470.7	473.0	474.5	476.4	478.3	480.3	482.3	485.1
15213	470.4	472.6	474.1	475.9	477.9	479.8	481.9	484.8
14020	470.1	472.3	473.7	475.6	477.6	479.6	481.7	484.6
12827	469.8	471.9	473.4	475.2	477.3	479.3	481.4	484.4
11634	469.6	471.6	473.0	474.9	477.0	479.1	481.2	484.3
10441	469.3	471.3	472.7	474.6	476.7	478.9	481.0	484.1
9241	469.1	471.0	472.4	474.2	476.3	478.4	480.6	483.6
8430	468.8	470.6	471.9	473.6	475.6	477.7	479.8	482.8
7380	468.6	470.3	471.5	473.2	475.2	477.2	479.3	482.3
6880	468.5	470.2	471.4	473.0	475.0	477.0	479.1	482.1
5672	468.2	469.7	470.8	472.3	474.3	476.3	478.4	481.2
3650	467.8	469.2	470.2	471.6	473.6	475.6	477.6	480.3
1628	467.3	468.4	469.2	470.2	472.2	474.1	476.2	478.8
306	467.0	468.0	468.7	469.6	471.6	473.6	475.6	478.3
135	467.0	467.9	468.6	469.5	471.4	473.4	475.4	478.1

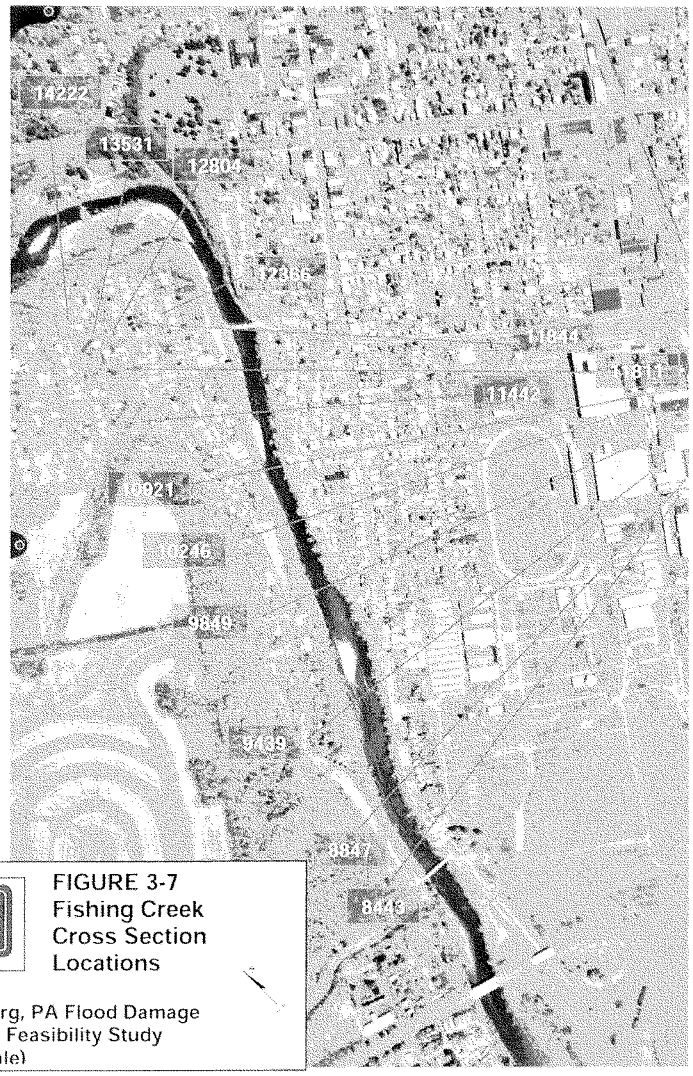


FIGURE 3-7
Fishing Creek
Cross Section
Locations

Bloomsburg, PA Flood Damage
Reduction Feasibility Study
(not to scale)

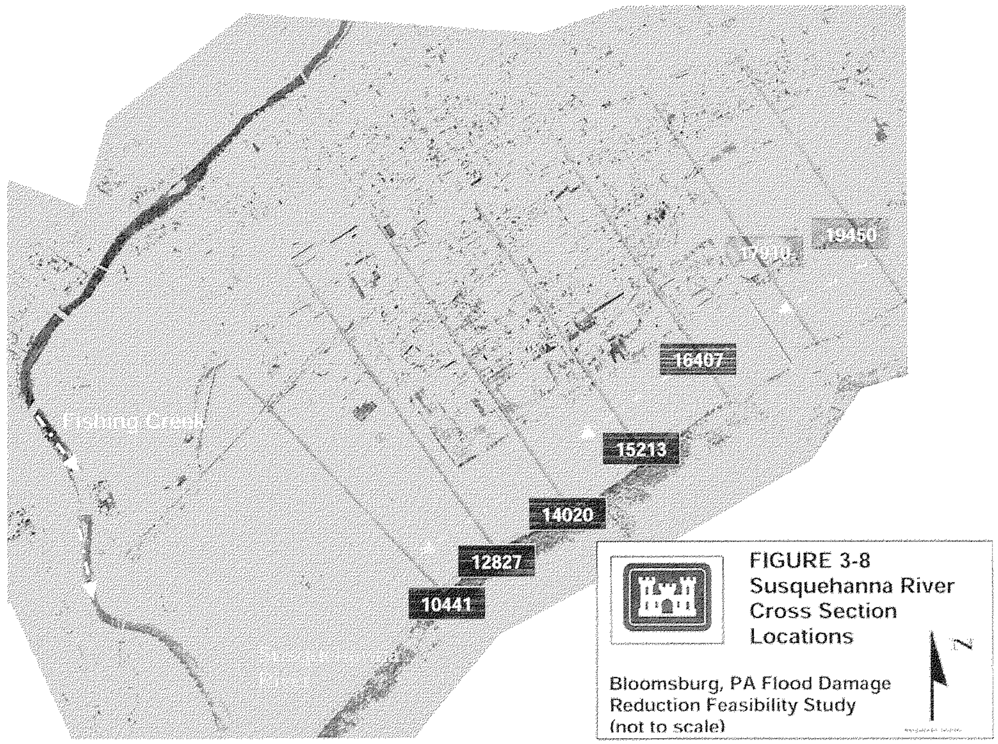


FIGURE 3-8
Susquehanna River
Cross Section
Locations

Bloomsburg, PA Flood Damage
Reduction Feasibility Study
(not to scale)

3.4 Flood Damage Analyses

Flood damages under future with- and without-project conditions were estimated through: (1) an inventory of floodplain development, (2) direct interviews with major industry representatives, (3) estimation of depreciated structure replacement costs and content damages, (4) preparation of generalized stage-damage functions, and (5) combination stage/frequency relationships and stage/damage relationships into frequency/damage relationships. The process and results of damage estimation are described in detail in the Economics Appendix, and are summarized below.

Flood Damage Surveys. A structure inventory was compiled by conducting field surveys of structures in the 500-year floodplain during February and March of 2002. There are approximately 600 total structures within the 500-year floodplain, including 2 municipal and 75 non-residential (commercial and industrial) structures. Each structure was assigned a unique structure identification number. First floor and low opening elevations (measured from known benchmarks using a survey transit) and street addresses were recorded for all structures. Structure information required to compute depreciated replacement values was collected for residential structures based on Means Real Estate Valuation Guide. Data collected included the following categories: structure type, style, construction material, quality, condition, effective age, finished floor area, and other exterior characteristics. Content values were estimated in accordance with guidance provided in Corps economic guidance memoranda EGM 01-03 and 04-01[8]. Interviews were held (2002-2003) with owners/operators of non-residential floodplain properties, including municipal and major industrial facilities.

Actual damage information from the 1972 flood was obtained from the Town and published sources, and was used to calibrate depth-damage functions. Public emergency costs were calculated as a percentage of total damages based on local damage reports provided in *Tropical Storm Agnes June 1972 Post Flood Report*, Baltimore District, USACE, Nov 1974.

Depth-Damage Relationships. Depth-damage functions from Economic Guidance Memorandum 01-03 – *Generic Depth-Damage Relationships for Residential Structures without Basements* and Economic Guidance Memorandum 04-01 – *Generic Depth-Damage Relationships for Residential Structures with Basements* were applied to the inventory of residential floodplain properties in order to develop depth-damage relationships. Current HEC-RAS output (discharge-frequency-water surface elevations) was combined with the depth-damage data in order to calculate average annual damages under existing conditions.

Structure and Content Damages. A risk-based spreadsheet model (Microsoft Excel ® running statistical modeling software) was used to estimate flood damages to non-residential and residential structures and contents. Structure specific information (identification number,

[8] These economic guidance memoranda prescribe a methodology that differs from those used in past economic analyses of flood damage reduction projects conducted in the Wyoming Valley. While prior analyses used a content-to-structure ratio of 0.72, this analysis uses new depth-damage relationship curves developed by the Corps. The new depth-damage curves (full set available in October 2003) model content damages as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of contents valuations. Corps policy states that use of the new damage curves eliminates the need to establish content-to-structure ratios through surveys.

structure type, value, first floor elevation, zero damage level, and reach designation) was included in a structure inventory database for input to the model. Residential structures were classified as one of five types: one-story with a basement, one-story without a basement, split-level, two-story with a basement, and two-story without a basement. The model used depth-percent damage curves corresponding to the structure type to relate flood depth to percent damage for residential and selected non-residential structures and their contents. Each structure was referenced to two cross sections which were used to determine the water surface elevations for the storm frequency events of 2-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year return intervals.

3.4.1 Risk and Uncertainty

Planning guidance requires that risk and uncertainty be incorporated into flood damage reduction studies. Statistical modeling software and Microsoft Excel were used to incorporate uncertainty from damage input variables into the analysis. The evaluation process uses Monte Carlo Simulation to compute the expected value of damages while incorporating the variability associated with each input variable.

Under the Monte Carlo approach, multiple iterations selected input values from the full range of possible values for each variable identified as a source of uncertainty. Expected values and standard deviations for each key input variable were used to develop distributions from which sample variables were randomly selected in the calculation of flood damages.

In normal distributions, 68 percent of the sampled values of a particular variable are within one standard deviation on either side of the mean, 95 percent within two standard deviations from the mean, and 99.7 percent within three standard deviations from the mean. With each iteration of the model a value is randomly selected from the key hydraulic and economic variable distributions and used in the calculation of structure and contents flood damages for that particular iteration. The sum of all flood damage calculations divided by the number of iterations yields the expected value of flood damages for the model run. Ten thousand iterations were run for each study area reach to ensure that the full range of possible outcomes was represented in the analysis.

Some of the important uncertainties specific to this particular analysis are described below.

3.4.1.1 Hydrologic and Hydraulic Uncertainty

Hydrologic and hydraulic uncertainty factors include hydrologic data record lengths that are often short or do not exist, precipitation-runoff computational methods that are not precisely known, and imprecise knowledge of the effectiveness of flow regulation. Additional uncertainty arises from the use of simplified models to describe complex hydraulic phenomena, including the lack of detailed geometric data, misalignments of hydraulic structures, material variability, and errors in estimating slope and roughness factors. Water surface elevations were allowed to vary based on the standard deviations for specific return events taken directly from the hydrologic and hydraulic analyses conducted as part of this feasibility study.

3.4.1.2 Economic Uncertainty

Economic uncertainty factors include land uses, depth/damage relationships, structure/content values, structure locations, first floor elevations, floodwater velocity, the amount of debris and mud, flood duration, and warning time and response of floodplain inhabitants. Variability in depth-damage curves was incorporated into the model by using standard deviations for specific damage percents taken directly from depth-damage functions provided in Corps economic guidance memoranda EGM 01-03 and EGM 04-01. Additional variability in first floor survey error (5 percent), and depreciated replacement values (estimated as a percent of the range shown in Means Cost Estimating Guides) were captured in the damage model.

3.4.2 Existing Conditions Damages in Principal Flood Damage Reaches

Based on the patterns of past flooding, the topography of the study area, and the distribution of floodprone properties, the study area was divided into four damage reaches. Figure 3-9 shows an aerial photograph of the general study area with the locations of the reaches identified. These reaches were used to evaluate the costs of structural and nonstructural flood damage reduction measures and to estimate the benefits of the alternative plans, based on the corresponding reduction in flood damages.

The study reaches are described in Sections 3.4.2.1 through 3.4.2.4. With- and without-project future conditions for the flood-prone reaches assume a stable level of development. Because floodplain regulations restrict new construction in areas that are subject to damage by a 100-year flood event, it was assumed that development of new residential, commercial, and industrial uses in the floodplain is unlikely.

3.4.2.1 Bloomsburg Fishing Creek Damage Reach

Flooding in this reach causes inundation of residential and commercial structures, and roadways. The flood pathway for all damageable property in this reach is via direct inundation by Susquehanna River floodwaters flowing upstream through Fishing Creek and by floodwaters flowing from the Fishing Creek watershed. This damage reach is bounded by Fishing Creek to the north and west, West 5th Street to the south, and Railroad Street to the east. The 500-year floodplain of this reach contains about 250 residential structures (duplex homes are counted as one structure), the north end of the Fairgrounds, and about 20 commercial structures. Flooding begins for a small number of structures in this reach at roughly a 5-year event on Fishing Creek. Most structures begin to incur damages between the 10- and 25-year events.

Average annual damages to residential structures and contents equal $1,175,000 through the 1 percent chance exceedance event (100-year return interval) and $1,386,000 through the 0.2 percent chance exceedance event (500-year return interval). Average annual damages to nonresidential property amounts to $50,000 and $62,000 for the 1 percent chance exceedance event and 0.2 percent chance exceedance events, respectively. Numbers of structures damaged and modeled damage costs under each of the eight return intervals are shown in the Economics Appendix.

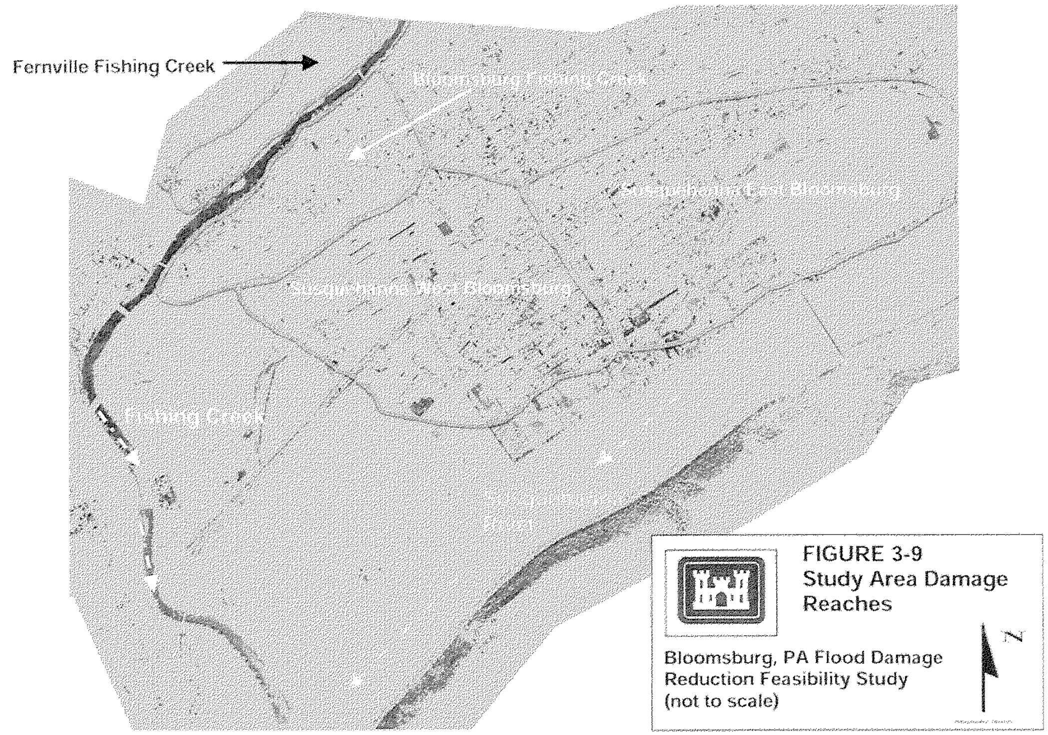


FIGURE 3-9
Study Area Damage Reaches

Bloomsburg, PA Flood Damage Reduction Feasibility Study (not to scale)

3.4.2.2 Fernville Fishing Creek Damage Reach

Fernville is located on the right descending bank of Fishing Creek directly across from Bloomsburg, and includes approximately 75 residential structures in the 500-year floodplain. Fernville was included as a damage reach because it was anticipated that any line of protection constructed for the Bloomsburg side of Fishing Creek (left bank) would raise water surface elevations on the Fernville side of Fishing Creek (right bank). Information on damage amounts and the numbers of structures damaged at the eight return intervals is provided in the Economics Appendix. Average annual damages for this reach are $116,000 through the 1 percent chance exceedance event and $147,000 through the 0.2 percent chance exceedance event.

3.4.2.3 Susquehanna River Lower (West Bloomsburg) Damage Reach

Structures in this damage reach are inundated by the Susquehanna River. This reach is bounded by West 5th Street to the north, the Susquehanna River to the south, Market Street to the east, and Fishing Creek to the west. The reach includes a small number of flood-prone residential structures, Bloomsburg Middle and High Schools (the schools are not in the 100-year floodplain), Bloomsburg's wastewater treatment plant, and the major industrial facilities of Magee Rieter Automotive Systems and Bernardi Italian Foods.

Damage costs and numbers of structures damaged under the eight return intervals are provided in the Economics Appendix. Average annual damages to residential structures and contents are $114,000 through the 1 percent chance exceedance event and $219,000 through the 0.2 percent chance exceedance event. Average annual damages to non-residential property equal $1,549,000 and $2,079,000 through the 1 percent chance exceedance event and the 0.2 percent chance exceedance event, respectively.

3.4.2.4 Susquehanna River Upper (East Bloomsburg) Damage Reach

This reach is bounded by Market Street to the west, the Bloomsburg Town limits to the east, the Susquehanna River to the south, and East 8th Street to the north. The reach includes about 135 residential and commercial structures, the Bloomsburg Airport and Kawneer Architectural Products. Significant damages begin to occur in this reach at the 50-year event, with inundation of about 60 residential and commercial structures.

Residential average annual damages are $88,000 through the 1 percent chance exceedance event and $130,000 through the 0.2 percent chance exceedance event. Nonresidential damages amount to $288,000 and $367,000 through the 1 percent chance exceedance event and the 0.2 percent chance exceedance event, respectively. Information on the numbers of structures inundated and damage costs for each of the eight return intervals is provided in the Economics Appendix.

3.5 Screening of Structural Flood Damage Reduction Measures

Based on the physical layout of the study area, the flood hydrology, and the profiles of structures at risk, the following structural flood damage reduction measures were considered: (1) floodwater barriers, (2) stream modifications and dredging, and (3) detention basins. The screening of flood damage reduction measures includes an assessment of the potential engineering, economic, environmental, public, financial, and institutional feasibility of implementing each measure. Those measures that were not entirely screened out were carried forward for more detailed analysis as alternative plan components. The structural measures and the results of the initial screening are described below.

3.5.1 Floodwater Barriers

Floodwater barriers, (e.g., floodwalls and levees) confine flood flows to the existing channel footprint, prevent breakout of floodwaters, and provide protection against flooding to homes, commercial buildings, municipal buildings, roadways and tributary bridges. While floodwalls and levees provide a cost-effective means to prevent flooding of low-lying areas, interior drainage facilities are often required to handle stormwater that ponds behind them.

Levees and floodwalls are combined with closure structures, such as stoplog closures and gate closures, which are manually installed over roadways, bridges, and railways prior to flooding to provide a continuous barrier against flooding to a pre-determined elevation.

3.5.2 Stream Modifications and Dredging

Stream modifications and dredging are used to protect communities against riverine flooding and stream blockages. Stream modifications can include dredging, channel deepening and widening, as well as modification of bridge and culvert openings. Decreases in water surface elevations and flood damages in some parts of Bloomsburg could be achieved through a reduction in channel blockages resulting from high sediment loads and bank material transported during flood events. Because *minor* snagging and clearing would not have a measurable impact on flood stages or water surface elevations, implementation of this measure would require significant channel deepening and widening for several miles upstream and downstream of Bloomsburg.

Channel improvements to Fishing Creek were considered in earlier Corps evaluations, but eliminated due to excessive costs (USACE, 1983; USACE, 1998). Fishing Creek flows over exposed bedrock in much of the study area reach; most channel improvements would require blasting and excavation of this bedrock. It is likely that implementation of stream modifications would result in adverse impacts to extensive reaches of aquatic habitat. Environmental mitigation costs would be extremely high, and operations and maintenance costs associated with the extensive stream modifications would be significant.

While stream modifications can be an effective means to reduce flood damages in some cases, it was determined that stream modifications would be neither effective nor economically justified for the study area. For the Town of Bloomsburg, it was estimated that 4.5 miles of the Susquehanna River would need to be dredged to a depth of 10 additional feet to remove enough sediment (10,000,000 cubic yards) to get a measurable reduction in the 100-year water surface elevation. The initial dredging and disposal effort was estimated to cost $35 per cubic yard, or $350 million, and would reduce the 100-year water surface elevation by 2.3 feet along Railroad Street. Further, it was estimated that the Town's cost for maintenance would be in the range of $17 million to $20 million per year because sediments would deposit at a rate of 5 percent per year (or 500,000 cubic yards) with a unit maintenance dredging and disposal cost of $35 per cubic yard.

The high cost of initial construction, substantial adverse environmental effects to the aquatic ecosystem, as well as the high annual cost of maintenance to remove accumulated sediments eliminated stream modifications and dredging from further consideration as a flood damage reduction measure.

3.5.3 Detention Basins

Detention basins are used to attenuate the peak flow rate of run-off by temporarily storing large volumes of stormwater, then releasing them at a controlled rate of flow. This alternative was considered as a means to create flood storage areas in the floodplain by enclosing a large area with a dike. During floods, the floodwaters would overflow into the storage area. Stored floodwaters would then be released slowly through a downstream outlet. Preliminary investigations based on flood flows determined that placing flood control storage areas in the floodplain would require an extensive amount of land to achieve any measurable water surface elevation reductions. Environmental impacts of this option would be significant. Potential downstream negative effects could include changes in the quality of water flowing out of the reservoir behind a dam and changes in downstream water temperatures. Downstream riparian areas that are dependent on overbank flows for recharge would probably experience reductions in size. Finally, economic justification was determined to be highly unlikely for alternatives that rely on detention basins. For these reasons, detention basins were dropped from further consideration.

3.6 Screening of Nonstructural Flood Damage Reduction Measures

Nonstructural measures were fully considered in plan formulation. However, full-scale nonstructural measures were screened out early in plan formulation due to the number of flood-prone structures in the study area identified through the inventory of flood-prone structures. The following nonstructural measures were identified as potentially applicable to flood damage reduction in the study area, including: (1) acquisition of flood-prone property, (2) floodplain zoning, (3) floodproofing, and (4) flood warning systems. While analysis of the nonstructural measures to provide flood damage reduction eliminated most of these measures as potential stand-alone alternatives, some measures were carried forward as potential complements to structural measures. The screening of nonstructural measures is summarized below.

3.6.1 Acquisition of Flood-Prone Structures

Permanent evacuation of the floodplain involves acquisition of land and structures by fee purchase or by exercising powers of eminent domain. Following acquisition, all structures and improvements are demolished or relocated. Table 3-5 below displays the total number of residential and non-residential structures in the Bloomsburg floodplain, by recurrence interval. Typically, acquisition plans are formulated by flood zone, so this table displays the number of structures that would be involved in successively larger relocation efforts, from the 99% (1-year) to the 1% (100-year) floodplains.

This table indicates the number of damageable residential and non-residential structures that could potentially be relocated, and the degree to which evacuation of various flood zones would resolve Bloomsburg's flooding problems. Relocation of more frequently flooded areas, such as the 10% (10-year) or 4% (25-year) recurrence interval floodplains, would involve 106 and 212 structures, respectively, out of a total of 425 structures in the 100-year floodplain, but would not result in even a 50% reduction in Bloomsburg's average annual flood damages.

Table 3-5
Damageable Properties by Recurrence Interval

Recurrence Frequency	Residential Structures	Non-Res Structures	Total Structures	Annual Flood Ins Admin Cost
99%	0	0	0	$
20%	29	3	32	$5,216
10%	99	7	106	$17,278
4%	198	14	212	$34,556
2%	262	40	302	$49,226
1%	365	60	425	$69,275

With about 425 structures in the 100-year floodplain, buyout and relocation costs would exceed $80 million. The last column of Table 3-5 shows the cost savings in annual flood insurance premiums, assuming 100% flood insurance participation by every property in each flood zone. This is the maximum value of the potential flood damage reduction benefits of relocation plans, since ER 1105-2-100, Para E-17.b.(1) states that "There are no damages avoided claimable as benefits for the properties which are relocated or evacuated". Relocation of the 100-year floodplain would result a maximum of $69,000 in average annual flood damage reduction benefits, compared to over $4.6 million in average flood damage reduction costs. Because of this prohibition on claiming privately incurred damages for relocations/evacuation projects, these types of projects must be justified almost entirely on reuse benefits of vacated floodplain lands. Acceptable reuse alternatives would include recreation, open space, or ecosystem restoration on the vacated floodplain lands.

Under certain circumstances, the buyout concept is a potentially viable flood protection measure, as demonstrated by buyouts implemented by Federal agencies (most notably the Federal Emergency Management Agency). However, FEMA does not prohibit inclusion of privately incurred damages for their relocations/evacuation projects, and so are more able to economically justify their buyout projects. If flood protection can be achieved without structural measures, other potential benefits that can be used to justify a relocation/evacuation project can include returning the floodplain closer to its natural state, creating additional open space, or certain forms of minimal facilities recreation uses that are not inconsistent with floodplain regulations.

To establish criteria for the formulation of buyout alternatives, it is important to define the goals of a buyout effort. While public expectations vary, any buyout effort should accomplish the following:

- public acquisition and removal of flood-prone structures,
- assembly of vacant parcels to preclude development,

- prohibitions against new structures in the floodplain or floodproofing and stormwater management in some limited cases,
- creation of recreation or natural wildlife areas and wetlands in appropriate areas,
- development of permanent public open space to provide new recreational opportunities,
- removal or adjustments to the public infrastructure to eliminate intrusions into the floodplains and to prevent interruption of essential services during floods, and
- enforcement of land use controls to prevent redevelopment in acquired areas and establishment of water management standards at un-acquired properties.

While environmental benefits of a buyout in the Town of Bloomsburg initially appear to be attractive, closer analyses of the potential NED and NER benefits cannot support a positive recommendation for a relocation/evacuation plan. Bloomsburg already has a significant amount of open space in and adjacent to the town. The Bloomsburg Fairgrounds provide more than adequate open space for a population of Bloomsburg's size, and the State Comprehensive Outdoor Recreation Plan (SCORP) does not indicate a significant need for additional recreation features that would be consistent with approved uses of the regulated floodplain. Bloomsburg Park, located on the banks of the Susquehanna River, is a significant recreation resource for the community that meets the study area's active recreation needs.

Ecosystem restoration would generate NER benefits, however it is highly unlikely that these benefits would be sufficient to justify the $80 million cost of the relocation of all structures in the 100-year floodplain, or the scaled costs of smaller relocation efforts. There are no designated habitats for Federal or state listed species within or near the study area, so establishing Federal, state or regional significance would be problematic. Forested riparian habitat is abundant throughout the region, so restoration of the riparian floodplain, while beneficial, would not involve restoring scarce resources, even on a local basis. Also, within the 100-year floodplain is an abandoned landfill that would likely not be a viable candidate for restoration efforts, further reducing the scope of potential restoration efforts. Finally, the 100-year floodplain is approximately 300 acres in size, which would result a cost per acre of over $260,000 for land acquisition costs only, which is significantly higher than what would be justified based on limited restoration benefits, and would not satisfy Administration & OMB guidelines for identifying priority restoration projects.

Regarding the Other Social Effects (OSE) and Regional Economic Development (RED) Accounts, the social and economic impacts resulting from the necessary displacement of 365 households, 60 businesses and public buildings, the demolition of an equivalent number of buildings of all types, and the removal of tens of millions of dollars in property value and tax base would have significant negative effects on the local economy. The Town of Bloomsburg does not support the floodplain buyout plan, as it would displace from 10 to 20 percent or more of its housing, reduce tax revenues, eliminate businesses, and lower regional income and employment. The plan would also generate significant local controversy, disrupt community cohesion, and place economic burdens on relocated families, relatives, and neighbors.

For the reasons cited above, it is highly unlikely that a floodplain buyout plan would meet P&G guidelines, is not justified from a NED or NER perspective, and would have negative effects on the RED and OSE Accounts, and was therefore eliminated from consideration as a stand alone alternative.

Limited, partial acquisitions, in conjunction with structural measures, have been evaluated and are contained in the final array of alternatives. Acquisition of structures in Fernville for the mitigation of hydraulic effects (discussed later in this section) was retained as a mitigation measure. Several structures in Fernville along Drinker Street were previously acquired as part of a non-Federal flood damage mitigation project.[9] This measure was carried forward as a potential component in one or more Bloomsburg flood control alternative plans.

3.6.2 Floodplain Zoning

Through proper land use regulation, floodplains can be managed to ensure that their use is compatible with the severity of a flood hazard. Several means of regulation are available, including zoning ordinances, subdivision regulations, and building and housing codes. Their purpose is to reduce losses by controlling the future use of floodplain lands. Bloomsburg already participates in the National Flood Insurance Program (NFIP) and manages floodplain land uses consistent with the program. In fact, as a participating community in the Community Rating System, Bloomsburg's floodplain management program exceeds the minimum standards of the NFIP. Most of the buildings in the study area floodplain were built prior to the adoption of NFIP zoning standards and are not subject to current floodplain zoning regulations unless they are substantially improved. Therefore, zoning cannot be considered independently as a long-term mitigation solution for flood damage reduction to existing structures.

3.6.3 Floodproofing

Floodproofing reduces flood damages through modifications to structures and relocation of building contents. Floodproofing techniques involve keeping water out of the structure, as well as reducing the effects of inundation. Nonstructural adjustments, such as the elevation of structures, can be applied by an individual or as part of a collective action either when flood-prone buildings are under construction or through retrofitting of an existing structure. Floodproofing alone was found to be prohibitively expensive, since a majority of structures would require costly raising and many structures currently have basements. While eliminated as a major element in the formulation of alternative plans, selective floodproofing was retained as a flood damage reduction measure as a part of other comprehensive alternative plans.

3.6.4 Flood Warning System

Flood warning systems can be utilized to warn property owners of pending floods and provide time for safe evacuation and relocation of movable property subject to flood damage. As stated previously, flood forecast and warning systems for the Susquehanna River just upstream of Bloomsburg were not specifically considered as part of this feasibility study or the earlier 905(b)

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[9] The properties were purchased after the 1975 flood with U.S. Department of Housing and Urban Development funds administered through the Columbia County Redevelopment Authority. After the Redevelopment Authority purchased the properties and razed the structures, the vacant land was offered for sale to adjacent property owners.

analysis, since such a system is already under consideration as part of the Wyoming Valley Levee Raising Project.

Any improvement of the Flood Warning System for Fishing Creek would be an expansion of the current Integrated Flood Observing and Warning System (IFLOWS), which provides Susquehanna River flood estimates both upstream and downstream of the study area. Rainfall data on Fishing Creek, at Pine Summit and Benton, is integrated in the IFLOWS; however, additional rainfall and stream gage instrumentation on Fishing Creek is necessary in order to provide more accurate flood data for Fishing Creek floodplain residents.

Although a state-of-the-art flood warning system would increase the awareness of the citizenry and allow for a more orderly evacuation of residents, a warning system alone would not provide sufficient time to significantly reduce flood damages. This flood damage reduction measure, while important as a project feature, was eliminated from consideration as a stand-alone alternative. Each of the alternatives described in the FS/EIS include upgrades to the existing flood warning system.

3.7 Flood Damage Reduction Plans

As the next step in the plan formulation process, flood damage reduction measures that survived the initial screening were developed in detail. The initial screening of flood damage reduction measures resulted in the following structural and nonstructural measures being carried forward for more detailed investigations:

- levee/floodwall systems along the right descending bank of the Susquehanna River to protect the eastern and western portions of Bloomsburg; and
- levee/floodwall system along the left descending bank of Fishing Creek.

3.7.1 Alternative Levee/Floodwall System Alignments

The availability of land to construct a levee/flood wall system varies significantly throughout the study area and along the potential alignments. Because of the potential limited space for construction and installation, three types of floodwater barriers were considered.

1. Earthen levee constructed of compacted select fill, a landside toe drain, and set back a minimum of 15 feet from the top of bank. The typical levee crest would be 10 feet wide with a land side slope of 2.5 horizontal to 1 vertical (2.5H:1.V) and a riverside slope of 2H:1V. The river-side toe would be placed at least fifteen feet from the bank crest of Fishing Creek.

2. Mechanically Stabilized Earth (MSE) Wall constructed of compacted select fill in 8-inch lifts. Each 8-inch lift would be structurally stabilized with geo-grid reinforcement. Structural reinforcement allows for the side slopes of the MSE wall to be near vertical, and would require minimum of 24 feet of land from the top of bank.

3. H-Pile Flood Wall constructed of driven steel H-piles on six-foot centers with precast concrete panel installed between piles. The maximum width of the H-pile wall is 2 feet with vertical sides.

The primary basis for determining which type of flood barrier would be applied along a line of protection was the land requirements for the flood barriers. Land requirements for the different floodwater barrier footprints ranges from a maximum of 92.5 feet for an earthen levee to 24 feet for the MSE wall to a minimum of 2 feet for the H-pile wall.

Based on the flooding history, the areas subject to inundation from the 100-year frequency flood, and local sponsor input, three floodwater barrier alignments were evaluated as potential flood damage reduction measures in the Town of Bloomsburg study area:

1. Interior Alignment;
2. Fringe Alignment; and
3. East Bloomsburg Extension Alignment.

Each of the alignments includes earthen levee and closure structures, an the interior and fringe alignments also include MSE wall and H-Pile wall flood barriers. The general layout of each alignment is shown on Figure 3-10.[10]

Much of the flood damages in Bloomsburg are attributable to Susquehanna River backwater flooding through Fishing Creek. A floodwater barrier along the Susquehanna River alone would be ineffective in the reduction of flood damages because Susquehanna River flood waters would flow upstream and overtop the banks of Fishing Creek. Therefore, all alternative alignments include a levee segment that protects Bloomsburg from Susquehanna River backwater flooding along Fishing Creek.

3.7.1.1 Initial Alternative Screening - Interior Alignment Levee/Floodwall System

For the purposes of the initial alternative screening, the Interior Alignment was designed to provide flood damage reduction up to the 100-year event[11] for residential and non-residential property. Properties within the Interior Alignment line of protection would include those in the following damage reaches:

- Bloomsburg Fishing Creek; and
- Susquehanna River Lower (western portion of Bloomsburg).

[10] Figure 3-10 shows a line of protection on the right descending bank of Fishing Creek. This line of protection represents a levee/floodwall system that would be put in place as a means of mitigating for increased flooding along the right descending bank of Fishing Creek. The need for mitigation and a discussion of mitigation options is provided later in this section.

[11] Regulations had once required the Corps to design urban flood damage reduction measures with a minimum 100-year level of protection, but those regulations have been rescinded. Nevertheless, the evaluation of designs for flood damage reduction measures continues to begin at the 100-year level of protection as a matter of custom, and in an attempt to reduce the number of structures located in FEMA designated Special Flood Hazard Areas, which are defined as areas having a one percent chance of being flooded in any given year (i.e., the 100-year flood).

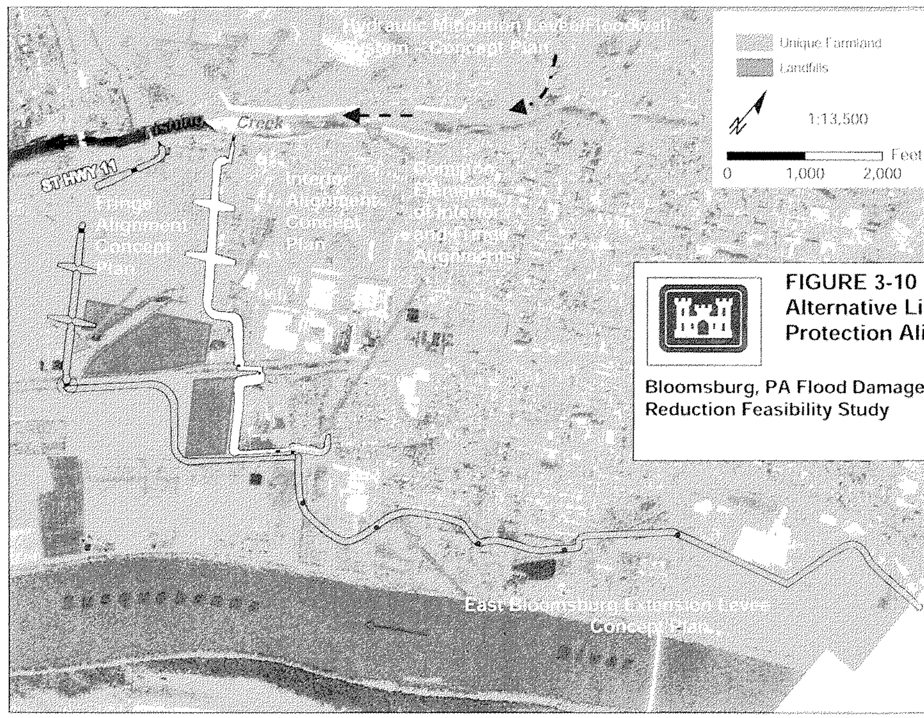

FIGURE 3-10
Alternative Line of Protection Alignments

Bloomsburg, PA Flood Damage Reduction Feasibility Study

The overall length of the 100-year line of protection would be 9,100 linear feet, and would consist of earthen levee, MSE wall, and concrete floodwall. For discussion purposes, the alignment consists of three segments, or legs:

- Fishing Creek Leg - North of Route 11;
- Fishing Creek Leg - South of Route 11; and
- Susquehanna River Leg.

The levee/floodwall system was designed to protect property from direct inundation from the Susquehanna River, direct inundation from Fishing Creek, and backwater flooding from the Susquehanna River through Fishing Creek. The top-of-protection elevations for the Fishing Creek legs were derived from 100-year water surface elevations on Fishing Creek, and the top-of-protection elevations for the Susquehanna River leg were derived from 100-year water surface elevations on the Susquehanna River.

Fishing Creek Leg – North of Route 11

The upstream terminus of the Fishing Creek leg of the alignment would be located east of the Railroad Street bridge in Bloomsburg. A closure structure on the south side of the Railroad Street bridge would be about 3 feet high, and bring the closure to the elevation of 100-year flood protection.

The line of protection would continue along the left descending bank of Fishing Creek as an earthen levee providing 100-year flood protection for approximately 1,450 linear feet. The levee would transition to an MSE wall and continue for about 1,250 linear feet, and then the MSE wall would transition to a concrete floodwall. The concrete floodwall would continue the line of protection for 250 feet, turn 90 degrees in a southerly direction, and meet a closure structure that would cross Route 11 (West Main Street).

Fishing Creek Leg – South of Route 11

The Fishing Creek leg would continue the line of 100-year flood protection south of Route 11 (West Main Street) from the southern end of the Route 11 closure structure. The alignment would continue in a southerly direction as a concrete floodwall for about 75 feet, transition to an MSE wall, and continue for the next 200 feet until it would transition to an earthen levee. The levee would continue in a generally southern direction for approximately 1,850 feet crossing the Fairgrounds west of the exhibit buildings. It was assumed that two ramps over the levee within the Fairground parking area would provide vehicle access to parking areas on the riverside of the levee.

After continuing 1,850 feet in a southern direction, the levee would turn 90 degrees to the east in order to avoid crossing a closed landfill. The levee would continue to the east for about 300 feet before making another 90-degree turn to the south and continuing toward the North Shore railroad tracks for about 550 feet. A 24-foot single-track closure structure would cross the North Shore railroad tracks, and the line of protection would turn 90 degrees again to the east as an MSE wall. The MSE wall would continue eastward for another 300 feet in order to avoid an additional closed landfill, and again cross the North Shore railroad tracks with another 24-foot wide single-track closure structure.

Susquehanna Leg

The Susquehanna leg of the alignment begins on the south side of the second railroad closure structure. Here the levee would make a 90-degree turn to the west and continue westward for 300 feet in order to avoid extensive interference with the Bernardi plant. The levee would make an additional 90-degree turn to the south and continue for 900 feet before making a 90-degree turn to the east at the north side of West 11th Street. The line of protection would continue to the east along the north side of West 11th Street as an MSE wall for about 500 feet, where a 50-foot wide closure structure would cross the entrance to the Bernardi plant. The MSE wall would continue from the east side of the closure structure for an additional 200 feet and then transition to an earthen levee. The earthen levee would continue eastward for about 600 feet to its tie-out into high ground northeast of the intersection of Barton Street and West 11th Street.

3.7.1.2 Initial Alternative Screening - Fringe Alignment Levee/Floodwall System

An additional alignment was designed to provide 100-year flood protection to property located in the Bloomsburg Fishing Creek and Susquehanna River Lower (West Bloomsburg) damage reaches. Initial design of this second alignment, referred to as the Fringe Alignment, evolved in an attempt to avoid anticipated negative effects of the Interior Alignment. The anticipated negative effects of the Interior Alignment that led to the initial design of the Fringe Alignment are discussed below.

The Interior Alignment was positioned as a setback levee along Fishing Creek (south of Route 11), and would cover the shortest distance across the Fairgrounds parking area to provide a line of protection. It was anticipated that the setback feature would provide a flow area for floodwaters and minimize the level of increased flooding to property located on the right descending bank of Fishing Creek. While the design of the Interior Alignment would provide an efficient floodwater flow area, potential problems associated with the position of the alignment were identified, and are outlined below.

1. The likelihood of encountering hazardous, toxicological, and radiological waste (HTRW) would be high, because the alignment would run along the borders of two known closed landfills. Ordinarily, an alignment could be shifted if HTRW were to be encountered. While path of the Interior Alignment would be anticipated to cause at least some disruption to operations at Bernardi and Magee, significant interference to operations would occur at those facilities if the need arose to shift the alignment further away from the landfill boundaries.
2. Because the alignment would be located along the boundaries of two known closed landfills, it would be likely that extensive excavation would be required to reach a depth where foundation suitable soil would be present.
3. The alignment would cross Route 11 (West Main Street) at the eastern Fairgrounds entrance, and would not provide protection to 16 residential and two commercial structures located immediately west of the main Fairground entrance on Route 11.

The Fringe Alignment was designed to address these problems, though some features of the Fringe Alignment are identical to those of the Interior Alignment. These identical features are provided below.

- The Fringe Alignment would provide flood damage reduction up to the 100-year event for residential and non-residential property in the Bloomsburg Fishing Creek damage reach and the Susquehanna River Lower (western portion of Bloomsburg) damage reach.
- The alignment consists of three segments, or legs: Fishing Creek Leg - North of Route 11; Fishing Creek Leg - South of Route 11; and Susquehanna River Leg.
- The levee/floodwall system was designed to protect property from direct inundation from the Susquehanna River, direct inundation from Fishing Creek, and backwater flooding from the Susquehanna River through Fishing Creek
- Top-of-protection elevations for the Fishing Creek legs were derived from 100-year water surface elevations on Fishing Creek.
- Top-of-protection elevations for the Susquehanna River leg were derived from 100-year water surface elevations on the Susquehanna River.

The overall length of the Fringe Alignment 100-year line of protection would be 12,450 linear feet, and would be comprised of earthen levee, MSE wall, and concrete floodwall.

Fishing Creek Leg – North of Route 11

This leg of the Fringe Alignment would be nearly identical to the Interior Alignment's Fishing Creek leg that lies north of Route 11. However, instead of crossing Route 11 at the east Fairgrounds gate, the Fringe Alignment would continue as a floodwall along the left descending bank of Fishing Creek for an additional 1,000 feet past the point where the Interior Alignment would cross Route 11. This leg of the alignment would provide flood protection for 17 structures west of the main Fairgrounds entrance and south of Route 11.

The downstream terminus of this leg would be at a closure structure across Route 11 located just upstream of the "double track" bridge.

Fishing Creek Leg – South of Route 11

The alignment would continue from the Route 11 (West Main Street) closure structure, proceeding in a westerly direction as an earthen levee for 300 feet. A closure structure would cross River Road (also the western Fairgrounds entrance), and the levee would continue for an additional 450 feet to its tie-out located at the southeastern corner of the Route 11 / Route 42 interchange.

The line of protection would be maintained at a 100-year level of protection by the Route 11 / Route 42 interchange embankment, and the earthen levee would resume in a southerly direction approximately 500 feet to the south, also tied into the Route 11 / Route 42 interchange.

An additional closure structure would cross River Road after approximately 50 linear feet of earthen levee. The levee would resume its southerly course (it was assumed that two ramps crossing over the levee would be provided for vehicle access to parking areas on the riverside of the levee) at a 100-year level of protection for an additional 1,850 feet to the North Shore railroad tracks, where it would cross the tracks with one single-track closure structure.

Susquehanna Leg

The Susquehanna leg of the alignment begins after the railroad closure structure. Here the levee would make a 90-degree turn to the east and continue eastward for 1,200 feet. The levee would be located as close to the North Shore railroad tracks as possible in order to minimize impacts to adjacent farmland. The levee would take an additional 90-degree turn to the south and continue for an additional 1,100 feet in order to avoid crossing through an abandoned landfill. The levee would turn 90 degrees again to the east just after crossing and permanently closing Sands Street, and would continue its eastward course for 1,400 feet along the south side of West 11th Street. A closure structure would cross West 11th Street, and the levee would continue for 600 feet to a tie-out at high ground northeast of the intersection of Barton Street and West 11th Street.

3.7.1.3 Initial Alternative Screening - East Bloomsburg Extension Levee

This alignment extension (comprised entirely of earthen levee and closure structures) would provide protection to a relatively large area, though the majority of residential and non-residential structures in the eastern portion of Bloomsburg's 500-year floodplain are located at elevations above the 100-year floodplain.

The East Bloomsburg Extension Levee would continue flood damage protection along the Susquehanna from the termination of the Interior and Fringe Alignments near the Magee-Rieter facility. The alignment would proceed around the south side of the high school and continue upstream to the northeast. The alignment would consist of 9,300 linear feet of earthen levee set back from the right descending bank of the Susquehanna River. This alignment would cross over Railroad Street, Perry Street, Market Street, and Catherine Street to the alignment's upstream terminus to the north and east of the Kawneer facility.

From the downstream terminus, the alignment would proceed along a northeastern path 500 to 1,000 feet landward of the Susquehanna. This alignment would require three large road closure structures (at Railroad, Perry and Market Streets) and two small road closure structures (at Catherine Street and the wastewater treatment plant access road). It was assumed that five drainage structures would be necessary to provide minimum interior drainage facilities. The drainage structure at Kinney Run might ultimately require a pumping station due to the large drainage area of the tributary, though the costs of pumping facilities were not included in the initial cost analysis.

3.7.2 Mitigation for Hydraulic Impacts

Hydrologic and hydraulic investigations indicated that installation of a levee/floodwall along the left bank of Fishing Creek would cause increased flooding on the right bank in the neighboring Village of Fernville, and Hemlock and Montour Townships. In addition, 18 structures west of the Interior Alignment on Route 11 would incur increased flooding from implementation of the Interior Alignment. Increases in water surface elevations for the Fringe and Interior Alignments are shown in Table 3-6.

Table 3-6
With-Project Increases in Water Surface Elevations along Fishing Creek

River Station	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	200-Yr	500-Yr
Increase in Water Surface Elevation (Fringe Alignment, Units = Feet)								
11811	0.0	0.1	0.5	2.3	4.1	5.9	5.6	5.8
11442	0.0	0.1	0.5	2.6	4.4	4.9	4.6	4.7
10921	0.1	0.1	0.6	2.9	5.3	4.6	4.1	4.0
10246	0.1	0.1	0.7	3.1	5.7	4.8	4.3	4.3
9849	0.1	0.1	0.7	3.4	5.4	4.7	4.1	4.1
9439	0.1	0.1	0.7	3.4	5.4	4.7	4.2	4.1
8847	0.1	0.1	0.8	3.7	5.1	4.4	3.9	3.8
8443	0.1	0.1	0.9	2.9	4.7	3.8	3.2	2.9
Increase in Water Surface Elevation (Interior Alignment, Units = Feet)								
River Station	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**	**200-Yr**	**500-Yr**
11811	0.0	0.0	0.0	0.5	1.2	2.9	2.6	2.7
11442	0.0	0.0	0.0	0.5	1.3	1.8	1.6	1.7
10921	0.0	0.0	0.0	0.6	1.6	1.1	0.7	0.6
10246	0.0	0.0	0.0	0.7	1.9	1.2	0.8	0.8
9849	0.0	0.0	0.0	0.7	1.4	0.9	0.6	0.5
9439	0.0	0.0	0.0	0.8	1.3	0.9	0.6	0.5
8847	0.0	0.0	0.0	0.9	0.8	0.4	0.2	0.2
8443	0.0	0.0	0.3	0.3	0.7	0.4	0.2	0.2

Because most of the impacted structures are situated between Fishing Creek cross sections 11811 and 8443, Table 3-5 is limited to presentation of these cross sections and the cross sections between the upstream (11811) and downstream (8443) boundaries.

Approximately 135 structures would be impacted by increased flooding in Hemlock and Montour Townships (includes Fernville) with the Fringe alignment in place. This compares to 143 structures that would be impacted by increased flooding with the Interior Alignment in place, including 125 impacted structures in Hemlock and Montour Townships, and 18 structures in Bloomsburg.

Implementation of the Interior Alignment would result in a reduced impact on Hemlock and Montour Township properties as compared to the Fringe Alignment, since the Interior Alignment would leave more existing floodplain available for floodwaters to flow unrestricted in Bloomsburg, thereby reducing the backwater flood elevations on Fishing Creek (see Table 3-5).

However, the Interior Alignment would leave 18 structures outside of the line of protection in western Bloomsburg, making these properties subject to increased flooding.

Mitigation for the hydraulic impacts of the levee alternatives (increased flooding) was evaluated as part of the plan formulation process, combining structural or nonstructural protection for impacted properties with the alternative levee alignments.

3.7.2.1 Mitigation by Acquisition

All properties estimated to be within the increased flooding area were treated as fee takes. This mitigation measure was retained as an element of alternative plans, and cost estimates prepared for the acquisition (excluding relocation assistance payments) and demolition of those properties were included in the evaluation of alternatives. See the Real Estate Plan for further information about increased flooding and property acquisition.

3.7.2.2 Mitigation by Floodproofing

Floodproofing can be an effective means of reducing flood damages through modifications to structures and relocation of building contents. However, one of the primary considerations with floodproofing is to ensure that occupants do not become stranded by floodwaters. The elevation and configuration of the existing road network in the affected area is such that floodproofing could not be accomplished without stranding a significant number of the residents. Therefore, floodproofing of residential or commercial structures was eliminated from further consideration as a hydraulic mitigation measure.

3.7.2.3 Structural Mitigation – 100-Year Fishing Creek Right Bank Levee

Structural mitigation for Fernville was examined using a combination levee/floodwall to provide a 100-year level of protection. The initial design of the levee/floodwall system would have an upstream terminus to the north and east of the Railroad Street bridge. From the upstream terminus, the levee/floodwall system would follow the creek bank as an earthen levee, turn south and approximately parallel Drinker Street along the creek. A closure structure would be included at the Railroad Street bridge to maintain a 100-year level of protection. It is important to note that the design elevation for this levee/floodwall system would exactly match the design elevation for the Bloomsburg Fishing Creek levee/floodwall system.

The 100-year line of protection would continue as an earthen levee from west of the Railroad Street bridge for an additional 600 feet, where the levee would transition to a mechanically stabilized earth (MSE) wall to minimize the amount of land required for the line of protection. The MSE wall would continue along the bank of Fishing Creek for about 700 feet, at which point the line of protection would transition back to an earthen levee. The earthen levee would continue for approximately 1,500 feet before turning away from Fishing Creek and toward Drinker Street. A ramp over Drinker Street near the downstream terminus would permit the structure to be tied to high ground.

Similar to the Fishing Creek Left Bank Levee, the Fishing Creek Right Bank alignment also minimizes impacts to the residential areas along the creek. Earthen levee is expected to be constructed along approximately 85-percent of the alignment, while MSE wall is recommended for 700 feet to avoid major impacts to the homes and yards on the creek side of Drinker Street.

3.8 Alternative Flood Damage Reduction Plans

Alternative plans were developed incorporating one or more of the flood damage reduction measures to create various flood damage reduction alternative plans. Components of the alternative plans are described below and shown in Table 3-7.

Alternative 1: No Action.

Alternative 2: Fringe Alignment at a 100-year level of protection
East Bloomsburg Extension at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 3: Fringe Alignment at a 100-year level of protection
East Bloomsburg Extension at a 100-year level of protection
Hydraulic Mitigation Levee/Floodwall System at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 4: Fringe Alignment at a 100-year level of protection
Hydraulic Mitigation Levee/Floodwall System at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 5: Fringe Alignment at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 6: Interior Alignment at a 100-year level of protection
East Bloomsburg Extension at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 7: Interior Alignment at a 100-year level of protection
East Bloomsburg Extension at a 100-year level of protection
Hydraulic Mitigation Levee/Floodwall System at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 8: Interior Alignment at a 100-year level of protection
Hydraulic Mitigation Levee/Floodwall System at a 100-year level of protection
Hydraulic Mitigation Acquisition

Alternative 9: Interior Alignment at a 100-year level of protection
Hydraulic Mitigation Acquisition

Table 3-7
Features of Alternative Plans

	Alternative Plans								
Plan Features	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
No Action	✓								
Fringe Alignment		✓	✓	✓	✓				
Interior Alignment						✓	✓	✓	✓
East Bloomsburg Extension		✓	✓			✓	✓		
Hydraulic Mitigation Levee/Floodwall System			✓	✓			✓	✓	
Hydraulic Mitigation Acquisition		✓	✓	✓	✓	✓	✓	✓	✓

3.9 Evaluation of Alternatives

The no action plan (Plan 1) and eight alternative plans (Plans 2 through 9) are evaluated and compared in this section of the report. Specifically, this section provides discussions on the project economics, interior flooding, contributions to the planning objectives, and concludes with the identification of the National Economic Development (NED) Plan.

3.9.1 Alternative Evaluation Economics

This section of the report presents the results of the economic and engineering studies that were conducted to quantify the benefits and costs of the alternatives developed to reduce flood damages in Bloomsburg.

3.9.1.1 Flood Damage Reduction Benefits

Corps procedures calculate benefits based on the difference between the expected annual damages with and without alternative flood protection plans. The implicit assumption incorporated into this procedure is that the reduction in flood damages is directly translatable into increased net income to floodplain land uses. Benefits from flood damage reduction alternatives focus on inundation reduction benefits that would result from reduced physical damages to structures and contents, and transportation and infrastructure, electric utilities, and a reduction in administrative costs of the National Flood Insurance Program.

Without-project average annual flood damages and with-project average annual residual flood damages are shown in Table 3-8. Average annual damages under without-project conditions equal $4,601,000 (March 2004 price levels). Average annual residual damages range from $998,000 (Alternative 6) to $1,567,000 (Alternative 4). It is important to note that average annual residual damages are average annual damages that remain after a project has been constructed. For example, the average annual residual damages of the No Action alternative are equal to existing conditions average annual damages because no project would be constructed to reduce existing conditions damages. Similarly, if a particular project is constructed to provide a 100-year level of protection and floods of a greater magnitude could be expected (e.g., a 500-year flood), residual average annual damages would never equal zero because the project (in this example) would not provide protection for floods greater than the 100-year flood.

The percent reduction in average annual damages provided by the alternatives ranges from 66 percent (Alternatives 4 and 8) to 78 percent (Alternatives 2, 6, and 7).

Average annual benefits of the alternatives, which are equal to the difference between residual damages under each alternative and damages under the without project condition are shown in Table 3-9.

Table 3-8
Average Annual Damages Remaining with 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $ thousands)

Damage Category / Reach	Alternative Plans								
	1	2	3	4	5	6	7	8	9
RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	1,386	211	211	211	211	193	193	193	193
West Bloomsburg Susquehanna	219	104	104	217	217	104	104	217	217
East Bloomsburg Susquehanna	130	43	43	130	130	43	43	130	130
Fernville Fishing Creek	147	0	31	31	0	0	31	31	0
NON-RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	62	11	11	11	11	11	11	11	11
West Bloomsburg Susquehanna	2,079	531	531	531	531	531	531	531	531
East Bloomsburg Susquehanna	367	79	79	367	367	79	79	367	367
CLEAN-UP, INFRASTRUCTURE & NFIP COSTS									
Trans & Infrastructure Damages	121	26	28	41	40	27	27	41	40
Additional Debris Removal Costs	29	6	7	10	10	6	7	10	10
Electric Utilities Damages	14	3	3	5	5	3	3	5	5
FIS Administrative Costs	49	0	0	13	13	0	0	13	13
Total Damages	4,601	1,016	1,048	1,567	1,535	998	1,030	1,549	1,517
PERCENT DAMAGE REDUCTION									
Residential	0%	81%	79%	69%	70%	82%	80%	70%	71%
Non-Residential	0%	75%	75%	64%	64%	75%	75%	64%	64%
Total Damage Reduction	0%	78%	77%	66%	67%	78%	78%	66%	67%

Table 3-9
Average Annual Benefits of 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $ thousands)

Damage Category / Reach	Alternative Plans								
	1	2	3	4	5	6	7	8	9
RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	0	1,175	1,175	1,175	1,175	1,193	1,193	1,193	1,193
West Bloomsburg Susquehanna	0	114	114	1	1	114	114	1	1
East Bloomsburg Susquehanna	0	88	88	0	0	88	88	0	0
Fernville Fishing Creek	0	147	116	116	147	147	116	116	147
NON-RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	0	50	50	50	50	50	50	50	50
West Bloomsburg Susquehanna	0	1,549	1,549	1,549	1,549	1,549	1,549	1,549	1,549
East Bloomsburg Susquehanna	0	288	288	0	0	288	288	0	0
CLEAN-UP, INFRASTRUCTURE & NFIP SAVINGS									
Trans & Infrastructure Damages	0	94	93	80	81	95	94	80	81
Additional Debris Removal Costs	0	23	22	19	19	23	22	19	19
Electric Utilities Damages	0	11	11	9	9	11	11	9	9
FIS Administrative Costs	0	49	49	36	36	49	49	36	36
Total Benefits	0	3,586	3,553	3,034	3,067	3,604	3,572	3,053	3,085

3.9.1.2 Flood Damage Reduction Cost Estimates

Preliminary cost estimates used to screen alternative plans were prepared using February 2003 price levels, but have been adjusted to March 2004 price levels for presentation in this report. Cost estimates for flood damage reduction alternatives were based on calculated quantities and unit prices. Concept design cost estimates[12] used in the analysis were comprised of the following:

Interior Alignment Levee/Floodwall System $22,929,000	• construction cost • real estate acquisition costs for the levee/floodwall footprint • acquisition for 18 Bloomsburg properties subject to increased flooding

[12] Construction costs include costs for relocations, levees and floodwalls, cultural resource preservation, engineering and design, and construction management.

Fringe Alignment Levee/Floodwall System $22,009,000	• construction cost • real estate acquisition costs for the levee/floodwall footprint
East Bloomsburg Extension Levee $18,638,000	• construction cost • real estate acquisition costs for the levee/floodwall footprint
Hydraulic Mitigation Levee/Floodwall System $6,808,000	• construction cost • real estate acquisition costs for the levee/floodwall footprint
Hydraulic Mitigation Acquisition Interior Alignment $16,321,000 Fringe Alignment $17,118,000	• real estate acquisition costs

Operations and maintenance (O&M) costs were estimated based on the anticipated conditions over a 50-year period of analysis. Preliminary costs of the alternative plans, which include construction costs, real estate acquisition, engineering and design, environmental mitigation, and interest during construction, are shown in Table 3-10. Average annual costs were calculated based on the Federal discount rate of 5.375 percent and an analysis period of 50 years. Interest during construction was calculated assuming a 36-month construction period for all alternatives, though it is likely that construction of the East Bloomsburg Extension Levee would take longer than 36 months.

Annualized costs of the alternatives range from $1,907,000 (Alternative 4) to $3,651,000 (Alternative 6). Alternatives 5 and 9 have similar annualized costs of $2,399,000 and $2,443,000, respectively.

Table 3-10
Preliminary Costs of 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $ thousands)

	Alternative Plans							
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Construction Cost, LERRD, PED	57,069	47,455	28,817	38,432	57,888	48,375	29,737	39,250
Interest During Construction	1,852	1,469	892	660	1,178	1,389	812	601
Annual O&M Costs	227	279	184	133	227	279	184	133
Annualized Cost	3,643	3,116	1,907	2,399	3,651	3,165	1,955	2,443

3.9.1.3 Comparison of Preliminary Alternatives Costs and Benefits

A comparison of the costs, benefits, residual damages, benefit-to-cost ratios, and net benefits of the alternatives is shown in Table 3-11. Based on the results of the preliminary analysis, the Net Economic Development (NED) Plan is Alternative 4 (Fringe Alignment and Structural Mitigation for Fernville), as this alternative provides the highest benefit-to-cost ratio of 1.59 and the highest net benefits of $1,128,000. Alternatives 3, 5, 7, 8, and 9 also are economically justified, with benefit-to-cost ratios of 1.14, 1.28, 1.13, 1.56, and 1.26, respectively. Alternatives 2 and 6 are not economically justified, and are eliminated from further consideration.

Table 3-11
Preliminary Economic Evaluation of Alternative Plans
(March 2004 price levels, 50-year period of analysis, $ thousands)

	Alternative Plans							
	2	3	4	5	6	7	8	9
Annualized Cost	3,643	3,116	1,907	2,399	3,651	3,165	1,955	2,443
Total Annual Benefits	3,586	3,553	3,034	3,067	3,604	3,572	3,053	3,085
Total Remaining Damages	1,016	1,048	1,567	1,535	998	1,030	1,549	1,517
Benefit-to-Cost Ratio	0.98	1.14	1.59	1.28	0.99	1.13	1.56	1.26
Net Benefits	(57)	438	1,128	667	(48)	407	1,097	641

3.9.1.4 Separable Elements

The Interior Alignment and the Fringe Alignment each could be constructed as an individual flood damage reduction project. Each alignment provides a single line-of-protection with no separable elements. Alternatives that include the Interior Alignment or the Fringe Alignment as stand-alone project features are Alternatives 4 and 5 (Fringe Alignment), and Alternatives 8 and 9 (Interior Alignment)[13].

Each separable element represented in a justified plan (i.e., one for which total NED benefits exceed total costs) must be incrementally justified. Incremental justification requires that segment-specific dollar benefits must equal or exceed separable costs for that segment. The incremental justification test ensures that each segment, or element, of an economically justified plan adds to rather that subtracts from total net benefits produced by that plan.

Alternative 3 is an economically justified plan, with the sole difference between Alternatives 3 and 4 being Alternative 3 includes the East Bloomsburg Extension Levee as a second added element to the Fringe Alignment with a levee/floodwall system installed as a mitigation measure

[13] The method of mitigation for increased flooding on the right bank of Fishing Creek differs between Alternatives 4 and 5, and Alternatives 8 and 9. Mitigation is <u>not</u> a separable element, and is not subject to economic justification constraints regarding separable elements.

for increased flooding along the right bank of Fishing Creek. This same difference can be observed between Alternatives 7 and 8, where the East Bloomsburg Extension Levee is a second added element to the Interior Alignment with a levee/floodwall system installed as a mitigation measure for increased flooding along the right bank of Fishing Creek.

Construction of the East Bloomsburg Extension Levee would contribute an additional $18.6 million to construction costs and an additional $577 thousand in interest during construction costs. These additional $19.2 million in first costs translate to annualized first costs of approximately $1.11 million, and when an additional $95 thousand in annual O&M costs are added, the total average annual cost of the second added element would equal $1.21 million.

Average annual benefits that can be attributed to the East Bloomsburg Extension Levee are equal to $519 thousand, which results in a benefit-to-cost ratio for the East Bloomsburg Extension Levee of 0.43 to one. Therefore, the East Bloomsburg Extension Levee is not economically justified as a second added element, and Alternatives 3 and 7 have been eliminated from further consideration.

3.9.2 Interior Flooding

Following the guidance in Engineer Manual (EM) 1110-2-1413, *Hydrologic Analysis of Interior Areas*, interior drainage facilities were planned and evaluated separately from the line-of-protection. First, the minimum drainage facilities plan was identified. As stated in the EM, the minimum facilities should provide interior flood relief such that during low exterior stages the storm drainage system functions essentially as it did without flood protection in place, up to that of the local storm sewer design.

An interior flooding analysis was performed for the area behind the Bloomsburg portion of the Fringe and Interior Alignments. While a formal interior flooding analysis has not yet been conducted for the Fernville Alignment, five interior drainage structures have been included in the preliminary design to allow for the drainage of interior runoff through the levee/floodwall system. A detailed interior flooding analysis for the Fernville Alignment will be performed early in the preconstruction engineering and design study phase.

The area behind the Bloomsburg portion of the Interior and Fringe Alignments was divided into seven sub-basins: three for the Interior Alignment and four for the Fringe Alignment. Drainage structure capacity, pond storage volume, unit hydrograph data, loss rate coefficients, and hypothetical rainfall for each subbasin were determined for use in the Corps HEC-IFH (Interior Flood Hydrology) computer model. The analysis was performed for hypothetical storm events with the drainage structures assumed to be either completely blocked or completely unblocked at their outlets to Fishing Creek or the Susquehanna River.

The HEC-IFH analysis determined that implementation of either alignment would not increase ponding elevations in any of the sub-basins. Interior ponding elevations in Bloomsburg would be decreased substantially with either alignment in place when compared to the river and creek flood elevations under without-project conditions. The minimum facilities consist of extending the existing storm sewers through the levee/floodwall system. These drainage structures will handle interior runoff so that ponding elevations will not be higher than for without-project conditions. No additional facilities are merited at this time.

Additional information on the interior flooding analysis is presented in the Hydrology and Hydraulics attachment to the Engineering Appendix.

3.9.3 Contribution of Final Set of Alternatives to Planning Objectives

The final set of alternatives were compared against the planning objectives set forth previously in this section, and each alternative (designated as 1, 4, 5, 8, and 9) was given a relative ranking of its contribution to each planning objective. The highest relative ranking of an alternative in meeting an objective is designated as "●". Alternatives that meet an objective, but do not achieve the highest relative ranking are designated as "**o**". Alternatives that fully fail to meet an objective are designated as "○". A summary table is shown as Table 3-12.

A. Provide protection from frequent, low-level recurring floods

1	4	5	8	9
○	**o**	**o**	**o**	**o**

Alternatives 4, 5, 8, and 9 do not provide protection to the eastern portion of Bloomsburg. As such, these alternatives marginally meet the objective of providing protection from low-level recurring floods. Alternative 1, the No Action alternative provides no protection from frequent, low-level recurring floods to any portion of the study area.

B. Reduce the frequency and severity of backwater flooding from the Susquehanna River through Fishing Creek

1	4	5	8	9
○	●	●	●	●

With the exception of Alternative 1, the No Action alternative, each of the alternatives provides protection from backwater flooding from the Susquehanna River through Fishing Creek.

C. Reduce the frequency and severity of mainstem flooding from the Susquehanna

1	4	5	8	9
○	**o**	**o**	**o**	**o**

Alternatives 4, 5, 8, and 9 do not provide protection to the eastern portion of Bloomsburg, and therefore do not fully meet the objective of reducing the frequency and severity of mainstem flooding from the Susquehanna River. The No Action alternative provides no protection from mainstem Susquehanna River flooding.

D. Mitigate for any hydraulic impacts

1	4	5	8	9
n/a	●	●	●	●

The form of mitigation differs among the alternatives (i.e., mitigation through acquisition or mitigation through construction of a levee/floodwall system), but each alternative fully includes mitigation for increased flooding.

E. Maintain community cohesion

1	4	5	8	9
n/a	●	○	●	○

Implementation of any alternative will result in both positive and negative effects on community cohesion. Each alternative would provide protection from future floods, and would enhance community stability. With increased security, residents in protected areas would be less likely to relocate, and would be able to devote greater attention to other community issues and needs. The community as a whole would become more cohesive after project construction, but some areas would lose the neighborhood cohesion that currently exists.

In some portions of the study area, neighborhoods would be altered by the acquisition and clearing of properties along Fishing Creek to accommodate construction of the levee/floodwall system. Some residents will be able to stay, but others will relocate to new or different neighborhoods. This would diminish existing community cohesion for these areas in the near future.

Alternatives 4 and 8 include either the Fringe or Interior Alignments, and hydraulic mitigation for increased flooding in Fernville through construction of a levee/floodwall system. While property would need to be acquired along Fishing Creek to implement these alternatives (and impact community cohesion), these two alternatives achieve the highest relative rank for meeting the objective of maintaining community cohesion. However, it should be noted that Alternatives 4 and 8 do not include protection for the eastern portion of Bloomsburg. While these alternatives achieve the highest relative ranking of meeting the community cohesion objective, it is likely that there would be conflict in the community over a protection strategy that leaves the eastern portion of Bloomsburg unprotected.

Alternatives 5 and 9 completely fail to meet the objective of maintaining community cohesion even though the alternatives provide flood damage reduction benefits to Bloomsburg. Each of these alternatives addresses hydraulic mitigation for increased flooding in Fernville through a program of acquisition and evacuation. In short, large portions of Fernville would cease to exist as a cohesive community, making Alternatives 5 and 9 unacceptable.

F. Limit impacts on closed landfills

1	4	5	8	9
●	⭘	⭘	○	○

Each alternative was designed to avoid known landfill boundaries and limit impacts on closed landfills, though the No Action alternative is the only alternative to fully achieve this objective. During initial design, landfill boundaries were carefully considered in the layout of Alternatives 8 and 9 (Interior Alignment alternatives). The Interior Alignment is positioned immediately adjacent to the landfill boundaries because of space constraints. Moving the alignment further away from the landfill boundaries would result in operational impacts to major industrial facilities. Because the Interior Alignment cannot be moved further away from the boundaries, it is likely that the alignment would proceed through a closed portion of a landfill. For this reason, Alternatives 8 and 9 were judged to fail the objective of limiting impacts on closed landfills.

Alternatives 4 and 5 also include a levee alignment that navigates around the boundaries of closed landfills. These alternatives, however, follow the Fringe Alignment, which is positioned such that it can be moved away from the landfill boundaries if the mapped boundaries do not coincide with the physical limits of the landfills. For this reason, it is anticipated that the levee alignment included in these alternatives (the Fringe Alignment) can be constructed without impacting closed landfills.

G. Limit impacts to important farmland

1	4	5	8	9
●	○	○	●	●

The No Action alternative would not impact farmland. In addition, Alternatives 8 and 9 include the Interior Alignment, which would not intersect any areas that are designated as Prime Farmland or Additional Farmland of Statewide Importance. Therefore, these alternatives also fully meet the objective of limiting impacts to important farmland. Alternatives 4 and 5 follow the Fringe Alignment, which proceeds around the perimeter of two actively cultivated fields. As such, the levee would occupy (footprint and work easement) approximately 11.5 acres of land designated as Prime Farmland or Additional Farmland of Statewide Importance. To limit the impact of the Fringe Alignment on this land, the levee was positioned along the perimeter of the field (i.e., as close to the railroad tracks as possible) as opposed to crossing the field directly.

H. Avoid and minimize adverse environmental impacts

1	4	5	8	9
●	○	○	○	○

The No Action alternative entirely avoids adverse impacts to the study area environment, and fully meets the planning objective. While the flood damage reduction alternatives were developed in a manner consistent with avoiding and minimizing adverse environmental impacts, impacts to the environment would be expected with the implementation of any of the alternatives. The Fringe Alignment (a component of Alternatives 4 and 5) and the Interior Alignment (a component of Alternatives 8 and 9) would traverse emergent wetland areas located on Fairgrounds property. In addition, implementation of either alignment would result in impacts to the aquatic habitats, including forested wetlands of Fishing Creek. Whenever impacts to the environment could not be avoided, the alignment designs were altered to minimize impacts, and appropriate cost allowances were made for environmental mitigation.

Table 3-12 provides a summary of the contribution of alternative plans to the planning objectives.

Table 3-12
Contribution of Alternative Plans to Planning Objectives

Objective	Alternative Plans				
	1	4	5	8	9
A	○	⭘	⭘	⭘	⭘
B	○	●	●	●	●
C	○	⭘	⭘	⭘	⭘
D	n/a	●	●	●	●
E	n/a	●	○	●	○
F	●	⭘	⭘	○	○
G	●	⭘	⭘	●	●
H	●	⭘	⭘	⭘	⭘

As shown in the table, Alternative 4, the Fringe Alignment levee/floodwall system with a hydraulic mitigation levee/floodwall system, is the only alternative that does not fail to meet any of the planning objectives. It is also the plan that maximizes net benefits (i.e., the preliminary NED plan). Consequently, Alternative 4 is the recommended plan for which an optimal level of protection will be analyzed.

3.10 NED Plan Optimization

During the initial screening process, the preliminary NED plan (Alternative 4) was designed to provide 100-year level of protection to all structures in the Bloomsburg Fishing Creek and Fernville Fishing Creek reaches, and most structures in the Susquehanna River Lower (Western) reach. The plan would consist of the Fringe Alignment levee/floodwall system, a hydraulic mitigation levee/floodwall system for the right descending bank of Fishing Creek through Fernville, and limited hydraulic mitigation acquisition for properties in Montour and Hemlock Townships downstream of Fernville.

Optimization of the NED plan level of protection ensures that the final NED plan recommends Federal cost-sharing investment in the most cost-effective flood protection alternative for the Town of Bloomsburg. Costs and benefits of four different levels of protection for the NED plan were analyzed:

1. 50-year level of protection from Fishing Creek and the Susquehanna River;
2. 100-year level of protection from Fishing Creek and the Susquehanna River;
3. 500-year level of protection from Fishing Creek and the Susquehanna River; and
4. Agnes-level (440-year) protection from the Susquehanna River and 100-year level of protection from Fishing Creek.[14]

[14] As noted in Section 3.3.1, water surface elevations on Fishing Creek during the Agnes flood correspond to a 53-year flood. Therefore, flood damage reduction measures that provide at least a 53-year level of protection on Fishing Creek would protect Fishing Creek damage reaches from an Agnes-magnitude event.

Costs for the levee/floodwall system at the four alternative levels of protection are shown in Table 3-13. Average annual costs were calculated based on the Federal discount rate of 5.375 percent and an analysis period of 50 years, and includes interest during construction.

Table 3-13
Costs of Alternative Levels of Protection – NED Plan
(March 2004 price levels, 50-year period of analysis, $ thousands)

Cost Item	Level of Protection			
	50-Year	100-Year	500-Year	440-Year on Susquehanna / 100-Year on Fishing Creek
Construction Cost, LERRD, PED	23,897	28,817	34,504	28,973
Interest During Construction	740	892	1,068	897
Annualized First Cost	1,428	1,723	2,062	1,732
Annual O&M Cost	184	184	184	184
Total Annual Costs	1,612	1,907	2,246	1,916

The costs and benefits of the alternative levels of protection for the recommended plan are compared in Table 3-14. As shown in the table, the level of protection with the greatest net benefits would be the levee/floodwall system constructed to an elevation that would provide protection from Agnes-level (440-year) events on the Susquehanna and 100-year events on Fishing Creek. This NED plan would provide average annual benefits of $3,565,000 with average annual costs estimated at $1,916,000. Annual net benefits are estimated to be approximately $1,649,000, and the benefit-cost ratio is anticipated to be 1.86 to one. Additional analysis and design details of the NED plan are provided in Section 4.

Table 3-14
NED Plan Optimization
(March 2004 price levels, 50-year period of analysis, $ thousands)

Level of Protection	Average Annual Damages Prevented	Annual FIA[15], Emgcy & Other Savings	Average Annual Benefits	Average Annual Costs	Average Annual Net Benefits	BCR
50-Year	2,191	108	2,299	1,612	686	1.43
100-Year	2,891	143	3,034	1,907	1,128	1.59
500-Year	3,675	143	3,818	2,246	1,572	1.70
440-Year Susquehanna / 100-Year Fishing Creek	3,422	143	3,565	1,916	1,649	1.86

[15] Flood Insurance Administration (FIA).

4. THE RECOMMENDED PLAN

This section of the report describes the design, project costs, and benefits of the Recommended Plan, Alternative 4, with an Agnes (440-year) level of protection from Susquehanna River flooding, and 100-year level of protection from Fishing Creek flooding, is the recommended plan. The recommended plan consists of approximately 17,000 linear feet of levee/floodwall systems with fourteen drainage structures and eight closure structures, five of which include limited road raisings.

Significant considerations were made during the formulation process to avoid and minimize adverse affects to environmental resources. The levee alignment of Alternative 4 navigates around the boundaries of closed landfills to minimize the risk of surface water and groundwater contamination. The alignment is positioned such that it can be moved away from the landfill boundaries if the mapped boundaries do not coincide with the physical limits of the landfills.

Designs for the Fishing Creek levee/floodwall system made during plan formulation included extensive stone riprap on both the left and right descending banks from the top of protection to the invert (bottom) of the stream channel. Stone riprap protection was to be installed for the entire length of the Fishing Creek levee/floodwall system to protect the stream banks from erosion and migration that would eventually undermine the system's structural stability. It was determined that placing riprap along a 100-percent of both the right- and left-descending banks along the Fishing Creek levee/floodwall system would be particularly damaging to the aquatic environment of Fishing Creek. During later stages of plan formulation, the alignment was set back from the top of bank to eliminate the need for bank protection along the entire project. Additional site investigations identified only those areas especially vulnerable to erosion as needing to be armored. These areas include abutments for bridges, storm water outfalls, and areas where the design is confined with insufficient setbacks from the creek banks. The current design for the Fishing Creek levee/floodwall system included in Alternative 4 would result in approximately 3,000 linear feet of stream bank being riprap armored from the top of protection to the stream invert. This figure represents the total linear feet from both the left descending bank and the right descending bank, and is roughly 34 percent of the total linear feet (both banks) of the levee/floodwall system – a reduction of 66 percent from the initial designs.

Additional criteria used to refine the line of protection alignment (for both the Fishing Creek and Susquehanna legs) were:

- to follow high ground to the extent possible to minimize floodwall/levee costs, and
- to protect flood-prone structures, which are located in high-density concentrations.

4.1 Line of Protection Description

The project consists of a system of Earthen Levees, Mechanically Stabilized Earth (MSE) Floodwalls, Concrete Floodwalls, Railroad and Road Closure Structures and Roadway Relocations to provide ramps over the line of protection. Earthen levees are proposed for the majority of the line of protection, though MSE walls will be required along portions of Fishing Creek in both Bloomsburg and Fernville and a concrete floodwall (H-Pile wall) will be required along portions of Fishing Creek in Bloomsburg. Limited riprap will be used to protect the steep banks of Fishing Creek from bank crest to below the stream invert along the lower project reaches along Fishing Creek.

Major segments of the project are designated as:

- Bloomsburg Upstream Fishing Creek Segment;
- Bloomsburg Downstream Fishing Creek Segment;
- Bloomsburg Susquehanna Segment;
- Fernville Upstream Fishing Creek Segment; and
- Fernville Downstream Fishing Creek Segment.

Features of these segments are described below and a project layout for all of the segments is provided in Figure 4-1. The full design, including layout sheets, is provided in the Engineering Appendix.

4.1.1 Bloomsburg Upstream Fishing Creek Segment

This segment of the project runs from Station 1+33 to Station 52+00, a total length of about 5,100 linear feet. In general, the line of protection will follow the left descending bank of Fishing Creek from Station 0+00 to Station 39+00, where it will cross West 2nd Street (also known as U.S. Route 11) and will continue to Station 52+00. Earthen levees will be used for about 3,050 linear feet, Mechanically Stabilized Earth (MSE) walls will total 760 linear feet, and concrete floodwalls will total 1,140 linear feet.

4.1.1.1 Upstream Tie-out to Station 20+00: Railroad Street Closure & Levee

This segment begins immediately to the east of Railroad Street where the earthen levee ties into high ground at Station 1+33 (elevation 493.3). The line of protection will continue westward where an elevation of 493.3 is provided by a 3.3-foot high closure structure across Railroad Street. On the west side of Railroad Street (at Station 2+00), the line of protection transitions into an earthen levee with land side toe drain. The earthen levee proceeds westward adjacent to and parallel with Fishing Creek from Station 2+00 to Sta. 20+00 (1,800 feet).

A thirteen foot deep seepage cutoff slurry wall will be constructed from Station 1+33 to Station 10+00. Through this reach the levee crest will be 10 feet wide with a land side slope of 2.5 horizontal to 1 vertical (2.5H:1.V) and a riverside slope of 2H:1V. The river side toe will be placed at least twenty feet from the bank crest of Fishing Creek, and the riverside levee slope will be protected by 18 inch riprap. The left descending bank of Fishing Creek will not be disturbed along this reach.

This segment is shown on Sheets C-1 and C-2 of the design drawings, which are included as an attachment to the Engineering Appendix.

4.1.1.2 Station 20+00 to Station 27+60: MSE Wall

At Station 20+00 (design elevation of 491.0), the line of protection will transition to a 14 foot high MSE wall with a 14 foot wide crest, vertical wall faces, fall protection railings and a land side toe drain. The MSE wall will continue westward adjacent to and parallel with Fishing

FIGURE 4-1
NED Plan Alignment and Features

Bloomsburg, PA Flood Damage Reduction Feasibility Study

Creek to Station 27+60 (760 feet) transitioning to a design elevation of 490.5 feet. The river side toe of the MSE wall will be maintained twenty feet from the bank crest of Fishing Creek from Station 20+00 to Station 23+50 with 24 inch riprap at the top of bank only. Twenty-four inch riprap will be placed on the left descending bank of Fishing Creek from the toe of the MSE wall to below the creek invert between Stations 23+50 and 27+60.

This segment is shown on Sheets C-2 and C-3 of the design drawings.

4.1.1.3 Station 27+60 to Station 39+65: Floodwall & West 2nd Street Closure Structure

Beginning at Station 27+60 (design elevation of 490.5), the line of protection will transition to a floodwall (concrete H-Pile) directly adjacent to Fishing Creek. This reach along the line of protection is a narrow strip of land between West 2nd Street (also known as US Route. 11) and Fishing Creek. The floodwall will continue to station 39+13 (1,140 feet) and transition to a design elevation of 489.6 feet where the wall will turn southward away from Fishing Creek. The height of the floodwall will be approximately 12 to 12.5 feet, and will consist of concrete panels on steel H-piles spaced at six-foot centers. The left descending bank of Fishing Creek will require 24-inch riprap to stabilize the banks and protect the H-pile wall along this reach.

At Station 39+39 the line of protection will cross Route 11 as it enters Bloomsburg just upstream of the old Route 42 bridge (also known as the double track bridge). A 52-foot wide, 12-foot high closure structure will maintain the top of protection at 489.6 feet.

This segment is shown on Sheets C-3 and C-4 of the design drawings.

4.1.1.4 Station 39+65 to Station 52+00: Earthen Levee, River Road/Fairgrounds Access Road Combination Ramp, & Downstream Tie-Out

The earthen levee will continue after the closure structure at Station 39+65 with a design elevation of 489.6 feet, and will tie into the combined relocated roadways of the Fairgrounds access and Fairground entry/River Road ramp at Station 45+52 (design elevation 489.3 feet).

The ramp will be Y shaped, with the leg of the Y providing access to Route 11 and the arms of the Y providing access to the Fairgrounds and to River Road. The access road to Route 11 will have a paved width of 62 feet to provide sufficient sight distance and turning radius onto Route 11. Both the Fairgrounds access and River Road ramps will be 24 feet wide and designed for 25 MPH and 35 MPH speeds, respectively. The top of protection will be maintained across the ramp by a 3-foot high closure.

The levee will continue at a design elevation of 489.3 from Station 46+62 to its downstream tie-out at Station 52+00 (design elevation 488.8 feet), the Route 42 / Route 11 interchange embankment. Through this reach the levee crest will be 10 feet wide with a riverside side slope of 2H:1V and a land side slope of 2.5H:1V, the riverside side slope will be protected by 18-inch riprap.

This segment is shown on Sheets C-4 and C-5 of the design drawings.

4.1.2 Bloomsburg Downstream Fishing Creek Segment

This segment of the line of protection runs along the Fairgrounds parking lot, and begins at Station 60+00 where it will tie into the Route 11 / Route 42 interchange at a design elevation of 486.20 feet. The segment will extend to Station 81+00 (total length of approximately 2,100 feet), where it will terminate at a railroad gate closure. This entire segment of the project will be an earthen levee with a 10 foot crest, side slopes of 2.5H:1V, and a land side toe drain.

4.1.2.1 Station 60+00 to Station 68+50: Upstream Tie-Out, River Road Ramp, and Fairgrounds Ramp

The levee will proceed in a southerly direction from the tie-out to its first closure structure located on River Road. River Road will be relocated by ramping the roadway up and over the line of protection at Station 61+07, where a two foot high closure structure will be required to maintain the levee's design elevation. The levee will continue to Station 68+17, where a single ramp[16] will be constructed to allow vehicular traffic to proceed over the levee and into the fairgrounds. A three-foot high closure structure will be used to maintain the levee design elevation, and will be removed only as required to provide for access to the Fairgrounds.

This segment is shown on Sheet C-6 of the design drawings.

4.1.2.2 Station 68+50 to Station 81+00: Over Excavation and Railroad Closure

This segment is shown on Sheets C-3 and C-4 of the design layout package. The earthen levee will continue from Station 68+50 to Station 74+00, where six foot deep over excavation begins within the levee foot print. From Station 74+00 to Station 80+00 the line of protection will be in close proximity to or over an abandoned land fill site. Over-excavation will be required to ensure the integrity of the levee's foundation. At Station 80+80, the levee will tie into a 24-foot wide gate closure that crosses the single line SEDA-COG railroad. The top of protection will be maintained at 486.2 feet by an 11.25-foot high closure structure.

This segment is shown on Sheets C-6 and C-7 of the design drawings.

4.1.3 Bloomsburg Susquehanna Segment

This segment begins at Station 81+00 and turns about 90 degrees to the east just after the line of protection crosses the North Shore railroad. The earthen levee (design elevation of 486.2 feet, 10 foot crest and side slopes of 2.5H:1V) will follow the railroad embankment as closely as possible to minimize impacts on adjacent agricultural land. At Station 96+00 the levee will make another 90 degree turn (this time to the south), and run adjacent to and outside of Bloomsburg's closed landfill. At Station 106+00 (design elevation of 486.2 feet) the levee will cross and permanently

[16] Figures provided in Sections 2 and 3 of this document show two ramps crossing over the levee to the Fairgrounds, and the description of the Fringe alignment in Section 3 discusses two such ramps, as well. Alterations were made to the design of the Fringe Alignment after it was identified as the NED Alternative. Included among the changes were the addition of the Y-shaped ramp, which eliminated the need for twin access ramps to the Fairgrounds.

close Sands Street. From Station 106+00 to 121+00 the levee will run parallel to the south side of West 11th Street.

The levee will turn north just prior to reaching the Bloomsburg Elementary/ Middle School and will cross West 11th Street at Station 121+50. West 11th street will be relocated up and over the levee by constructing an earthen ramp and the level of protection is to be maintained at 486.2 feet by a 3-foot high closure structure. The ramp will be paved and will have a design speed of 25 miles per hour. The earthen levee will resume its northward course at Station 122+00, and tie out at high ground near Barton Street at Station 126+35.

This segment is shown on Sheets C-7 through C-12 of the design drawings.

4.1.4 Fernville Upstream Fishing Creek Segment

Design elevations for the top of protection for the Fernville levee/floodwall system exactly match the design elevations for the top of protection for the Bloomsburg Fishing Creek levee/floodwall system. The discussion below provides station numbers that correspond to the Fishing Creek levee/floodwall system design features. The station numbers relate only to the distance from the upstream terminus of the Fernville Fishing Creek levee/floodwall system. These station numbers **cannot** be compared to the station numbers provided for the Bloomsburg Fishing Creek levee/floodwall system because the levee/floodwall systems begin at different points along Fishing Creek.

The Upstream Fernville Fishing Creek Segment begins at its tie-out (Station 10+00) on the east side of Bloom Street as it heads north out of Fernville. No detailed mapping data are available for this reach; therefore, spot elevations were used to design an earthen levee at an elevation of 496 feet with a 10 foot wide crest, a 2.5H:1V land side slope, a 2H:1V river side slope, and 18-inch riprap on the levee slope for protection. Detailed topography for this reach will be obtained as a first priority during the next phase of design.

Field investigations indicate that sufficient space is available for an earthen levee on the right descending bank of Fishing Creek with minimal impact to existing residential structures. The levee will follow Fishing Creek to the Railroad Street bridge (Station 28+00), and will be located a minimum of 15 feet from the top of bank to minimize impacts to the riparian habitat of Fishing Creek.

This segment is shown on Sheets C-13 and C-14 of the design drawings.

The forested wetlands along Fishing Creek in Fernville are in an active floodplain setting at the base of a 15 foot tall floodplain terrace along the creek. The community of Fernville sits atop this terrace. Once the team develops more accurate topography for this area, the team plans to move the levee as far back from the creek as possible, to the point of straddling this topographic break, in order to avoid wetland impacts and also to minimize the hydraulic effect along Fishing Creek.

4.1.5 Fernville Downstream Fishing Creek Segment

The north approach to the Railroad Street bridge in Fernville will be realigned and ramped up above the elevation of the existing bridge deck. The full level of protection at the bridge will be provided by a 4.8-foot high closure structure. From Station 28+50 to Station 34+25 the line of protection will be an earthen levee with a 10 foot wide crest, a land side slope of 2.5H:1V, a river side slope of 2H:1V, and 18 inch riprap as protection on the levee slope. The levee toe will be located a minimum of 15 feet from the top of the creek bank to minimize disturbance to the aquatic and riparian habitats of Fishing Creek throughout this reach.

Beginning at Station 34+25 the line of protection transitions to a 17- to 19-foot high MSE wall that will be 14- to 16-feet wide, and equipped with protection railings. MSE wall is utilized in this reach to provide protection for and minimize impacts to 12 residential structures. This reach of MSE wall requires 24-inch riprap at the toe of the wall, extending to a minimum of 15 feet to the crest of the creek bank. The MSE wall terminates at Station 41+35 after transitioning to an elevation of 491.2 feet.

At this point (Station 41+35), the earthen levee resumes and continues for the remainder of the segment. At Station 49+50 the instability of the Fishing Creek banks and the close proximity of the levee to the bank crest requires that 24 inch riprap be placed on the creek banks to provide stability and erosion protection for the levee. This riprap will be placed in addition to the 18-inch riprap on the river side levee side slope.

Hemlock Street will be relocated up and over the line of protection by an earthen ramp beginning at Station 59+65. The ramp will be at the full height of the levee (design elevation of 490.4 feet), and will serve as a closure structure. The existing intersection of Hemlock and Drinker Streets will be maintained by ramping up Drinker Street to meet Hemlock Street within the line of protection. The tie-out into high ground is just North of Hemlock Street at Station 60+85 (design elevation of 490.2 feet).

This segment is shown on Sheets C-14 through C-17 of the design drawings.

4.2 Hazardous, Toxic, and Radioactive Waste (HTRW)

HTRW investigations were conducted to identify areas within the Fringe Alignment that could affect construction activities due to the presence of contamination. The scope of investigation was not designed to fully delineate the extent of contamination. However, the data collected were suitable for identifying potential constituents of concern, establishing guidelines for the handling of material generated during construction, and providing generalized recommendations for the subsequent phases of the project.

Sites of potential concern along the Fringe Alignment were identified and analyzed. Based on the analytical results, and as discussed in the HTRW attachment to the Engineering Appendix, elevated concentrations of heavy metals are present in the surface and subsurface soil along much of the proposed alignment. However, the heavy metals that were detected are likely a local background condition, and soils that contain no other HTRW would be considered uncontaminated from a regulatory perspective. Based on Pennsylvania's Clean Fill Policy, uncontaminated soils may be used in an unrestricted manner as fill material for the project. Ash and other foreign materials may also be used as fill under PADEP's General Permit for Beneficially Using Regulated Fill, so long as the conditions of the General Permit are met. Any material that exceeds applicable PADEP criteria would be considered unsuitable for use in the construction, and would be subject to disposal in a manner consistent with PADEP residual waste regulations.

For the purposes of this analysis, it was assumed that all of the excavated material is suitable for reuse in construction with the exception of the material located between Stations 74+00 and 80+00 (see the design drawings and the HTRW attachment to the Engineering Appendix for additional location information). This material is expected to be unsuitable for reuse due to the high debris content observed during the field investigation.

Results of the waste characterization sampling conducted in October 2003 indicate that the material in this area may be disposed as non-hazardous waste at a permitted disposal facility. Nevertheless, based on past experience related to construction projects at similar sites, and given the heterogeneity typical of dumpsites, 25 percent of the material from this area has been assumed to require offsite disposal as hazardous waste for cost estimating purposes. No hazardous waste has been identified to date in this area based on the limited sampling program, but this assumption offers a reasonable contingency to account for the range of material that may be encountered. The cost of any offsite disposal will be part of the CERCLA response cost for which the Town of Bloomsburg, as the non-federal sponsor, would be responsible – an important non-Federal financial consideration as the project moves forward.

The material assumed to be non-hazardous waste between Stations 74+00 and 80+00 (75 percent of the total excavated volume or approximately 13,600 cubic yards) may be disposed offsite at an actively permitted Resource Conservation and Recovery Act (RCRA), Subtitle D disposal facility that is capable of accepting "residual waste" (defined by PADEP as non-hazardous industrial waste). The nearest such facility is the Lycoming County Landfill, located in Montgomery, Pennsylvania, approximately 40 miles from the project site.

The remainder of the material excavated between Stations 74+00 and 80+00 (25 percent of the total volume, or approximately 4,500 cubic yards) is presumed to require disposal as a hazardous waste. In compliance with RCRA regulations, any hazardous waste encountered during construction activities must be properly disposed at a permitted RCRA Subtitle C Treatment, Storage, and Disposal (TSD) facility. For the purposes of cost estimating during this phase of the design, the nearest TSD facility capable of accepting the waste would be the Chemical Waste Management Chemical Services landfill located in Model City, New York (approximately 270 miles from the project site).

The potential impact of underground storage tanks adjacent to the project area along Fishing Creek must be further defined to determine whether relocation or removal is necessary. There is little concern about potential human exposure to contaminants from drinking groundwater because nearly all residences near the proposed alignment are believed to utilize drinking water delivered by United Water Pennsylvania (USACE, 2003). It should be noted, however, that several structures located on the left descending bank of Fishing Creek along River Road likely use groundwater.

4.2.1 HTRW Response Costs

As noted above, CERCLA regulated HTRW compliance costs will be incurred as a non-project cost by the non-Federal sponsor, as part of the non-Federal sponsor's requirement to provide project lands. While no CERCLA hazardous substances have been identified in the project alignment based on sampling to date, approximately 4,500 cubic yards of excavated material is presumed to require disposal as a hazardous waste. As a result, the CERCLA HTRW response cost is estimated at $895,600 ($629,000 in base costs plus $157,300 in contingency costs plus

$109,300 in escalation costs). This cost is not included as part of the Bloomsburg Local Flood Protection Project MCACES cost estimate, and is not cost-shared as part of the Federal project. The project's non-Federal sponsor, the Town of Bloomsburg, would be responsible for any and all CERCLA response costs incurred in the course of completing the project. Any other residual contaminated materials that are regulated under other laws may be able to be cost shared as a part of the project if they meet the requirements of ER 1165-2-132 at paragraph 6.c.

4.3 Geotechnical Analyses

Geotechnical investigations conducted for the Recommended Plan included: two phases of drilling to determine subsurface conditions, a seepage and slope stability analysis, MSE wall design, material source, closure structures, and H-Pile supported concrete floodwall design. Additional information on the location of field borings, field boring logs, and detailed methodology and results are provided in the Geotechnical attachment to the Engineering Appendix.

No extensive areas of soft, fine-grained materials were encountered in the two phases of drilling. Due to the granular foundation materials encountered in much of the project area, a long-term settlement analysis was not performed. The settlement caused by the levee/floodwall construction will occur during construction, thus the need to overbuild the levee project due to long-term settlement concerns has not been determined as necessary at this time. Additional engineering analysis during the PED phase of the project will seek to confirm this assumption.

Detailed explorations were not performed in Fernville, thus foundation conditions in Fernville were assumed to be similar to the conditions found in Bloomsburg between Stations 1+00 and 39+50 (directly across Fishing Creek). During the next phase of design, additional subsurface investigations will be undertaken to refine the design features and identify the foundation conditions in Fernville.

4.3.1 Subsurface Conditions

The average soil thickness for the area is approximately 20 feet. Bedrock depths are highly variable over the entire project area. Bedrock was encountered as shallow as 8 feet in one boring, and between 12 to 16 feet in several other borings, while it was not encountered at depths greater than 30 feet in several borings.

Along Fishing Creek from approximately Station 1+00 to 39+50, foundation soils are moderately pervious to very pervious with little to no impervious blanket above. A layer of dense gravel was encountered in most borings at a depth of approximately 10 feet. The soils had varying amounts of fines, but most of the soils were classified as sands and gravels. Also along Fishing Creek, bedrock was encountered between depths of 16 feet to 32 feet along the project alignment.

Borings along the Bloomsburg Fairgrounds portion of the alignment (approximately Station 62+00 to Station 80+00) show a silt/clay blanket with an average thickness of 4 feet, overlying a sand/gravel layer. Beneath this sand/gravel layer, highly weathered bedrock was encountered at depths of 10 feet to 20 feet.

Borings near the Susquehanna-side tie-out (approximately Station 106+00 to Station 126+00) show a 10-foot thick silt/clay blanket overlying sands and gravels. Bedrock was encountered beneath the sands and gravels at depths between 15 feet and 25 feet in three of the tie-out borings. One boring did not encounter bedrock at a depth of 30 feet.

4.3.2 Seepage and Slope Stability Analysis

Underseepage raises pore pressures in the blanket material, decreases the effective weight of the material, decreases effective stress, and reduces stability on the landside portion of the levee. The increased pore pressures can also lead to piping of the foundation material and undermining of the levee foundation. Many of the foundation soils are silty sands and silty gravels which could be susceptible to piping. Appropriate underseepage control measures will be implemented if the stability of the levee or foundation material is not adequate during high water events. Typical underseepage control measures are seepage cutoffs (slurry trenches, sheet pile, over-excavation and replacement with impervious material), seepage collection measures (toe drains, relief wells) or weighted landside filters (seepage blankets).

With the pervious soils located in the foundation for the levee, it was necessary to perform an underseepage analysis to estimate seepage quantities and the effect on the stability of the levee and MSE wall sections. Due to the proximity of the levee to the bank of Fishing Creek, it was assumed that the foundation zones are directly connected hydraulically to the creek. In other project reaches, the levee is located much farther from the creek and the Susquehanna River. An assumption of direct hydraulic connection was also made for these other reaches, but additional investigations in the next project phase will be required to confirm this assumption.

The typical levee section will consist of a random material zone on the riverside third, adjacent to a select fill zone, which will in effect be an impervious material. In sections without toe drains, a landside blanket drain will be used. In areas where riprap is determined to be necessary, a layer of riprap on 6 inches of bedding soil will be provided. Exterior levee slopes will be 2.5H:1V for areas receiving topsoil. Areas requiring riprap can be steepened to 2H:1V.

Over-excavation will most likely be required in the levee section adjacent to the Magee Carpet Landfill. Test pits performed for HTRW purposes exposed carpet remnants and other waste that could compromise the levee stability if left in place. Over-excavation will be required to an approximate depth of 6 feet in a reach estimated from Station 74+00 to 80+00. The over-excavation would extend under the entire levee section.

More details on the subsurface conditions and the seepage and slope stability analysis are presented in the Geotechnical attachment to the Engineering Appendix.

4.4 Interior Flooding

Interior drainage facilities were planned and evaluated separately from the line-of-protection in accordance with Engineer Manual (EM) 1110-2-1413, *Hydrologic Analysis of Interior Areas*. First, the minimum drainage facilities plan was identified, which represent the drainage conditions required so that interior flooding would not be increased by construction of the Recommended Plan. The minimum facilities consist of extending the existing storm sewers through the levee/floodwall system.

An interior flooding analysis was performed for the area behind the Bloomsburg portion of the Recommended Plan. For the Fernville portion of the Recommended Plan, five interior drainage structures have been included to allow for the drainage of interior runoff through the levee/floodwall system, though a formal interior flooding analysis has not yet been conducted. A detailed interior flooding analysis for the Fernville portion of the Recommended Plan will be performed early in the preconstruction engineering and design study phase to ensure that final designs fully incorporate all necessary interior drainage facilities.

The Bloomsburg portion of the Recommended Plan was divided into four sub-basins. Drainage structure capacity, pond storage volume, unit hydrograph data, loss rate coefficients, and hypothetical rainfall for each subbasin were determined used in the Corps HEC-IFH (Interior Flood Hydrology) computer model.

The HEC-IFH analysis shows that implementation of the Recommended Plan will not increase ponding elevations in any of the sub-basins. Interior ponding elevations in Bloomsburg would be decreased substantially with the Recommended Plan in place when compared to the river and creek flood elevations under without-project conditions. For this reason, no additional facilities are merited at this time.

Interior flooding is discussed in more detail in Section 3.9.2, as well as in the Hydrology and Hydraulics attachment to the Engineering Appendix.

4.5 Real Estate

All real estate requirements (provided in detail in the Real Estate Plan that accompanies this document) are the responsibility of the non-Federal sponsor. A detailed cost estimate for the project, in Microcomputer Aided Cost Estimating System (MCACES) format, is included as an attachment to the Engineering Appendix. The cost estimate includes the non-Federal sponsor's administrative, land, and P.L. 91-646 residential and business relocation costs necessary to accomplish the project's real property requirements, and the Corps administrative costs to assist and monitor the non-Federal sponsor's real property acquisition.

In the Town of Bloomsburg, there are expected to be 21 fee simple acquisitions (18 residential, 3 commercial) and 22 perpetual flood protection levee / temporary work area easements (19 residential, three commercial/agricultural).

Construction, operation, and maintenance of the flood protection components in Fernville (Hemlock Township) are expected to require one residential fee simple acquisition and 40 residential perpetual flood protection levee / temporary work area easements. Twelve residential parcels on the Fernville side of Fishing Creek (Montour Township) are expected to require seven residential fee simple acquisitions, one trailer park acquisition, and four flowage easement acquisitions. The trailer park consists of 29 trailers which are rented by the occupants. The REP estimates that that approximately half (15) of the trailers will be moved and the remainder (14) will be acquired due to the aged, poor, hence, unmovable condition of the trailers.

Standard Temporary Work Area Easements (TWAE) will be required for access and staging during construction of the Recommended Plan. The duration of the TWAE is projected to be three years to allow for acquisition and construction schedule requirements. Construction, operation, and maintenance of the flood protection components will require a standard perpetual flood protection levee easement for partial acquisitions or fee simple interest for full acquisitions. Staging areas will be thoroughly identified during preconstruction engineering and design (PED) but are estimated to require approximately one acre in Bloomsburg and one acre on the Fernville side of Fishing Creek. Construction access will be from public roads adjacent to the project area.

4.5.1 Takings Implication Assessment

A preliminary Takings Implication Assessment (TIA) conducted by the Army Corps of Engineers, Baltimore District, Office of Counsel, dated 10 July 2003, evaluated the effect of increased flooding caused by the project. The TIA considered increased flooding impacts due to increased depth, duration, velocity, frequency, and area of flooding. The existing hydrologic and hydraulic analysis and lowest and first floor opening elevation data indicate increased flooding to a small area on the right bank of Fishing Creek in Montour Township. The area in question is generally bounded by Fishing Creek to the south, Hemlock Creek to the east, a line some yards north of Perry Avenue, and Route 42 to the west. The area includes a two-story cottage near Fishing Creek, five stationary-mounted mobile homes, eight homes along both sides of Perry Avenue, and a Columbia County services agency building.

The TIA indicated that, due to the increased depth and frequency of flood events caused by the project, increased flooding impacts would probably rise to the level of a full taking. Therefore, fee simple acquisition is also expected for the following structures: the cottage; four of the mobile homes; and single-family residences located at 4 and 5 Perry Avenue. Although elevation data is incomplete, the mobile home park consisting of 29 structures on the right bank of Fishing Creek on the downstream side of State Route 42 is also expected to require fee simple acquisition.

The Recommended Plan is expected to cause increased flooding to structures located at 8, 9, 10, and 14 Perry Avenue, causing over one foot of water above the first floor opening during the 25-year flood event. Purchase of a flowage easement with a standard provision to allow existing specific, minimally-impacted residences to remain in the induced flooding area is planned. For cost estimating purposes, the value of this flowage easement is expected to be 25 percent of the fee simple value of these properties.

The Recommended Plan is also likely to increase flooding in the area upstream of the Railroad Street bridge along Fishing Creek, particularly on the left bank. The United Water Pennsylvania water treatment plant and an electric substation are located in this area. Under with-project conditions, the water treatment plant is likely to be impacted to some extent by increased flooding, as would the electrical sub-station.

Based on limited data, discussions and meetings between Corps engineering representatives, the project manager, the non-Federal sponsor and the treatment plant managers, a plan was proposed to address increased flooding concerns using standard floodproofing techniques. The costs of the non-structural items have been estimated and are included in the project cost estimate. An appropriate floodproofing agreement would be executed between the Town of Bloomsburg and United Water Pennsylvania.

An asphalt berm would be constructed inside the fence line of the electrical substation to protect against with-project increased flooding. Details of the floodproofing and non-structural plan for the water treatment plant are provided below.

The water treatment plant, originally constructed in the 1870s, services the Town of Bloomsburg. The plant is located immediately adjacent to Fishing Creek and is reportedly subject to frequent flooding under existing conditions. The current plan includes the installation of hoists and associated lift equipment that would be used to raise pumps and other critical equipment above the with-project 100-year water surface elevation. Electrical equipment in the building (e.g., breaker boxes) would be raised permanently above the with-project 100-year water surface elevation. While these measures would reduce damages to equipment, with-project water surface elevations would continue to cause more frequent water production down-time. It was assumed that this issue of decreased water supply could be mitigated through the provision of additional storage capacity. An upgrade of the unutilized reservoir was proposed for this reason. An unutilized 2.0 million-gallon brick reservoir adjacent to the reservoir currently in use would be upgraded (lined and covered with a floating roof) so that it could provide a stored source of potable water during a flood event.

Since the water treatment building was constructed in the 1870s, it is most likely eligible for inclusion in the National Register of Historic Places. A determination of eligibility and affect would be coordinated with the SHPO (see Section 5.7).

4.5.2 Summary of Real Estate Requirements

A summary of real estate acquisition requirements is shown below. The complete Real Estate Plan is provided in a separate volume that accompanies this report.

Parcels	Total Acquisitions	Total Acres
Fee Simple Acquisition (27 residential including 1 trailer park, 3 commercial)	30	13.1
Perpetual Flood Protection Levee Easements (59 residential, 3 commercial)	62	31.3
Residential Flowage Easements	4	1.2
Temporary Work Area Easements (59 residential, 3 commercial)	62	9.4

4.6 Utility Relocations

Required utility/facility relocations are the responsibility of the non-Federal sponsor. A combination fiber-optic/petroleum line runs perpendicular to the proposed floodwall and crosses under Fishing Creek upstream of the double-track bridge at Red Mill Road. The current plan calls for the utility line to be encased in concrete and remain in place. Existing roads in the area of West 11th Street in Bloomsburg and Drinker Street in Fernville will be raised to allow access over the levee. Construction of the closure structure across the North Shore Railroad will require intermittent closing of the rail line for a maximum of approximately four hours. Initial discussions with the Railroad operators have begun. Construction closings will be scheduled to minimize disruption to the railroad operation. Further investigations will be completed during PED.

Additional utility relocation costs are based on field investigations and on information developed by the Town of Bloomsburg, in consultation with local utility interests. For purposes of this study, utility and facility relocation costs have been used in the M-CACES estimate with appropriate contingencies added by the Corps. Further investigations and refinement of these costs will be completed during PED.

Estimated utility/facility relocation costs are included in the relocations account (Account 02) of the overall MCACES project cost estimate.

4.7 Economics of the Recommended Plan

A detailed cost estimate was developed for the recommended plan using the MCACES program. Project implementation costs include: pre-construction engineering and design (PED); real estate acquisition; project construction; construction management / supervision and administration (S&A); wetlands mitigation; cultural mitigation; escalation; and contingencies. Table 4-1 provides a cost estimate summary for the recommended plan. The change in costs for Alternative 4 from those shown in Table 3-13 reflect the final feasibility level design and MCACES cost estimate prepared for the Recommended Plan. The detailed MCACES cost estimate is included in the Engineering Appendix provided with this report.

Table 4-1
MCACES Cost Estimate – Recommended Plan
March 2004 Price Level

Account & Item Description	Cost	Contingency	Total Cost
02 Relocations	4,623,000	924,000	5,547,000
06 Fish & Wildlife Facilities	1,322,000	330,000	1,652,000
11 Levees & Floodwalls	17,610,000	3,728,000	21,338,000
18 Cultural Resources Preservation	400,000	100,000	500,000
TOTAL CONSTRUCTION COSTS	**23,955,000**	**5,082,000**	**29,037,000**
01 Lands & Damages	4,953,000	1,040,000	5,993,000
30 Preconstruction Engineering & Design	2,588,000	388,000	2,976,000
31 Construction Management	2,634,000	263,000	2,897,000
TOTAL PROJECT COSTS	**34,130,000**	**6,773,000**	**40,903,000**

Table 4-2 shows the project economic summary for the Recommended Plan, Alternative 4, which is the NED plan. The NED plan at an Agnes level of protection has total average annual costs of $2,583,200, total average annual benefits of $3,565,200, a benefit-to-cost ratio of 1.38 to 1, and annual net benefits of $982,000.

Table 4-2
Project Economic Summary
March 2004 Price Level, 5.375% Discount Rate, 50-Year Period of Analysis

Costs	
Total Project Costs	$ 40,903,000
Less: Adjustment for PL 91-646 Costs[17]	- $ 1,378,500
Interest During Construction	$ 1,832,400
Total Investment Costs	**$ 41,356,900**
Annualized Investment Costs	$ 2,397,900
Annual Operations & Maintenance Costs	$ 185,300
Total Average Annual Costs	**$ 2,583,200**
Benefits	
Residential Damage Reduction	$ 1,292,200
Non-Residential Damage Reduction	$ 2,129,600
Transportation & Pub Infrastructure Damage Reduction	$ 79,800
Additional Debris Removal Costs Avoided	$ 19,100
Electric Utilities Damage Reduction	$ 9,000
Flood Insurance Administrative Cost Savings	$ 35,500
Total Average Annual Benefits	**$ 3,565,200**
Benefit to Cost Ratio	**1.38**
Net Benefits	**$ 982,000**

With the exception of project benefits, these summary economic figures differ from those provided in Table 3-14 for the NED plan (average annual costs of $1,916,000, a benefit-to-cost ratio of 1.86 to 1, and annual net benefits of $1,649,000). The difference in costs, which result in

[17] PL 91-646 costs include moving and related expenses for a person whose dwelling is acquired because of the project. Because the NED cost of replacement housing is to be based on replacement in kind, moving and related expenses are deducted from the overall cost estimate for economic evaluation purposes. PL 91-646 costs are, however, included in the fully funded cost estimate discussed later in this document.

changes to each of the project performance measures, are due to information obtained from detailed design after identification of the NED plan.

Cost estimates used during the preliminary screening of project alternatives lacked costs associated with unsuitable fill material (detailed in the HTRW attachment to the Engineering Appendix), environmental mitigation, cultural mitigation, flood damage mitigation measures for the water treatment plant, and electrical sub-station. In addition, the final cost estimate incorporates detailed geotechnical and utility relocation analyses that were not available for the screening analysis and NED plan optimization.

Given the significant increase in Alternative 4 costs from the initial screening to plan optimization and recommendation, the project team undertook a back-check review of alternatives 4, 5, 8, and 9 to determine if similar increases in costs would be expected for these alternatives based on the additional information and cost considerations known at the time of plan optimization. Based on substantial review by the project delivery team, it was concluded that cost estimates for each of the alternatives considered during initial plan screening would have equally substantial and proportionate increases in project costs based on currently available data and refined engineering assumptions and requirements. With this knowledge and back-check review quality control check, the project delivery team confirmed its recommendation of Alternative 4 as the NED plan.

5. *ENVIRONMENTAL CONSEQUENCES

This section describes the potential effects from project-related activities on the physical resources, biological resources, hazardous, toxic, and radioactive wastes (HTRW), cultural resources, recreational resources, aesthetic resources, socioeconomic conditions, noise, environmental justice, and the cumulative effects of implementing the proposed action and alternatives. The estimated effects are quantified where possible and otherwise described qualitatively within a range of no impact to either potentially adverse or potentially beneficial. The significance of each change in impact is also described based on the magnitude of change resulting from the proposed action and the importance of the resource. To ensure that small potential effects are not over-analyzed, potential impacts have been assessed at a level of detail commensurate with the potential significance.

This analysis is being performed prior to the development of plans and specifications for the flood damage reduction project. Future design modifications are expected to occur as a result of detailed engineering investigations, cost evaluations, additional environmental considerations, and public participation as the design proceeds through the plans and specifications stage. While the designs featured in this evaluation are preliminary, the functionality of the features and the footprint for their construction should remain substantially the same as the project progresses through final design. Estimates of materials necessary to construct the project were developed from the MCACES cost estimate discussed in Section 4 (the full MCACES cost estimate is provided as an attachment to the Engineering Appendix. As such, these numbers are used to quantify the magnitude of the proposed action and not to prescribe detailed materials quantities or final design specifications.

The estimated environmental impacts have been developed to create an envelope of effects within which minor design changes can be made without compromising the integrity of the assessment. As such, the description of the features does not represent any formal commitment to final design, equipment for use, vendors for supply of materials, or methods of construction but gives an approximation of how the features could be constructed and the associated impacts thereof.

To construct the various features, a contractor was assumed to use typical construction equipment, such as bulldozers, excavators, cranes, compactors, hauling trucks, and vibratory hammers. Materials would be transported to and from the site using normal sized on-road hauling trucks.

In addition to the activities necessary to construct these features, this proposal would include all utility relocations and all routine maintenance (e.g., mowing, inspections, re-paving, repairs to structures, in-kind replacements) for both the sponsor operations and maintenance (O&M) and Corps-related activities necessary to maintain the safety or integrity of the flood damage reduction system. All of these actions would be assumed included in the proposed action.

Consistent with NEPA and CEQ regulations, plan formulation of flood damage reduction features have avoided adverse project effects (project implementation or O&M) to the fullest extent possible. When adverse effects could not be fully avoided, they were minimized. If adverse effects of project implementation or O&M are unavoidable, they will be mitigated to the extent practicable.

5.1 Physical Setting

5.1.1 Physiography and Geomorphology

Alternative 1: No Action

In the absence of Federal action, there would be no changes to the physiography and ongoing geomorphic processes at work in Fishing Creek and the Susquehanna River at Bloomsburg.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

There would be no change to the physiography from implementation of the Fringe Alignment, but confining flood flows within the levee/floodwall system would reduce catastrophic geomorphological changes from peak flows (e.g., cutting new meanders, etc.) within the confines of the levee/floodwall system.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Non-structural hydraulic mitigation for Fernville (i.e., no levee for Fernville) would allow floodwaters to inundate the lower elevations when Fishing Creek floods and would allow geomorphological changes to the unprotected right descending bank.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Effects of Alternative 8 would be similar to those of the Alternative 4.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Effects would be similar to Alternative 5.

5.1.2 Soils

Alternative 1: No Action

Taking no action would result in a continued flood-related deposition of silt within the floodplain of lower Fishing Creek and the right bank of the Susquehanna River in Bloomsburg.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Under Alternative 4, the Fringe Alignment crosses the North Shore railroad tracks and proceeds around the perimeter of two actively cultivated fields designated as Prime Farmland or Additional Farmland of Statewide Importance. This resource impact has been coordinated with the Columbia/Montour County office of the Natural Resources Conservation Service (USDA, 2002). The Fringe Alignment would result in the conversion of approximately 11.5 acres of farmland to non-agricultural use. The conversion area used for the purpose of this analysis is larger than the expected size of the placement area to accommodate slight realignments that are often necessary during final design. The Corps recognizes that the transformation of agricultural land, particularly prime farmland, is objectionable. However, the transformation to non-agricultural use is unavoidable because railroad tracks are immediately adjacent to the farmland, and closed landfill boundaries are located on the opposite side of the railroad tracks and immediately east of the farmland. Initial design of the Fringe Alignment has identified and taken into account these adverse effects, and considered alignment shifts that could lessen such adverse effects (e.g., aligning the levee along the perimeter of the field as opposed to crossing it directly).

The loss of unique farmland cannot be mitigated. Given the small area in question, the effect is characterized as unavoidable and permanent, but minimal because design modifications (i.e., maintaining a position as close to the railroad tracks as possible) were implemented to limit loss.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

This would be similar to Alternative 4.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Implementing Alternative 8 would not intersect any areas that are designated as Prime Farmland or Additional Farmland of Statewide Importance.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementing Alternative 9 would not intersect any areas that are designated as Prime Farmland or Additional Farmland of Statewide Importance.

5.2 Climate and Weather

Construction and maintenance of a flood damage reduction project would not adversely affect climate and weather. However, prolonged periods of adverse weather conditions might alter the construction schedule (e.g., snow, rain, etc.) and present seasonal restrictions on construction.

5.3 Water Resources

By way of this EIS, the Corps is documenting that the project study and design have, and will continue to meet the Commonwealth of Pennsylvania's Water Quality Standards as per Section 401 of the Federal Clean Water Act and is thereby eligible for a Section 404(r) exemption from the need to obtain a Water Quality Certification once the project report and EIS have been sent to and authorized by Congress.

5.3.1 Surface Water Resources

Alternative 1: No Action

Naturally, the No Action plan would not impact surface water resources in the same way as the construction alternatives. However, failing to provide Bloomsburg with flood damage protection measures could contribute to the temporary deterioration of the surface water quality in the event of large-scale flooding. Flooding in residential and commercial areas frequently results in the mixing of surface waters with sewage, contamination of drinking water supplies, and potential mobilization of HTRW. During flooding of municipalities, these constituents all predictably enter the surface waters causing temporary reductions in surface water quality.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Implementation of the Alternative 4 would be expected to result in only minor effects over current conditions. In general, some minor degradation of the channel would occur in the proposed levee/floodwall reaches. Increased sediment deposition would likely occur immediately upstream of the levee/floodwall on Fishing Creek due to backwater effects. However, increased deposition should only occur during flows greater than bank-full as the proposed flood protection measure only alters the channel hydraulics for flows greater than bank-full.

In levee and floodwall projects, stone slope protection (riprap) is usually required to protect stream banks from erosion and migration that could eventually undermine the structural stability of levees and floodwalls. For this reason, stone slope protection is often installed for the entire length of the levee/floodwall from the top of protection to the invert (bottom) of the stream channel. Initial design along Fishing Creek considered a similar approach on both banks, but where possible, the alignment was set back from the top of bank to eliminate the need for bank protection along the entire project. Additional site investigations identified only those areas especially vulnerable to erosion as needing to be armored. These areas include abutments for bridges, storm water outfalls, and areas where the design is confined with insufficient setbacks from the creek banks.

The Fringe Alignment would result in approximately 3,000 linear feet of stream bank being rip-rap armored from the top of protection to the stream invert. This figure represents the total linear feet from both the left descending bank and the right descending bank, and is roughly 34 percent of the total linear feet (both banks) of the levee/floodwall system. During construction of the bank armoring there would be a temporary increase in the turbidity of surface waters, as sediments would be disturbed during rock placement. Elimination of the stream-side vegetation and addition of the rock in the creek would also contribute to a small thermal impact by the increased exposure to sunlight.

Earth-moving activities during construction disturb soils and can create water quality effects. Adherence to best management practices and an approved sediment control plan by the construction contractor would minimize the risk of unintentional water quality effects.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

This alternative would be identical for the left descending bank of Fishing Creek as with Alternative 4, but would have marked differences for the right descending bank (Fernville). With non-structural hydraulic mitigation there would be no Fernville Levee needing for bank protection with riprap. There would be no riprap installed within the stream or riparian zone and the effects to water quality from this stabilization would be avoided.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

The Interior Alignment would result in substantially similar effects as the Fringe Alignment, though there would be a reduction in the linear feet of Fishing Creek that would require rip-rap.

Construction of the Interior Alignment would result in approximately 2,400 linear feet of stream bank being riprap armored from the top of protection to the stream invert. This represents roughly 31 percent of the linear feet of stream bank (both left descending bank and right descending bank) along Fishing Creek north of Route 11.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

As with Alternative 5, this non-structural hydraulic mitigation would avoid the effects of installing riprap along the right descending bank of Fishing Creek as described under Alternative 8.

5.3.2 Hydrogeology and Groundwater

Alternative 1: No Action

The No Action alternative would result in no direct impacts to the hydrogeology or groundwater. However, failing to provide flood protection for Bloomsburg could contribute to the contamination of groundwater resources through the repeated inundation during floods.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

The effects of the adjacent surface water flows dominate groundwater processes throughout most of the project area. Changes from either alignment would only affect groundwater hydrology during flows greater than bank-full as the proposed flood damage reduction project alters channel hydraulics only for flows greater than bank-full. An event with a return frequency of between 10 and 25 years (4 percent to 10 percent annual risk) would be necessary to force Fishing Creek to exceed the bank-full flow. Given the relatively infrequent occurrence of these flows and their relatively short duration, minimal effects on groundwater are expected.

Changes to precipitation runoff throughout the project area would predictably cause temporary ponding at the toe of the levee slope and subsurface. Subsurface flow greater than six feet below grade should be unimpeded by the levee structure.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Non-structural hydraulic mitigation for Fernville (i.e., no levee for Fernville) would allow floodwaters to inundate the lower elevations when Fishing Creek exceeds bank-full flows. However, as with Alternative 4, minimal effects on groundwater are expected.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Implementing Alternative 8 would result in substantially similar effects as the Alternatives 4 or 5.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementing Alternative 9 would result in substantially similar effects as Alternatives 4 , 5, or 8.

5.4 Biological Resources

5.4.1 Vegetation

Alternative 1: No Action

Taking no action to protect Bloomsburg from flooding would mean the environment would continue to experience inundation from predictable flood events. Experience has shown that vast quantities of debris (e.g., construction materials, vehicles, mobile homes, etc.) and sediment must be removed from the floodplain after a flooding event. The physical removal of the debris from the floodplain typically involves large, heavy equipment and requires the removal of trees and vegetation to provide points of ingress and egress for cleanup equipment. Failing to protect Bloomsburg from flooding could indirectly result in adverse effects to vegetation in the riparian corridor due to clean up after flood events.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

The vast majority of the Alternative 4 footprint is in areas of mowed grass for residential yards, Fairgrounds parking, roadside maintained areas, or the edges of cultivated fields. Wherever possible, alignment positioning has attempted to avoid areas with woody vegetation and to leave trees in place along the banks of Fishing Creek (with the requirement that any remaining trees must not be on the levee itself, and must not pose a potential hazard to undermining of the levee or associated features).

Implementation of Alternative 4 would require the placement of riprap along approximately 3,000 linear feet of stream bank from the stream invert to the top of protection. Within the area where riprap is placed, vegetation would be removed and the habitat would be permanently covered and maintained free of woody vegetation over approximately two acres (3,000 linear feet x 30 foot width). The vegetation along Fishing Creek that would be affected is not wetlands. Within one growing season, vegetation would be expected to re-colonize the interstitial spaces in the placed rock and provide a low quality habitat dominated by disturbance-tolerant species. The O&M plan would prescribe the removal of woody vegetation from the levee/floodwall system, including the riprap, but herbaceous species would remain. Areas of Fishing Creek that do not require armoring would remain undisturbed.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 5 would be similar to Alternative 4 with the exception of the need to provide riprap along the right descending bank of Fishing Creek for Fernville. Because the Fernville hydraulic mitigation would be non-structural, there would no longer be the need to riprap the stream bank resulting in 1.2 acres fewer acres of vegetation removed as described in Alternative 4. The Bloomsburg (left descending) bank would continue to need protection, as described in Alternative 4, resulting in approximately 0.8 acres of habitat being removed for the placement of riprap.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Effects to vegetation from implementing Alternative 8 would be substantially the same as the Alternatives 4 and 5 with the exception that the shorter length of protection and associated riprap along Fishing Creek would result in fewer disturbances to vegetation. Under Alternative 8, approximately 2,400 linear feet of stream bank would be riprap armored from the top of protection to the stream invert. Within the area where riprap is placed, vegetation would be removed and the habitat would be permanently covered and maintained free of woody vegetation over approximately 1.6 acres (2,400 linear feet x 30 foot width). This is a reduction of approximately 600 linear feet of stream bank that would require riprap when compared to the Alternative 4. The shorter reach to be affected is because the Interior Alignment turns away from Fishing Creek and crosses Route 11 approximately 600 feet upstream of where the alignment under Alternatives 4 and 5 would turn.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 5 with the exception of the need to provide riprap along the right descending bank of Fishing Creek for Fernville. Because the Fernville hydraulic mitigation would be non-structural, there would no longer be the need to riprap the stream bank resulting in 1.2 acres fewer acres of vegetation removed as described in Alternative 5. The Bloomsburg (left descending) bank would continue to need protection, as described in Alternative 8, resulting in approximately 0.4 acres of habitat being removed for the placement of riprap (600 linear feet of riprap x 30 foot width).

5.4.2 Wetlands

Executive Order 11990 (Protection of Wetlands) requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The discharge of fill materials in waters of the United States must also comply with Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal sites for Dredged or Fill Material found at 40 CFR Part 230. The 404(b)(1) Guidelines evaluation is included in the Planning Appendix in Volume 2 of this report package.

Only two wetland sites are being impacted by any of the alternatives. Through sequencing, impacts to other wetland sites in the project area have been avoided. It is expected that these avoided wetlands (as mapped in Section 2, Figures 2-3 and 2-4) would not be impacted by alignment changes or other construction impacts.

Of these various alternatives, there are two main themes: a levee and wall system around Bloomsburg with and without structural protection for Fernville. Adding the structural protection around the community of Fernville causes direct impacts to approximately 2.4 acres of forested wetlands along Fishing Creek. The alignment in the Fernville area is planned to be shifted landward during the first stages of the design phase and this wetland impact could be reduced to less than one acre of direct impact. For a full discussion of these avoidance measures please see Section 4.1.4. The impacts to these wetland areas will be mitigated during construction of the levee and are discussed in Section 5.15. These impacts are avoided all together by the alternatives not having a Fernville structural protection component. Those alternatives only have 0.7 acres of impact.

Alternative 1: No Action

There will be no direct impacts to wetlands in this alternative. In the absence of a flood damage reduction project, the wetlands within the project area would continue to be influenced by periodic flooding.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

The selection of alignment paths considered wetlands and attempted to minimize the environmental effects of project implementation. As depicted in Figures 2-3 and 2-4, approximately 3.1 acres of wetlands are within the expected area of disturbance for Alternative 4 as identified in Section 2.4.2. These impacts occur at two locations in the project area: 0.7 acres of impact to a mixed cover, lower quality wetland at the fairgrounds and 2.4 acres of high quality forested wetlands in the Fernville Creek floodplain at the upper end of the Fernville Levee on either major alignment.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Non-structural hydraulic mitigation for Fernville would avoid the 2.4-acre wetland impact from the Fernville Levee. Therefore, there would be no substantial differences in the effects to wetlands between Alternative 4 and Alternative 5.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Approximately 0.9 acres of palustrine emergent and shrub-scrub wetlands are within the expected area of disturbance for Alternative 8 as identified in Section 2.4.2. Construction would require that the 0.9 acres of wetlands be filled. As with Alternative 4, the upper end of the Fernville Levee would impact approximately 2.4 acres of high quality forested wetlands.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Non-structural hydraulic mitigation for Fernville would avoid the 2.4-acre wetland impact from the Fernville Levee. Therefore, there would be no substantial differences in the effects to wetlands between Alternative 8 and Alternative 9.

5.4.3 Wildlife

Coordination with the Pennsylvania Game Commission and the U.S. Fish and Wildlife Service (USFWS) occurred throughout the study. The Corps requested that USFWS prepare a Planning Aid Report for this study and by a letter (dated October 2004), though this request was declined by USFWS. Instead, they opted to review the draft EIS for comments on Endangered Species as well as for compliance with the Fish and Wildlife Coordination Act. Their comment letter (dated June 2005) indicates, "no significant effects to wildlife are expected to occur from the proposed activity" (USFWS, 2005). As such, the responsibilities of the Corps to protect migratory birds under Executive Order (EO) 13186 have been met. This EO establishes further coordination requirements with the USFWS when agency actions have, or are likely to have, a measurable negative effect on migratory bird populations.

Alternative 1: No Action

Under the No Action alternative, there would be no changes in land use in Bloomsburg or Fernville. Within the project area, wildlife habitat is characterized as relatively low quality and significantly disturbed. In the absence of a flood protection measure for Bloomsburg, wildlife abundance and diversity within the project area would remain unchanged.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Alternative 4 would be constructed primarily within the mowed grass of residential yards, Fairgrounds parking; roadside maintained areas, or the edges of cultivated fields. These disturbed areas have little or no wildlife habitat function. The wildlife species within the wetlands would be disturbed during the construction process. However, the area to be disturbed is a relatively small part of the local aquatic ecosystem. Mobile species could find refuge in other areas until the construction disturbance is over. In addition, species sensitive to disturbance would likely not utilize these areas because of the regular disturbances related to activities at the Fairgrounds. Some disturbance tolerant individuals of certain species may be permanently displaced or destroyed during construction. As such, constructing Alternative 4 would have a temporary disturbance on species within the wetland habitat, but would not create significant permanent effects to wildlife.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementing Alternative 5 would result in similar effects to wildlife habitat within the Bloomsburg levee footprint, but would not result in the loss of riparian habitat on the right descending bank of Fishing Creek in Fernville. Non-structural hydraulic mitigation in Fernville would therefore result in less construction-related disturbance and no permanent loss of riparian vegetation on the right descending bank.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Implementing Alternative 8 affects a smaller reach (600 feet shorter) of the Bloomsburg side of Fishing Creek than Alternative 4. However, 2,400 linear feet of stream bank on the left and right descending banks of Fishing Creek would be denuded during and after construction. The Interior Alignment under Alternative 8 would also affect wetlands habitat at a location east of where the Fringe Alignment intersects wetland habitat. The effects to wildlife from construction of the Interior Alignment would be minimal, as the majority of the affected area is low quality wildlife habitat.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementing Alternative 9 would result in similar effects to wildlife habitat within the Bloomsburg levee footprint, but would not result in the loss of riparian habitat on the right descending bank of Fishing Creek in Fernville. Non-structural hydraulic mitigation in Fernville would therefore result in less construction-related disturbance and no permanent loss of riparian vegetation on the right descending bank.

5.4.4 Fish

Alternative 1: No Action

Constructing no flood protection project for Bloomsburg would not result in any direct impacts to the fisheries of Fishing Creek or the Susquehanna River. However, failing to provide flood protection for Bloomsburg would allow contamination of surface waters during flooding by floodwaters mobilizing contaminants from domestic, industrial/commercial, or municipal sources (e.g., sanitary sewage, chemicals from industrial facilities). Although diluted by the volume of water associated with flooding, these constituents enter the aquatic environment during floods and potentially effect fish.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Activities necessary to implement Alternative 4 could have potentially adverse effects on the aquatic habitat of Fishing Creek. Although efforts were made to minimize the extent of Fishing Creek bank that would need to be riprap protected to the invert of the stream channel, approximately 3,000 linear feet of stream bank (1,800 linear feet on the right descending bank and 1,200 linear feet on the left descending bank) would require riprap an assumed distance of 10 feet into the water. Approximately 0.7 acres of stream habitat would be transformed from natural habitat to riprap by placing the material into the stream. Placement of stone would require the removal of streamside riparian habitat on both banks of the creek, excavation and removal of surficial sediments, and placement of stone. Work would also occur in the stream (in-water) to set the toe of the bank protection. This is predicted to cause localized increases in turbidity from the disruption of sediments during construction and would decrease the extent of shade along the creek by removing overhanging vegetation along the stream banks. Best management practices would be implemented to minimize the introduction of sediment to the creek during construction. Maintenance clearing of woody vegetation that re-colonizes the areas of placed stone would make these effects permanent. Fishing Creek is characterized by the PFBC as naturally changing from a cold-water to warm-water fishery within the vicinity of the

Project Area. Therefore, the potentially adverse thermal effects (increased warming of the water as a result of increased solar exposure) would be moderated by the naturally occurring warming of the stream. Actions to mitigate impacts to the aquatic resources in the creek are discussed further in section 5.15. Further, it is expected that the impacts identified herein, will be all that is impacted and that further impacts to these resources will be avoided during construction.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 5 would be similar to Alternative 4 excepting that there would no longer be the need to provide riprap along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in 0.4 acres fewer acres of in-stream habitat being disturbed as described in Alternative 4. The Bloomsburg (left descending) bank would continue to need protection, as described in Alternative 4, resulting in a total of approximately 0.28 acres of streambed being affected by the placement of riprap.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

As with Alternative 4, construction of Alternative 8 would affect the streambed along both sides of Fishing Creek because of the placement of riprap approximately 10 feet into the streambed. Alternative 8 would require protecting 600 fewer linear feet on the left descending bank (Bloomsburg side) but would still require placement of riprap into the stream over approximately 2,400 linear feet. Placement of the stone would result in of a total of approximately 0.55 acre of streambed being affected. This is approximately a 20 percent reduction in the areal extent of streambed that would be covered with large stones, when compared to Alternative 4.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 8 except there would no longer be a need to provide riprap along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in 0.4 acres fewer acres of in-stream habitat being disturbed as described in Alternative 8. The Bloomsburg (left descending) bank would continue to need protection, as described in Alternative 4, resulting in a total of approximately 0.14 acres of streambed being affected by the placement of riprap.

5.5 Threatened and Endangered Species

Alternative 1: No Action

Taking no action would have no effect on protected species as none have been identified within the project area.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

As described in Section 2.5 Threatened and Endangered Species, all consultation with appropriate state and Federal resource agencies indicate that no listed endangered, threatened, or candidate species are known to exist in the potential project impact areas. No effects are predicted to protected species as a result of implementing Alternative 4.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

No effects are predicted to protected species as a result of implementing Alternative 5.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

No effects are predicted to protected species as a result of implementing Alternative 8.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

No effects are predicted to protected species as a result of implementing Alternative 9.

5.6 Air Quality

Alternative 1: No Action

Under the No Action alternative, potential air quality impacts associated with the construction and operation of a flood damage reduction project would not occur. Air quality would not be predicted to change from existing conditions where periodic flooding can lead to temporary deterioration in air quality during and after flooding. Floods typically result in the contamination of surface waters with sewage and other contaminants that can contribute to poor air quality. In addition, sediment clean up can lead to temporary increases in fugitive dust from street sweeping of sediment.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

The Air Quality Appendix provides a detailed background and methodology used to develop the General Conformity evaluation.

The Clean Air Act General Conformity Rule (58 FR 63214, November 30, 1993, Final Rule, Determining Conformity of General Federal Actions to State or Federal Implementation Plans) dictates that a conformity review be performed when a Federal action generates air pollutants in a region that has been designated a nonattainment or maintenance area for one or more National Ambient Air Quality Standards (NAAQS).

The general conformity rule was designed to ensure that Federal actions do not impede local efforts to control air pollution. It is called a conformity rule because Federal agencies are required to demonstrate that their actions "conform with" (i.e., do not undermine) the approved State Implementation Plan (SIP) for their geographic area. The purpose of conformity is to (1) ensure Federal activities do not interfere with the air quality budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQS. Federal agencies make this demonstration by performing a conformity review. The proposed actions at Bloomsburg would be subject to detailed conformity determinations unless these actions are clearly considered *de minimus* emissions. Use of the *de minimus* levels assures that the conformity rule covers only major Federal actions (USEPA, 1993).

A conformity review requires consideration of both *direct* and *indirect* air emissions associated with the proposed action. Direct emissions are those that occur as a direct result of the action, and occur at the same time and place as the action. Sources that would contribute to direct emissions from this project would include demolition or construction activities associated with the proposed action and equipment used to facilitate the action (e.g., construction vehicles). Indirect emissions are those that occur at a later time or distance from the place where the action takes place, but may be reasonably anticipated because of the proposed action. To be counted as an indirect emission, the Federal proponent for the action must have continuing control over the source of the indirect emissions. Sources of indirect emissions include commuter activity to and from the construction site (e.g., employee vehicle emissions). Both stationary and mobile sources must be included when calculating the total of direct and indirect emissions, but this project involves only mobile sources.

The total direct and indirect emissions predicted for VOCs and NOx were summed (as described in the Air Quality Appendix) to develop a total release for Alternative 4. The 3-year total VOC and NOx releases were then divided by three to establish an estimated annual release. This annual figure was then compared to the *de minimus* thresholds to determine whether the annual emissions from direct and indirect sources for each pollutant exceeded the *de minimus* thresholds.

It was estimated that annual emissions would not exceed the threshold limits. The sum total of direct and indirect sources for NOx and VOCs for Alternative 4 resulted in a predicted annual release of 39.09 tons of NOx (38.33 tons direct emissions + 0.76 tons indirect emissions) and 3.56 tons of VOCs (2.79 tons direct emissions + 0.77 tons indirect emissions). The annual emission rates for these criteria pollutants in an ozone transport region are 100 tons/year for NOx and 50 tons/year for VOCs. The estimates for Alternative 4 (the Recommended Alternative) represent only 39 percent of the annual limit for NOx and 7 percent of the annual limit for VOCs; therefore, a conformity assessment is not required. Because projected emissions are below threshold levels, the action is exempt from further conformity analysis.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 5 would be similar to Alternative 4, with the exception that there would no longer be structural protection along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in the use of less construction equipment because there would be no levee construction in Fernville. As with Alternative 4, Alternative 5 would be below threshold levels and not require further conformity analysis.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Detailed equipment operational data were not available for evaluation of Alternative 8 construction. However, it is reasonable to assume that the effects would be less than those evaluated in the Fringe Alignment given the shorter length of the levee/floodwall system for the Interior Alignment.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 8 excepting that there would no longer be the need to provide riprap along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in the use of less construction equipment because there would be no levee construction in Fernville. As with Alternative 4, Alternative 5 would be below threshold levels and not require further conformity analysis.

5.7 Cultural Resources

Federal agencies must consider the degree to which a proposed action may adversely affect districts, sites, buildings, structures, or objects listed in or eligible for listing in the National Register of Historic Places and have direction to provide protection and enhancement of the cultural environment through Executive Order 11593 (Protection and Enhancement of the

Cultural Environment). Federal agencies must consider the loss or destruction of historic properties when planning to carry out their respective missions. Under Section 106 of the National Historic Preservation Act, federal agencies are required to identify historic properties near proposed project sites, including properties listed on the National Register of Historic Places or properties that the agency and the SHPO agree are eligible for listing. If the proposed action is determined to have an adverse effect on historic properties, the federal agency must consult with the SHPO and the Advisory Council on Historic Preservation to develop alternatives to avoid or mitigate the adverse effect.

Because the project team had difficulties obtaining Rights of Entry onto private property for cultural resource investigations, traditional compliance with Section 106 (following the normal procedures of 36 CFR 800) will not be possible until after the FR/EIS is completed. Therefore, the Corps has coordinated and will execute a Programmatic Agreement (PA) with the SHPO outlining the procedures to be followed by the Baltimore District in compliance with the responsibilities of Section 106 of the National Historic Preservation Act, IAW 36 CFR 800.14(b)(3). The Bloomsburg project qualifies for development of a PA under 36 CFR 800.14(b), for resolution of adverse effects from certain complex projects, where circumstances warrant a departure from the normal Section 106 process [36 CFR 800.14(b)(1)(v)] and when effects on cultural resources cannot be fully determined prior to approval of an undertaking [36 CFR 800 14(b)(1)(ii)]. Execution of the PA with the SHPO completes the Section 106 requirements, allowing the project to move forward while the District continues the identification and consideration of cultural resources as the project develops. The SHPO has indicated their concurrence with this proposal via a letter date August 23, 2005. A copy of this letter is enclosed in the Planning Appendix in Volume 2 of this report package.

Alternative 1: No Action

Under the No Action alternative, no effects to known and unknown cultural and architectural resources would result from construction of flood protection measures. Potential visual impacts to any historic structures from prominent levee/floodwalls would not occur. However, the existing potential for flooding would continue and cultural or historic resources would remain unprotected from the potentially destructive effects of flooding. The No Action alternative could contribute to the permanent damage or destruction of cultural and historic resources by failing to protect them in a comprehensive measure.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Archeological investigations of Alternative 4 conducted to date have not revealed the presence of any intact prehistoric archaeological resources within the APE. Several large prehistoric sites are located between the APE and the Susquehanna River, most notably the Kistler Farm complex, but they would not be affected by Alternative 4 construction. Due to the frequency of flooding and the historic land uses, it is unlikely that the construction of a flood damage reduction project along Fishing Creek, on both left and right banks, would have an effect on prehistoric cultural resources.

The only historic archeological resource encountered to date has been the identification of a canal lock on the Susquehanna Canal, located in Bloomsburg near the High School. The site of the canal lock is located in the proximity of the upstream tie-out, and the alignment can be successfully realigned to avoid this historic archeological resource. Additional testing will be conducted along the Fishing Creek portions of the alignment, which may reveal some historic archeological remains but these areas were occupied late in the historic period and are likely not to yield archeological deposits that would be eligible for National Register listing.

Although 26 structures would be demolished to build Alternative 4, the Recommended Plan, is considered to only have a minimal effect on historic architectural resources. Water surface elevations along Fishing Creek (from its confluence with the Susquehanna to just downstream of the Route 11 bridge) and along the Susquehanna River throughout the entire project area, do not change with the Fringe Alignment in place. Therefore, historical sites along these areas, such as the McClure House, the Boone house and the Rupert covered bridge will not experience increased flooding with Alternative 4 in place.

It is important to note, however, that water surface elevations along Fishing Creek upstream of the Route 11 bridge would increase with Alternative 4 in place. It is likely that the increased flooding and flood proofing of the Irondale water treatment facility (currently owned and operated by United Water Pennsylvania) would result in an adverse effect to this historic property, possibly requiring mitigation. Completion of this mitigation would be required prior to the construction phase.

Visual effects of Alternative 4 are likely to be negligible, because of the distance of the Fringe Alignment APE from the historic center of Bloomsburg, and the limited visual impact that levee/floodwall system would have upon historic viewsheds in general.

The Baltimore District will complete the process of identifying all historic properties in the project area and determining the effect of the project on those resources, in accordance with the proposed PA with the SHPO.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 5 would be similar to Alternative 4 except that there would be no structural protection along the right descending bank of Fishing Creek for Fernville, because the Fernville hydraulic mitigation would be non-structural. The non-structural mitigation would require the removal of 110 residences along Fishing Creek and 124 structures in total. Archeological investigations conducted to date have not revealed the presence of any intact prehistoric resources within the APE. Additional testing is to be conducted along the Fishing Creek portions of the alignment, which may reveal some historic archeological remains but these areas are historically late and are not likely to yield archeological deposits that would be eligible for National Register listing.

The Baltimore District will complete the process of identifying all historic properties in the project area and determining the effect of the project on those resources, in accordance with the proposed PA with the SHPO.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

The effects of implementing Alternative 8 to archeological resources are likely to be similar to Alternative 4. The primary difference between the two alignments is the path of the alignments through the Fairgrounds, and most of the affected property has been disturbed by the construction of the Fairgrounds. The implementation of Alternative 8 would require the demolition and removal of 44 structures.

Visual impacts to historic architectural resources, however, would likely be moderately increased by Alternative 8 as the levee/floodwall system would bisect the core of the Bloomsburg

Fairgrounds, a National Register property, and it would be much more visually intrusive to the adjacent historic resources in the industrial district of Bloomsburg, including Magee Rieter Automotive Systems.

The Baltimore District will complete the process of identifying all historic properties in the project area and determining the effect of the project on those resources, in accordance with the proposed PA with the SHPO.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 8 except that there would no longer be structural protection in Fernville because the Fernville hydraulic mitigation would be non-structural. The non-structural mitigation would require the removal of 110 residences along Fishing Creek and a total of 154 structures in total. Archeological investigations conducted to date have not revealed the presence of any intact prehistoric resources within the Area of Potential Effect (APE). Additional testing is to be conducted along the Fishing Creek portions of the alignment, which may reveal some historic archeological remains but these areas are historically late and are not likely to yield archeological deposits that would be eligible for National Register listing.

The Baltimore District will complete the process of identifying all historic properties in the project area and determining the effect of the project on those resources, in accordance with the proposed PA with the SHPO.

5.8 Hazardous, Toxic, and Radioactive Waste (HTRW)

Alternative 1: No Action

Under the No Action alternative the Bloomsburg flood protection project would not be constructed. Consequently, there would be no potential historical waste management issues to address from the project construction. The excavation of potentially contaminated soils, landfill debris, and contaminated materials would be avoided.

Failing to provide Bloomsburg with flood damage reduction measures would indirectly contribute to the dispersion of HTRW materials and environmental damage to Bloomsburg and the Susquehanna River. Significant flooding can result in the mobilization and dispersion of HTRW from businesses, residences, as well as buried materials. Flood clean up experience has shown that vast quantities of debris and increasingly HTRW materials are dispersed into the floodplain and aquatic environment when large-scale flooding occurs.

Taking no action would also avoid the taking and demolition of residences, businesses, a municipal building, and the moving of a trailer park under the various action alternatives. This would avoid the generation of construction demolition and debris material requiring landfilling.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

The HTRW section of the Engineering Appendix states that constructing Alternative 4 (Fringe Alignment) would generate approximately 13,600 of non-hazardous "residual" waste that would require disposal at an active Resource Conservation and Recovery Act (RCRA) Subtitle D disposal facility. The nearest such facility capable of accepting residual waste is the Lycoming

County Landfill in Montgomery, PA, approximately 40 miles from Bloomsburg. In addition, approximately 4,500 cubic yards of hazardous waste[18] is expected to be generated during levee construction and would require disposal at a RCRA Subtitle C hazardous waste landfill. The nearest RCRA Subtitle C facility capable of accepting the waste is the Chemical Waste Management Chemical Services landfill located in Model City, New York (approximately 270 miles from the project site). More extensive investigations would be completed for the landfill areas impacted by the Fringe Alignment during the pre-construction engineering design (PED) phase.

Also during the PED phase, limited sampling will also be performed along the Fernville side of the proposed alignment and homeowner interviews will be conducted along the Bloomsburg side of the Fishing Creek segment to determine the need for additional sampling and/or a geophysical survey. This information will be used to establish whether or not underground storage tanks in the area could affect construction activities.

Worker exposure to contaminants during construction could include inhalation of vapors and fugitive dust, incidental ingestion of soil, and skin absorption. Those actively working in contaminated areas would wear personal protective equipment in accordance with an approved Health and Safety Plan. Excavation and management of contaminated soil during construction and transportation for disposal would be conducted in a manner that minimizes the potential for offsite transport via air and surface water pathways. If visible emissions of dust occur in these areas, whether due to low moisture content of the excavated soils or high winds, dust suppression measures will be implemented. Temporary sediment and erosion control measures such as silt fences may also be used during excavation and staging of contaminated material to minimize dispersion.

It is important to note that the non-Federal sponsor would be responsible for any HTRW response costs, and none of these costs could be credited towards the non-Federal sponsor's share of total project costs.

The alignment of the flood protection under Alternative 4 would require the taking of an estimated 22 residences, three commercial structures, one County building, and the moving of a trailer park.

Debris generated during demolition as part of a buyout varies based on the size and the structure's primary construction materials. Debris from demolition of wood frame structures with a foundation are estimated at 100-120 pounds/square foot, wood frame structures with a crawl space at 40-50 pounds/square foot, and full brick frame structures with foundation at 125-150 pounds/square foot. Data from other similar projects indicate that demolition of one-story and two-story houses generates between 35 and 60 tons of demolition debris. The weight of the demolished structure is a function of the home's square footage, the structure's construction materials, and the extent to which the structure was cleaned out prior to being demolished. Materials accumulated during demolition are typically placed in a 20-yard dumpster and transported to a disposal site by truck. The Corps contractually requires the demolition contractor to dispose of waste materials in a licensed permitted site but allows the contractor to

[18] This is a feasibility-level estimate based on preliminary investigations. Verification of the amount will be further investigated during PED.

identify their own disposal site. To minimize transportation costs, the contractor would most likely select a local licensed landfill.

Assuming approximately 90 cubic yards of debris per structure demolished, Alternative 4 would generate approximately 2,500 cubic yards of construction demolition debris for landfill disposal. For all of the action alternatives, trailers in the trailer park would be moved rather than demolished.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Nonstructural hydraulic mitigation for Fernville is assumed to be strictly buyout. Owner participation in the nonstructural mitigation would be voluntary, thus quantifying the impacts associated with the nonstructural aspect of the project is more speculative. For the sake of analysis, all of the 110 residences in Fernville were assumed to participate in the buyout.

Implementing Alternative 5 would require the taking of an estimated 122 residences, one commercial structure, one County building, and the moving of a trailer park. Alternative 5 would generate approximately 11,500 cubic yards of construction demolition debris for landfill disposal.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Comprehensive HTRW investigations could not be completed along critical portions of the Interior Alignment under Alternative 8 due to refusals to grant rights-of-entry. Therefore, conclusions regarding the presence or absence of HTRW in these areas cannot be inferred from the available data. However, a capped landfill is located within the Interior Alignment footprint. Construction of a levee section through a capped landfill would involve many restrictions (if the construction could even be permitted). The portion of the landfill beneath the levee footprint would need to be removed. The landfill on either side of the levee would need to be sloped back and reclaimed properly to provide an appropriate cap. Significant design and permitting issues would undoubtedly be encountered during construction of the Interior Alignment for Alternative 8.

Any material that is selected for reuse elsewhere in the project would be subject to Pennsylvania's Clean/Regulated Fill Policy. Based on the limited information available for the unsampled Interior Alignment areas, much of the material would not be expected to meet the guidelines for reuse as either clean or regulated fill, and off-site disposal would be necessary. Again, the non-Federal sponsor would be responsible for any HTRW response costs, and none of these costs could be credited towards the non-Federal sponsor's share of project costs.

Implementing Alternative 8 would require the taking of an estimated 40 residences, three commercial structures, one County building, and the moving of a trailer park. Alternative 8 would generate approximately 4,000 cubic yards of construction demolition debris for landfill disposal.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 8 excepting that there would no longer be structural protection in Fernville because the Fernville hydraulic mitigation would be non-structural. As with Alternative 5, for the sake of analysis, all of the 110 residences in Fernville were assumed to participate in the buyout. Implementing Alternative 9 would require the taking of an estimated 152 residences, one commercial structure, one County building, and the moving of a trailer park. Alternative 9 would generate approximately 14,000 cubic yards of construction demolition debris for landfill disposal.

5.9 Socio-Economics

Alternative 1: No Action

Under the no action alternative, levee/floodwall would not be constructed to protect the residences and businesses of Bloomsburg from flooding. Future catastrophic flooding would result in major economic and social effects to Bloomsburg including loss of homes and destruction of businesses. In areas with recurring flooding, homes tend to become more degraded over time because money that could be used for general improvements is used for flood repairs. Over time, the market value of real property diminishes and negatively impacts local tax revenues. Recurring flooding also requires the expenditure of local tax revenues for flood-fighting, clean-up, infrastructure repair and emergency response. This diverts local revenues from infrastructure and recreation improvements from all of Bloomsburg, not just the flooded areas. Damage to commercial and industrial facilities ripple through the economy when businesses are forced to close, lay-off workers, and cease production for several weeks. In the long-run, permanent tax and employment losses would occur if owners of commercial and industrial facilities are no longer willing to endure recurrent flooding.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Construction of the Fringe Alignment would result in the addition of more than $40 million dollars into the regional economy over the three-year construction period. Construction activities would involve skilled and unskilled labor earning wages between $15 and $50 per hour.

Effect on Housing

The flood damage reduction project would have a direct positive impact on housing due to a reduction in the potential for future flood damages and the subsequent reduction in associated costs to repair such damages. The project also would have a positive effect on residential property values in Bloomsburg and Fernville due to the reduced probability of flood damages.

At the same time, a negative effect would be experienced by residents whose homes are currently located in the footprint of the levee/floodwall system. These homes would be acquired and razed as part of Fringe Alignment construction.

Effect on Population and Economic Growth

The proposed project would not be expected to create any long-term secondary economic impacts on the region's population because the project would not induce long-term growth and should not cause in-migration. Implementation of the flood damage reduction project could encourage business to remain or become established in Bloomsburg, but flood protection is not the only factor that stimulates economic growth.

Effect on Demographics

Implementation of the flood damage reduction project would not result in significant growth-inducing, or growth-inhibiting, impacts on existing or future demographic characteristics because the area is almost completely developed. The project would have no impact on the number, density, or racial composition of residents living within the project area.

Construction of a flood damage reduction project would have a direct positive economic impact on existing businesses in the study area due to reduced potential for future flood damages, business interruptions, and access to businesses after major storm events. There also would be a minor, indirect beneficial economic impact on the local economy during construction from the introduction of construction workers and the resulting purchase of supplies and food during the construction phase. Like the impact on housing, businesses that are located in the levee/floodwall system footprint would experience an adverse effect as their properties are acquired and razed for construction of the Fringe Alignment.

Effect on Fishing Creek Access

Construction of a levee/floodwall system along both sides of Fishing Creek would create a physical barrier that would restrict pedestrian access for recreational purposes. However, the left descending bank of Fishing Creek along the Bloomsburg side of the alignment is steep until the downstream-most portion of the alignment, and thus limits access under current conditions. The right descending bank of Fishing Creek along the Fernville side of the alignment Creek is accessible, and would continue to be so over the top of the levee portions of the levee/floodwall system. There is no public canoe or boat launch access to Fishing Creek in the reach, as all of the property is privately owned.

Executive Order 13045

Executive Order 13045 (1977), Protection of Children from Environmental Health Risks and Safety Risks, recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health and safety risks. This Executive Order requires Federal agencies, to the extent permitted by law and mission, to identify and assess such environmental health and safety risks.

No aspect of the project would expose children to materials that would result in an adverse effect on their health. Areas where potential hazards exist (active construction areas and staging areas) would be provided with perimeter fencing and signed as appropriate to deter unauthorized access especially to ensure the safety of children. The local authorities would be responsible for monitoring the project during off hours to ensure the project is policed to deter unauthorized access and to ensure the child safety measures included in the project design are maintained.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Construction of Alternative 5 would result in similar beneficial socioeconomic effects from the infusion of construction dollars into the local economy. As such, the effects of implementing Alternative 5 would be substantially similar to the effects of implementing Alternative 4 with the important exception of the effects to housing and community cohesion in Fernville. Implementing non-structural hydraulic mitigation for Fernville would result in the taking and demolition of approximately 110 more structures in Fernville. This would have a significant negative effect to community cohesion, as virtually the entire community would be removed.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Construction of Alternative 8 would result in similar beneficial socioeconomic effects from the infusion of construction dollars into the local economy and similar detrimental effects from creating a physical barrier between Bloomsburg and Fernville. Implementation of the Alternative 8 would also result in a higher negative effect on major industrial facilities during the construction phase as staging areas, limits of work, and the alignment itself would interfere with on-going operations at the facilities. The takings analysis indicates that implementing Alternative 8 would require the taking of an estimated 40 residences, three commercial structures, one County building, and the moving of a trailer park. The Fringe Alignment identified in Alternative 4 would affect only the Fairgrounds parking area while the Interior Alignment (Alternative 8) would permanently affect operations of the Fairgrounds by encumbering the movement of people and equipment within the Fairgrounds. The visual intrusion of the levee would also reduce sight lines, limit access to venues, and dramatically alter the character of the Fairgrounds.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Construction of Alternative 9 would result in beneficial socioeconomic effects from the infusion of construction dollars into the local economy. The effects of implementing Alternative 9 would be substantially similar to the effects of implementing Alternative 8 with the important exception of the effects to housing and community cohesion in Fernville. Implementing non-structural hydraulic mitigation for Fernville would result in the taking and demolition of approximately 110 more structures in Fernville. This would have a significant negative effect to community cohesion, as virtually the entire community would be removed. Implementing Alternative 9 would require the taking of an estimated 152 residences, one commercial structure, one County building, and the moving of a trailer park. As such, this alternative represents the most detrimental to community cohesion, displaces the most people, and results in the greatest negative effects.

5.9.1 Environmental Justice

Alternative 1: No Action

Under the No Action alternative, a flood damage reduction project would not be constructed for Bloomsburg, and there would be no Environmental Justice effects.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Compliance with Executive Order 12898 requires an evaluation of the nature of the proposed actions and the human context into which those actions would be undertaken. In order to have potential Environmental Justice impacts, a proposal must have potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Native American tribes. This action has been evaluated for potential disproportionately high environmental effects on minority or low-income populations and there would not be a high human health or environmental impact on minority or low-income populations. The population within the Town of Bloomsburg is 94.4 percent white, 2.6 percent black or African American, and 1.7 percent Hispanic or Latino. Census block-level data (U.S. Bureau of the Census, 2004) for the affected areas were examined to determine whether the minority population in the affected area is meaningfully greater than the minority population percentage in the general population. The block-level data show that the population of the affected areas of Bloomsburg, Fernville, and Montour Township is 94.6 percent white, 96.5 percent white, and 97.9 percent white, respectively. Therefore, the minority population of the affected areas does not exceed 50 percent, and the minority population is not higher in the affected areas than in other areas of the community.

Low-income populations are identified using statistical poverty thresholds from the Bureau of the Census Current Population Reports, Series P-60 on Income and Poverty (U. S. Bureau of the Census, 2000). The threshold for the 2000 census was an income of $17,761 for a family of four (U.S. Bureau of the Census, 2000). Based on the 2000 Census, Bloomsburg has approximately 10.5 percent of families below the poverty level (U.S. Bureau of the Census, 2004). Census block-level data (U.S. Bureau of the Census, 2004) for the affected areas were examined to determine whether the population of families below the poverty level is meaningfully greater than the population of families below the poverty level in the general population. The block-level data show that the population of families below the poverty level in the affected areas of Bloomsburg, Fernville, and Montour Township is 12.7 percent, 2.6 percent, and 7.8 percent, respectively. While the percent of families below the poverty level is higher for Bloomsburg at the Census block level than for the Town as a whole (12.7 percent versus 10.5 percent), the areas within Bloomsburg with the highest concentration of persons below the poverty level would not be within the potential project area (U.S. Bureau of the Census, 2004). Census block data for Fernville and Montour Township also show that and there would be no disproportionate effect to low-income populations.

Implementation of Alternative 4 would not result in any change to environmental resources that individuals involved in subsistence fishing or hunting utilize. Also, construction of Alternative 4 would not involve the release of hazardous, toxic, or radioactive materials to which minority or low-income populations would be exposed. As such, implementation of Alternative 4 would not create disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Native American tribes.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

As with Alternative 4, there would be no predicted environmental justice effects of implementing Alternative 5.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

There would be no predicted environmental justice effects of implementing Alternative 8.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

There would be no predicted environmental justice effects of implementing Alternative 9.

5.10 Noise

Alternative 1: No Action

Without construction of a flood damage reduction project, noise within the project area would remain unchanged from current conditions. In the event of a major flood, noise would be generated associated with the operation of heavy equipment used for cleanup and reconstruction. The effects of these noise sources would include annoyance and community disturbance. Because there would be no flood protection under the no action alternative, this community-wide cleanup and reconstruction noise would occur repeatedly and on a predictable basis.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Construction of Alternative 4 would include the use of earth-moving equipment, trucks to haul materials to and from the site, and equipment used for construction. Noise effects associated with the project would be generated from construction and materials transportation activities.

Construction noise would be typically limited to standard business hours; however, significant disturbances to those residing along Fishing Creek would be expected. No serious disturbances are expected along the rest of the proposed alignment, including Bloomsburg High School. The construction contractor would be expected to keep construction activities under surveillance and control to minimize environmental damage by noise. Techniques for abating construction noise may vary from simple, inexpensive, easily implemented measures such as a requirement that all engines be equipped with a properly operating muffler, to more expensive, elaborate methods, such as equipment enclosures.

Many construction related activities that generate noise also create subsurface vibration. Normal project construction activities would not generate significant levels of vibration. However, pile driving, during construction of the floodwall, could produce ground-borne vibration levels that might be perceptible within approximately 650 feet of the pile-driving activity (USDOH, 1998). Ground-borne vibration levels at distances of approximately 60 meters or more will generally not result in adverse effects. Pile driving very close to structures, (within 60 feet) can cause structural damage due to displacement of soil and resulting lateral movement. Vibration from pile driving occurring within about 10 feet can cause architectural and structural damage to some buildings, especially un-reinforced or older buildings (USDOH, 1998). Current designs do not call for the need to utilize pile driving for construction of the flood control measures. If used, the construction specifications will contain the appropriate number and type of structural inspections, and vibration analyses to ensure that construction equipment (including pile installation equipment) does not adversely affect existing structures. Further, the number of structures that could be subject to damage would be determined and mitigation plans would be developed.

Methods to be employed, for any of the action alternatives, to minimize the effects of construction noise include:

(1) design considerations and project layout,

(2) alternative construction methods,

(3) source control,

(4) site control,

(5) time and activity constraints, and

(6) community awareness.

Design Considerations and Project Layout

During the preconstruction engineering and design (PED) stage, sensitive noise receptors can be identified, and steps can be taken to lessen the construction noise impacts. During location studies, natural and artificial barriers such as ground elevation changes and existing buildings can be considered for use as shields against construction noise. During PED, waste material dump and storage sites can be designated in areas where they also serve as noise barriers. Haul roads can be designated in locations where the noise effects caused by truck traffic will be reduced.

Alternate Construction Methods

Steps can be taken in PED to address the scheduling of work operations. Several noisy operations can be scheduled concurrently to take advantage of the fact that the noise levels produced will not be significantly greater than the level produced if the operations were performed separately. If noise barriers would be constructed for traffic noise abatement, they could be constructed in the initial stages of construction to reduce the overall noise impacts of the construction.

Source Control

Another abatement technique is to specify and employ site noise limits and noise control measures within the construction contract. Specifications may be written that set certain limits at the receptors, thus allowing the contractor to devise their own methods for meeting the requirements or they may directly specify certain actions that may be taken to achieve noise reduction at the receptors. One way to reduce noise impacts at sensitive receptors is to operate stationary equipment such as air compressors, generators, etc. as far away from the sensitive receptors as practical. Pit areas or excavated portions on the job site may provide suitable locations for stationary construction equipment and serve as noise barriers.

In some cases, activities such as form building, culvert construction, or other work involving stationary activities can be conducted inside an enclosure in order to reduce noise impacts. In all cases where enclosures and excavation are involved, proper ventilation, access, egress and safety for the construction workers must be considered and maintained. In urban areas or on isolated sections of a project, it may be beneficial and indeed necessary to construct barriers adjacent to the work area.

Time and Activity Constraints

Construction activity and its associated noise can be quite annoying and disruptive during leisure hours, during sleep hours, and any time when loud continuous noises may affect receptors. Time constraints and use of equipment regulations can be very effective in reducing the effects caused during these hours of the day. The basis for the noise control strategy is to limit the times that certain construction activities may be conducted. Generally, this can be accomplished by requiring the contractors to perform such work during daylight hours when the majority of individuals who would ordinarily be affected by the noise are either not present or are engaged in less noise-sensitive activities.

Community Awareness

Although not a physical method of noise abatement, public relations and community awareness is a positive method of lessening the effects of construction-related noise and disturbances. There may be numerous occasions during construction when noise reduction is neither feasible nor warranted. In these cases, it is especially helpful for the affected property owners to be made aware of the impending noise levels. Various techniques may be employed to inform the public of upcoming noise impacts related to construction activity. Depending on the duration of a particular phase of work and the degree of unavoidable effect, the methods used can be as simple as distributing flyers to the adjacent property owners or may be as complex as conducting public informational meetings. The most important considerations are early communication and a clear explanation of the scope of the proposed work and the duration in order to allow residents to plan their activities accordingly.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 5 would be similar to Alternative 4 excepting that there would no longer be structural protection along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in less construction-related noise because there would be no levee construction in Fernville. However, the demolition and removal of 110 residences represents an additional noise disturbance until all structures have been removed.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

The levee constructed for Alternative 8 (Interior Alignment) passes in closer proximity to residential areas and in closer proximity to businesses after turning south from Fishing Creek and crossing the Bloomsburg Fairgrounds. The noise effects from construction would be more severe than from the Fringe Alignment because the distance to the receptors would be reduced. Because of the logarithmic scale used to describe noise, doubling the strength of a noise source (e.g., twice as much traffic on a road) produces a 3-dB increase in average roadway noise. Such an increase would not be perceived as a doubling in noise loudness, which requires a 10-dB increase. Sound levels caused by line sources (e.g., relatively long, variable, or moving sound sources such as traffic) decrease at a rate of 3-dB when the distance from the road is doubled due to distance attenuation. Sounds from discrete events or stationary point sources, such as stationary equipment operating, decrease by 6-dB when the distance from the source is doubled. Conversely, halving the distance to a source increases sound levels by 3-dB and 6-dB for roadway and point sources, respectively. The distance to receptors under Alternative 8 is measurably less and would predictably lead to higher noise effects.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

Implementation of Alternative 9 would be similar to Alternative 8 excepting that there would be no structural protection along the right descending bank of Fishing Creek for Fernville because the Fernville hydraulic mitigation would be non-structural. This would result in the use of less construction equipment because there would be no levee construction in Fernville, however, the demolition and removal of 110 residences represents an additional noise disturbance until all structures have been removed.

5.11 Traffic

Alternative 1: No Action

Under the No Action alternative there would be no changes to the current traffic patterns or volumes due to constructing a flood reduction measure. However, failing to provide flood protection would predictably lead to substantial traffic effects during and after flooding. Currently flooding in Bloomsburg and Fernville makes roads impassable during high water and after floodwaters recede until sediments and debris are cleaned up. Continued flooding could also permanently damage bridges, culverts, or roads for which construction could take weeks or months creating longer-term traffic problems until the infrastructure was repaired or replaced.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Construction of the Fringe Alignment could take as many as 31,000 truckloads of materials and approximately 750,000 miles of road travel over the three-year construction period. Estimates of the number of trucks and total number of miles traveled were developed based on materials assumptions in the MCACES cost estimate shown in the Engineering Appendix. The estimated numbers were rounded up to a conservatively larger number of assumed trucks and total miles traveled.

Regional experience in the Wyoming Valley indicates that construction activities are seasonally influenced with the majority of activity taking place during the summer. As such, the transportation in support of the construction was assumed to have an uneven seasonal distribution. The seasonal distribution of activity was assumed as follows: winter (Dec, Jan, Feb) 5 percent, spring (Mar, Apr, May) 20 percent, summer (Jun, Jul, Aug) 50 percent, and fall (Sept, Oct, Nov) 25 percent.

For the Fringe Alignment, the total transportation events (31,000) were divided by the number of years (3) for the construction to derive an annual number of trucks (10,333). Applying the seasonal distribution factors and dividing by the number of workdays per season (60) yields the predicted daily increase in truck traffic.

Table 5-1
Estimated Truck Trips

	Total Trucks	Trucks Per Year	Winter	Spring	Summer	Fall
Annual Increase	31,000	10,333	517	2,067	5,167	2,583
Daily Increase	n/a	n/a	9	34	86	43

Under this set of assumptions, the greatest increase in traffic was predicted for transportation of materials during the summer months (July, August, and September) with an average increase of 86 trucks per workday coming to and from the project. Given baseline levels of service (LOS) in Bloomsburg, the projected increase in traffic would likely cause additional traffic congestion if vehicles were routed through known problem areas. To the extent possible, access and egress would be managed to avoid those intersections known to be congested and to avoid those intersections at peak times of day. Accessing the majority of the construction area using Interstate Route 80, P.A. Route 42, and U.S. Route 11 should minimize the effects on traffic, as these routes have no problems in their levels of service.

The greatest potential for adverse effects would exist when the busy summer construction season coincides with large-scale events hosted at the Fairgrounds. Once construction is completed, no permanent effects to traffic are expected with routine (not during times of flood conditions) use of study area roads.

To minimize the effects of traffic increases, the Corps will develop a traffic management plan during the next phase (preconstruction engineering and design) of project planning. This plan will be developed in concert with the Town and local residents to effectively reduce the traffic effects during construction.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

The effects to traffic from implementing Alternative 5 would be similar to Alternative 4. While there would be no structural protection to construct in Fernville, the truck traffic for removal of construction demolition debris resulting from the demolition of 110 residential structures would offset the traffic from protection construction under Alternative 4.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

An MCACES cost estimate and material quantities are not available for the actions described for Alternative 8 (Interior Alignment). The overall length of the alignment is approximately 3,000 feet shorter than the Fringe Alignment. The effects on traffic from construction of the Interior Alignment would be lower as a result of less material being transported to and from the site and from a slight reduction in construction duration (i.e., completing construction of the Interior Alignment sooner than the Fringe Alignment).

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

The effects to traffic from implementing Alternative 8 would be similar to Alternative 9. While there would be no structural protection to construct in Fernville, the truck traffic for removal of construction demolition debris resulting from the demolition of 110 residential structures would offset the traffic from protection construction under Alternative 8.

5.12 Aesthetics

Alternative 1: No Action

Under the No Action alternative, no levees or floodwalls would be constructed in Bloomsburg or Fernville. As such, there would be no changes to aesthetic and scenic resources stemming from the construction and operation of the structural flood damage reduction measures. Existing views of Fishing Creek from residential areas of Fernville and Bloomsburg would not be obscured or altered. In the absence of flood protection, destructive flooding would be predicted to occur such that homes, property, and businesses would be damaged or destroyed. The scenic resource of the communities of Bloomsburg and Fernville could be permanently and significantly altered if a severe flood occurred without a flood damage reduction project under the No Action alternative. Chronic, less severe flooding also decreases the aesthetic value of an area by accelerating the deterioration of structures and infrastructure and diverting capital away from municipal or residential improvements in favor of repair from flood damage.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Potential visual impacts under Alternative 4 would include temporary and long-term visual changes introduced by the construction of the floodwall and levee. Figure 5-1 is an aerial photograph of a similar levee in a residential area of Moorefield, West Virginia. Construction activities with potential visual impacts include the temporary establishment and use of construction laydown areas, the placement of H-pile, and the completion of the final structural components. Potential long-term visual impacts would result from a change in the visual appearance for residents of Bloomsburg and Fernville as well as Fairgrounds patrons.

The levee/floodwall system along the Bloomsburg side of Fishing Creek would be between 12 and 15 feet above current grade, and the Fernville reach of the levee/floodwall system along Fishing Creek would similarly be between 15 and 17 feet above grade[19]. Pedestrian and residential views of Fishing Creek would be obscured when at the same grade as the floodwall/levee.

[19] While the height above grade will differ for the Bloomsburg and Fernville sides of the levee/floodwall system, the top of protection for both sides of the system (i.e., the left descending bank and the right descending bank) will be constructed to identical elevations.

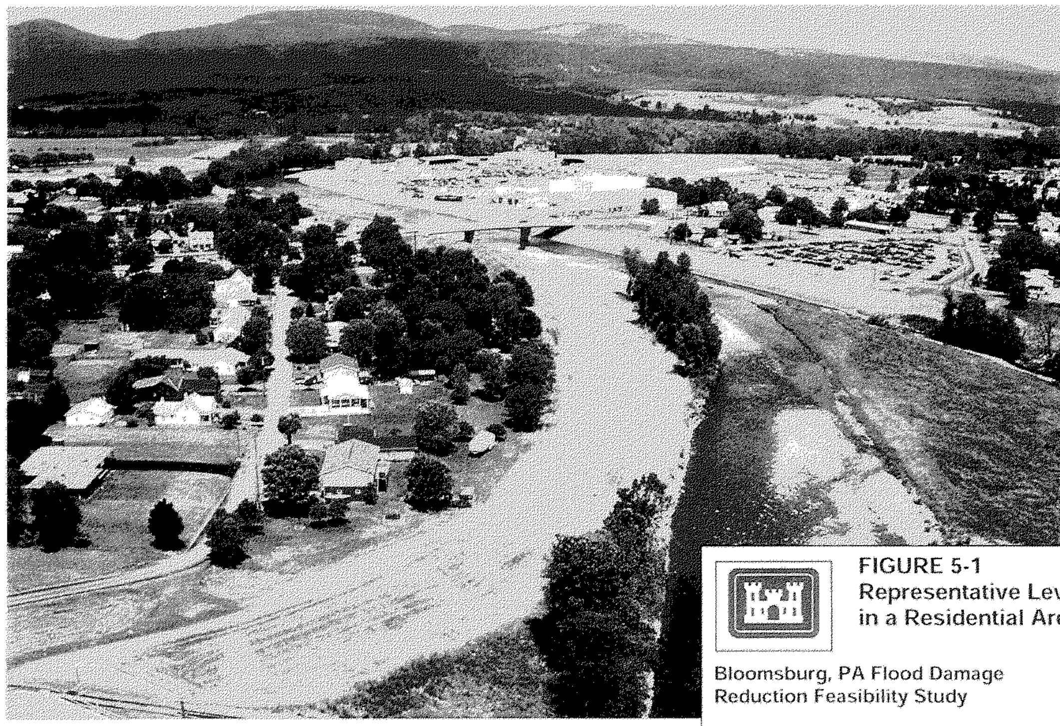

FIGURE 5-1
Representative Levee in a Residential Area

Bloomsburg, PA Flood Damage Reduction Feasibility Study

The visual impact to the property owners along Fishing Creek is considered permanent and significant. The proposed structural changes would occur within a residential park-like setting where visual connection to Fishing Creek is readily available and important. Where possible, the basic design of the proposed levee will be refined to minimize the aesthetic impacts of the levee/floodwall system, but the visual barrier will remain.

Although a significant effect to the property owners, there would not be a significant aesthetic effect to the community as a whole. There is no public access to Fishing Creek within the Fringe Alignment. Public access to view Fishing Creek is currently available from the Railroad Street Bridge and the Double Track Bridge (Red Mill Road); these locations will continue to provide accessible points of observation for the general public.

There would be no significant visual effect to the Susquehanna River from the Fringe Alignment, although the Susquehanna River is designated as an American Heritage River. Sight lines from the river are obscured by elevation, riverbank vegetation, and existing structures (e.g., sewage treatment plant and Bloomsburg High School).

The construction activities associated with the levee/floodwall system would be of limited duration and would be distributed throughout Fernville and Bloomsburg. To the extent possible, final design would include features to minimize the aesthetic impacts such that the structural features would blend in with, or be partially screened by, trees, landscaping, and buildings along the alignment.

The construction contractor would be expected to remove residual signs of temporary construction facilities such as haul roads, work areas, structures, foundations or temporary structures, stockpiles of excess or waste materials, or other vestiges of construction. The disturbed areas would be graded and filled, and the entire area would be seeded unless otherwise indicated to minimize the permanent visual impacts.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

The aesthetic effects from implementing Alternative 5 would be similar to Alternative 4 for the effects to Bloomsburg, but would differ substantially for the aesthetic and visual effects in Fernville. Under Alternative 5, there would be no structural protection to construct in Fernville and therefore no levee construction effects or visual barriers remaining after construction. However, the aesthetic and visual effects from the demolition and removal of 110 residential structures would create a significant, permanent aesthetic effect.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

With implementation of Alternative 8, the visual and aesthetic effects to the residents of Bloomsburg and Fernville along Fishing Creek would be similar to those created by building the Fringe Alignment: permanent and significant. At the downstream end of Fishing Creek there would be less of a visual impact on the Bloomsburg side because under Alternative 8 (Interior Alignment), the alignment would turn away (south) from Fishing Creek approximately 600 feet upstream from where the Fringe Alignment turns to cross the Bloomsburg Fairgrounds. As with the Fringe Alignment, the visual effects to the public would not be significant.

Because the Interior Alignment is in closer proximity to residences and businesses as it crosses the Fairgrounds, the visual impact would be more severe than for the Fringe Alignment, where the visual intrusion is more removed.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

The aesthetic effects from implementing Alternative 9 would be similar to Alternative 8 for the effects to Bloomsburg, but would differ substantially for the aesthetic and visual effects in Fernville. Under Alternative 9, there would be no structural protection to construct in Fernville and therefore no levee construction effects or visual barriers remaining after construction. However, the aesthetic and visual effects from the demolition and removal of 110 residential structures would create a significant, permanent aesthetic effect.

5.13 Land Use

Alternative 1: No Action

Under the No Action alternative, potential effects to land use associated with the construction and operation of a flood damage reduction project would not occur. Land use patterns would be expected to remain unchanged, as the community has persisted for decades enduring the effects of flooding. The continued potential for flooding of residences and businesses discourages investment in flood-prone areas.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Land that would be affected by the construction of Alternative 4 consists of residential, commercial, and agricultural areas. Within Bloomsburg, 18 residential and three commercial structures would need to be removed to build the Fringe Alignment. The Fernville levee would require the removal of one residential structure. In addition, seven residential structures and one mobile home park (consisting of 29 mobile homes) would be removed in Montour as mitigation for increased flooding from the Fringe Alignment.

In the Fairgrounds, property currently used for parking would be used for the footprint of the levee, and 11.5 acres of farmland south of the Fairgrounds would no longer be arable.

Land use within the Fringe Alignment would not be predicted to change appreciably after completion of construction. Businesses would continue to operate with the increased measure of safety provided by the flood damage reduction project.

Executive Order 11988

Executive Order 11988 (1977) requires Federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Corps policy addresses this Executive Order as follows:

> *....projects that achieve only land development (location) benefits do not address the priority purpose of flood damage reduction and, therefore, have a low budget priority. Federal participation in these projects or separable increments will not be recommended.*
>
> *The NED plan will be formulated to protect existing development and vacant property that is interspersed with existing development. All project benefits, including land development benefits for the interspersed vacant property, will be included for project formulation and justification. The NED plan may also provide for the protection of vacant property that is not interspersed with existing development if it can be demonstrated that the vacant property would be developed without the project and*

benefits are based on savings in future flood proofing costs or reduction in damages to future development.

Economic analyses conducted to identify the NED plan (described in Section 4) assigned no value to vacant property contained within the protected area, and no benefits associated with the vacant property were included in the analysis. As such, the NED plan does not "provide for the protection of vacant property" merely because vacant property is contained within the protected area. Rather, the vacant property is contained in the protected area because the alignment was positioned to avoid the boundaries of closed landfills.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

The effects to land use from implementing Alternative 5 would be similar to Alternative 4 for the effects to Bloomsburg, but would differ in Fernville. Under Alternative 5, there would be non-structural hydraulic mitigation requiring the demolition and removal of 110 residential structures within that community, in effect, changing the land use from residential to natural.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Land Use effects from implementation of Alternative 8 would be substantially identical to implementation of Alternative 4 in Fernville and Montour, but Alternative 8 would not affect agricultural lands. Because Alternative 8 has the Interior Alignment proceeding directly through the Fairgrounds and in close proximity to active industrial facilities, the Interior Alignment would have potentially adverse effects on current industrial land use.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

The effects to land use from implementing Alternative 9 would be similar to Alternative 8 for the effects to Bloomsburg, but would differ in Fernville. Under Alternative 9, there would be non structural hydraulic mitigation requiring the demolition and removal of 110 residential structures within that community, in effect, changing the land use from residential to natural.

5.14 Parks and Recreation

Alternative 1: No Action

Under the No Action alternative, no flood damage reduction project would be constructed, and there would be no changes to parks and recreational resources. None of the alignments assessed in the action alternatives provide protection for parks in Bloomsburg, so these resources would not be affected by taking no action.

Alternative 4: Fringe Alignment and Fernville Levee Hydraulic Mitigation

Construction of Alternative 4 would be expected to have no effect on nearby municipal parks or recreation areas. During and after construction, the Fringe Alignment would reduce the size of the parking area for the Fairgrounds and effect access to events. However, after construction is completed, the flood damage reduction project would provide protection to Fairgrounds facilities.

Alternative 5: Fringe Alignment and Non-Structural Hydraulic Mitigation

The effects of implementing Alternative 5 are predicted to have no effect on nearby municipal parks or recreation areas.

Alternative 8: Interior Alignment and Fernville Levee Hydraulic Mitigation

Effects of building and operating Alternative 8 would be substantially the same as Alternative 4 with the exception that Alternative 8 would physically separate the Fairgrounds from its parking lot. It is expected that there would be a minimal affect on the recreation potential of the Fairgrounds, as exhibitors would be confined to the area defined by the Interior Alignment.

Alternative 9: Interior Alignment and Non-Structural Hydraulic Mitigation

The effects of implementing Alternative 9 are predicted to have no effect on nearby municipal parks or recreation areas.

A summary table that compares the environmental effects of the final array of alternatives is provided in Table 5-2

5.15 Environmental Mitigation

5.15.1 On-Site Mitigation

Wetlands Impacts Mitigation

Construction of the Preferred Alternative (4) in the vicinity of the south-central edge of the Fairgrounds and the North Shore Railroad will require the unavoidable filling of approximately 0.7 acres of wetlands. Wetlands that would be impacted were delineated and GPS-located in June 2003, as described in a report entitled, "Bloomsburg Local Flood Protection Project Wetlands Delineation Report", dated 17 July 2003. These wetlands consist of approximately 0.2 acres of mixed palustrine forested and shrub-scrub wetlands and about 0.5 acres of palustrine emergent wetlands. The wetlands are anthropogenic in origin; the wetland hydrological conditions created by constructed berm-impoundment of surface runoff and soil compaction associated with historical use of the area as a landfill and rail-side staging area. More than 50 percent of the wetland area is dominated by non-native species (common reed-grass) monotypic stand, which render these wetlands as lower quality habitats. There is also approximately 2.4 acres of high quality forested wetlands planned to be directly impacted by the current alignment at the upper end of the Fernville levee alignment. This wetland performs several important functions as detailed in the functional assessment included in the Planning Appendix.

The effects to these wetland areas will be mitigated during construction of the levee (see Tables 5-3 and 5-4). Approximately 1.1 acres of non-wetland area just west of the proposed levee and confluent with delineated wetlands "A" and "E" (see Figure 2-3 in Section 2) will be graded to retain surface water, seeded with a native wetland seed mix and planted with native wetland trees and shrubs. This wetland project will offset the loss of the lower quality wetlands being directly impacted by the project. It is anticipated that the 2.4 acres of forested wetlands along Fishing Creek will be almost totally avoided during the design phase by a planned alignment shift towards the upland terrace paralleling this creek and its floodplain. Any remaining impacts to this forested wetland that remains will require additional wetland mitigation, either along the lower segments of Fishing Creek or along the floodplain of the river.

Table 5-2
Summary of Final Alternatives Environmental Affects

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Physiography and Geomorphology	No changes to the physiography and ongoing geomorphic processes at work in Fishing Creek and the Susquehanna River at Bloomsburg.	No change to the physiography, but confining flood flows within the levee/floodwall system would reduce catastrophic geomorphological changes from peak flows within the confines of the levee/floodwall system.	Non-structural hydraulic mitigation for Fernville (i.e., no levee for Fernville) would allow floodwaters to inundate the lower elevations when Fishing Creek floods and would allow geomorphological changes to the unprotected right descending bank.	Effects of Alternative 8 would be similar to those of the Alternative 4.	Effects would be similar to Alternative 5.
Soils	Continued flood-related deposition of silt within the floodplain of lower Fishing Creek and the right bank of the Susquehanna River in Bloomsburg	Would result in the conversion of approximately 11.5 acres of farmland to non-agricultural use.	Similar to Alternative 4.	Would not intersect any areas that are designated as Prime Farmland or Additional Farmland of Statewide Importance.	Would not intersect any areas that are designated as Prime Farmland or Additional Farmland of Statewide Importance.
Climate and Weather	No effect.	No effect.	No effect.	No effect.	No effect.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Surface Water	Failing to provide Bloomsburg with flood damage protection measures could contribute to the temporary deterioration of the surface water quality in the event of large-scale flooding.	Expected to result in only minor effects over current conditions. During construction of the bank armoring there would be a temporary increase in the turbidity of surface waters, as sediments would be disturbed during rock placement. Elimination of the streamside vegetation and addition of the rock in the creek would also contribute to a small thermal impact by the increased exposure to sunlight.	Identical to Alternative 4 for the left descending bank of Fishing Creek, but would have marked differences for the right descending bank (Fernville). With non-structural hydraulic mitigation there would be no Fernville Levee needing for bank protection with riprap. There would be no riprap installed within the stream or riparian zone and the effects to water quality from this stabilization would be avoided.	Substantially similar effects as Alternative 4, although there would be an approximate 600-foot reduction in the length of Fishing Creek shoreline that would require rip-rap.	Similar to Alternative 5 as non-structural hydraulic mitigation would avoid the effects of installing riprap along the right descending bank of Fishing Creek
Hydrology and Groundwater	No direct impacts. However, failing to provide flood protection for Bloomsburg could contribute to the contamination of groundwater resources through the repeated inundation during floods	Would only affect groundwater hydrology during flows greater than bank-full as the proposed flood damage reduction project alters channel hydraulics only for flows greater than bank-full. Given the relatively infrequent occurrence of these flows and their relatively short duration, minimal effects on groundwater are expected	Would allow floodwaters to inundate the lower elevations when Fishing Creek exceeds bank-full flows. However, as with Alternative 4, minimal effects on groundwater are expected.	Would result in substantially similar effects as Alternative 4.	Would result in substantially similar effects as Alternative 5.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Vegetation	Failing to protect Bloomsburg from flooding could indirectly result in adverse effects to vegetation in the riparian corridor due to clean up after flood events.	Approximately 2 acres of riparian vegetation permanently removed for the placement of riprap.	Approximately 0.8 acres of riparian vegetation permanently removed for the placement of riprap.	Approximately 1.6 acres of riparian vegetation permanently removed for the placement of riprap.	Approximately 0.4 acres of riparian vegetation permanently removed for the placement of riprap
Wetlands	No direct impacts to wetlands in this alternative. In the absence of a flood damage reduction project, the wetlands within the project area would continue to be influenced by periodic flooding.	Approximately 3.1 acres of wetlands are within the expected area of disturbance: 0.7 acres of impact to a mixed cover, lower quality wetland at the fairgrounds and 2.4 acres of high quality forested wetlands in the Fernville Creek floodplain at the upper end of the Fernville levee.	Approximately 0.7 acres of impact to a mixed cover, lower quality wetland at the fairgrounds.	As with Alternative 4, approximately 2.4 acres of high quality forested wetlands at the upper end of the Fernville levee as well as 0.9 acres of palustrine emergent and shrub-scrub wetlands in the alignment.	Approximately 0.9 acres of palustrine emergent and shrub-scrub wetlands in the alignment.
Wildlife	In the absence of a flood protection measure for Bloomsburg, wildlife abundance and diversity within the low quality and significantly disturbed habitat of the project area would remain unchanged.	Temporary disturbance to species within the wetland habitat, but would not create significant permanent effects to wildlife.	Temporary disturbance to species within the wetland habitat, but would not have habitat loss on Fernville bank. Would not create significant permanent effects to wildlife.	Temporary disturbance to species within the wetland habitat Would not create significant permanent effects to wildlife.	Similar to Alternative 5.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Fish	No direct impacts to the fisheries of Fishing Creek or the Susquehanna River. However, failing to provide flood protection for Bloomsburg would allow contamination of surface waters during flooding from domestic, industrial/commercial, or municipal sources	Approximately 0.7 acre of stream habitat would be transformed from natural habitat to riprap by placing the material into the stream.	Approximately 0.28 acre of streambed transformed from natural habitat to riprap placing the material into the stream.	Approximately 0.55 acre of streambed transformed from natural habitat to riprap placing the material into the stream.	Approximately 0.14 acre of streambed transformed from natural habitat to riprap placing the material into the stream.
Threatened and Endangered Species	No effect on protected species as none have been identified within the project area.	No effect.	No effect.	No effect.	No effect.
Air Quality	Potential air quality impacts associated with the construction and operation of a flood damage reduction project would not occur.	Estimates of releases of National Ambient Air Quality Standards indicate only 39 percent of the annual limit for NOx and 7 percent of the annual limit for VOCs would be released. Conformity assessment is not required.	Less than Alternative 4, but still not requiring a conformity assessment.	Less than Alternative 4, but still not requiring a conformity assessment.	Less than Alternative 4, but still not requiring a conformity assessment.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Cultural Resources	No effects to known and unknown cultural and architectural resources would result from construction of flood protection measures. Potential visual impacts to any historic structures from prominent levee/floodwalls would not occur. Could contribute to the permanent damage or destruction of cultural and historic resources by failing to protect them with a comprehensive measure.	Archeological investigations have not revealed the presence of any intact prehistoric archaeological resources and this alternative is considered to only have a minimal effect on historic architectural resources. Effects to historic views are likely to be negligible.	Same as Alternative 4.	Visual impacts to historic architectural resources would likely be moderately increased over Alternatives 4 and 5 as the levee/floodwall system would bisect the core of the Bloomsburg Fairgrounds.	Same as Alternative 8.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
HTRW	Failing to provide flood damage reduction measures would indirectly contribute to the dispersion of HTRW materials and environmental damage. Significant flooding can result in the mobilization and dispersion of HTRW from businesses, residences, as well as buried materials. Flood clean up experience has shown that vast quantities of debris and increasingly HTRW materials are dispersed into the floodplain and aquatic environment when large-scale flooding occurs	Would generate approximately 13,600 of non-hazardous "residual" waste that would require disposal at an active Resource Conservation and Recovery Act (RCRA) Subtitle D disposal facility. Approximately 4,500 cubic yards of hazardous waste is expected to be generated during levee construction and would require disposal at a RCRA Subtitle C hazardous waste landfill. Also, approximately 2,500 cubic yards of construction demolition debris for landfill disposal.	Same non-hazardous "residual" waste and RCRA Subtitle C waste as Alternative 4. Approximately 11,500 cubic yards of construction demolition debris for landfill disposal.	Comprehensive HTRW investigations could not be completed along critical portions of the Interior Alignment under Alternative 8 due to refusals to grant rights-of-entry. Approximately 4,000 cubic yards of construction demolition debris for landfill disposal.	Same lack of information as under Alternative 8. Approximately 14,000 cubic yards of construction demolition debris for landfill disposal.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Socio-Economics	Future catastrophic flooding would result in major economic and social effects to Bloomsburg including loss of homes and destruction of businesses.	Approximately $40 million dollars into the regional economy over the three-year construction period. Positive effect on residential housing values.	Same as for Alternative 4, but non-structural protection for Fernville would have a significant negative effect to community cohesion, as virtually the entire community would be removed	Influx of construction dollars into the economy as with all action alternatives. Intrusion of the levee through the Fairgrounds would also reduce sight lines, limit access to venues, and dramatically alter the character of the Fairgrounds	Same as for Alternative 8, but non-structural protection for Fernville would have a significant negative effect to community cohesion, as virtually the entire community would be removed
Environmental Justice	No Environmental Justice effects.	Would not create disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Native American tribes.	Same for all alternatives.	Same for all alternatives.	Same for all alternatives.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Noise	Noise within the project area would remain unchanged from current conditions. Noise would be generated associated with the operation of heavy equipment used for flooding cleanup and reconstruction. This community-wide cleanup and reconstruction noise would occur repeatedly and on a predictable basis.	Construction noise would be typically limited to standard business hours; however, significant disturbances to those residing along Fishing Creek would be expected. No serious disturbances are expected along the rest of the proposed alignment, including Bloomsburg High School.	Similar to Alternative 4 excepting that there would no longer be structural protection along the right descending bank of Fishing Creek resulting in less construction-related noise because there would be no levee. However, the demolition and removal of 110 residences would represent an additional noise disturbance until all structures have been removed.	The distance to receptors under is measurably less (Interior Alignment) and would predictably lead to higher noise effects.	Same as Alternative 8 in addition to the demolition and removal of 110 residences in Fernville as described in Alternative 5.
Traffic	No changes to the current traffic patterns or volumes due to constructing a flood reduction measure. However, failing to provide flood protection would predictably lead to substantial traffic effects during and after flooding.	Could take as many as 31,000 truckloads of materials and approximately 750,000 miles of road travel over the three-year construction period.	The effects would be similar to Alternative 4. While there would be no structural protection to construct in Fernville, the truck traffic for removal of construction demolition debris resulting from the demolition of 110 residential structures would offset the traffic from protection construction under Alternative 4.	The effects on traffic from construction would be lower as a result of less material being transported to and from the site (shorter line of protection) and from a slight reduction in construction duration.	Similar to Alternative 8. While there would be no structural protection to construct in Fernville, the truck traffic for removal of construction demolition debris from the demolition of 110 residential structures would offset the traffic from protection construction under Alternative 8.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Aesthetics	No changes to aesthetic and scenic resources from the construction and operation of the structural flood damage reduction. Scenic resource of the communities of Bloomsburg and Fernville could be permanently and significantly altered if a severe flood occurred without a flood damage reduction project. Chronic, less severe flooding decreases the aesthetic value of an area by accelerating the deterioration of structures and infrastructure.	The visual impact to the property owners along Fishing Creek is considered permanent and significant. The proposed structural changes would occur within a residential park-like setting where visual connection to Fishing Creek is readily available and important. n not be a significant aesthetic effect to the community as a whole. No significant aesthetic effect to the community as a whole.	Similar to Alternative 4 for the effects to Bloomsburg, but would differ substantially for the aesthetic and visual effects in Fernville. There would be no structural protection to construct in Fernville and therefore no levee construction effects or visual barriers remaining after construction. However, the aesthetic and visual effects from the demolition and removal of 110 residential structures would create a significant, permanent aesthetic effect.	Visual and aesthetic effects to the residents of Bloomsburg and Fernville along Fishing Creek would be similar to those created by building Alternative 4: permanent and significant. Because the alignment for Alternative 8 is in closer proximity to residences and businesses as it crosses the Fairgrounds, the visual impact would be more severe than for the Fringe Alignment, where the visual intrusion is more removed.	Similar to Alternative 8 for the effects to Bloomsburg, but would differ substantially for the aesthetic and visual effects in Fernville. No structural protection to construct in Fernville and therefore no levee construction effects or visual barriers remaining after construction. However, the aesthetic and visual effects from the demolition and removal of 110 residential structures would create a significant, permanent aesthetic effect.

Resource	Alternative 1 (No Action)	Alternative 4	Alternative 5	Alternative 8	Alternative 9
Land Use	Land use patterns would be expected to remain unchanged, as the community has persisted for decades enduring the effects of flooding. The continued potential for flooding of residences and businesses discourages investment in flood-prone areas.	Land that would be affected consists of residential, commercial, and agricultural areas. Within Bloomsburg, 18 residential and three commercial structures would need to be removed. The Fernville levee would require the removal of one residential structure. In addition, seven residential structures and one mobile home park (consisting of 29 mobile homes) would be removed. 11.5 acres of farmland south of the Fairgrounds would no longer be arable Land use within the Fringe Alignment would not be predicted to change appreciably after completion of construction. Businesses would continue to operate with the increased measure of safety provided by the flood damage reduction project.	This alternative would be similar to Alternative 4 for the effects to Bloomsburg, but would differ in Fernville. Under Alternative 5, there would be non-structural hydraulic mitigation requiring the demolition and removal of 110 residential structures within that community, in effect, changing the land use from residential to natural.	Land Use effects from implementation of Alternative 8 would be substantially identical to implementation of Alternative 4 in Fernville and Montour, but Alternative 8 would not affect agricultural lands.	Similar to Alternative 8 for the effects to Bloomsburg, but would differ in Fernville. Under Alternative 9, there would be non-structural hydraulic mitigation requiring the demolition and removal of 110 residential structures within Fernville, changing the land use from residential to natural.
Parks and Recreation	There would be no changes to parks and recreational resources	No effect on nearby municipal parks or recreation areas	No effect on nearby municipal parks or recreation areas	No effect on nearby municipal parks or recreation areas	No effect on nearby municipal parks or recreation areas

Table 5-3
Herbaceous Wetland Mitigation Alternatives Cost Effective and Incremental Cost Analysis

Alternative	Plan ID	Name	[1]Environmental Output (Functional Capacity Units) at 50 Years	Cost (Actual $)	Incremental Cost	Incremental Output	Incremental Cost per Unit: $/FCU
1	No Action Plan		0.00	$0	$0	0.00	$0
4	Plan C ***	0.7 Acres of emergent wetland, recruited herbaceous plants	0.36	$17,500	$17,500	0.36	$48,611
3	Plan B	0.7 Acres of emergent wetland, planted with Seedmix #2	0.36	$22,634	$5,134	0.00	n/a
2	Plan A	0.7 Acres of emergent wetland, planted with Seedmix #1	0.36	$23,200	$18,066	0.00	n/a

[1] Compensatory Mitigation must have at least the same FCU as the existing impacted wetland. The vast majority of outputs are realized the first year after completion. Full functionality is expected within 3 to 5 years.
*** Best Buy Plan

Table 5-4
Forested Wetland Mitigation Alternatives Cost Effective and Incremental Cost Analysis

Alternative	[2]Plan ID	Name	[1]Environmental Output (Functional Capacity Units) at 50 Years	Cost (Actual $)	Incremental Cost	Incremental Output	Incremental Cost per Unit: $/FCU
1	No Action Plan		0.00	$0	$0	0.00	$0
2	Plan III	1.5 acres of forested wetland, recruited woody plants	0.32	$32,500	$32,500	0.32	$101,563
3	Plan I	1.5 acres of forested wetland, planted with seedlings	0.64	$54,821	$22,321	0.32	$69,753
4	Plan II ***	1.5 acres of forested wetland, planted with container saplings	0.80	$55,900	$1,079	0.16	$6,744

[1] Compensatory Mitigation must have at least the same FCU as the existing impacted wetland. See mitigation minimization discussion on PED changes.
[2] Refer to the Plan Timeline below for phased outputs per alternative. All forested wetland mitigation plans eventually reach 0.8 FCUs
*** Best Buy Plan

5.15.2 Off Site Mitigation

Fishing Creek Impacts Mitigation

Construction of the Recommended Plan (Alternative 4) would result in permanent adverse effects to the Fishing Creek riparian corridor, temporary effects to water quality during construction, and permanent effects to benthic invertebrates by establishing approximately 3,000 linear feet of rip-rap from the top of protection to the stream channel invert. There would be permanent loss of woody vegetation (stream shade cover) in these reaches and soil disturbance during construction would likely favor re-colonization with disturbance-tolerant species that are characteristically less desirable. The PFBC has commented on the proposed project report and DEIS and has stated that along with the wetland mitigation and the fish passage project, they would also request a 1:1 replacement of the 3,000 linear feet of forested riparian banks being permanently lost as a result of rip-rap placed along the banks of the creek. The District has considered this comment and recommends only the planned wetland and fish passage projects. The tree canopy along this segment is not closed over the creek channel and the orientation of the creek channel gives the shallow water column direct sun exposure the majority of the day. Given these facts, the fact that the watershed for the creek is predominately rural in nature and doesn't lack riparian vegetation and the fact that this creek is so low in the creek's watershed, thermal loadings, though a valid concern, should not warrant riparian mitigation as recommended by the PFBC.

To mitigate for the permanent alteration creek habitat both aquatic and riparian, the Corps is proposing to restore fish passage to lower Fishing Creek as part of the project. There is currently a low-head dam on Fishing Creek nearly one mile downstream from the project area that prevents upstream fish migration, locally referred to as Boone's Dam.

Annually, four anadromous species of the herring family (American shad- *Alosa sapidissima*, hickory shad- *Alsoa mediocris*, alewife- *Alosa pseudoharengus*, blueback herring- *Alosa aestivalis*), striped bass (*Morone saxatilis*) and American Eel (*Anguilla rostrata*) migrate into the Susquehanna River and its tributaries from the Atlantic Ocean (USACE, 2003a). Within the Susquehanna River, migratory fish now have access to many of miles of river because of construction of fish-passage facilities at large hydroelectric dams. Members of the Chesapeake Bay Program's Fish Passage Task Group (consisting of several Federal, state and local agencies) have removed nearly forty dams from Susquehanna River tributaries, leading to the reopening of 230 stream miles (USACE, 2003a). A few hundred fish returned to the Susquehanna annually from 1972 to 1984. As evidence of the recent success, shad numbers have increased to an average of 150,000 each year from 2000 to 2002 (USACE, 2003a).

However, anadromous migratory fish are blocked from additional fish-spawning habitat on Susquehanna tributaries because of low-head dams like the low-head dam on Fishing Creek. Restoring access to historic habitats would benefit inter-jurisdictional fish populations as well as piscivorous birds and mammals, migratory birds, and some marine mammals. These benefits contribute to the conservation, protection, and enhancement of fish, wildlife, and plants, and their habitats.

The goal of fish passage is to provide an easy, relatively effortless way for migrating fish to swim past the barrier and reach upstream habitat. A simple method would be to remove all or part of the low-head dam by creating an opening or notch (breaching), or removing the dam entirely. Although typically more expensive, a fishway (i.e., fish ladder) could also be constructed around the low-head dam. Fish ladders typically consist of a series of baffles, or weirs, that interrupt the flow of water in a series of ascending pools over the dam.

There may be social and cultural concerns with removing the dam. The dam may be eligible for inclusion in the National Register of Historic Places but its cultural resources value has been adversely affected by previous attempts to stabilize the original timber crib and rock construction type. The dam is important locally for recreational fishing in the still water behind the dam. There are no anthropogenic wetlands supported by this dam. Therefore, during the next phase (detailed design) of the project, alternatives that would provide improved fish passage will be developed and evaluated. Alternatives would include but are not limited to notching, complete removal, fish ladder, and by-pass channel. The evaluation of the alternatives would include consideration of social/local concerns, recreation, economics, cultural resources, and ecological benefits. The development and evaluation of the alternatives would be coordinated with the town of Bloomsburg, along with State and Federal resource agencies.

A cost effective/incremental cost analysis, required by the Corps Planning Guidance has been prepared and was considered during the development of the mitigation package. At this time, due to the previously mentioned deterioration of the dam, and the former attempt by others to stabilize the dam, it is more cost effective to remove the entire structure than to create a notch, fish ladder or bypass channel and further stabilize the structure. All of these would have the same ecological benefit of restoring fish access up and down this segment of Fishing Creek. The incremental cost/cost effectiveness analysis for this mitigation project is also included in the Planning Appendix in Volume 2. The costs for these alternatives were based on discussions between the biologists and the PFBC lead on dams and fish blockage removals. In the end, based on the condition of the dam and the past fixes to the dam as well as the engineering concern of leaving a partial structure across the waterway, the District selected the full removal option as the most cost effective to pursue in PED.

Both the wetland mitigation and the fisheries mitigation projects are concepts at this time and may change during the PED phase. The costs for environmental mitigation features in this mitigation plan are presented in the MCACES cost estimates in the Engineering Appendix in Volume 2. This $1.8 Million budget was generated when the project has more ecosystem impacts than is in the current report and represents a worst-case scenario cost estimate. It is anticipated that the final mitigation package will be less costly.

5.16 Cumulative Effects

Cumulative effects result "from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 CFR 1508.7). These actions include on- or off-site projects conducted by government agencies, businesses, or individuals that are within the spatial and temporal boundaries of the actions considered in this EIS.

Providing Bloomsburg with a flood damage reduction project would contribute to the protection of life, and to the reduction of physical and environmental damage. Significant flooding often results in contamination of drinking water supplies, dispersion of HTRW, and dispersion of large quantities of solid waste that require clean-up and disposal. Experience has shown that vast quantities of debris (e.g., homes, vehicles, mobile homes, etc.) and sediment must be collected and hauled away after a flooding event. Hauling the collected debris to a local municipal landfill requires significant transportation and involves huge quantities of solid waste that fill available landfill space. Providing flood protection significantly reduces the probability that these environmental consequences of flooding would be incurred.

The Town of Bloomsburg plans to floodproof the sewage treatment plant south of the project area. Protecting the sewage treatment area from overtopping during flooding contributes to minimizing environmental and human health effects during flooding.

Negative effects associated with implementation of the Preferred Alternative (4) that could contribute cumulatively with the effects of other projects include increases in traffic, construction noise, the diminished visual resources, and loss of riparian habitat and wetlands. There are no cumulative air quality concerns as the total direct and indirect emissions from construction of the project have been conservatively estimated and do not exceed the General Conformity limits under the Clean Air Act.

The positive cumulative effects of implementing Alternative 4 include the temporary expansion of the local economy, and the ecological benefits of mitigation that would restore fish passage at Boone's dam on lower Fishing Creek.

The Susquehanna River Basin extends 450 miles in length from its headwaters to the Chesapeake Bay and drains approximately 27,510 square miles along over 30,000 miles of streams from portions of New York, Pennsylvania, and Maryland. The Corps regulates 13 multi-purpose reservoirs and more than 56 local flood protection projects in the Susquehanna River Basin (USACE, 2003a). In addition to the Corps projects, various state agencies, commercial interests, and natural resource preservation organizations have constructed 10 reservoirs and 48 local flood protection projects (USACE, 2003a). Combined, the Susquehanna River Basin has approximately 23 reservoirs and over one hundred local flood protection projects.

Of the 1,400 communities in the Susquehanna River basin, about 1,160 have residents located in flood-prone areas (USACE, 2003a). Consequently, flood damage reduction projects are concentrated around municipalities for the protection of life and property. The Corps of Engineers local flood protection projects have altered approximately 128 miles of riparian corridor with the construction of levees and floodwalls. Cumulative environmental effects from the watershed-wide flood protection include:

Hydrologic and Hydraulic Effects

- Increased flood velocity of the Susquehanna and its tributaries when confined within levees and floodwalls and a concomitant increased scour of sediment materials.
- Increased water surface elevations upstream of the levees, floodwalls, and detention structures.
- Decreased time of concentration for flood flows into the Susquehanna and its tributaries by isolating the flows from the floodplain.

Biological Effects

- Eliminated the deposition of sedimentation and nutrients on floodplain soils by isolating flood flows from historic floodplains.

- Eliminated the hydraulic connection to special aquatic sites (e.g., wetlands, riffle and pool complexes) in the historic floodplains and river channels.
- Elimination of the riparian habitat (typically bottomland hardwood forest) removed for the construction of the flood damage reduction projects.
- Elimination and fragmentation of wildlife habitat removed for the construction of the flood damage reduction projects.

HTRW Release Effects

- Confined flows within levee and floodwalls significantly limit or prevent the contamination of drinking water supplies, dispersion of HTRW, overtopping of sewage treatment systems, and dispersion of large quantities of solid waste.

5.17 Summary of Environmental Effects

5.17.1 Unavoidable Adverse Environmental Impacts

The construction of either the Fringe or Interior Alignment would result in unavoidable adverse effects on the project area.

- Traffic would be adversely affected because of construction-related transportation.
- Noise would be an unavoidable construction effect.
- Permanent unavoidable adverse effects would occur to the visual resources in the vicinity. Under either alternative, views that currently include Fishing Creek from Bloomsburg or Fernville would be unavoidably restricted by the levee/floodwall system. Views from Fishing Creek (typically from recreational users) would be diminished, as would views from within the Fairgrounds property.
- Construction of the levee/floodwall system would require the excavation and off-site disposal of approximately 4,500 cubic yards of HTRW materials. The occupational risks of HTRW exposure and human health risks during transportation are unavoidable.
- The Fringe Alignment would require the conversion of approximately 11.5 acres of farmland designated as Prime Farmland or Additional Farmland of Statewide Importance to non-agricultural use.
- Implementation of either alignment would result in the unavoidable long-term loss of nearly 3,000 linear feet of riparian habitat along Fishing Creek.
- Either alignment would result in the loss of approximately one acre of wetlands.
- The taking of residential homes and business structures within the levee/floodwall footprint, or for increased flooding mitigation, would be an unavoidable adverse effect on the community.

5.17.2 Short-Term Use and Long-Term Productivity of the Environment

Because of the disruption caused by construction of either the Fringe or Interior Alignments, there would be negative effects on short-term uses of the environment in the project area.

Implementation of either alignment would result in a long-term loss of ecological habitat and farmland. Creation of additional wetlands adjacent to the proposed levee would improve the long-term productivity within the project area and the provision of a fish passage on Fishing Creek would contribute to the restoration and enhancement of long-term productivity of the Susquehanna River ecosystem.

5.17.3 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of resources and the effects that consumption, permanent loss, or commitment of those resources would have on future generations. Irreversible commitments occur as a result of the use or destruction of a resource (e.g., fossil fuels) that cannot be replaced. Irretrievable resource commitments involve the loss in value of an affected resource.

Irreversible and irretrievable commitments of resources would be limited to the basic construction materials used for the levee/floodwall system, and fossil fuels used to operate equipment during construction. Some other resources and material that would be used could be recycled (e.g., topsoil, fill, riprap) and do not represent an irreversible and irretrievable commitment.

The riparian habitat that would be degraded is not considered irreversible because these areas could be restored to their original condition by removal of the bank armoring and planting of appropriate native species.

5.17.4 Environmentally Preferable Alternative

The Council on Environmental Quality (CEQ) regulations for implementing the NEPA require that the Record of Decision (ROD) specify "the alternative or alternatives which were considered to be environmentally preferable" (40 CFR 1505.2(b)). This alternative has generally been interpreted to be the alternative that will promote the national environmental policy as expressed in NEPA's Section 101 (CEQ's "Forty Most-Asked Questions," 46 Federal Register, 18026, March 23, 1981). Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.

On the basis of the assessment of potential environmental impacts presented in this Final FS/EIS, no alternative can be clearly identified as environmentally preferable. The alternatives do not present a clearly environmentally preferable selection as each of the alignment alternatives intersects wetlands and results in the loss of habitat along Fishing Creek. Each of the alignments also provides protection to Bloomsburg's historic and cultural resources within the protection with no clear distinction among the alternatives. The Fringe alignment also has other cultural effects such as the protection of more of the Fairgrounds property. Although slight differences in the size of impact areas were identified, none of the differences were considered to result in one alternative being environmentally preferable over the others. The Fringe alignment also has other social effects such as the protection of more of the Fairgrounds property and fewer potential landfill impacts.

6. PLAN IMPLEMENTATION

As the non-Federal project sponsor, the Town of Bloomsburg must enter into a contractual design agreement (DA) with the Corps. The DA will carry the project through the preconstruction engineering and design (PED) phase, including development of project plans and specifications (P&S). A project management plan (PMP) will be prepared to identify tasks, responsibilities, and financial requirements of the Federal government and the non-Federal sponsor during PED.

The PED phase will be followed by execution of a project cooperation agreement (PCA) by the Town of Bloomsburg and the Corps. The PCA will carry the project through advertisement, award, construction, and turnover to the non-Federal sponsor for operation and maintenance. The construction PCA cannot be executed prior to project construction authorization by Congress. In addition, funds must be appropriated by the Federal government and budgeted by the Town of Bloomsburg to support PED and construction related activities. A project schedule has been established based on reasonable assumptions for the design and construction schedules, in accordance with Administration and Corps policy requirements (see Section 6.4 for the current schedule).

6.1 General

The Bloomsburg Flood Damage Reduction project requires construction authorization by Congress. Such authorization is normally provided in a Water Resources Development Act (WRDA). Based on the current schedule for report approval by Corps Headquarters, it is assumed that the project will be authorized in the next WRDA. Following Congressional authorization, the project would be eligible for construction funding. Project construction funding will be considered for inclusion in the President's budget on the basis of national priorities, magnitude of the Federal commitment, economic and environmental feasibility, level of local support, willingness of the non-Federal partner to fund its share of the project cost, and budgetary constraints that may exist at the time of funding.

6.2 Local Cooperation

In accordance with Section 105 (a)(l) of WRDA 1986, the Bloomsburg, Pennsylvania, Flood Damage Reduction Feasibility Study was cost shared 50 percent between the Federal Government and the Town of Bloomsburg.[20] The fact that funds were contributed by the non-Federal project partner, Bloomsburg, indicates the Town's intent to support a project for flood damage reduction.

A fully coordinated Design Agreement (DA) package, which will include the non-Federal partner's financing plan, would have to be prepared subsequent to the approval of the feasibility

[20] Fifty percent of the non-Federal share of feasibility study costs (25% of total feasibility study costs) was provided by the Pennsylvania Department of Environmental Protection (PA-DEP) on behalf of the Town of Bloomsburg. PA-DEP remains an important project partner during PED and project construction, having committed to provide additional financial support to the Town of Bloomsburg. However, PA-DEP is not an official signatory on the Feasibility Study Cost Sharing Agreement, design agreement, or PCA, and therefore is not officially recognized as a non-Federal sponsor for the Bloomsburg Flood Damage Reduction Project.

report. The DA will reflect the recommendations of the feasibility study. The non-Federal sponsor, the Town of Bloomsburg, Pennsylvania, has indicated support for recommendations presented in this Feasibility Report and its desire to execute a DA. Other non-Federal interests, such as the Pennsylvania Department of Environmental Protection (PADEP), have indicated their support of the project.

As the non-Federal project partner, the Town of Bloomsburg must comply with all applicable Federal laws and policies and other requirements, including but not limited to:

- Provide a minimum of 35 percent, but not to exceed 50 percent of total project costs as further specified below:

  (1) Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

  (2) Provide, during construction, any additional funds needed to cover the non-federal share of design costs;

  (3) Provide, during construction, a cash contribution equal to 5 percent of total project costs;

  (4) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of the project;

  (5) Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of the project; and

  (6) Provide, during construction, any additional costs as necessary to make its total contribution equal to at least 35 percent of total project costs.

- For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, including mitigation features, at no cost to the Federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and any specific directions prescribed by the Federal government in the operation, maintenance, repair, replacement, or rehabilitation (OMRR&R) manual and any subsequent amendments thereto.

- Grant the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspection, and, if necessary after failure to perform by the non-Federal project partner, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project. No completion, OMRR&R by the Federal government shall operate to relieve the non-Federal sponsor of its responsibility to meet the non-Federal sponsor's obligations or to preclude the Federal government from pursuing any other remedy at law or equity to ensure faithful performance.

- Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors.

- Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Codes of Federal regulations (CFR) Section 33.20. The non-Federal sponsor is also responsible for complying with the Single Audit Act of the 1984, 31 U.S.C. Sections 7501-7507, as implemented by Office of Management and Budget Circular No. A-133.

- Assume complete financial responsibility, as between the Federal government and the non-Federal sponsor, for all necessary CERCLA cleanup and response costs in, on, or under lands, easements, or rights-of-way that the Federal government determines to be necessary for the construction, operation, or maintenance of the project.

- As between the Federal government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability. To the maximum extent practicable, operate, maintain, repair, replace and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.

- Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the construction, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

- Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense directive 5500.11 issued pursuant thereto, as well as Army regulation 600- 7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army", and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. §§ 3141-3148 and 40 U.S.C. §§ 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis Bacon Act (formerly 40 U.S.C. § 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. § 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. § 276c)).

- Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement.

- Participate in and comply with applicable Federal flood plain management and flood insurance programs and comply with the requirements in Section 402 of the Water Resources Development Act of 1986, as amended.
- Not less than once each year inform the community of the extent of protection afforded by the project.
- Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with the protection provided by the project.
- Provide and maintain necessary access roads, and parking areas open and available to all on equal terms.
- Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.
- Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments), which might hinder its operation and maintenance, or interfere with its proper function, such as any new development on project lands or the addition of facilities which would degrade the benefits of the project.
- Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

In an effort to keep the non-Federal sponsor involved and the local government informed, meetings were held throughout the feasibility phase. Coordination efforts will continue, including coordination of this study with other State and Federal agencies. A public meeting was held upon release of the Draft Feasibility Report & Environmental Impact Statement. As the project proceeds from design and into construction, further opportunities will be available for the public to interact with the team, and for the non-Federal sponsor and the affected public to provide input to the design process. This will include Flood Committee meetings, Town Council meetings, the District and Town websites, press releases and other avenues for information exchange.

6.3 Cost Sharing

The fully funded cost of the project, escalated to the base year of 2009 is shown in Table 6-1. Table 6-2 shows the apportionment of cost sharing responsibilities between the Federal government and the non-Federal sponsor, Bloomsburg, Pennsylvania. The table includes costs associated with flood damage reduction features and environmental mitigation features. The total project first costs - including Lands, Easements, Rights-of-way, Relocations, and Disposal areas (LERRD) - are shared on a maximum 65 percent basis by the Federal government and a 35 percent basis by the non-Federal partner. The Federal Government will design the project, prepare detailed plans/specifications and construct the project, exclusive of those items specifically required of the non-Federal sponsor.

The non-Federal partner is responsible for all LERRD and all operation and maintenance (O&M) costs. The LERRD costs are applicable to the non-Federal share of the initial project costs. For example, the total LERRD costs ($12,833,000) borne by the non-Federal sponsor are applicable to the 35 percent chare of total initial non-Federal project costs.

In this particular case, the non-Federal sponsor's responsibility for LERRD costs ($12,833,000) combined with the minimum 5 percent cash contribution ($2,311,950) does not exceed 35 percent of total project costs. An additional cash contribution of $1,038,700 is required to bring the non-Federal contribution to 35 percent of total project costs.

It is important to note again, that the Town of Bloomsburg will be responsible for any and all costs associated with hazardous, toxic, or radioactive waste (HTRW) as necessary to provide project lands that are clean of regulated materials as required for project construction by the Corps. It is important to emphasize that CERCLA response costs are not considered part of project costs, nor are they cost-shared or credited as part of Corps flood damage reduction projects as per ER 1165-2-132 and ER 1105-2-100.

As documented in the HTRW Attachment to the Engineering Appendix, and as discussed in greater detail in Section 6.3.1, the Corps has prepared an estimate of non-Federal sponsor CERCLA response costs in an attempt to assist the Town of Bloomsburg budget for additional costs it should anticipate beyond the costs quantified in Tables 6-1 and 6-2. The current non-Federal sponsor CERCLA cost estimate is $895,600. Again, detailed information about this planning level estimate is provided in the HTRW Attachment to the Engineering Appendix.

Table 6-1
Fully Funded Cost Estimate – NED Plan

Account & Item Description	Cost	Contingency	Escalation	Total Cost
02 Relocations	4,623,000	924,000	771,000	6,318,000
06 Fish & Wildlife Facilities	1,322,000	330,000	230,000	1,882,000
11 Levees & Floodwalls	17,610,000	3,728,000	2,965,000	24,303,000
18 Cultural Resources Preservation	400,000	100,000	70,000	570,000
TOTAL CONSTRUCTION COSTS	**23,955,000**	**5,082,000**	**4,036,000**	**33,073,000**
01 Lands & Damages	4,953,000	1,040,000	522,000	6,515,000
30 Preconstruction Engineering & Design	2,588,000	388,000	459,000	3,435,000
31 Construction Management	2,634,000	263,000	319,000	3,216,000
TOTAL PROJECT COSTS	**34,130,000**	**6,773,000**	**5,336,000**	**46,239,000**

Table 6-2
Cost Apportionment
Federal and Non-Federal Responsibilities

Total Project Cost[21]		**$ 46,239,000**
Non-Federal Share (minimum 35%)		
5% Cash minimum	**$2,311,950**	
100% LERRDs	**$12,833,000**	
Cash Balance	**$1,038,700**	
Total Non-Federal Share (35%)		**$16,183,650**
Federal Share (65%)		**$30,055,350**

6.3.1 Advance Project-Related Work by Non-Federal Sponsor

As previously explained, it is currently assumed that some level of CERCLA response cost will be incurred as a non-project cost by the non-Federal sponsor. That cost, based upon the current estimate of 4,500 cubic yards, is $895,600 (escalated to the midpoint of construction). This cost has not been included in the MCACES estimate, since it is not a project cost, but it has been identified in this report because it would be a necessary cost for the non-Federal sponsor to incur in the course of completing the project. This estimate may be increased by HTRW investigations to be conducted during PED along the Fernville levee alignment for underground storage tanks believed to be present there.

Due to the level of uncertainty associated with the final location, amount, and extraction of all HTRW, and the resulting cleanup and response cost, the non-Federal sponsor is considering undertaking pre-construction excavation activities for the area of the Fringe Alignment that would likely approach or impact the closed landfills. This activity would both prepare for the construction of the levee/floodwall system along the path of the excavation, and allow for a controlled HTRW response action by the non-Federal sponsor to the extent necessary for the completion of the flood damage reduction project.

Because there is some urgency on the part of the non-Federal sponsor to resolve this matter expeditiously, the non-Federal sponsor may elect to execute this work prior to project authorization by Congress. The non-Federal sponsor has been informed that approval through

[21]Excludes non-Federal sponsor response costs for RCRA Subtitle C HTRW, as discussed in Section 6-3, 6-3.1, and the HTRW Section of the Engineering Appendix.

Congressional authorization[22] is necessary in order to obtain any cost sharing credit or reimbursement for cost of the portions of the excavation work that does not involve an actual HTRW response. The non-Federal sponsor is aware that there is no cost limitation associated with the amount of potential credit or reimbursement that may be approved, but that approval is not guaranteed.

Because there is the possibility of additional cost-shared HTRW investigation during the PED phase, the non-Federal sponsor may choose to wait until after project authorization to perform excavation work along the Fringe Alignment. If the non-Federal sponsor chooses to wait to perform this work until after project authorization, the non-Federal sponsor has been informed that credit and reimbursement is possible, but would instead be accomplished under the authority of Section 215 of the Flood Control Act of 1968, 42 U.S.C. 1962d-5a.

The non-Federal sponsor has also been informed that a cost limitation of one percent (1%) of the total project cost or $5 million, whichever is greater, would be associated with the amount of credit or reimbursement that could be received for its project-related excavation costs, along with a $5 million limitation on the annual cost credit or reimbursement. Finally, the non-Federal sponsor has been informed that a Section 215 agreement would need to be negotiated and executed with the Department of the Army prior to the non-Federal sponsor's performance of any such construction/pre-construction work in order to be eligible for receipt of credit or reimbursement.

6.4 Implementation Schedule

A preliminary implementation schedule was developed for the recommended plan. The schedule is based on information available to date, and is largely dependent on when the project is authorized in the Water Resources Development Act (WRDA). The estimated implementation schedule is provided below:

- Complete Feasibility Phase: December 2005
- Project Construction Authorization: 2005 (assumed to be provided in the Water Resources Development Act of 2005, if signed into law)
- Design Agreement Executed: Late 2005/Early 2006
- Plans and Specifications Development: 2006 to 2008
- Project Cooperation Agreement Executed: 2008/2009
- Real Estate Acquisition: 2009
- Section 215 Agreement Executed (if needed): 2008
- Construction: 2010 to May 2013

[22] Approval could also be provided by an evaluation and decision of the Department of the Army, in accordance with Section 104, Public Law 99-662, and ER 1165-2-29.

6.5 Financial Analysis

For purposes of executing the design agreement (DA), Bloomsburg has stated its intention to enter into an agreement by which the Pennsylvania Department of Environmental Protection will fund 50 percent of the non-Federal share of PED and construction costs. The Commonwealth has a stable source of funding and has further indicated its intent to provide financial support to the Town of Bloomsburg as it enters into a DA at the conclusion of the study.

The sponsor's draft financing plan for project construction has been reviewed by the District. The level of risk associated with non-performance by the sponsor is moderate based on the information provided on the revenue streams identified in the financing plan. Additional information on the draft financing plan is provided in the Economics Appendix.

In addition, the Town of Bloomsburg has indicated that it intends to seek Federal grants to meet their non-Federal cash contribution requirements. Per U.S. Army Corps of Engineers policy, each potential Federal grant would require a review to determine whether it qualifies as an acceptable matching contribution from the Sponsor.

6.6 Views of Non-Federal Partners and Other Agencies

The recommended plan has received strong support from the non-Federal project partner, Bloomsburg, PA, as well as agencies of the Commonwealth of Pennsylvania. This support is documented in Section 8 of this document. Through project planning and NEPA scoping, a variety of other Federal agencies have been involved in this investigation.

6.7 Areas of Concern

Areas of concern regarding the recommended plan for the Bloomsburg Flood Damage Reduction Project are currently being addressed with the non-Federal sponsor. The Non-Federal sponsor has indicated that there are few, though relatively major, concerns. The mechanics of assembling the non-Federal share of the projects costs, the potential cost of the hazardous waste issues related to the landfills, the potential flexibility to extend project tie-outs to protect more of the community and those costs are all documented as areas of concern.

7. *COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

Preparation of this Integrated Feasibility Report and Environmental Impact Statement has included coordination with appropriate Federal and State resource agencies. For this stage of the planning process, compliance was met for all environmental quality statutes and environmental review requirements. Following is a list of Federal environmental quality statutes to which this planning process and recommended plan are in compliance:

Federal Statutes	Level of Compliance[1]	Section Referenced
Archeological and Historic Preservation Act	Full	2.7, 5.7
Clean Air Act	Full	2.6, 5.6
Clean Water Act	Full	2.3, 5.3
Comprehensive Environmental Response, Compensation and Liability Act	Full	2.8, 5.8
Endangered Species Act	Full	2.5, 5.5
Farmland Protection Policy Act	Full	2.1.2
Fish and Wildlife Coordination Act	Full	2.5
National Historic Preservation Act	Full	2.7, 5.7
National Environmental Policy Act	Full	1.5
Resource Conservation and Recovery Act	Full	2.8, 5.8
Executive Orders, Memoranda, etc.		
Migratory Bird (E.O. 13186)	Full	5.4.3
Protection and Enhancement of Environmental Quality (E.O. 11514)	Full	1.5
Protection and Enhancement of Cultural Environment (E.O. 11593)	Full	5.7
Floodplain Management (E.O. 11988)	Full	5.13
Protection of Wetlands (E.O. 11990)	Full	5.4.2
Prime and Unique Farmlands (CEQ Memorandum, 11 Aug. 80)	Full	2.1.2
Environmental Justice in Minority and Low-Income Populations (E.O. 12898)	Full	2.9.1, 5.9.1

[1] Level of Compliance:

Full Compliance (Full): Having met all requirements of the statute, E.O., or other environmental requirements for the current stage of planning.

Partial Compliance (Partial): Not having met some of the requirements that normally are met in the current stage of planning.

Non-Compliance (NC): Violation of a requirement of the statute, E.O., or other environmental requirement.

Not Applicable (N/A): No requirements for the statute, E.O., or other environmental requirement for the current stage of planning.

8. *PERTINENT CORRESPONDENCE & PUBLIC INVOLVEMENT

Public involvement and citizen participation are an integral part of this feasibility study. Coordination by the U.S. Army Corps of Engineers and the local sponsor, the Town of Bloomsburg, as well as PADEP, other agencies, and interested parties has occurred on a regular basis since the beginning of the study.

Meetings with officials and residents of Bloomsburg, surrounding communities, and other interested parties were conducted in groups and on an individual basis. The purpose of carrying out coordination with officials, citizens and other interested parties is to ensure that the study addresses all pertinent questions from the public, is of the highest quality, and ultimately meets the needs of the people it will serve.

8.1 Scoping Process

In November 1999, the Baltimore District published a Notice of Intent (NOI) for the Bloomsburg Local Flood Protection Project in the *Federal Register* (November 23, 1999, Volume 64, Number 225) in compliance with 40 CFR 1508.22. As recommended in 40 CFR 1501.7(b), a public scoping meeting also was held for the project. The meeting was held on February 24, 2000 in Bloomsburg. The purpose of the scoping meeting was to introduce the study and study team members to the community as well as gather area resident's ideas, comments, and concerns about the study.

To address special issues with the residents adjacent to Fishing Creek, a public meeting was held February 2, 2000 to provide a brief overview of the flood protection study. The meeting focused on the soil sampling required on properties adjacent to Fishing Creek and the need for rights of entry for Baltimore District or contractor personnel.

A public walking tour along the proposed alignment was made available on March 20, 2000, with participants visiting Kinney Run and South Bloomsburg as well as Fernville. Twenty people attended the Kinney Run/South Bloomsburg walk and thirty-eight attended in Fernville.

In May 2000, the Baltimore District, Town of Bloomsburg, and the Pennsylvania Departments of Environmental Protection and Transportation participated in a workshop to share information about the study area and develop a project strategy. The Baltimore District and the Town of Bloomsburg (the project's local sponsor) implemented a public involvement program to obtain input from various groups, organizations, or individuals that represent business, homeowner, educational, environmental, government, neighborhood, and community interests. The program included formal and informal meetings with stakeholders.

8.2 Major Issues Identified for Analysis During Scoping

Public comments received during the public scoping meeting have been incorporated into the plan formulation, feasibility, and evaluation process associated with this flood control project. Clarifying questions and issues raised during the public scoping process are segregated by subject matter and listed in Sections 8.2.1 through 8.2.6. Where public input simply requested clarifying information, the comment itself had no bearing on the Corps planning process or decision making. Comments *i-iv* are compilations of more substantive input from several sources garnered during the public review process. Comments *i-iv* are explained in greater detail below.

"*i. Project alignments - Many of the landowners expressed reservations, about the various alignments that were considered early in the planning process. Although individuals expressed desires to have areas protected or avoided, cost effective protection of the economic damage centers drove the alignments, not any business, groups, or neighborhood.*

ii. Mode of flood protection - Many citizens wondered how they would be afforded flood protection. Various means were investigated including structural and non-structural measures. Many citizens have heard over time that dredging the river is the best option. Other mentioned that buy outs were what they wanted. All of these were considered and addressed in the report. There were no additional methods of structural or non-structural protection recommended by the public that the Corps was not already considering. As such, the comments did not affect the FS/EIS.

iii. Protection against increased flooding impacts - The public requested clarification as to why certain facilities were being impacted. The sewage treatment plant, water treatment plant, electrical substation, and railroad operations are all areas that were identified from comments at the various public meetings over the years held locally in the project area. Each of these areas was already being considered in the evaluation, but the public comments served to focus attention on clearly presenting the analysis of these areas in the FS/EIS.

iv. Areas left out of protection - Some Bloomsburg residents (particularly East Bloomsburg) wondered why the flood protection being recommended (NED Plan) does not extend up the right descending bank of the Susquehanna River and therefore does not offer protection to residences and businesses of East Bloomsburg. The narrative of the FS/EIS explained how the Corps planning process requires that Flood Protection have incremental justification for the discrete sections. Because of the request to closely examine this area, the Corps thoroughly documented the costs and benefits and explained in Section 3 of the FS/EIS and at the public hearing on the FE/EIS how the Corps requirements for incremental justification dictate that the NED plan exclude protection for East Bloomsburg.

v. Protection of cultural resources such as the McClure house, the covered bridge over Fishing Creek, the Railroad trestle bridge over the Susquehanna River, and other resources from flood damages - Some of these resources could not be protected by this project because of their isolated location and distance from other damage centers. Some are slightly affected. The District did a complete historic structural inventory throughout the project area and elected to establish a Programmatic Agreement with the State Historic Preservation Office (SHPO) whereby the Corps documents the procedures they will follow to comply with the requirements of the National Historic Preservation Act.

8.2.1 Process

- Effects of the proposed flood protection project in the context of other activities in Bloomsburg including the airport expansion and PennDOT road projects (US 11);
- Who ultimately makes the decision (commissioners or public) and is there a public referendum;
- Over what period of time are the cost/benefit ratios considered;
- Do residents of Montour have any say in the project;
- What happens if someone is impacted after the levee is constructed because of miscalculations.

8.2.2 Alternatives and Design

- Will dredging Fishing Creek or the islands in the Susquehanna River be considered as an alternative;
- What was the basis for selecting the study area;
- Will there be stabilization of stream banks along Fishing Creek;
- Will Fishing Creek back up more after the levee is constructed;
- Where does the water go that is trapped behind the levee;
- Will the islands in Fishing Creek be cleaned up;
- Can you construct a series of small dams along Fishing Creek instead of a levee system;
- Why not construct a levee the entire length of Fishing Creek (both sides) to the confluence with the Susquehanna River.

8.2.3 Real Estate

- Questions regarding the details of how much would be paid for buyouts and whether residents must pay 20-percent of relocation costs;
- Will properties be condemned by eminent domain;
- What if resident doesn't want to sell, they want protection;
- If a home is seasonal and may be acquired, is there an option to move it to another location rather than demolition;
- What will happen to the mobile homes impacted by the project;
- Fair market values for houses are now significantly less since the floodwall was proposed.

8.2.4 Infrastructure

- Consider protecting the water company sub-station on the Bloomsburg side of Fishing Creek;
- The Railroad Bridge should be removed for eight inches of flood level reduction;
- Doubletrack Bridge to Fernville is unsafe and a concern;
- Rupert Railroad bridge removal is recommended;
- Consider removing Boone's Dam and the covered bridge (all barriers in Fishing Creek);
- Schools and sewage treatment plant need to be protected;
- Will the levee/wall consider future raisings as was done after Wilkes/Sunbury were overtopped;
- Consider the storm/sewer system in town;
- Who is responsible for maintenance and removal of sedimentation and debris in and along Fishing Creek after the levee is constructed;
- Consider the historic significance of the area and Ft. McClure House.

8.2.5 Communities

- Why not put floodwall on Fernville side of Fishing Creek;
- No access/egress from Fernville during a flood;
- When will buyouts occur in the study process;
- Will the study consider downstream flooding on residents and businesses in Catawissa;
- Why not also protect Espy area, Scott Township, Kawneer Company, airport, school, sewage treatment plant, and homes on 11^{th} and 12^{th} streets;
- Appears that the flood protection is only being built to satisfy Magee-Reiter;
- Perry Avenue homes had five feet of water on the first floor, will the properties be acquired;

8.2.6 Public Involvement

- The project needs a vote after the study is completed;
- All communities need to be involved in the final decision making;

8.3 General Meetings

Numerous meetings and coordination activities were conducted to gather data, conduct field studies, and notify property owners in the study area of the work being conducted. The contacts and meetings for data gathering and coordination are too numerous to mention herein, but are summarized in the next paragraphs.

Property owners within the proposed alignment of the plan alternatives were contacted and rights-of-entry were requested from them for the purposes of conducting environmental and geotechnical field studies. Further coordination relating to the real estate activities being conducted is presented in the Real Estate Plan.

Besides the coordination with Bloomsburg and municipalities adjacent to the study area, contacts with various Federal, State, and local agencies were also made. They include the U.S. Fish and Wildlife Service, Federal Emergency Management Agency, United States Geological Survey, Pennsylvania Department of Transportation, Columbia County Parks, Columbia County Engineer, public utilities, and others. Coordination with elected representatives at the Federal, State, and local level has also been integral to the process.

Pertinent letters of correspondence are provided below. The correspondence presented indicates the non-Federal sponsor's formal position on the feasibility report. Correspondence relating to general requests for information, questions, letters of invitation, technical, environmental, cultural, real estate rights-of-entry, permits and other matters are too numerous to be present here.

During the public review of the draft feasibility report and EIS, the public, agencies, and all interested parties were asked to comment on the draft report. This process lasted 45 days from May 13 to June 27, 2005. Only a few written comments were received via letter or e-mail during the comment period. Additional agency correspondence was received from the EPA, Federal Emergency Management Agency, Pennsylvania Fish & Boat Commission, U.S. Fish and Wildlife Service, and the Pennsylvania Game Commission. A public meeting was held June 16, 2005 from 7:00-9:00 pm to review the project and afford the public an opportunity to formally comment of the draft FS/EIS. Approximately 46 members of the public attended the meeting and no one offered oral or written comments during the formal comment period. The meeting was officially adjourned and then members of the public were given an opportunity for informal question and answer period with representatives from the Corps and study team providing responses. No significant issues or concerns were raised during the public review process that dictated changes to the Draft FR/EIS.

The U.S. Army Corps of Engineers considered all comments received during the entire public review process in preparing the Final FS/EIS. A 30-day waiting period on this Final FS/EIS will begin with the publication of the U.S. Environmental Protection Agency Notice of Availability in the Federal Register.

8.4 Response to Public and Agency Comments on the Draft FS/EIS

Prior to preparation of this Final FS/EIS, public involvement was conducted through the publishing of a Notice of Intent in the Federal Register, holding a public scoping meeting prior to developing the draft FS/EIS, publication of the draft FS/EIS for a public and agency review period, and holding a public hearing to receive comments on the draft FS/EIS. Additionally, coordination with resource agencies was conducted through agency coordination letters that solicited their input on the draft FS/EIS. Copies of all correspondence received on the Draft FS/EIS are reproduced in Section 15. The U.S. Army Corps of Engineers reviewed and considered all comments received in preparing the Final FS/EIS. No substantive comments were received from the public during the 45-day public comment period on the draft FS/EIS.

Public concerns identified during the public meeting and in written comments submitted reiterated issues previously identified during scoping that had been evaluated and discussed in the FS/EIS; no new substantial issues were raised. The most frequently raised issue identified during the public meeting and in the written correspondence requested explanation as to why certain residences and facilities were being protected (e.g., Magee) and others in East Bloomsburg were not (e.g., sewage treatment plant, airport, high school and middle schools, and the Town Park). The narrative in Chapter 3 of the FS/EIS explains how the Corps planning process requires that Flood Protection have incremental justification for discrete sections and why the East Bloomsburg was not included in the NED plan.

In accordance with NEPA and Section 309 of the Clean Air Act, the Environmental Protection Agency reviewed the Draft FS/EIS. Based on the review, the EPA rated the environmental impacts of the preferred alternative (NED Plan) as "EC-2" indicating there were Environmental Concerns and the adequacy of the impact statement was "2" because of insufficient information. This rating was given because the EIS did not contain sufficient information to fully assess the environmental effects that should be avoided in order to fully protect the environment. Based on discussions with the EPA reviewer, the Corps was able to address the issues to improve clarity in the Final FS/EIS. EPA was mainly concerned with the wetlands resources and the necessary mitigation of unavoidable impacts, endangered species documentation and gave specific project comments in various sections of the Draft EIS. These comments have all been addressed in each resource category in Sections 2 and 5. EPA also mentioned several design goals for the team to consider as the project moves into PED phase.

The PFBC concurred with the wetland and fish mitigation and also stated that the project should provide mitigation for the 3,000 linear feet of riparian vegetation being lost via riprap protection along Fishing Creek. This has been addressed in Section 5.15 of the report.

Table 8-1
Meetings with Agencies and Public During the Feasibility Study

DATE	AGENCY / GROUP / ORGANIZATION	PURPOSE	LOCATION
2/7/03	Steve Leins, Bernardi Foods	Employment Impact	Bernardi Foods, Bloomsburg, Pa
2/27/03	Bloomsburg Planning Commission	Project Update	Bloomsburg, PA
4/3/03	Al Hunsinger	Public Information	Offices of Hemlock Twp. Supervisor, Buckhorn, PA
4/8/03	Hemlock Township Meeting 7:00 pm		Hemlock Township Municipal Building, Buckhorn, PA

DATE	AGENCY / GROUP / ORGANIZATION	PURPOSE	LOCATION
4/10/03	Montour Twp Supervisors Meeting		Montour Township Municipal Building, Rupert, PA
4/17/03	Pat Parker	Public Information	Private home, Drinker St., Fernville, PA
5/1/03	Pat Parker		Private home, Drinker St., Fernville, PA
5/1/03	Fernville residents	Interviews - information	Along various streets, Fernville, PA
5/2/03	Teleconference – Fred Trump	Fair Association update & public information	
5/8/03	Dr. Joe Kelly, Superintendent, Bloomsburg Area School District	Update Bloomsburg Area School District staff & Board President	Offices of Bloomsburg Area School District, Bloomsburg, PA
5/12/03	Fred Trump, Bloomsburg Fair Board	Meeting with Bloomsburg	Bloomsburg Fair Grounds, Bloomsburg, PA
5/12/03	Fernville Public Meeting – 7:00 pm	Update to approximately 100 citizens of area	Buckhorn Fire Company, Station #2, Fernville, PA
5/13/03	Bloomsburg Authority	Public Information & Project update	Bloomsburg Town Hall, Bloomsburg, PA
6/5/03	Site Tour – Hemlock Twp.	Project Status Update	Hemlock Twp., PA
6/5/03	Al Hunsinger, Hemlock Township	Public Meeting – Project Review	Offices of Hemlock Twp. Supervisor, Buckhorn, PA
6/12/03	Fred Trump	Project Review	Phone Call
6/16/03	Bill Whispell, Fernville	Tour Fernville water plant site & island	Banks & island along & in Fishing Creek
6/24/03	Bloomsburg Town Meeting 7:00 pm	Project update to Town residents	Bloomsburg Area High School, Bloomsburg, PA
6/24/03	Bloomsburg Town Meeting 1:30 pm	Project update to Town residents	Bloomsburg Area High School, Bloomsburg, PA
6/25/03	Elmer Folk, Montour Township Supervisor	Project Review	Montour Twp. Offices, Rupert, PA
6/25/03	Montour Township Public Meeting 7:00 pm		Montour Township Municipal Building, Rupert
6/26/03	Bloomsburg Town Meeting 7:00 pm	Project update to Town residents	Bloomsburg Fire Hall, Bloomsburg, PA

DATE	AGENCY / GROUP / ORGANIZATION	PURPOSE	LOCATION
6/30/03	Stephen Kistler	Project Update & Review	Town Hall, Bloomsburg, PA
7/15/03	Marion Staniszewski Fernville	Response to concerns & letter to USCOE	Citizen's Home, Drinker St., Fernville, PA
8/25/03	Magee Reiter	Discuss private funding	Magee Reiter, Bloomsburg, PA
8/28/03	Bernardi Foods	Discuss private funding	Bernardi Foods, Bloomsburg, PA
9/16/03	Tom Boehmen, Amerimax	Discuss private funding & update project status	Amerimax, Bloomsburg, PA
11/18/03	Bloomsburg Chamber		Bloomsburg, PA
11/18/03	Columbia Alliance	Presentation of Project Status	Bloomsburg, PA
1/6/04	Dr. Joe Kelly, Superintendent, Bloomsburg Area School District	Project Update	Telephone

In addition to these specific meetings, the Town has established a web page and Council members and staff have provided countless hours of one-on-one interaction with citizens and special interest groups.

TOWN OF BLOOMSBURG
Town Hall
301 East Second Street ♦ Bloomsburg, PA 17815
Phone: 570-784-7703 ♦ Fax: 570-784-1518
www.bloomsburgpa.org

April 4, 2005

Colonel Robert J. Davis, Jr.
District Engineer
U.S. Army Engineer District, Baltimore
Programs & Project Management Division
10 South Howard Street
Baltimore, MD 21203-1715

RE: Financing Plan, Bloomsburg Flood Damage Reduction Project

Dear Colonel Davis:

This letter identifies the financial resources available to the Town of Bloomsburg to meet the non-federal financial requirements associated with the implementation of the flood damage reduction project.

This project will consist of a system of earthen levees, mechanically stabilized earth floodwalls, concrete floodwalls, railroad and road closure structures and roadway relocations to provide ramps over the line of protection. The U.S. Army Corps of Engineers (USACOE) has estimated the cost of the project to be $45,470,000.00. The federal share of the project is $29,555,500.00; and the non-federal share of the project is $15,914,500.00 plus $895,600.00 of non-matched environmental costs assigned to the Town for a total of $16,810,100.00.

A preliminary implementation schedule was developed by the USACOE based on information available and is largely dependent on whether the project is funded in the Water Resources Development Act (WRDA) of 2005. The current estimated schedule is as follows:

Project Cooperation Agreement Executed	January 2007
Real Estate Acquisition	February 2007 – January 2009
Construction	March 2009 – February 2012

Non-Federal Project Costs (35% of total project costs)	
5% Cash	$ 2,273,500.00
LERRD	12,064,000.00
Cash Balance	1,577,000.00
Subtotal	$15,914,500.00
Non-Matched Environmental Cost	895,600.00
Total	$16,810,100.00

Colonel Robert J. Davis, Jr., District Engineer
April 4, 2005
Page Two

Approximate Schedule of Non-Federal Costs

Year	Non-Federal Outlay
2007	$6,927,600.00
2008	6,032,000.00
2009	.00
2010	2,273,500.00
2011	1,577,000.00

The Town of Bloomsburg will meet its financial obligation of $16,810,100.00 associated with the proposed flood damage protection project through a variety of funding sources, each with varying degrees of certainty. The enclosed plan describes each funding source including the estimated funds and the level of certainty of acquiring those funds. Although this working draft financing plan includes funds the Town may or may not receive, these uncertain monies are supported by other more certain funding sources to demonstrate the Town's ability to meet all financial obligations.

The Commonwealth of Pennsylvania will provide 50% ($7,957,250.00) of the non-federal project cost. Additionally, the Town has committed local funds eligible to match federal grants in the amount of $3,150,000.00 and expects contributions from commercial and industrial benefactors of the flood project to provide an additional $1,500,000.00 of local funds. Commitment levels will be determined as USACOE and the Town undertake the stakeholder information.

Grants for which the Town of Bloomsburg will be applying to use to fund this project total $2,300,000.00 as delineated in the enclosed plan.

The remaining financial obligations of the Town will be met through a borrowing with the debt to be retired by a general tax obligation or a flood control fee assessed by the Flood Authority. Preliminary meetings with Bond Counsel and the Pennsylvania Department of Community and Economic Development indicate that the Town is eligible to borrow several million dollars through either the Section 108 Loan Program of the Governor's Economic Development Initiative or bond issue. The solicitor is working with the Flood Committee and the Town in both the development of an Authority and continued analysis of debt financing.

Sincerely,

Charles H. Coffman, III
Mayor, Town of Bloomsburg

ENCL

2. Municipal Authority of the Town of Bloomsburg

In exchange for the assistance provided to the Authority by the Town of Bloomsburg with their upcoming capital improvement flood proofing project, the Authority has pledged a $2,150,000 contribution to the flood control project. These local funds are committed and carry few limitations or restrictions.

3. Pennsylvania Department of Community and Economic Development – Community Development Block Grant

The Community Development Block Grant (CDBG) provides three opportunities to the Town of Bloomsburg for this project. Because the Town has town-wide low-moderate income based on the 2000 census, Bloomsburg's entitlement funds are eligible for this project. Bloomsburg has traditionally received an entitlement allocation of approximately $230,000.00; all of which may be set aside for this project, or borrowed against for a five year period. Upon Council action, these funds in the amount of one million dollars ($1,000,000) are available and are eligible to match federal funds.

A second source of CDBG funds is Columbia County's entitlement program. Columbia County annually receives approximately $200,000. The county receives applications from throughout Columbia County, and consequently, has competition for these funds. Funds would likely be available for those portions of the project that benefit Hemlock or Montour Township. Columbia County Commissioners support this project and would likely make a commitment of approximately $200,000.

The third CDBG revenue source is the statewide competitive program. Grants of up to $500,000 are available. This project is supported by Columbia County Commissioners, has regional economic impact, and through proper public information efforts is likely to receive two such competitive grant awards on behalf of Hemlock Township and Columbia County.

4. Protected Business Alliance

There are approximately 60 businesses, some of which are self-insured, located in the protected areas of this project. Four of those, Magee Rieter, Bernardi Foods, Bloomsburg University, and Bloomsburg Fair, will realize significant annual savings upon completion of the Flood Control Project and redrawing of the Floodways. The Town of Bloomsburg will be assuming debt which disproportionately benefits these businesses, and will be completing a project which both saves them money and increases the value of their properties. A capital contribution pledged over three years has been preliminarily discussed and upon presentation of the plan is anticipated.

5. Hemlock Township Contribution

This project, as it should, includes protection for the Fernville community of Hemlock Township, including homes and infrastructure. The residents will realize a reduction in flood insurance costs and a likely increase in property value. A contribution from Hemlock Township will be sought upon detailed review of the study and completion of the public information process. A $50,000 contribution is anticipated.

6. **Pennsylvania Capital Budget/Governor's Action Team**

   The Commonwealth of Pennsylvania each year, in the development of the state budget, earmarks special capital budget projects. Typically, funds are set aside for these projects through the state representative and/or senator. In some cases, they are actually earmarked by the Governor through the Governor's Action Team. Most of the time, these capital budget funds are related to economic development activities. A strong cooperative relationship between the industries, the Town, state representatives, and the Governor's office will be important. It is estimated the Town may obtain $250,000 from this source.

7. **The Pennsylvania Department of Community and Economic Development (DCED) - Economic Opportunity Grant/Industrial Development Program**

   DCED has two grant programs which are provided to municipalities to facilitate the creation of manufacturing jobs, or to support existing manufacturing jobs. By working cooperatively with manufacturers protected by this project, demonstrating increased job creation and capital investments by these industries, the Town may be eligible for grants to provide public infrastructure, including flood protection. The amount of funds available is tied to the private contribution and number of jobs created/retained. It is estimated that the Town may obtain $500,000 from these sources.

8. Brownfields Funding Programs, PENNVEST Program, and US Environmental Protection Agency

   These are funds which may be used to assess and mitigate contaminated properties to allow for economic development. The stipulation is that the municipality owns the property. This program might be applicable to the hazardous waste site that has been identified in the current landfill area. Care needs to be taken relative to the liability exposure of the Town in accepting ownership of the site. It is estimated that the Town may obtain $200,000 from these sources.

9. Pennsylvania Emergency Management Agency (PEMA) Hazard Mitigation Grant Funds

   This is a federal grant program passed through the Pennsylvania Emergency Management Agency, and the funds can be used for the construction of flood control facilities, the acquisition, relocation, or demolition of flood prone properties. We would have to balance the prohibition of federal funds matching federal funds, but the program may have applicability to some of the acquisition, relocation, and demolition elements of the project. It is estimated that the Town may obtain $100,000 from these sources.

Grants

The following grant programs have been identified, but are not included in the budget at this time:

10. Columbia County, Wyoming Valley Mitigation Funds

    These federal funds are available through the Columbia County Commissioners and the Columbia County Mitigation Committee. The Municipal Authority has obtained a large portion of these funds for the Wastewater Treatment Plant flood proofing (see Paragraph 2). There are also some severe restrictions on these funds as it relates to matching other federal grant funds. All of that said, the Town is eligible to receive these funds for the Bloomsburg Area Flood Control Project and the County has a little over two million dollars ($2,000,000) available after their commitment to the Wastewater Treatment project. These funds must be shown to mitigate Susquehanna River flooding resultant from the Wyoming Valley Project. With the pending commitment for the Wastewater Treatment Plant and the limitations placed on these funds, while they are a resource, they are of limited likelihood. It is worthy of note, however, that some portions of the mitigation funds were intended to remove the railroad bridge, a project now shown unnecessary by USACOE. Local public support will determine the availability of the funds.

11. Pennsylvania Department of Conservation and Natural Resources (DCNR) - Bureau of Recreation

    DCNR offers matching grants through their Bureau of Recreation for recreation activities. Bloomsburg should investigate ways to utilize these funds for the components of the project that include recreational activities. This might include walking and biking paths, reconstruction of ball fields, development of outdoor recreation spaces, or interpretive trails. Grant funds are quite competitive and somewhat limited. It is unlikely that the Town would receive assistance of more than $100,000. These funds are an adjunct in that they enhance the project, but do not reduce the construction cost.

12. Department of Conservation and Natural Resources – Susquehanna Greenway

    The Susquehanna Greenway project is a partnership of local, state, and federal agencies focused on identifying and developing important resources along the 500 mile Susquehanna corridor. It may fund, or facilitate funding, recreational or cultural activities and projects related to the flood control project. These funds are an adjunct in that they enhance the project, but do not reduce the construction cost.

13. Pennsylvania Historic and Museum Commission (PHMC)

    Matching grants are available from the PHMC for historic renovation/restoration of structures. Much like the DCNR grants above, the grants are competitive and have limited resources. With the proactive role the Town is considering related to historic structures and this project, I believe that a matching grant of up to $200,000 may be possible. These funds are an adjunct in that they enhance the project, but do not reduce the construction cost.

14. Environmental Protection Agency – American Heritage Rivers EO13061

    The upper Susquehanna River (Wilkes Barre to Sunbury) has been designated as an American Heritage River. As such, projects which protect the river or the river communities are afforded increased cooperation and access to federal funding sources. While the designation may not provide project grants, it may open opportunities currently unidentified and provide access for related projects particularly the mining reclamation program funds. Unknown level of funding at this time.

LOANS

The following are sources available to the Town:

1. HUD Section 108 Loan/PA DCED

   The Governor's has announce a new Economic Development Initiative for Pennsylvania, which utilizes the state's federal Community Development Block Grant allocation to guarantee low interest loans. In federal fiscal year 2003, the Commonwealth received $58,000,000 under the Community Development program. Most of these funds are entitlement funds, subgranted to municipalities such as Bloomsburg. However, the Governor's office has negotiated with HUD to use these funds to guarantee loans at interest rates of 1.5 percent. This program is still under development, but the Town is eligible to borrow up to $5 million, without the traditional front end costs of a bond issue. The Town has met with DCED relative to this effort, and has been invited to join the consortium.

2. Bond Issue

   Bond Counsel, Peter Carlucci spoke to Council relative to a bond issue as a means of financing this project. A bond provides a relatively inexpensive way for Bloomsburg to borrow funds for major capital improvement projects. Town has adequate bonding capacity to pay for the non-grant funded portion of this project.

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8460
Harrisburg, PA 17105-8460
February 25, 2004

Bureau of Waterways Engineering 717-772-5989

Christine Haney, Office Assistant
Town of Bloomsburg
Town Hall
301 E. Second Street
Bloomsburg, PA 17815

Re: DEP File No. F19:1

Dear Mrs. Haney:

Reference is made to recent telephone conversations requesting that the Department of Environmental Protection (DEP) cost share in a Flood Damage Reduction Project in the Town of Bloomsburg.

DEP has a program where it cost shares 50% of the Sponsor's cost when the Sponsor enters into an agreement with the Corps of Engineers to do a flood protection, streambank stabilization or channel restoration project. DEP's share can be used toward relocation of utilities, land acquisition, and legal and administrative fees. The funding is on a reimbursement basis. After we have entered into an agreement and the work has been completed, an invoice for DEP's share plus proof of your payment to the Corps of Engineers, when appropriate, must be submitted to this office.

As soon as the Town has signed the Project Cooperation Agreement for design with the Corps, please forward a signed copy to DEP. At that point, if monies are available, DEP can enter into a Partnering Agreement with the Town to cost share.

If you have any questions, please contact Lorna Frick of my staff at 717-783-7727.

Sincerely,

Michael D. Conway, P.E.
Director
Bureau of Waterways Engineering

cc: Mary Dan, COE
Bill Seigel, SEDA-COG

9. RECOMMENDATIONS

In making the following recommendations, I have given consideration to all significant aspects in the overall public interest, including environmental, social and economic effects, engineering feasibility and compatibility of the project with the policies, desires and capabilities of the Town of Bloomsburg, Pennsylvania and other non-Federal interests.

I recommend that the plan for flood damage reduction at Bloomsburg, Pennsylvania (and associated mitigation), as fully detailed in this Integrated Feasibility Report and Environmental Impact Statement, be authorized for construction as a Federal project for flood damage reduction, subject to such modifications as may be prescribed by the Chief of Engineers.

These recommendations are made with the provisions that local interests will:

a. Provide to the United States all necessary lands, easements, rights-of-way, relocations, and suitable borrow and/or disposal areas deemed necessary by the United States for initial construction and subsequent maintenance of the project.

b. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance, operation, and public use of the project, except damages due to the fault or negligence of the United States or its contractors.

c. Maintain continued public ownership and public use of the areas upon which the amount of Federal participation is based during the economic life of the project.

d. Maintain, repair, rehabilitate, and replace the protective measures and/or structures during the economic life of the project as required to serve the intended purposes at their design levels of flood damage reduction and in accordance with regulations prescribed by the Secretary of the Army.

e. Provide and maintain necessary access roads, parking areas, and other public use facilities open and available to all on equal terms.

f. Contribute the local share of non-Federal costs for initial construction and operation and maintenance over the economic life of the project, as required to serve the intended purposes.

g. Upon completion of each project feature, acquire, rehabilitate, repair, replace, operate and maintain easements for public access to areas created or enhanced by the project. The cost of the operation and maintenance of these easements will be the responsibility of the non-Federal sponsor.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to Congress as proposals for authorization and implementation funding. However, prior to transmittal to Congress, the non-Federal project partner (The Town of Bloomsburg, Pennsylvania) interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Robert J. Davis
ROBERT J. DAVIS
Colonel, Corps of Engineers
District Engineer

10. *REFERENCES AND CONTACTS

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11. *LIST OF PREPARERS

The following individuals were primarily responsible for the preparation of this integrated feasibility report and environmental assessment.

Individual	Responsibility
Mary Dan	Project Manager
Jeff Trulick Vinicio Vannicola (DMA, Inc.)	Project Planner
Bill Abadie Jeff Trulick Michael McGarry (DMA, Inc.) Robert Wiley (DMA, Inc.)	Biologist; National Environmental Policy Act Compliance; Mitigation
Dennis Klosterman Vinicio Vannicola (DMA) David Miller (DMA)	Economic Analysis
Scott Watson ScottCox (PADEP) Thomas Jones (KAR)	Cultural Resources Analysis
Harvey Johnson Ray Smith	Civil Design Management
Tony Vidal Jim Ludlam	Civil Design
Dennis Seibel Lori Bank	Hydrology & Hydraulic Analysis
Chris Westbrook	Structural Engineering
Jim Snyder Chuck Frey	Geotechnical Engineering
John Naurot Cedric Bland Olie Leimbach	Cost Engineering

Individual	Responsibility
Gerry Mijares Bryan Frey	Hazardous, Toxic, and Radioactive Waste Analysis
Jim Bemis	Office of Counsel
Jim Moore John Naurot	Construction Management
Craig Homesley Adam Oestreich	Real Estate Analysis

12. *INDEX

13. *DISTRIBUTION LIST

This distribution list includes only those agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved and any appropriate Federal, State, or local agency authorized to develop and enforce environmental standards. Copies of this Draft SEIS are also being sent to the public that requested a copy even though their names and addresses are not listed here.

Mr. John M. Fowler, Executive Director Advisory Council on Historic Preservation Old Post Office Building 1100 Pennsylvania, NW, Suite 809 Washington, DC 20004	Mr. Carl Jablonowski Forest Service U.S. Department of Agriculture Star route 1 Box 88 Bradford, PA 16701
Ms. Ramona Schreiber National Oceanic & Atmospheric Administration 14th & Constitution Avenue, NW Washington, DC 20230-0001	Mr. Steven A. Kokkinakis National Oceanic & Atmospheric Administration 14th & Constitution Avenue, NW Washington, DC 20230-0001
Mr. Dalton G. Paxman, Ph.D. Regional Health Administrator Office of Public Health and Science Dept of Health and Human Services, Reg. 111 150 S. Independence Mall West, Suite 436 Philadelphia, PA 19104	Mr. William A. Swersky Philadelphia Regional Office U.S. Dept of Housing & Urban Development 100 Penn Square East Philadelphia, PA 19107-3380
Dr. Mamie A. Parker, Regional Director Northeast Region U.S. Fish & Wildlife Service 300 Westgate Center Drive Hadley, MA 01035-9589	Mr. William H. Werkheiser, District Chief Water Resources Division, PA District U.S. Geological Survey 215 Limeklin Road New Cumberland, PA 17070
Ms. Marie Rust, National Park Service North east Field Area 200 Chestnut Street, 5th Floor Philadelphia, PA 19106	Director Federal Highway Administration, USDOT 400 7th Street, S.W. Washington, DC 20590
Ms. Gene Gruber, Environmental Protection Specialist Federal Emergency Management Agency One Independence Mall, Sixth Floor 615 Chestnut Street Philadelphia, PA 19106-4404	Mr. Samuel E. Hayes, Office of the Secretary Pennsylvania Department of Agriculture 2301 North Cameron Street Room 211 Harrisburg, PA 17110-9408

Mr. Raymond R. Christman, Secretary Pennsylvania Department of Commerce 4th Floor South Office Building Harrisburg, Pa 17120	Mr. Dallas A. Dollase, Director Bureau of Community Planning PA Dept of Community Affairs Forum Building Harrisburg, PA 17120-0025
Regional Director Northeast Regional Office PA Department of Community Affairs 201 Samters Building Scranton, PA 18503	Mr. Warren Ely Chief, Div of State Forest Management Bureau of Forestry Dept of Conservation & Natural Resources P.O. Box 8552 Harrisburg, PA 17105-8552
Mr. Roger Fickes, Director Bureau of State Parks Dept of Conservation & Natural Resources P.O. Box 8551 Harrisburg, PA 17105-8551	Mr. Larry G. Williamson, Director Bureau of Recreation and conservation Dept of Conservation & Natural Resources Room 555 Forum Building Harrisburg, PA 17120-0155
Mr. Edward R. Brezina, Chief Div. Of Assessments & Standards Bureau of Watershed Protection PA Dept. Of Environmental Protection P.O. Box 8555 Harrisburg, PA 17105-8465	Mr. Lou Guerra Policy Office PA Dept of Environmental Protection P.O. Box 2063 Harrisburg, PA 17105-2063
Mr. Cedric Karper, Chief Division of Municipal Planning & Finance Bureau of Water Quality Management, PADEP P.O. Box 8465 Harrisburg, PA 17105-8465	Ms. Susan Wilson, Director DEP Citizens Advisory Council Rachel Carson State Office Building P.O. Box 8459 Harrisburg, PA 17105-8459
Mr. Glenn E. Maurer, Acting Director Bureau of Water Quality Protection PA Dept of Environmental Protection P.O. Box 2063 Harrisburg, PA 17105-2063	Mr. Michael D. Conway, Director Bureau of Waterways Engineering PA Dept. of Environmental Protection P.O. Box 2063 Harrisburg, PA 17105-2063
Mr. Larry C. Tropea, Deputy Secretary Office of Water Management PA Dept. of Environmental Protection P.O. Box 2063 Harrisburg, PA 17105-2063	Dr. N. Mark Richards, Secretary PA Dept of Wealth Health & Welfare Bldg P.O. Box 90 Harrisburg, PA 17108

Mr. Michael M. Ryan, Deputy Secretary Highway Administration, PADOT Keystone Building 400 North Street Harrisburg, PA 17120	Mr. David L. Smith, Director PA Emergency Management Agency 2605 Interstate Drive Harrisburg, PA 17110-3321
Mr. Delano Graff, Director Fisheries Bureau PA Fish and Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9620	Mr. John A. Arway, Chief Division of Environmental Services PA Fish and Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9620

14. *ORGANIZATIONAL CONFLICT OF INTEREST REPRESENTATION STATEMENT

NEPA FINANCIAL DISCLOSURE STATEMENT FOR PREPARATION OF U.S. ARMY CORPS OF ENGINEERS ENVIRONMENTAL IMPACT STATEMTENTS

Council on Environmental Quality Regulations at 40 CFR 1506.5 (c), which have been adopted by the U.S. Army Corps of Engineers (ER 200-2-2), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial interest or other interest in the outcome of the project. The term "financial or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981, guidance, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 Federal Register. 18,026 - 18,038, Questions 17a and 17b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 Federal Register. 18,031.

In accordance with these requirements, the undersigned hereby certifies that the company and any of its subcontractors have no financial or other interest in the outcome of the above named project.

August 30, 2005
Date

Signature

David J. Miller
Name

President
Title

David Miller & Associates, Inc.
Company

15. COMMENTS ON THE DRAFT FS/EIS

Mr. Jeff Trulick, Planning Division
P.O. Box 1715
Baltimore, MD 21203
April 18, 2005

Mr. Trulick:

Call me cynical, but I have little faith my comments will influence the Corps of Engineers in any way. However, since I did receive a letter from Mr. Coleman addressed to "All Interested Parties," and I am extremely interested, I hereby submit my comments based solely on experience, common sense and feasibility.

I was born and raised in Bloomsburg and now live in Fernville, so I am able to comment on behalf of people on both sides of the creek.

A – The Bloomsburg Portion of the Proposal

1 – The word protection does not equate with damage reduction.

2 – The proposed levee system supposed to protect Bloomsburg from the Susquehanna River is NOT along the river bank and will not prevent the river from rising past the sewer plant and flooding everything east of the structure's terminus at Railroad St. In time of a major flood water will undoubtedly rise through the low-lying East end and Town Park until it is higher than the width of the levee's base and will then flow inside the wall with no way to get out. This definitely is not protection.

3 – The levee does NOT protect the town's sewage system, which when shut down affects the entire town; nor the Water Company – ditto.

4 – The proposed levee does not protect the High School or Middle School and if water came as predicted, with the proposed wall behind them, they would be inundated.

5 – The proposed "protection" system does nothing for the airport, Kawneer, the recycling plant – all financial concerns that are not being addressed.

6 – The levee around the lower end of Bloomsburg would throw much more water into Montour Township, wipe out the newly repaired covered bridge and most of the village of Rupert.

7 – Perhaps it doesn't matter to you, but this proposed levee system is utterly UGLY! Because of its ridiculous combination of earth and cement, it cannot become a walkway, it will be extremely difficult to keep the grass mowed, and Bloomsburg's budget will not be sufficient to also maintain the Fernville wall as proposed and future Councils will no doubt vote to discontinue such maintenance.

8 – We have been led to believe help will be available in time of flooding from the Army Reserve – and guess what? Bloomsburg no longer has one! Are you guys in Baltimore going to bring those hundreds of sandbags and put them in place for us?

B – The Fernville Portion

1 – High walls on both sides of Fishing Creek can only make a funnel. Water has to go somewhere, and nature sends it straight ahead, not around the bend of the creek.

2 – In 1972 the creek reached the floor of the Railroad St. bridge. By narrowing the space in which it can escape, it will come higher, back up over the unprotected Water Co., top the bridge and in time, erode and breach any mud wall.

3 – The proposed "gate" on the Fernville side of the bridge takes manpower to erect and close – not available in the small community, and if it IS closed there will be no escape and, what's worse, no access for emergency vehicles - fire, ambulance, police etc. Believe me, I have lived here over 40 years and when water is high, lower Drinker Street and Creek Road are utterly impassable, yet you want to close our only bridge on both sides. In the meantime water is gushing down the hillside and pooling in our yards the same as if there were no wall and it came from the creek.

4 – The entire country is cutting down millions of trees which severely affects our ecology, bird life, air quality and, in the case of creeks, bank retention. We in Fernville love our trees and our view of the creek. We don't want either destroyed on a full time basis for the sake of a once-in-a-while flood. We KNOW they may become more frequent – thanks to what you have done upstream, and the excessive amount of building and paving, but we'd still rather take our chances and not live behind a prison wall.

****

As for the two industries who want the wall but are unwilling to absorb the cost – I am emphatically sold on the theory of the Invisible Wall around them – not along the river nor along the creek, merely surrounding the buildings. This could not possibly be as expensive than the entire levee system you propose, and would not be a permanent eyesore for either community. They (Reiter and Bernardi) should be forced to pay at least half the cost and their workers would be available to erect the panels when flooding is expected. We would not need sandbags, grass mowing, heavy equipment to put up gates, nor property acquisition in Bloomsburg.

Of course this doesn't put the money in the coffers of the Corps of Engineers – but over the past 40 years, don't you think you've milked us for enough already? Well, you asked for my opinion, and since I have expressed it so often in the past, you're not hearing anything new. But for once, how about listening the majority of people who will be affected instead of to Rep. Kanjorsky whose only aim is mitigation forced upon him by political conscience. Now <u>there</u>'s an oxymoron!

A perpetual, perennial protestor against
Flood Walls,

Pat Parker

Pat Parker
558 Drinker St.
Fernville,
Bloomsburg, PA

U.S. Department of Homeland Security
Region III
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

FEMA

JUN 07 2005

Mr. Jeffery Trulick
USACE, Planning Division
Post Office Box 1715
Baltimore, Maryland 21203

RE: Draft Integrated Feasibility Report and Environmental Impact Statement
Flood Damage Reduction Project
Susquehanna River & Fishing Creek
Bloomsburg, Pennsylvania

Dear Mr. Trulick:

This is in response to your May 5, 2005, Notice of Availability to the Federal Emergency Management Agency (FEMA) regarding a Draft Integrated Feasibility Report and Environmental Impact Statement. The letter describes a recommended flood damage reduction plan to provide Agnes (440-year) level protection from Susquehanna River flooding and 100-year level of protection from Fishing Creek flooding. The project alternatives are in areas of the Susquehanna River and Fishing Creek that have been mapped by FEMA as a Special Flood Hazard Area (SFHA)—an area subject to flooding during the 1% annual chance flood.

FEMA administers the National Flood Insurance Program (NFIP), which is designed to reduce flood losses through local floodplain management and the provision of flood insurance to property owners. The NFIP requires participating communities to adopt and enforce floodplain management ordinances with stipulations regarding modifications made to areas within the SFHA. As such, each community is asked to enforce an ordinance that requires permits for all proposed construction within the SFHA and also requires that the flood-carrying capacity of an altered stream be maintained.

This may apply to some of the proposed alternatives. To prove that the flood-carrying capacity of an impacted stream will be maintained may require an engineering study and completion of a Conditional Letter of Map Revision (CLOMR) application. This application and related information can be found on our website at: www.fema.gov/mit/tsd/dl_mt-2.htm. A CLOMR is required under the NFIP regulations, 44 CFR 65.12, when proposed encroachments will result in Base Flood Elevation (BFE) increases in excess of those permitted under subparagraphs 60.3(c)(10) or 60.3(d)(3). Increases in excess of those allowed means that for encroachments on a FEMA designated floodway there is to be no rise when comparing existing to proposed conditions. No rise is defined as 0.00'. For areas studied in detail for which a floodway has not been defined, and for areas studies by approximate methods (Zone A), the maximum allowable increase in BFE from existing to proposed conditions is 1.00'

www.fema.gov

Mr. Jeffery Trulick
USACE, Planning Division
June 7, 2005
Page 2

The impact of proposed construction on BFEs should be determined by appropriate engineering methods. For projects where the increase in BFE is determined to be within acceptable limits, although a CLOMR is not required by FEMA's standards, a community may still require a developer to obtain a CLOMR prior to issuing a building permit. In this case, FEMA will review the case for technical accuracy and compliance with NFIP standards as with any other CLOMR. Please coordinate with the City of Bloomsburg Floodplain Manager to ensure that the proposal meets the requirements of their floodplain management ordinance.

Please be aware that the City of Bloomsburg may have an approved Hazard Mitigation Plan in accordance with the provisions of 44CFR Part 201. This project should be integrated with their Plan and referenced in it.

Additionally, FEMA administers mitigation grant programs under which flood prone structures are frequently acquired and demolished or relocated. The remaining properties have restrictive open space covenants conveyed in their deeds (44CFR Part 206.434). This should be investigated by the USACE for any potential conflicts, if land acquisition and construction in or near the floodplain are being considered.

If you have any questions regarding this letter, or the NFIP in general, please call Ms. Science Kilner, Regional Environmental Officer at (215) 931-5651.

Sincerely,

Eugene K. Gruber, P.E.
Director
Federal Insurance and Mitigation Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

October 21, 2004

Mr. Jeffrey L. Trulick
Project Manager
U.S. Army Corps of Engineers
Baltimore District, Planning Division
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Trulick:

This verifies ongoing coordination between you and members of my staff (Tony Tur and Cindy Tibbott) regarding the proposed Bloomsburg Flood Protection Project in Columbia County, Pennsylvania. Per those discussions, due to staffing shortages here and the relatively minor impacts to fish and wildlife habitat expected to result from any of the project alternatives being considered, we are declining the opportunity to prepare a Fish and Wildlife Coordination Act Planning Aid Letter or Report. We acknowledge the Corps of Engineers commitment to minimize wetland impacts, and to provide compensatory mitigation for any unavoidable wetland losses. We do anticipate being able to provide a Fish and Wildlife Coordination Act response to this project proposal by providing comments on the draft Environmental Impact Statement.

Thank you for your efforts to keep us involved in this project. Please direct any questions to Ms. Tibbott at 814-234-4090.

Sincerely,

David Densmore
Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

June 14, 2005

Mr. Jeff Trulick
U.S. Army Corps of Engineers
Planning Division
P.O. Box 1715
Baltimore, MD 21203

RE: USFWS Project #2005-2005

Dear Mr. Trulick:

This responds to the Public Notice dated May 5, 2005, requesting information about federally listed and proposed endangered and threatened species within the area affected by the proposed flood damage reduction project located in the Town of Bloomsburg, Columbia County, Pennsylvania. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species, and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment nor further consultation under the Endangered Species Act are required with the Fish and Wildlife Service. This determination is valid for two years from the date of this letter. If the proposed project has not been fully implemented prior to this, an additional review by this office will be necessary. Also, should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

We have also reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement, and no significant adverse effects on fish and wildlife are expected to result from the proposed activity. Therefore, the Service has no objection, from a standpoint of fish and wildlife, to this project.

This response is based on an office review of the proposed project's location, and no field inspection of the project area has been conducted.

Requests for information regarding State-listed endangered or threatened species should be directed to the Pennsylvania Game Commission (birds and mammals), the Pennsylvania Fish and Boat Commission (fish, reptiles, amphibians and aquatic invertebrates), and the Pennsylvania Department of Conservation and Natural Resources (plants).

To avoid potential delays in reviewing your project, please use the above-referenced USFWS project tracking number in any future correspondence regarding this project.

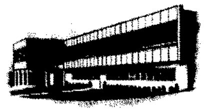
Please contact Jennifer Dombroskie or Cindy Tibbott of my staff at 814-234-4090 if you have any questions or require further assistance.

Sincerely,

David Densmore
Supervisor

Enclosure

Robison-Anton
Textile Company



SPECIALIZING IN FINE DECORATIVE YARNS AND EMBROIDERY THREADS FOR OVER 90 YEARS

June 20, 2005

Mr. Jeff Trulick
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

Re: Bloomsburg Flooding

Dear Mr. Trulick:

Your name has been given to me by Carol Mas of the Bloomsburg Pennsylvania Municipal Authority. I am writing to you to express my profound disappointment in the Municipality of Bloomsburg, PA. We have been a business owner in Bloomsburg for 26 years. We currently employ 100 people in our Bloomsburg facility. During the course of time we have operated in Bloomsburg, we have experienced all too many occasions when either there was a threat of a flood or we actually took water into our facility. Every winter and spring we hold our breath with the worry that we are going to have another flood. When we receive a flood warning, it has become standard practice to remove all of our pumps and pump motors from all of our equipment, move all of our inventory, dyes and chemicals, and all peripheral controllers and electric equipment from our factory floor. This exercise is extraordinarily expensive due to the fact that we generally work around the clock to facilitate this move. It normally takes two days to dismantle the factory and 3-4 days to put all equipment back into place. If there is a flood, up to five days can be added for cleanup. The loss of production and the overtime hours is a tremendous hardship.

I am aware that the Bloomsburg Council recently voted the project down. They felt that too few people were protected by the proposed project. Nearly 1,000 people are employed between our company and Magee Rieter. The affect on these people not being employed at this facility would have a major impact on everyone in the town of Bloomsburg. I would strongly suggest that this project move forward. I am sure that another

175 BERGEN BLVD. · P.O. BOX 159 · FAIRVIEW, NJ 07022 · TEL. (201) 941-0500 · FAX (201) 941-8994

Mr. Jeff Trulick
June 20, 2005
Page Two

flood within the next 12-24 months will cause our company to look for an alternative location.

If you wish to discuss this with me further, please do not hesitate to contact me.

Very truly yours,

ROBISON-ANTON TEXTILE CO.

David E. Ronner
Executive Vice President

DER/ss
enclosure
/glood

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

June 29, 2005

ER 05/410

Mr. Jeff Trulick
U.S. Army Corps of Engineers
Planning Division
P.O. Box 1715
Baltimore, MD 21203

Dear Mr. Trulick:

The U. S. Department of the Interior (Department) has no comment on the Draft Integrated Feasibility Report and Environmental Impact Statement for the Flood Damage Reduction Project, in Bloomsburg, Pennsylvania.

Thank you for the opportunity for comment. We apologize for the delayed response.

Sincerely,

Michael T. Chezik
Regional Environmental Officer

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE, HARRISBURG, PA 17110-9797

July 7, 2005

Mr. Jeff Trulick
Planning Division
U. S. Army Corp of Engineers
PO Box 1715
Baltimore, MD 21203-1715

Re: Draft FR/EIS
Towns of Bloomsburg (Levee)
Flood Damage Reduction Project
Bloomsburg, Columbia County, PA

Dear Mr. Trulick:

This is our response to your notice dated May 5, 2005, requesting information on the above referenced project.

We have completed an office review of the proposed project and determined that it is not located within the boundary line of any State Game Lands. Also, we have determined that except for occasional transient individuals, this proposed project is not located within an area, which is the habitat of an endangered or threatened species of bird or mammal recognized by the Pennsylvania Game Commission.

The Department of Conservation and Natural Resources has developed a new Pennsylvania Natural Diversity Inventory Environmental Review tool that is now available for use. The web site can be accessed at www.naturalheritage.state.pa.us. The new site replaces the old system that will be shut down in the near future. The new site should be used for the initial review of species of special concern under the jurisdiction of the Pennsylvania Game Commission. The project is cleared for species of special concern by the Pennsylvania Game Commission if the search results do not indicate any potential impacts listed for our agency. If State Game Lands are listed as a conservation measure you should contact the Pennsylvania Game Commission and provide the information indicated on the PNDI search results. The Pennsylvania Game Commission no longer requires you to directly contact our agency when no potential impacts are listed by the search results. You need to follow the directions contained in the search results if potential impacts are listed for the Pennsylvania Game Commission and for large projects that cannot be reviewed by the system. If you need further clarification on this change you can contact the Pennsylvania Game Commission at the phone number listed below.

ADMINISTRATIVE BUREAUS:
PERSONNEL: 717-787-7836 ADMINISTRATION: 717-787-5670 AUTOMOTIVE AND PROCUREMENT DIVISION: 717-787-6594
LICENSE DIVISION: 717-787-2084 WILDLIFE MANAGEMENT: 717-787-5529 INFORMATION & EDUCATION: 717-787-6286 LAW ENFORCEMENT: 717-787-5740
LAND MANAGEMENT: 717-787-6818 REAL ESTATE DIVISION: 717-787-6568 AUTOMATED TECHNOLOGY SYSTEMS: 717-787-4076 FAX: 717-772-2411
WWW.PGC.STATE.PA.US
AN EQUAL OPPORTUNITY EMPLOYER

Mr. Jeff Trulick -2- July 7, 2005

Should project plans extend beyond the present study area, or if additional information on endangered or threatened species of birds or mammals becomes available, this review may be reconsidered. This reply relates only to endangered and threatened species and does not address other concerns of the Pennsylvania Game Commission.

If you have any questions, please contact me at (717) 783-5957.

Very truly yours,

James R. Leigey

James R. Leigey
Wildlife Impact Review Coordinator
Division of Environmental Planning
And Habitat Protection
Bureau of Land Management

JRL/pfb

Cc: File

Pennsylvania Fish & Boat Commission

established 1866

Bureau of Fisheries
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823
814-359-5228
July 15, 2005

Jeff Trulick
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Trulick:

After review of the Flood Damage Reduction Project DIFR&EIS for the Town of Bloomsburg, PA, the Pennsylvania Fish and Boat Commission would like to offer the following comments.

The Town of Bloomsburg and the village of Fernville are prone to the effects flooding due to historic and current development within the floodplain of the Susquehanna River and Fishing Creek. Development of residential, commercial, and industrial properties within floodplain habitats negatively impact the biological communities, water quality, and physical components of the associated aquatic ecosystems in watersheds across the Commonwealth. The PFBC agrees that the tentatively selected alternative meets the stated purpose of this project to provide a 440-year level of protection from Susquehanna River flooding and a 100-year level of protection from Fishing Creek flooding.

The report indicated that approximately 0.7 ac of mixed wetland habitat and 0.7 ac of the stream bottom of Fishing Creek would be permanently impacted with the construction of this project. The report also indicated approximately 3000 linear feet of vegetated stream corridor along Fishing Creek would be permanently impacted and replaced with rock riprap. Two ac of forested wetland also exist within the proposed alignment path. Avoidance of stream and wetland impacts would be ideal, however the PFBC will work to help minimize and/or mitigate impacts to stream and wetland features within the project boundaries.

The PFBC concurs with the wetland mitigation approach for this project. The impacts to Fishing Creek require additional discussion. The mitigation concept for the impacts to the stream bottom of Fishing Creek indicate that fish passage would be restored to a reach of Fishing Creek based on the removal of a downstream dam. The PFBC agrees that removal of this dam would provide access to historic spawning habitat and therefore supports the removal to compensate for impacts to the stream bottom of Fishing Creek. To adequately compensate for the loss of 3,000 linear feet of vegetated stream corridor, the PFBC recommends that a 1:1 ratio

Our Mission: www.fish.state.pa.us

To provide fishing and boating opportunities through the protection and management of aquatic resources.

Jeff Trulick
July 15, 2005
Page 2

of stream bank corridor mitigation occur in the Fishing Creek watershed. Vegetated stream corridors are extremely important for the maintenance of water temperatures, stream bank stability, and overhead refuge habitat.

The PFBC appreciates the opportunity to comment on this project. We look forward to working with the USACE to minimize and/or mitigate environmental impacts and implement a flood reduction project that satisfies the requirements of National Environmental Policy Act.

Sincerely,

Tom Shervinskie

Thomas A. Shervinskie, Fisheries Biologist
Watershed Analysis Section

PFBC – Spotts, Moase, Thompson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

June 27, 2004

Jeff Trulick
Planning Division
U. S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203

RE: Draft Integrated Feasibility Report and Environmental Impact Statement Flood Damage Reduction Project Bloomsburg, PA, April 2005

Dear Mr. Trulick:

In accordance with the National Environmental Policy Act (NEPA) of 1969 and Section 309 of the Clean Air Act, the Environmental Protection Agency (EPA) has we reviewed the Draft Environmental Impact Statement (DEIS) for the above referenced project.

The purpose of this DEIS is to evaluate alternative plans to reduce flood damages in Bloomsburg along Fishing Creek and the Susquehanna River. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. Extensive portions of Bloomsburg are within the 500-year floodplain of the Susquehanna River and Fishing Creek. The 500-year floodplain includes approximately 525 residential structures, and 75 businesses and local government buildings.

The recommended flood damage reduction plan is to provide hurricane Agnes (440-year) level protection from Susquehanna River flooding and 100-year level of protection from Fishing Creek Flooding. The recommended plan consists of 16, 555 linear feet of levee/floodwall systems with fourteen drainage structures and nine closure structures, six of which incorporate limited road raising. The alignment of the line of protection was refined based on physical, environmental, and economic criteria.

The proposal consists of a system of earthen levees, mechanically stabilized earth floodwalls, concrete floodwalls, railroad and road closure structures and roadway relocations to provide ramps over the line of protection. Limited riprap will be used to protect steep banks along the lower reaches of Fishing Creek.

Based on our review of the DEIS, EPA has rated the environmental impacts of the preferred Alternative as "EC" (Environmental Concerns) and the adequacy of the impact statement as "2" (Insufficient). The basis for these ratings and a copy of the rating criteria are contained in the attachment to this letter. Thank you for the opportunity to offer these comments. If you have any questions, please contact Barb Okorn at (215)814-3330.

Sincerely,

William Arguto
NEPA Team Leader

enclosures

EPA Supporting Comments
Flood Damage Reduction Project Bloomsburg DEIS:

Please include details of the wetlands. The report references field investigations, but details are not provided in the DIES. The maps should indicate the wetland types.

The most recent state and federal threatened and endangered species coordination letters should be included in the EA. In addition, we recommend that the appropriate state and federal agencies be contacted annually at a minimum regarding these issues.

The Corps should coordinate all activities with the PA Historical and Museum Commission.

Page 2-17 states that " The areas within Bloomsburg with the highest concentration of persons below the poverty level would not be within the potential project area and there would be no disproportionate effect to low-income populations." This statement should be clarified. What is the definition of "highest concentration". It is important that environmental justice issues are fully evaluated in the DEIS.

Page 3-31 states that "..it is highly unlikely that a floodplain buyout plan would meet present Federal National Economic Development policy for a finding of Federal interest. This is due primarily to insufficient benefit-cost ratios under mandated economic analysis procedures. As a consequence, Federal funding of all or part of a buyout would appear remote." More information should be provided to explain this statement. It is unclear to the reader why it is "highly unlikely" and why it would "appear remote". Part of fully evaluating alternatives should provide definitive statements.

Page 3-32 discusses flood warning systems and states that while they would increase awareness, they would not decrease damages, so they were not considered as a stand alone alternative. These systems should be a part of the selected alternative to increase public safety.

Page 4-14 discusses utility relocations. It is unclear if environmental impacts associated with these relocations are considered. Also, a more detailed explanation of the roadway relocations should be provided (i.e. would pavement be left in place, etc.)

The Corps should work closely with the appropriate agencies to avoid and minimize erosion and construction impacts. Areas of disturbance should be revegetated as soon as possible with native vegetation.

Page 5-7 should discuss the types of wetlands impacted and clearly depict them on a map. It is unclear if the 2.0 acres of forested wetlands that will be impacted will be minimized for only alternative 4 or all of the alternatives.

Page 5-33 indicates that mitigation for aquatic and riparian impacts will be restoring fish passage to lower Fishing Creek. It appears that there may be problems with removing the dam, but no other alternative mitigation concepts are discussed. Also, one of the potential impacts to the aquatic environment mentioned in the DEIS, is an increase in water temperature due to impacts to riparian vegetation. There is no discussion on how this may impact the fish passage.

More details should be provided on the potential wetland mitigation site and the COE should work with the appropriate state and federal agencies to develop an acceptable mitigation package to address aquatic, wetland and terrestrial environmental impacts.

It doesn't appear that PA Game Commission received a copy of this document. They should be given an opportunity to review it for state species of concern.

The following comments are for you consideration to minimize impacts caused by construction:

Air Resources

In an effort to eliminate impacts to air quality, the Corps should control or minimize construction emissions through use of the following typical Best Management Practice (BMPs) in association with each proposed project involving on-site construction:

- Utilize appropriate dust suppression methods during on-site construction activities. Available methods include application of water, soil stabilizers, or vegetation; use of enclosures, covers, silt fences, or wheel washers; and suspension of earth-movement activities during high wind conditions;

- Maintain a speed of less than 15 mph with construction equipment on unpaved surfaces as well as utilize fuel with lower sulfur content;

- Employ a construction management plan in order to minimize interference with regular motor vehicle traffic;

- Use electricity from power poles instead of generators whenever possible;

- Repair and service construction equipment according to the regular maintenance schedule recommended for each individual equipment type;

- Use low-VOC architectural materials and supplies equipment; and

- Incorporate energy-efficient supplies whenever feasible.

SmartWay Transport

Please consider incorporating any SmartWay initiatives that can be integrated into this project or general facility operating procedures, especially some of the idling best management practices. This effort has the potential to reduce pollution emissions as noted in the brief smart way description provided below.

SmartWay Transport is a voluntary partnership between various freight industry sectors and EPA that establishes incentives for fuel efficiency improvements and greenhouse gas emissions reductions. By 2012, this initiative aims to reduce between 33-66 million metric tons of carbon dioxide (CO2) emissions and up to 200,000 tons of nitrogen oxide (Nox) emissions per year. At the same time, the initiative will result in fuel savings of up to 150 million barrels of oil annually. There are three primary components of the project: creating partnerships, reducing all unnecessary engine idling, and increasing the efficiency and use of rail and intermodal operations.

One component of the SmartWay Transport Partnership is to eliminate unnecessary truck and rail idling by developing a nationwide network of idle-reduction options along major transportation corridors - truck stops, travel centers, distribution hubs, rail switch yards, borders, ports, and even along the side of the road. The Environmental Protection Agency is working with the trucking industry, manufacturers of idle control technologies, various states, and other partners to help save fuel and reduce air pollution from idling trucks. EPA is conducting emissions testing on idling trucks under various conditions, surveying trucking fleets to learn more about idling times, implementing demonstration projects to test idle control technologies, and holding workshops to educate affected communities.

The vast majority of fuel consumed during long-duration idling can be saved and air emissions reduced by installing one of several idle control technologies that provide heat, air conditioning, and electrical power. These technologies include auxiliary units and truck stop electrification. The technologies to address engine idling are evolving, and EPA plans to test new technologies as they come to the market. You can find a list of the currently available idle technologies at http://www.epa.gov/otaq/retrofit/idlingtech.htm.

Noise

Noise mitigation measures should be implemented during renovation, demolition and/or construction. These measures may include:

- maintenance of construction equipment and installation of mufflers to reduce noise;

- time of day restrictions on construction and maintenance activities to eliminate noise during those times of day when it is considered to be most objectionable; and

- timing of demolition and/or construction activities to avoid primary breeding and nesting seasons of avian and other affected species.

Surface Water Resources

- time of year restrictions on construction to accommodate aquatic life cycles and recreation activities;

- disposal of construction debris at an approved upland site to reduce the risk of contamination to surface water; and

- use of barriers and depressions to slow and impound precipitation and trap sediment.

The area should be revegetated immediately after construction with native vegetation or non-invasive species. Vegetated swales, treatment systems and other stormwater management controls should be implemented as necessary.

Low Impact Development

A Presidential Memorandum (dated April 26, 1994) and Guidance (dated August 10, 1995) applicable to Federal facilities and federally funded projects pertinent to environmentally and economically beneficial landscape practices is to be incorporated into all NEPA-related documents. As outlined in Executive Order 13148 dated April 26, 2000 (Federal Register Vol. 65, No. 81) on Greening the Government, it has been directed that all agencies incorporate the above Guidance into landscape programs, policies and practices. The Guidance calls for agencies that fund any landscape to provide recipients with information of beneficial landscaping as well as to work to support and encourage application of the principles. The EPA, GSA, and USDA are tasked with providing technical information on beneficial landscaping to other federal agencies and their facilities. This effort, also recognized as low impact development, has the potential to reduce impacts on watershed hydrology and aquatic resources as described below.

Low impact development, or LID, is a natural approach to land development and stormwater management designed to reduce impacts on watershed hydrology and aquatic resources. It is important to incorporate LID efforts to mitigate the effects of development through traditional stormwater management practices which have proven to not be entirely successful. Traditional collection and conveyance systems, stormwater ponds and other stormwater facilities do not replicate natural systems, which greatly slow water before it reaches streams, wetlands and other waters. Development often times results in the loss of trees and other vegetation, the compaction of soils be heavy equipment, and the creation of vast stretches of connected impervious areas.1 These combined factors are extremely difficult to compensate for using traditional practices. Prior to the development of any structural stormwater practices on a site, significant reductions in stormwater quantity and quality impacts can be made through enhancements to site design. As a result, the following site design goals and planning practices can be used to minimize stormwater impacts.

* Design Goal: Minimize direct stormwater impacts to streams and wetlands to the maximum extent practicable. Practices: 1. Locate stormwater facilities outside of streams and wetlands; 2. maintain natural drainage routes on site; 3. preserve riparian buffers; and 4. distribute "Integrated Management Practices (IMPs)" used in lieu of centralized ponds.

* Design Goal: Preserve the natural cover on as much of the site as possible, especially for areas located on hydrologic soil groups (HSG) A and B. Practices: 1. Utilize clustered development designs that preserve a significant portion of the site in a natural state; 2. utilize "fingerprint" clearing by limiting the clearing and grading of forests and native vegetation to the minimum area needed for the construction of the lots, the provision of necessary access, and fire

protection; 3. avoid impacts to wetlands or vegetated riparian buffers; and a4. Preserve A & B soils in natural cover.

* Design Goal: Minimize the overall impervious cover. Practice: 1. Utilize the minimum required width for streets and roads; 2. utilize street layouts that reduce the number of homes per unit length; 3. minimize cul-de-sac diameters, use doughnut cul-de-sacs, or use alternative turnarounds; 4. minimize excess parking space construction, utilize pervious pavers in low-use parking areas; 5. utilize structured or shared parking; 6. reduce home setbacks and frontages; 7. where permitted, minimize sidewalk construction by utilizing sidewalks on one side only, utilizing "skinny" sidewalks, or substituting sidewalks with pervious trails through common greenspace; 8. substitute pervious surface3s for impervious wherever possible; 9. where permitted, avoid the use of curb and gutter and utilize vegetated open swales, preferably "engineered swales' with a permeable soil base; and 10. minimize compaction of the landscape and in areas where soils will become compacted due to construction equipment, specify that the soils will be "disked" prior to seeding, and amended with loam or sand to increase absorption capacity.

* Design Goal: Locate infiltration practices on HSG A and B soils wherever possible. Thus, every effort should be made to utilize areas with these soils for IMPs that promote infiltration.

* Design Goal: Locate impervious areas on less permeable soils (HSG C and D). Placement of impervious areas on lower permeability soils minimizes the potential loss of infiltration/recharge capacity on the site.

* Design Goal: "Disconnect" impervious areas. "Disconnecting" means having impervious cover drain to pervious cover, i.e. downspouts draining to the yard, not the driveway. This decreases both the runoff volume and time of concentration.

* Design Goal: Increase the travel time of water off of the site (time of concentration). Practices: 1. Flatten grades for stormwater conveyance to the minimum sufficient to allow positive drainage; 2. increase the travel time in vegetated swales by using more circuitous flow routes, rougher vegetation in swales, and check dams; and 3. utilize "engineered" swales in lieu of pipes or hardened channels.

* Design Goal: Utilize soil management/enhancement techniques to increase soil absorption. Practices: 1. Delineate soils on site for the preservation of infiltration capacity; and 2. require compacted soils in areas receiving sheetflow runoff (such as yard, downslope of downspouts).

* Design Goal: Revegetate all cleared and graded areas with native and noninvasive species.

* Design Goal: Utilize level spreading of flow into natural open space.

For additional LID information, please refer to the following web sites.
- LID Manuals:

http://www.epa.gov/owow/nps/lid_hydr.pdf

Borrow and Fill Disposal

Disposal of excess waste or the borrowing of fill for the earthmoving activities of (highway) construction can lead to potential secondary impacts. Efforts should be made to avoid and minimize the impacts of the project on ecologically sensitive areas. It is important that borrow and waste methods not impact those same resources. Even if specific designs have not been developed, to the extent possible, potential staging areas should be identified and their impacts assessed and evaluated.

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

23 August 2005

Scott C. Watson, CENAB-PL-E
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

Re: ER# 99-2780-037-D
Bloomsburg Flood Protection Project, Bloomsburg,
Columbia County, Pennsylvania

Dear Mr. Watson:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

We agree to resolve Section 106 consultation for this project with a Programmatic Agreement as long as the procedures of 36 CFR 800 are followed. We look forward to reviewing a draft of the document when it has been completed.

If you need further information in this matter please consult Steven McDougal at (717) 772-0923.

Sincerely,

Jean H Cutler for
Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/srm

Agency/Contact Name and Date	Comment Number	Comment	Response
U.S. Department of the Interior, U.S. Fish and Wildlife Service David Densmore June 14, 2005	1	Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment or further consultation under the Endangered Species Act or the Fish and Wildlife Coordination Act is required with the Fish and Wildlife Service.	Comment noted.
USFWS, continued.	2	We have also reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement, and no significant adverse effects on fish and wildlife are expected to result from the proposed activity. Therefore, the Service has no objection, from a standpoint of fish and wildlife, to this project.	Comment noted.
U.S. Department of Homeland Security, Federal Emergency Management Agency Eugene K. Gruber, June 7, 2005	1	To prove the flood-carrying capacity of an impacted stream will be maintained may require an engineering study and completion of a Conditional Letter of Map Revision (CLOMR) application. This application and related information can be found on our website at: www.fema.gov/mit/tsd/dl_mt-2.htm. A CLOMR is required under the NFIP regulations, 44 CFR 65.2, when proposed encroachments will result in Base Flood Elevation (BFE) increases in excess of those permitted under subparagraphs 60.3(c)(10) or 60.3(d)(3). Increases in excess of those allowed means that for encroachments on a FEMA designated floodway there is to be no rise when comparing existing to proposed conditions. No rise is defined as 0.00'. For areas studied in detail for which a floodway has not been defined, and for areas studies by approximate methods (Zone A), the maximum allowable increase in BFE from existing to proposed conditions is 1.00'.	The team will produce a CLOMR in PED as is our normal practice.

Agency/Contact Name and Date	Comment Number	Comment	Response
FEMA, continued.	2	The impact of proposed construction on BFEs should be determined by appropriate engineering methods. For projects where the increase in BFE is determined to be within acceptable limits, although a CLOMR is not required by FEMA's standards, a community may still requires a developer to obtain a CLOMR prior to issuing a building permit. In this case, FEMA will review the case for technical accuracy and compliance with NFIP standards as with any other CLOMR. Please coordinate with the City of Bloomsburg Floodplain Manager to ensure that the proposal meets the requirements of their floodplain management ordinance.	Comment noted. This will be done in PED, as is our normal practice.
FEMA, continued.	3	Please be aware that the City of Bloomsburg may have an approved Hazard Mitigation Plan in accordance with the provisions of 44 CFR Part 201. This project should be integrated with their Plan and referenced in it.	Comment noted.
FEMA, continued.	4	Additionally, FEMA administers mitigation grant programs under which flood prone structures are frequently acquired and demolished or relocated. The remaining properties have restrictive open space covenants conveyed in their deeds (44 CFR Part 206.434). This should be investigated by the USACE for any potential conflicts, if land acquisition and construction in or near the floodplain are being considered.	This was investigated during the Feasibility Study and it was determined that there are no properties acquired under the FEMA mitigation grant programs within the boundaries of the properties to be affected by the project.
U.S. Department of the Interior, Office of Environmental Policy and Compliance Michael T. Chezik June 29, 2005	1	The U.S. Department of the Interior has no comment on the Draft Integrated Feasibility Report and Environmental Impact Statement for the Flood Damage Reduction Project.	Comment noted.

Agency/Contact Name and Date	Comment Number	Comment	Response
U.S. Environmental Protection Agency, Region III William Arguto June 27, 2004	1	Please include details of the wetlands. The report references field investigations, but details are not provided in the DEIS. The maps should indicate the wetland types.	Text in Section 2.4.2 Wetlands was added to indicate what type of wetland unit was represented in Figure 2-3.
U.S. EPA, continued.	2	The most recent state and federal threatened and endangered species coordination should be in the EIS. In addition, we recommend that the appropriate state and federal agencies be contacted annually at a minimum regarding these issues.	Most recent correspondence from USFWS and Commonwealth of Pennsylvania has been referenced and appended. USFWS letter indicates the determination is valid for two years from the date of the letter.
U.S. EPA, continued.	3	The Corps should coordinate all activities with the PA Historical and Museum Commission.	The Corps has coordinated with the PA Historical and Museum Commission. See SHPO letter in Section 15 and cultural resources discussion in Section 5.7.
U.S. EPA, continued.	4	Page 2-17 states, "The areas within Bloomsburg with the highest concentration of persons below the poverty level would not be within the potential project areas and there would be no disproportionate effect to low income populations." This statement should be clarified. What is the definition of "highest concentration"? It is important that environmental justice issues are fully evaluated in the DEIS.	Text in Section 2-17 was edited to improve clarity and now states "The areas within Bloomsburg with the highest concentration of persons below the poverty level are not in proximity to the potential project area (U.S. Bureau of the Census, 2004).
U.S. EPA, continued.	5	Page 3-31 states, "…it is highly unlikely that a floodplain buyout plan would meet present Federal National Economic Development policy for a finding of Federal interest. This is due primarily to insufficient benefit-cost ratios under mandated economic analysis procedures. As a consequence, Federal funding of all or part of a buyout would appear remote." More information should be provided to explain this statement. It is unclear to the reader why it is "highly unlikely" and why it would "appear remote." Part of fully evaluating alternatives should provide definitive statements.	Text in Section 3.6.1 Acquisition of Flood Prone Structures has been re-written to provide sufficient details regarding why floodplain buyout was not evaluated in greater detail.

Agency/Contact Name and Date	Comment Number	Comment	Response
U.S. EPA, continued.	6	Page 3-32 discusses flood warning systems and states that while they would increase awareness, they would not decrease damages, so they were not considered as a stand-alone alternative. These systems should be a part of the selected alternative to increase public safety.	Flood warning system upgrades are part of all of the action alternatives. Text in Section 3.6.4 Flood Warning System was added as follows: "Each of the build alternatives described in the FS/EIS include upgrades to the existing flood warning system."
U.S. EPA, continued.	7	Page 4-14 discusses utility relocations. It is unclear if environmental impacts associated with these relocations are considered. Also, a more detailed explanation of the roadway relocations should be provided (i.e., would pavement be left in place, etc.).	Text in the introduction to Section 5 "Environmental Consequences" was added to improve clarity. Text now reads, "In addition to the activities necessary to construct these features, this proposal would include all utility relocations (emphasis added) and all routine maintenance… All of these actions would be assumed included in the proposed action."
U.S. EPA, continued.	8	The Corps should work closely with the appropriate agencies to avoid and minimize erosion and construction impacts. Areas of disturbance should be re-vegetated as soon as possible with native vegetation.	Best Management Practices will be implemented to minimize the effects of construction.
U.S. EPA, continued.	9	Page 5-7 should discuss the types of wetlands impacted and clearly depict them on a map. It is unclear if the 2.0 acres of forested wetlands that will be impacted will be minimized for only alternative 4 or all of the alternatives.	Text in Section 5.4.2 Wetlands was revised to refer the reader back to Figure 2-3 where the wetlands are depicted on a map and to text in Section 2.4.2 where the type of wetland is indicated. Text also added to indicate that effects to the wetlands would be minimized where possible.

Agency/Contact Name and Date	Comment Number	Comment	Response
U.S. EPA, continued.	10	Page 5-33 indicates that mitigation for aquatic and riparian impacts will be restoring fish passage to lower Fishing Creek. It appears that there may be problems with removing the dam, but no other alternative mitigation concepts are discussed. Also, one of the potential impacts to the aquatic environment mentioned in the DEIS is an increase in water temperature due to impacts to riparian vegetation. There is no discussion on how this may impact fish passage.	Water temperature increases in this lower segment of Fishing Creek will not be a factor in blocking fish access in the future with project condition since the creek segment is managed as a warm water (river) fishery by the PFBC. The fish passage project at Boone's Dam may experience normal technical and engineering issues related to the project's construction. It is not anticipated that this will be a significant problem for the project. If this is the case, as stated in this section of the report, the District will collaboratively work with the resource agencies in the Commonwealth to identify an alternative means of mitigating the creek impacts.
U.S. EPA, continued.	11	More details should be provided on the potential wetland mitigation site and the USACE should work with the appropriate state and federal agencies to develop an acceptable mitigation package to address aquatic, wetland and terrestrial environmental impacts.	The District has conducted multiple interagency field reviews of the project over the past several years, including the EPA. A concept plan in identified in the report and final plans will be prepared for construction during PED. There are no terrestrial environmental impacts that warrant mitigation. See Section 5.15.
U.S. EPA, continued.	12	It doesn't appear that the PA Game Commission received a copy of this document. They should be given an opportunity to review it for state species of concern.	PA Game Commission did receive the Draft FS/EIS and did provide comment. (See below.)

Agency/Contact Name and Date	Comment Number	Comment	Response
Pennsylvania Game Commission James R. Leigey July 7, 2005	1	We have completed an office review of the proposed project and determined that it is not located within the boundary line of any State Game Lands. Also, we have determined that except for occasional transient individuals, this proposed project is not located within an area, which is the habitat of an endangered or threatened species of bird or mammal recognized by the Pennsylvania Game Commission.	Comment noted.
Pennsylvania Fish & Boat Commission, Division of Environmental Services Thomas A. Shervinskie, July 15, 2005	1	The PFBC agrees that the tentatively selectyed alternative meets the stated purpose of this project to provide a 440-year level of protection from Susquehanna River flooding and 100-year level of protection from Fishing Creek flooding.	Comment noted.
PFBC, continued.	2	The report indicated that approximately 0.7 ac of mixed wetland habitat and 0.7 ac or the stream bottom of Fishing Creek would be permanently impacted with the construction of this project. The report also indicated approximately 3000 linear feet of vegetated stream corridor along Fishing Creek would be permanently impacted and replaced with riprap rock. Two ac of forested wetland also exist within the proposed alignment path. Avoidance of stream and wetland impacts would be ideal, however, the PFBC will work to help minimize and/or mitigate impacts to stream and wetland features within the project boundaries.	Comment noted.
PFBC, continued.	3	The PFBC concurs with the wetland mitigation approach for this project.	Comment noted.

Agency/Contact Name and Date	Comment Number	Comment	Response
PFBC, continued.	4	The impacts to Fishing Creek require additional discussion. The mitigation concept for the impacts to the stream bottom of Fishing Creek indicate that fish passage would be restored to a reach of Fishing Creek based on the removal of a downstream dam. The PFBC agrees that removal of this dam would provide access to historic spawning habitat and therefore supports the removal to compensate for he impacts to the stream bottom of Fishing Creek. To adequately compensate for the loss of 3,000 linear feet of vegetated stream corridor, the PFBC recommends that a 1:1 ratio of stream bank corridor mitigation occur in the Fishing Creek watershed. Vegetated stream corridors are extremely important for the maintenance of water temperatures, stream bank stability, and overhead refuge habitat.	The District has evaluated this recommendation for additional riparian mitigation and in our judgment, the mitigation already developed with the interagency team is commensurate with the proposed impacts to the Fishing Creek ecosystem. As PED progresses, we can seeks additional minimization measures and attempt to identify other potential ways to address this issue but we feel the mitigation package already developed addresses the impacts.

US ARMY CORPS
OF ENGINEERS
BALTIMORE DISTRICT

TOWN OF
BLOOMSBURG
The only TOWN in Pennsylvania

THE TOWN OF BLOOMSBURG,
PENNSYLVANIA

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

FLOOD DAMAGE REDUCTION PROJECT

FINAL INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL IMPACT STATEMENT

Volume 2

August 2005

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

May 2004

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List of Attachments

Engineering Drawings entitled "Plans for Bloomsburg Local Flood Protection Project Feasibility Study"-See Index of Drawings on Sheet G-1

ENGINEERING APPENDIX

1. GENERAL INFORMATION

1.1 Purpose and Scope of Project

Flooding along the Susquehanna River and Fishing Creek is a major reoccurring problem for the residents of the Town of Bloomsburg, Pennsylvania. The purpose of this project is to provide the Town of Bloomsburg protection from flood events on the Susquehanna River and Fishing Creek. The Town of Bloomsburg is the non-Federal sponsor, with the Pennsylvania Department of Environmental Protection providing 50 percent of the non-Federal sponsor's share of project costs. Flood damage reduction measures in Bloomsburg would result in increased flooding on the right (west) bank of Fishing Creek, and therefore, flood damage mitigation measures would be required on the right bank of Fishing Creek. This feasibility report has been prepared to the 35% design level.

1.2 Location

The Town of Bloomsburg is located in Columbia County, Pennsylvania, within the Middle Susquehanna subbasin. See Figure 2-1 of the Main Report for a regional overview. The Susquehanna River forms the Town's southern boundary, and Fishing Creek forms the Town's northern and western boundary.

1.3 Flood Damage Reduction Alternatives

This section presents a summary of the screening process for the three flood damage reduction measures that remained after the project delivery team screened structural and non-structural alternatives as part of the plan formulation process. The study plan formulation process is detailed in the Main Report, Section 3.

Following the initial screening process, three flood damage reduction measures were identified for more detailed investigations:

- levee/floodwall system along the Susquehanna River;
- levee/floodwall system along Fishing Creek (left descending bank); and
- acquisition for flood protection

1.4 Potential Levee/Floodwall Alignments

Three levee/floodwall alignments were evaluated as potential flood damage reduction measures for Bloomsburg, based on historic flooding, the limits of the 100-year floodplain, and input from the non-Federal sponsor. These alignments were:

- Interior Alignment
- Fringe Alignment
- East Bloomsburg Extension Alignment

Each of the alignments included a combination of earthen levee, mechanically stabilized earth (MSE) wall, and H-Pile wall flood barriers. The three alignments are depicted in the Main Report at Figure 3-10.

The flood damages incurred in Bloomsburg are largely a result of Susquehanna River backwater flooding through Fishing Creek. A flood damage reduction measure along just the Susquehanna River would be ineffective in reducing flood damages at the west side of Bloomsburg, since the Town would remain subject to backwater flooding on Fishing Creek. Therefore, all alternative alignments included a levee segment to protect Bloomsburg from Susquehanna River backwater flooding on Fishing Creek. More information about this levee segment is provided below.

1.4.1 Interior Alignment

A detailed narrative description of the Interior Alignment is provided in the Main Report at Section 3.7.1.1. This alignment would provide the shortest length of levee/floodwall to provide flood protection to the western portion of Bloomsburg. However, the project delivery team identified several significant, potential problems associated with the Interior Alignment.

In particular, there are existing, unpermitted historic landfills in the vicinity of the Interior Alignment. Drilling was not accomplished in the areas of these specific landfills due to rights-of-entry issues. However, there is a high potential for poor foundation conditions in the area near the landfills (excluding any HTRW concerns). Based on existing commercial and industrial operations, the exact alignment of the levee/floodwall cannot be shifted away from the landfill boundaries to minimize or avoid foundation concerns. Any debris, rubble, and uncontrolled fill would need to be overexcavated and replaced for foundation stability issues. This excavated material would not likely be suitable for use in the levee section and would have to be disposed of either off-site, in overbuild sections for ramps, or in other overbuild areas that may be created.

Any material that is selected for reuse elsewhere in the project would be subject to Pennsylvania's Clean/Regulated Fill Policy. Based on the limited information available for these unsampled interior alignment areas, much of the material would not be expected to meet the guidelines for reuse as either clean or regulated fill, and off-site disposal would be necessary. As detailed in Section 6 of the Main Report, the non-Federal sponsor would be responsible for any hazardous, toxic, or radioactive waste (HTRW) response costs, and none of these costs can be credited towards the non-Federal sponsor's share of project costs.

A capped landfill is also found within the Interior Alignment footprint. To build a levee section through a capped landfill would require many restrictions (if the construction could even be permitted). The portion of the landfill beneath the levee footprint would need to be removed. The landfill on either side of the levee would need to be sloped back and reclaimed properly to provide an appropriate cap. Significant design and permitting issues would undoubtedly be encountered in this reach.

In addition, the Interior Alignment would leave 16 residential and 2 commercial structures on the riverside of the line of protection, requiring full acquisition of these properties to mitigate the impacts of increased flooding.

A summary for the concept design estimates for the alternatives considered during the concept design / preliminary analysis is presented in Table 3-9 of the Main Report.

1.4.2 Fringe Alignment

A detailed discussion on the Fringe Alignment is provided in the Main Report at Section 3.7.1.2. The Fringe Alignment was developed in an attempt to avoid or minimize the negative effects previously described for the Interior Alignment. This alignment would avoid some of the historic landfill areas impacted by the Interior Alignment, and would allow shifting of the alignment to potentially minimize impacts associated with disturbance of existing landfills and poor foundations.

While slightly longer in total length, the Fringe Alignment would provide flood damage protection for the 16 residential and 2 commercial structures in Bloomsburg that are outside of the line of protection with the Interior Alignment. As a result, the Fringe Alignment would avoid the costs associated with full acquisition of these 18 structures.

While avoiding real estate takings in Bloomsburg, the Fringe Alignment would result in a greater increase in Fishing Creek backwater flooding as compared to the Interior Alignment. This is because the Interior alignment is setback further from the banks of the creek, providing a greater flow area for floodwaters. Given the reduced flow area for Fishing Creek flooding, the project delivery team initially assumed that mitigation of increased flooding costs from the Fringe Alignment would be more expensive than that for the Interior Alignment. However, based on preliminary Takings Implication Assessment (TIA) documented in the Real Estate Plan, the Fringe and Interior Alignments would require nearly identical takings, or flood mitigation property acquisition, on the right bank of Fishing Creek. The TIA ultimately resulted in a determination that the Fringe alignment would be less costly than the Interior alignment, because the cost savings from avoiding the 18 takings acquisitions[1] in Bloomsburg would be greater than the additional cost for constructing the longer Fringe Alignment.

1.4.3 East Bloomsburg Extension

A discussion of the East Bloomsburg Extension is provided at Section 3.7.1.3 in the Main Report. While this alignment would protect a relatively large land area from flood damages, most properties are located outside of the 100-year floodplain making the potential for recurrent damaging floods far less than for other portions of the Bloomsburg floodplain. The East Bloomsburg Extension Alignment was ultimately eliminated as an alternative based on a lack of incremental economic justification.

[1] The acquisition of these18 structures would add approximately $3.5 million to the cost of the Interior Alignment, which easily exceeds the approximately $2.0 million savings due to a shorter alignment.

1.5 Flood Damage Mitigation Measures to Address Increased Flooding

As mentioned earlier in this Appendix, and in Section 3.7.2 of the Main Report, installation of a levee/floodwall along the left bank of Fishing Creek would increase flooding on the right bank of Fishing Creek in the Village of Fernville, as well as Hemlock and Montour Townships. Approximately 135 properties on the right bank of Fishing Creek would be impacted by increased flooding with the Fringe Alignment in place.

Implementation of the Interior Alignment would result in increased flooding to 125 properties on the right bank of Fishing Creek, in these same neighboring areas. In addition, the Interior Alignment would also increase flooding to 18 properties in Bloomsburg, resulting in a total of 143 properties impacted by increased flooding if this plan were implemented.

Measures considered to mitigate for the hydraulic impacts of increased flooding included: 1) fee take acquisition of all properties within the increased flooding area; 2) floodproofing of structures within the increased flooding area; and 3) structural mitigation by construction of a levee/floodwall along the right bank of Fishing Creek. Ultimately, fee take acquisition was determined to be the least cost measure for addressing increased flooding to the 18 properties in Bloomsburg, should the Interior Alignment be implemented. But for the properties on the right bank of Fishing Creek, implementation of a levee/floodwall system in Fernville, and limited mitigation acquisition for impacted properties in Montour and Hemlock Townships downstream of Fernville, proved to be the most cost effective measure to mitigate for increased flooding from the Interior Alignment or the Fringe Alignment.

1.6 Selected Alignment

Selection of the recommended levee/floodwall alignment is detailed in Section 3.9 through 3.9.3 of the Main Report, including a cost summary for the alternatives considered. Alternative 4, the Fringe Alignment levee/floodwall system with a hydraulic mitigation levee/floodwall on the right bank of Fishing Creek was identified as the selected plan based on preliminary screening. This plan was further refined to optimize the level of flood protection to be provided, in order to identify the plan that would maximize national economic development benefits – the NED plan.

1.6.1 NED Plan Optimization

Costs and benefits for four different levels of protection were developed for the selected plan, which consisted of a levee/floodwall system following the Fringe Alignment in Bloomsburg, a hydraulic mitigation levee/floodwall system for the right descending bank of Fishing Creek through Fernville, and limited hydraulic mitigation acquisition for impacted properties in Montour and Hemlock Townships downstream of Fernville.

Section 3.10 of the Main Report presents a summary of the plan optimization process followed in this study. In summary, the project delivery team considered four differing levels of flood damage protection for the selected alignment: 50-year protection from Susquehanna River and Fishing Creek flooding; 100-year protection from both; 500-year protection from both; and Agnes level (440-year) protection from Susquehanna River flooding and 100-year (greater than Agnes) level of protection from Fishing Creek flooding.

As presented in Table 3-13 of the Main Report, the recommended plan was identified to be the Fringe Alignment with Agnes level protection from the Susquehanna River flooding and 100-year level of protection from Fishing Creek flooding.

1.7 Project Description

The project consists of a system of earthen levees, mechanically stabilized earth (MSE) floodwalls, concrete (H-Pile) floodwalls, both railroad and road closure structures, and roadway relocations. A detailed project description is provided in the Main Report, Section 4.1, and is not repeated in the Engineering Appendix.

The Bloomsburg portion of the project can be divided into three generalized segments: A. Fishing Creek (Stations 1+33 to 52+00±), B. Bloomsburg Fairgrounds (Stations 60+00 to 81+00±), and C. Susquehanna River (Stations 81+00 to Tie-out at 126+00±). The flood protection in Bloomsburg is approximately 12,500 linear feet.

The Fernville portion of the project can be divided into two generalized segments: A. Upstream Fernville (Stations 10+00 to 28+00±) above the Bloom St. bridge, and B. Downstream Fernville (Stations 28+00 to 60+85±) across from Bloomsburg downstream from the Bloom St. bridge to the tie-out just North of Hemlock St. at high ground (Sta. 60+85.5). The Downstream Fernville segment maintains a level of protection corresponding with the adjacent Bloomsburg segment directly across Fishing Creek. The flood protection in Fernville is approximately 5,100 linear feet.

See the Engineering Drawings for more details on the recommended plan. The Engineering Drawings are entitled "Plans for Bloomsburg Local Flood Protection Project Feasibility Study." Half-size drawings are provided, and due to physical size are separated from this Appendix. An index of the Engineering Drawings is provided at Sheet G-1. The cost estimate for the recommended plan is included as Attachment F.

1.8 Operation and Maintenance

Near the completion of construction and prior to project turnover to the local sponsor, the U.S. Army Corps of Engineers, Baltimore District will furnish the non-Federal project sponsor, the Town of Bloomsburg, with an Operation and Maintenance Manual. Contained in this manual will be detailed information for assisting local interests in complying with the "Flood Control Regulations - Maintenance and Operations of Structures and Facilities" as approved by the Secretary of the Army, hereinafter referred to as the Regulations. The Regulations, which comprise Section 208.10, Title 33 of the Code of Federal Regulations, were published in the Federal Register of 1 July 2002 and are presented at Attachment G. Compliance with the Regulations is one of the requirements of local cooperation.

2. HYDROLOGY AND HYDRAULICS

A detailed presentation on project hydrology and hydraulics is presented at Attachment A of the Engineering Appendix.

2.1 Flow Frequency Analysis

The Hydrologic Engineering Center – Flood Frequency Analysis (HEC-FFA) program was used to estimate flood frequencies for Fishing Creek at Bloomsburg and for the Susquehanna River above the confluence with Fishing Creek at Bloomsburg. HEC-FFA is a standard Corps program that is used to compute flood frequencies in accordance with "Guidelines for Determining Flood Flow Frequencies," Bulletin 17B of the U.S. Water Resources Council (WRC). Annual peak flows are available for United States Geological Survey (USGS) stream gages from the USGS web site. Bloomsburg peak flow data for the HEC-FFA program were derived from annual peak flows at the USGS Fishing Creek stream gage 5.5 miles upstream from Bloomsburg and from the USGS river gage on the Susquehanna River at Danville, 10.3 miles downstream from Bloomsburg. The flood frequencies that were produced are comparable to those from other agency sources.

2.2 Hydraulics

A HEC-RAS (Hydraulic Engineering Center, River Analysis System) computer model was developed for the Susquehanna River and Fishing Creek in the Bloomsburg Project area. Cross sections were surveyed by the Hunt Engineering Co. and used for the model. The survey consisted of a total of 9 river cross sections and 2 bridge cross sections across the Susquehanna River and 32 stream cross sections and 8 bridge cross sections across Fishing Creek. The model was calibrated using high water marks from the June 1972, September 1975 and January 1996 events. The model was used to analyze 3 different levee alignments along the Susquehanna River and Fishing Creek and 2 depths of dredging along the Susquehanna River. Plans that include the levee alignments were analyzed for two different frequency events.

Estimated flows for Fishing Creek and the Susquehanna River at Bloomsburg were based on the flood frequency analysis for the 2, 5, 10, 25, 50, 100, 200 and 500-year flooding events. Flooding was assumed to peak at the same time for Fishing Creek and the Susquehanna River at Bloomsburg, and downstream of the confluence of the Susquehanna River and Fishing Creek the sum of the flood peaks for Fishing Creek and the Susquehanna River in Bloomsburg were used as flow data.

Manning's "n" values were used to estimate roughness. Observations from field reconnaissance were used along with guidance in EM 1110-2-1416 and Chow (1959) to estimate Manning's "n" values for the channel, left overbank and right overbank along Susquehanna River and Fishing Creek.

2.3 Calibration of HEC-RAS Model

High-water marks used in calibrating the HEC-RAS model were determined based on information gathered from 42 property owners that the Corps contacted, each of whom owned properties in the flood prone areas of Bloomsburg. Of those 42 properties, 12 highwater marks were found to be useable for three flood events: June 1972, September 1975 and January 1996. The Manning's "n" values used in the HEC-RAS model were adjusted within reasonable limits to produce existing conditions water surface profiles for the three events that matched closely (+ or -0.5 ft.) with the highwater marks.

2.4 With Project Conditions

For the purposes of the hydrology and hydraulics analysis, three different levee alignments were analyzed using the calibrated HEC-RAS model: 1) Interior Alignment 2) Fringe Alignment 3) Fringe Alignment with Fernville Mitigation Levee. The alignments are pictured in Figure 3-10 of the Main Report and Figure 5 of Engineering Appendix, Attachment A (Hydrology and Hydraulics). The 2, 5, 10, 25, 50, 100, 200 and 500-year hypothetical events and June 1972 historic event were analyzed. Susquehanna River dredging at five-foot and ten-foot depths were also analyzed for the 10, 100 and 200-year events.

Two bridges were considered for removal: 1) the railroad bridge across the Susquehanna River downstream of the junction with Fishing Creek at river station 6870; and 2) the Double Track Bridge (Rt. 44) on Fishing Creek. Water surface profiles were computed to determine the amount of reduction in existing conditions water surface elevations due to the removal of these bridges. The removal of the Rt. 44 bridge does not reduce the water surface elevations for a June 1972 and 100-year event and therefore was kept in the HEC-RAS model. The removal of the railroad bridge reduces the water surface profile a maximum of 0.7 feet for a June 1972 event and a maximum of 0.5 feet for a 100-year event, based on current data and modeling. The 0.7 feet reduction in water surface elevation with an Agnes level event was not considered a substantial amount of decrease compared to the anticipated cost of removing the bridge. Based on these considerations, and the Town of Bloomsburg's stated preference to have the bridge remain in place, a decision was made to leave the bridge in the model. Keeping the bridges in the model provides for a conservative estimate of the water surface elevations should the bridges be removed in the future.

2.5 Dredging

Channel improvements to deepen Fishing Creek as a means of reducing flood damages were considered in earlier Corps evaluations, but were eliminated due to excessive costs. Fishing Creek is underlain by sandstone a few feet below the channel bottom and would require blasting and excavation of rock in order to deepen the channel, as well as significant and frequent operation and maintenance to maintain the channel depth. The affect of dredging the Susquehanna River was analyzed using the HEC-RAS model. Five-foot and ten-foot deep channels were modeled starting upstream of the Route 42 bridge to about 7,000 feet upstream of the Rt. 487 bridge (a total of approximately 24,000 feet of dredging distance). The channels were modeled as 1,000 feet wide trapezoidal channels with the slope determined using the average existing channel bottom slope. With 5 feet of dredging on the Susquehanna River, the maximum difference in the 100-year water surface elevation is a decrease of 1.6 feet. With 10 feet of dredging on the Susquehanna River, the maximum difference in the 100-year water surface elevation is a decrease of 2.6 feet.

2.6 Interior Flooding Analysis

A preliminary interior flooding analysis was performed for the area behind the Bloomsburg Fringe and Interior Alignments. The area behind the Bloomsburg Interior and Fringe Alignments was divided into subbasins, three for the interior and four for the fringe. Drainage structure capacity, pond storage volume, unit hydrograph data, loss rate coefficients, and hypothetical rainfall for each subbasin were determined for use in the HEC-IFH (Interior Flood Hydrology) computer model. The analysis was performed for hypothetical events only, with the drainage structures through the proposed levee alignment assumed as either totally blocked or totally unblocked at its outlet.

A formal interior flooding analysis has not yet been conducted for the Fernville Alignment, however five interior drainage structures have been included in the preliminary design to allow for the drainage of interior runoff through the levee/floodwall system. A detailed interior flooding analysis for the Fernville Alignment will be performed early in the preconstruction engineering and design phase of the project.

2.7 HEC-IFH Modeling and Results

The subbasin information was input into a HEC-IFH model for each subbasin. The models were run under the following conditions: (1) with-project and existing facilities with outlet structures totally unblocked, (2) with-project and existing facilities with outlet structures totally blocked, (3) with-project and the inclusion of additional drainage structures with outlet structures totally unblocked and (4) with-project and the inclusion of pumping facilities. The interior ponding elevations in Bloomsburg are decreased substantially with the project in place when compared with the river flooding elevations that exist without the project in place. Since the project does not increase the ponding elevations in any of the subbasins, no additional facilities are justified. The minimum facilities consist of extending the existing storm sewers through the line-of-protection. These drainage structures would handle interior runoff so that ponding elevations would not be higher than for without-project conditions.

Any measure to reduce residual interior flooding would need to be incrementally justified as a separate project feature from the line-of-protection project. A separate benefit-cost analysis would need to be performed during the final interior flooding analysis to determine if any additional drainage structures or possibly a pumping station could be justified to help reduce the residual interior flooding, particularly in subbasins 1 and 4. This analysis would be performed during the preconstruction engineering and design phase.

2.8 Riprap Analysis

A preliminary analysis was performed to determine the riprap requirements along the line of protection. The channel velocities from the HEC-RAS output for the Fringe Alignment with

Fernville mitigation levee were used as the basis for this analysis. Riprap was considered to be necessary where the channel velocity for the 100-year event was equal to or greater than 6 feet per second. Under this assumption, riprap would be required along both banks of Fishing Creek wherever a levee section exists, beginning at the upstream tie out of the Fernville levee and continuing downstream to about 50 feet past the Route 44 Bridge. Riprap would be required beginning at the upstream tie out and continuing downstream to station 52+00. A more detailed analysis determining riprap location, size and placement will be performed in the next phase of study, during preconstruction engineering and design. Every effort to minimize the necessity for riprap and provide alternative methods for erosion protection will be made.

3. DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

3.1 General

The recommended flood protection project for Bloomsburg would include earth levees, mechanically stabilized earth (MSE) walls, closure structures, and drainage structures, including a mitigation levee on the right descending bank of Fishing Creek at Fernville.

3.2 Levees

The proposed project would provide approximately 9,600 feet of full levee embankment in the Town of Bloomsburg and, for purpose of mitigating for increased flooding, approximately 4,350 feet of full levee embankment in Fernville. The typical levee section would consist of a random material zone (for drawdown protection) on the riverside 1/3, adjacent to a select fill zone, which would in effect be an impervious material. In sections without toe drains, a landside blanket drain would be used. In areas where riprap is determined to be necessary, a layer of riprap on 6 inches of bedding soil would be provided. Exterior levee slopes would be 2.5H:1V for areas receiving topsoil. Areas that would require riprap can be steepened to 2H:1V.

3.3 Mechanically Stabilized Earth Wall

Approximately 760 feet of double-sided MSE wall is proposed in the Town of Bloomsburg and is located between stations 20+00 and 27+60. Approximately 710 feet of double-sided MSE wall is proposed in Fernville, located between stations 34+25 and 41+35. The MSE wall would consist of modular concrete block facing, reinforcing elements, soil backfill, and drainage materials. The average height of the MSE wall would be approximately 14 feet above the existing ground surface, which varies along each section. A final detailed design will be performed in the plans and specifications phase of the project.

3.4 Closure Structures and Ramps

In order to maintain protection at the road and bridge crossings, a closure structure or ramp would be required at each crossing. Seven structures are proposed in Bloomsburg and two in Fernville. The following summary data provides the approximate dimensions for each structure:

Bloomsburg

Location	Width	Height
Railroad Street (Sandbag)	35'	3.3'
Route 11/W. 2nd St. (Stoplog)	52'	11.9'
River Road/Fair Ground Entry (2 Ramps/Sandbag)	110'	3.0'
River Road (Ramp/Sandbag)	26'	2.0'
Fairground Ramp (Removable)	40'	3.0'
Railroad (Miter Gate)	24'	11.25'
W. 11th St. (Ramp/Sandbag)	40'	3.0'

Fernville

Location	Width	Height
Bloom St. (Ramp/Stoplog)	24'	5'
Drinker St./Hemlock St. (Ramp)	25'	0'

The heights shown are distances over and above any ramp structure which require closure; therefore at Drinker St./Hemlock St. where the ramp is designed to the full height of protection, the height shown is zero.

3.5 Drainage Structures

Construction of the levee system would require construction of nine drainage structures in Bloomsburg and five in Fernville, as discussed in Section 8.4 and as shown on the Engineering Drawings. These drainage structures would permit surface runoff and pipe flow from the existing storm water sewer and low areas to cross the line of protection. The drainage structures would consist of a concrete outlet structure with a flap gate, a control manhole with a sluice gate, and reinforced concrete pipe (RCP). One drainage structure would drain into a riverside manhole, rather than an outlet structure. The largest would be an 84-inch pipe for structures B1 and B7. The remaining drainage structures would have pipes varying in diameter from 12 to 36-inches. The Engineering Drawings, Plates 3 through 19 show the drainage structure locations and Plates 31 through 34 show drainage structure profiles and details. See the index of drawings at Sheet G-1 of Attachment G of this Appendix.

4. RELOCATIONS

The Engineering Drawings show the locations of road and utility relocations, in addition to information provided in the Main Report.

4.1 General

Construction of the project would require the relocation, modification, or termination of various water, sewer, gas, electric, telephone lines, and roads. In general, utilities that would no longer be required due to building demolition or proposed construction, would be terminated, as necessary, from within the project limits. A brief description of the proposed work follows.

4.2 Utilities

Bloomsburg - Overhead utility relocations would require a total of approximately 1,850 linear feet. Water, sewer, and gas line relocations would total about 450, 1550, and 350 linear feet respectively. Underground cable relocation would total approximately 300 linear feet. These estimates will be further refined during the next phase of study.

Fernville - Overhead utility relocations required would total approximately 3,000 linear feet. Water, sewer, and gas line relocations would total approximately 150 linear feet each. Underground cable relocation would total about150 linear feet. These estimates will be further refined during the next phase of study.

4.3 Roads

Construction of closure structures and ramps would require adjustments to the existing road grade and replacement of existing road surfaces that were removed or damaged due to construction. Roads that would be anticipated to require either closure structures or ramps are listed in paragraph 3.4 above. West First Street in Bloomsburg would be permanently barricaded near Sta. 15+75, although a revised alignment using an MSE wall in this area is being considered where the road would not need to be barricaded until Sta. 19+00. Sand Street, near Sta. 106+00 would be permanently barricaded.

5. GEOLOGY AND SOILS

Attachment C, Geotechnical Engineering, provides detailed geology and soils data.

5.1 Regional Geology

The study area is in the Appalachian Mountain Section of the Ridge and Valley physiographic province. The long, parallel ridges and valleys in this physiographic region were produced by differential erosion of folded strata. Bloomsburg is located beyond the southern terminus of the late Wisconsinan glacier. That glacial episode produced most of the prominent glacial landforms found in northeast Pennsylvania. Meltwater from the Wisconsinan glacier carried significant quantities of materials through the Fishing Creek and Susquehanna River valleys.

Much of Bloomsburg consists of a low terrace, where glacial meltwaters and more recent floodwaters deposited material up to boulder-size. Published geologic reports indicate that this material is stratified and moderately to poorly graded. The thickness of these deposits is 3 to 50 feet near Bloomsburg.

The soil unit mapped by the U.S. Department of Agriculture in the study area is the Chenango silt loam. It formed in sand & gravel outwash and is well drained. The surface layer of this soil consists of silt loam and gravelly sand loam. Below that is gravelly sandy loam to a depth of 20 to 50 inches, followed by stratified gravel and sand. Bedrock is reportedly at a depth greater than 30 feet; however, borings drilled for this feasibility study evaluation encountered bedrock at shallower depths.

Bedrock underlying most of the study area is part of the Wills Creek Formation. Part of the study area, near the northeast end, is underlain by Bloomsburg Formation rocks. The strike of bedrock bedding at the Railroad Street Bridge is north 65° east; dip is 28° to the south. That bedding dip is within the range measured in test boring cores. Bedrock strike at the test boring locations should be similar to that measured at the outcrop. A bedrock geologic map of the area is included as Figure 1 in Attachment C of the Engineering Appendix.

The Wills Creek Formation is mostly calcareous claystone or shale, but also consists of calcareous limestone and dolostone. Laminated to thin bedding predominates in Wills Creek rocks. Wills Creek rocks are usually highly weathered to a moderate depth, due to lithology, bedding characteristics, joints, and calcareous content.

The Bloomsburg Formation is mostly claystone and shale, with abundant siltstone and sandstone interbeds. The claystones and shales are medium to thick-bedded. Sandstones and siltstones are thin to medium-bedded. Bloomsburg Formation rocks are also highly susceptible to weathering, but not to the extent of Wills Creek rocks.

5.2 Exploration Program

The subsurface conditions were investigated in two phases, Phase One in November 2000 along Fishing Creek, and Phase Two in April-July 2002 along the southern and eastern parts of the alignment. Drilling was performed by contractors to Pennsylvania Department of Environmental

Protection (DEP). DEP provided the drilling services as in-kind services to this project. Multiple borings along the proposed alignment were unable to be drilled due to inability to obtain rights-of-entry. Also, no investigations were performed in Fernville for this project phase. A total of 31 borings (9-Phase One, 22-Phase Two) were performed to investigate the foundation conditions in the area of the flood protection alignment in Bloomsburg. An overall boring location plan is attached as Figure 2 in Attachment C. See the study drawings for more detailed boring location information. Field boring logs are included at Attachment C. Final boring logs will be prepared in the next design phase, which will include additional drilling and testing.

The borings in Phase One were advanced by means of the standard penetration test (SPT) method with continuous sampling. The borings in Phase Two were advanced by means of the SPT method with continuous sampling in the upper 10.5 feet and sampling at 2.5-ft intervals below a depth of 10.5 feet, with augering between samples. The SPT consists of driving a 1 3/8-inch ID by 2-ft 8-inch long split spoon sampler a total of 18 inches with a 140-pound hammer falling 30 inches. The SPT provides a disturbed sample for defining soil consistency and relative density. Rock coring was performed with NWD4 (2-1/8th inch diameter) bit and double tube barrel.

5.3 Laboratory Testing

All jar samples were visually inspected and assigned a Unified Soil Classification System (USCS) classification by an experienced laboratory technician. Additionally, grain size distributions and Atterberg Limits tests were performed on selected samples. Results of all laboratory tests are included at Attachment C.

5.4 Description of Subsurface Conditions

The average soil thickness for the area is approximately 20 feet. Bedrock depths are highly variable over the entire project area. Bedrock was encountered as shallow as 8 feet in DH-124 and between 12-16 feet in several other borings, while it was not encountered at depths greater than 30 feet in several borings.

Along Fishing Creek from approximately Station 1+00 to 39+50, foundation soils are moderately pervious to very pervious with little to no impervious blanket above. A layer of dense gravel was encountered in most borings at a depth of approximately 10 feet. The soils had varying amounts of fines (material passing No. 200 sieve), but most of the soils were classified as sands and gravels. Also along Fishing Creek, Bedrock was encountered between depths of 16 feet to 32 feet along the project alignment.

Borings along the Bloomsburg Fairgrounds portion of the alignment (approximately Station 62+00 to Station 80+00) show a silt/clay blanket (average thickness of 4 feet) overlying a sand/gravel layer. Beneath this sand/gravel layer, highly weathered bedrock was encountered at depths of 10 feet to 20 feet.

Borings near the Susquehanna-side tie-out (approximately Station 106+00 to Station 126+00) show a 10-ft thick silt/clay blanket overlying sands and gravels. Bedrock was encountered beneath the sands and gravels at depths between 15 feet and 25 feet in three of the tie-out borings. One boring did not encounter bedrock at a depth of 30 feet.

Borings were also performed for a second potential alignment for the flood protection structure. This alignment was subsequently removed from consideration. The field logs for these borings (DH-102 to DH-108) are included, however no subsurface characterization or design analysis was performed using this information.

6. LEVEE AND MECHANICALLY STABILIZED EARTH (MSE) WALL DESIGN

6.1 General

The proposed flood protection would consist of a combination of earth levee embankment, mechanically stabilized earth wall, and concrete floodwall. The levee and MSE wall designs were performed in accordance with guidance contained in EM 1110-2-1913, Design and Construction of Levees (30 April 2000), and EM 1110-2-2502, Retaining and Floodwalls (29 September 1989).

6.2 Seepage and Slope Stability

Seepage and slope stability analyses were performed for the study. This consisted of analyzing levee, MSE wall, and floodwall sections of varying heights with varying foundation conditions. The foundation conditions were based upon the foundation drilling described earlier. The seepage and stability calculations are presented in the Geotechnical Attachment.

With the pervious soils located in the foundation for the levee, it was necessary to perform an underseepage analysis to estimate seepage quantities and the effect on the stability of the levee and MSE wall sections. Due to the proximity of the levee to the bank of Fishing Creek, it was assumed that the foundation zones are directly connected hydraulically to the Creek in the seepage analysis. In the other project reaches, the levee is located much farther from the Creek and the Susquehanna River. In that case, the conservative assumption of direct hydraulic connection was also made; however, additional investigations in the next project phase will be required to confirm this assumption.

The seepage and slope stability analysis determined project reaches that needed toe drains, blanket drains, or seepage cutoffs. These are described in more detail in the Geotechnical Attachment.

6.3 Settlement

The test borings did not encounter any soft, compressible soils along the levee alignment, therefore long-term consolidation is unlikely. Significant amounts of uncontrolled granular fill materials were encountered in the test borings, however, which would be expected to settle almost instantly after the application of the loads of the levees. If necessary, additional embankment fill can be placed to compensate for this settlement during the latter stages of construction.

6.4 MSE Walls

A preliminary design for the MSE walls was performed in order to assess feasibility and placement issues for the walls. Each of the MSE wall sections for this project would be double-sided with a 14 to 17-foot exposed height. Final design and construction details would be prepared in the next design phase.

7. STRUCTURAL DESIGN

7.1 Route 11 Stop Log Closure Structure

Details of the structural design are presented in Attachment D.

7.1.1 Selection of Structure.

This structure would be located at Sta. 39+65 and is connected to the end of a concrete floodwall. This structure would only be erected during a flood and would temporarily close Route 11 to through traffic. The stop log closure structure would consist of aluminum skin plates and standard channels to form a typical 13-ft long by 4-ft height panel. Three panels would stack together to make a 12-ft high wall section. Since the roadway is 52-ft wide, there would be 4 bays of closure panels to close off the opening. In addition to aluminum panels, three 15-ft long (3-ft would be below roadway surface) steel posts would be installed between the closure panels to provide support.

7.1.2 Geotechnical Considerations.

(1) Subsurface Conditions. The subsurface condition at this closure is currently represented by drill hole DH-1. The upper 4 feet of overburden consist of fill materials. The fill contains silt, sand and gravel materials. The second strata consists mainly of sand (SC, SM, and combinations thereof) with some silty and clayey zones and is 16 feet deep. The last 7 feet of drive is in decomposed shale.

(2) Geotechnical Design Parameters. On both ends of the closure, a concrete abutment would be constructed to support the end spans of the stop log panels and to retain the levee embankment. A foundation key parallel to the wall below the foundation would be built to increase the abutment factor of safety against sliding failure. The following geotechnical design parameters were provided to the Structural Engineer to analyze the closure structures for stability (i.e. determine forces, moments, and FS against sliding and overturning).

Angle of Internal Friction = 30°
Moist Unit Weight of Soil = 125 pounds/ft^3
Active Lateral Earth Pressure Coefficient = Ka = .33
Passive Lateral Earth Pressure Coefficient = Kp = 3.0

7.2 Bloom Street Stop Log Closure Structure

7.2.1 Selection of Structure.

This is part of flood protection work located in Fernville. A mechanically stabilized earth (MSE) wall and earth levee would be constructed along Fishing Creek to protect Fernville. At Bloom

Street, the roadway surface would be ramped, but would still be 5 feet below top of levee, so it is required to build a removable closure structure to close off this opening during a flood. Since the opening is only 24 feet wide by 5 feet high, two pieces of standard 6 inch I-shaped aluminum beams lying side by side, and stacked up to 5 feet high would seal off the opening during flood time. This is a single span of aluminum beam (weighing about 100 pounds apiece) which would fit into the recess slots of two abutments.

7.2.2 Geotechnical Considerations.

(1) Subsurface Conditions. No subsurface information is available at this time. A drilling and test program will commence during the next phase of study.

(2) Geotechnical Design Parameters. The final roadway surface is approximately 5 feet below top of levee. Fill would be placed to raise the elevation of the roadway through the closure to reduce the grade change from the Bloom Street bridge. All new fill material would be structural fill on which the proposed closure abutments and roadway would be constructed.

7.3 Railroad Gate Closure Structure

7.3.1 Selection of Structure.

Where the levee crosses a single railroad track, a 24 feet wide opening needs to be provided to allow for train traffic. During a flood event, this opening needs to be closed. Since this closure is located in a fairly remote and not easily accessible area, a steel swing gate, 24 feet wide by 11.25 feet high, was designed to close off the opening rapidly with minimum manpower and equipment. Concrete abutments at each end of the closure would hold the gate in place as well as act as retaining walls for the levee material. The railroad track would be provided with a rubber crossing panel to provide a flush surface for the gate to seal against. The steel swing gate would consist of two horizontal 24-inch I-beam girders, vertical stiffeners, diagonal bracing rods and a 3/8-inch thick steel skin plate. The gate would be designed to be operated manually, but would be provided with a portable winch system to assist if necessary.

7.3.2 Geotechnical Considerations.

(1) Subsurface Conditions. Rock is shallow in the vicinity of the gate closure (see DH-125), piles are not an option.

(2) Geotechnical Design Parameters. Due to the large uplift force on the concrete abutment during a flood event, the net weight of the steel gate and abutment may not be able to resist the sliding force from the flood. Since rock is shallow in the vicinity of the gate closure, piles are not an option to resist sliding. Therefore, the overburden shall be removed down to competent rock, approximately a depth of 12.5 feet, and a massive concrete foundation shall be placed in rock. A shoring system would be required to perform the mass excavation. The following geotechnical design parameters were provided to the Structural Engineer to analyze the closure structures for stability (i.e. determine forces, moments, and FS against sliding and overturning).

Angle of Internal Friction = 30°
Moist Unit Weight of Soil = 125 pounds/ft^3
Active Lateral Earth Pressure Coefficient = Ka = .33
Passive Lateral Earth Pressure Coefficient = Kp = 3.0

7.4 H-Pile Supported Concrete Floodwall

7.4.1 Selection of Structure.

The concrete floodwall begins at the end of MSE wall from Sta. 27+60 to Sta. 39+13, at the beginning of the Route 11 stop log closure. The total length of concrete floodwall is 1,153 ft. An H-pile supported wall is more expensive than other types of flood protection, such as a MSE wall or earthen levee, in terms of comparing the cost per linear foot of flood protection. The main reason that this type of wall was selected is due to limited land for construction.

7.4.2 Geotechnical Considerations.

(1) Subsurface Conditions. The subsurface conditions along the H-pile wall alignment consist of four strata. The upper 4 to 6 feet of overburden consist of Fill materials, as shown on the field logs. The fill contains silt, sand and gravel materials. The second strata consists mainly of sandy and gravelly materials (SC, SM, GP, GC, GM and combinations thereof) with some silty and clayey zones. This second strata varies in thickness from 6 to 16 feet. The third strata is decomposed shale varying in thickness from 4 to 10 feet. Lastly, bedrock consists of shale. See drilling logs for DH-1, DH-2, DH-3, DH-4 and DH-102.

(2) Geotechnical Design Parameters. The Structural designer used the following geotechnical values to analyze the pile section, spacing and determine the maximum wall deflection under load:

Average Top of Competent Rock = Elevation +453 feet
Lateral Subgrade Reaction Coefficient (n_h) = 8 pci [based on Terzaghi (1955)]

The Structural Engineer's analysis concluded that the piles would need to be embedded 33 feet into the ground. Based on the estimated top of rock elevation, it was assumed that the piles would be placed 10 feet into competent rock. The rock would be pre-drilled prior to placing the pile. A non-shrink grout would be used to fill the void after placing the piles. The diameter to be pre-drilled would be based on the final H-pile section selected. Conceptually, a 24-inch diameter hole would be pre-drilled.

The precast wall panels would be placed into the H-piles. The H-piles would be placed on 6-feet spacings. The panels would bear a minimum of frost depth below final grade, conservatively 4 feet. Additionally, due to potential underseepage concerns, a toe drain would be placed on the landside of the wall. This would consist of backfilling the landside portion of the excavation with compacted gravel. This detail will be designed during the next design phase.

7.5 Drainage Structures

These single-conduit drainage structures would use existing pipe or new reinforced concrete pipe. The primary structural design effort for these features is for the control manholes. The structural design of control manholes has been deferred until the preconstruction engineering and design phase, when the location of manholes will be better defined. The control manholes would be either precast or cast-in-place concrete with an average wall thickness of 12 inches.

8. CONSTRUCTION CONSIDERATIONS

8.1 Levee Embankment

The entire foundation of the levee embankment would be stripped to a depth of 12 inches to remove topsoil and organic material. An inspection trench would be excavated to a depth of 5 feet below the stripped surface to intercept any anticipated soft or extremely pervious zones in the upper foundation soils. Materials from these excavations would be spoiled unless they meet, or can be processed to meet, the requirements of random earth material or material to be placed outside the levee limits (such as in the ramps). In addition, all embankment surfaces would receive a layer of topsoil and seeding except where riprap is provided. Construction details will be prepared in the next project phase.

8.2 MSE Wall

The MSE wall would be a modular concrete block system. The layout and detailed design would be performed in the next design phase.

8.3 Closure Structures

The construction of most of the abutments and concrete retaining wall could be completed without major disruption of traffic, as only shoulders of the streets would be involved. Each closure would involve some utility relocation, and would require travel to be reduced to one lane during those relocations. The streets would again be reduced to alternating single lanes of traffic during construction of the concrete sills and replacement of the roadway surface. The required structural fill would be specified by material type and gradation band. Depending upon the actual structural fill material used, preboring through the structural fill material might be necessary prior to driving piles. Any piles placed into rock would be pre-drilled.

8.4 Drainage Structures

The proposed drainage structures, in most cases, would be constructed at low elevations along the levee alignment. Therefore, temporary dewatering might be necessary to construct the culverts and adjacent fills. The procedures and equipment used to compact fill adjacent to the structures and piping would be specified to prevent damage to the structures and to ensure adequate compaction.

9. HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE ANALYSIS

9.1 General

A preliminary hazardous, toxic, and radioactive waste (HTRW) investigation was conducted to identify areas within the currently proposed limits of construction of the flood protection project that, due to the presence of contamination, could impact the planned construction activities. Sampling was conducted in May 2003 and October 2003.

Based on the results of this investigation, sites of potential concern were identified along the Interior and Fringe Alignments. Sampling results revealed elevated concentrations of heavy metals in excess of applicable cleanup levels throughout the study area and additional volatile organics and pesticide contamination in the vicinity of the inactive Magee Industries landfill. The data indicates that the heavy metals concentrations throughout the study area are consistent with background levels, and as a result, it is assumed that the majority of the material will be available for reuse in the construction of the flood protection elements. Contaminated soil in the segment of the alignment that passes through "Area E" of the landfill area is unlike material found elsewhere within the study area because of the presence of carpet fibers and other debris. Therefore, it would be unsuitable for reuse during construction and would require offsite disposal in a manner consistent with Pennsylvania and Federal regulations.

To pre-characterize the material that is expected to require offsite disposal, additional sampling was conducted in the inactive landfill area. The analytical results indicate that the material that was sampled in this area may be disposed as non-hazardous waste at a permitted disposal facility. Nevertheless, based on past experience related to construction projects at similar sites, and given the heterogeneity typical of uncontrolled dump sites, 25 percent of the material from "Area E" has been assumed to require offsite disposal as hazardous waste for cost estimating purposes. Although no hazardous waste has been identified to date in this area based on the limited sampling program, this assumption offers a reasonable contingency to account for the range of material that may be encountered.

9.2 Material Handling and Worker Protection

Based on the analytical results, and as discussed in the previous section, elevated concentrations of heavy metals are present in the surface and subsurface soil along much of the proposed alignment. However, the heavy metals that were detected are likely a local background condition, and soils containing no other regulated constituents are considered uncontaminated from a regulatory perspective. Based on Pennsylvania's proposed Clean Fill Policy, such soils may be used in an unrestricted manner as fill material for the project. Ash and other foreign materials may also be used as fill under PADEP's proposed General Permit for Beneficially Using Regulated Fill (WMGR096), so long as the conditions of the General Permit are met. Any material that exceeds applicable PADEP criteria and is unsuitable for use in the construction would be subject to disposal in a manner consistent with PADEP residual waste regulations. For the purposes of this analysis, it is assumed that all of the excavated material is suitable for reuse in construction with the exception of the material at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00). This material is expected to be unsuitable for reuse due to the high debris content observed during the field investigation.

The results of the waste characterization sampling conducted in October 2003 indicate that the material that was sampled in this area may be disposed as non-hazardous waste at a permitted disposal facility. Nevertheless, based on past experience related to construction projects at similar sites, and given the heterogeneity typical of uncontrolled dump sites, 25 percent of the material from "Area E" has been assumed to require offsite disposal as hazardous waste for cost estimating purposes. No hazardous waste has been identified to date in this area based on the limited sampling program, but this assumption offers a reasonable contingency to account for the range of material that may be encountered.

The fraction of material being assumed non-hazardous waste (75% of the total volume or approximately 13,600 cubic yards) will be disposed offsite at an actively permitted RCRA Subtitle D disposal facility that is capable of accepting "residual waste" (defined by PADEP as non-hazardous industrial waste). The nearest such facility is the Lycoming County Landfill, located in Montgomery, Pennsylvania, approximately 40 miles from the project site. The remainder (25% of the total volume, or approximately 4,500 cubic yards) is presumed to require disposal as a characteristically hazardous waste.

It is important to note that the Town of Bloomsburg will be responsible for any and all costs associated with removal of hazardous, toxic, or radioactive waste (HTRW) as necessary to provide project lands that are clean of HTRW hazards as required for project construction by the Corps, in addition to the non-Federal share of Corps project costs. As documented in the HTRW Attachment, the Corps has prepared an estimate of non-Federal sponsor HTRW response costs in an attempt to assist the Town of Bloomsburg budget for additional costs it should anticipate beyond the costs quantified in Tables 6-1 and 6-2 of the Main Report. The current non-Federal sponsor HTRW response estimate totals $895,600, which cannot be credited to the Town as part of the non-Federal cost for the Bloomsburg Flood Damage Reduction Project, as HTRW response costs may not be cost-shared as a matter of Corps and Federal policy.

Again, detailed information about this planning level estimate are provided in Attachment E, HTRW Analysis.

9.3 HTRW Construction Considerations

The alignments under consideration for this project would cross or pass very close to several closed landfills. As detailed previously, it was assumed that some volume of hazardous waste requiring offsite disposal would be generated during the construction in the landfill areas. The extents of the landfills in the vicinity of the proposed alignments are defined based on user knowledge and best available data, but it should be noted that the true extents are uncertain. Adjustment of the alignment to avoid the landfills may be possible, but additional site characterization efforts would be necessary to identify the most realistic alignment that avoids HTRW concerns to the greatest extent possible in this area. Any adjustments would need to be evaluated in terms of impacts on backwater flooding on Fishing Creek, National Environmental Policy compliance, and project benefits and costs. Since some current landowners did not provide rights-of-entry for investigations in some of the more critical areas associated with the Interior Alignment, it would be difficult to make concrete conclusions about HTRW in these areas. However, it is clear that construction in the Interior Alignment landfill areas would present significant administrative and legal hurdles. For these reasons and for the purposes of the HTRW analysis, it was assumed that the Fringe alignment would be the recommended alignment.

The depth of contaminated material in the vicinity of Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) is expected to be on the order of five feet below ground surface, although it may extend into the underlying saturated zone. If trench dewatering would be necessary during the construction, this fluid would be containerized, tested, and disposed in a manner consistent with U.S. Environmental Protection Agency and PADEP guidance.

Bloomsburg, Pennsylvania, Local Flood Protection Project
H&H Appendix A

1. Flow Frequency Analysis

1.1 Summary.

The Hydrologic Engineering Center - Flood Frequency Analysis (HEC-FFA) program was used to estimate flood frequencies for Fishing Creek at Bloomsburg and for the Susquehanna River above the confluence with Fishing Creek at Bloomsburg. HEC-FFA is a standard Corps program that is used to compute flood frequencies in accordance with "Guidelines for Determining Flood Flow Frequencies", Bulletin 17B of the U.S. Water Resources Council (WRC). Annual peak flows are available for United States Geological Survey (USGS) stream gages from the USGS web site. Bloomsburg peak flow data for the HEC-FFA program were derived from annual peak flows at the USGS Fishing Creek stream gage 5.5 miles upstream from Bloomsburg and from the USGS river gage on the Susquehanna River at Danville, 10.3 miles downstream from Bloomsburg. The flood frequencies that were produced are comparable to those from other agency sources.

1.2 Peak Flow Data.

Gage data were not directly available at Bloomsburg. The nearest gage on the Susquehanna River is at Danville, Pa., approximately 10.3 miles downstream of the project area. The period of record for the Danville gage is 99 years. Fishing Creek has a gage located 5.5 miles north of Bloomsburg, with a period of record of 61 years.

A USGS river gage was located at Bloomsburg from 1902 to 1996, but it was not a reporting gage and has been removed. Bloomsburg gage data were insufficient for use in this study.

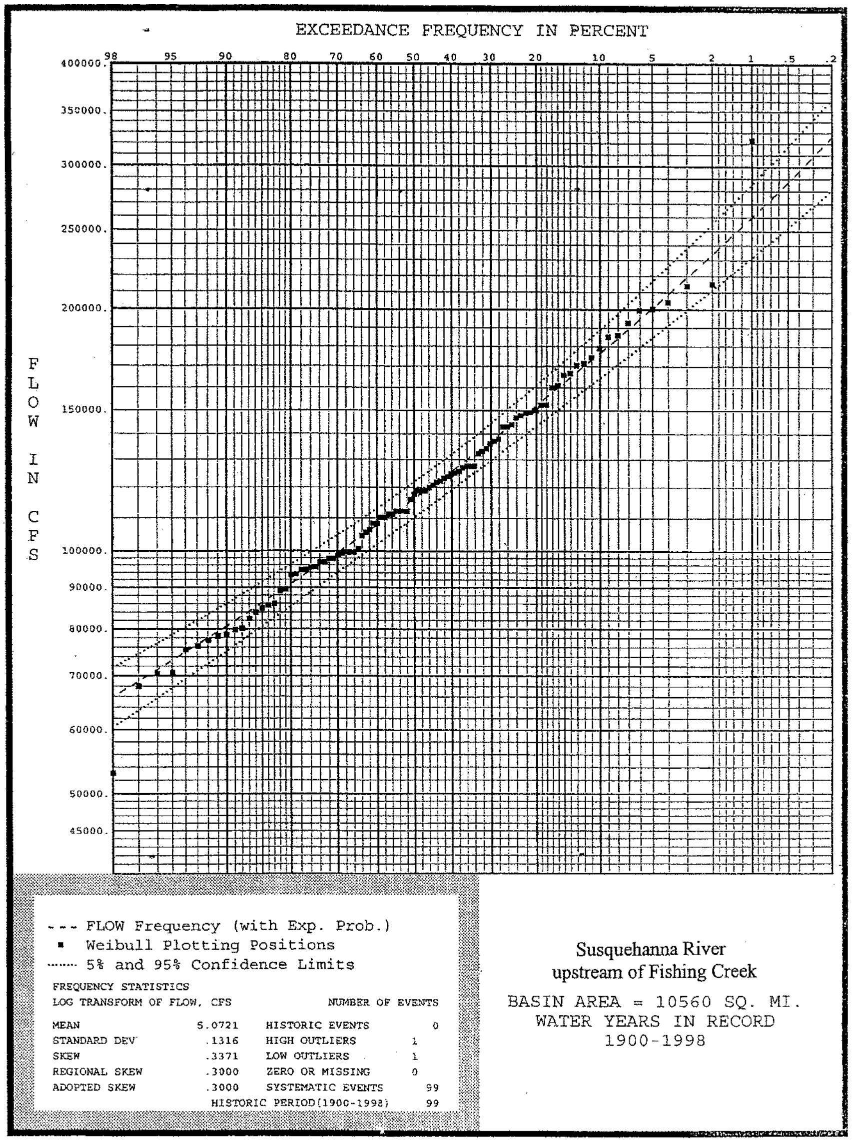
Because the purpose of this analysis is to evaluate flood frequencies, Danville flood data from the gage was adjusted to account for holdouts from Corps of Engineers dams upstream of Bloomsburg. There are 8 major Corps of Engineers dams that are regulated to provide flood protection in the Susquehanna River basin upstream of Bloomsburg. They are: Almond, Arkport, Aylesworth, Cowanesque, East Sidney, Stillwater, Tioga-Hammond, and Whitney Point. These flood control reservoirs have been in operation for different lengths of time, beginning in the 1930s. In most situations, peak flood flows in the years before the dams were in operation would now be reduced. Before use in deriving FFA input data, the flood peak data for Danville was therefore adjusted to account for the floodwater that is retained by these reservoirs.

The following equation was used to estimate flows at Bloomsburg based on the flows at the Fishing Creek gage and at Danville.

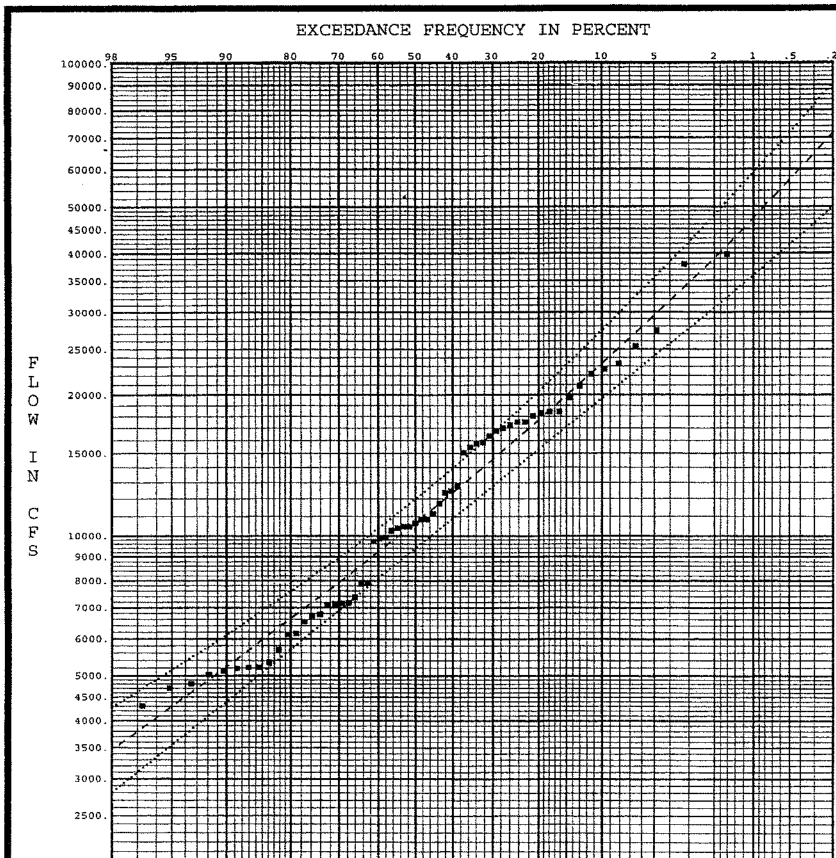
$$Q_{U/S}/Q_{D/S} = (DA_{U/S}/DA_{D/S})^{exp}$$

where Q is flow and DA denotes drainage area. The exponent normally varies between 0.5 and 1. In the absence of flow data to use at a specific location, 0.75 has been determined to be the appropriate exponent to calculate upstream and downstream flow in the Susquehanna basin. Therefore, for Fishing Creek, 0.75 was used for the exponent to estimate annual peak flows at Bloomsburg. On the basis of the limited data that were available for the Susquehanna River at Danville and Bloomsburg, 0.65 was used for the exponent to estimate annual peak flows upstream of the confluence with Fishing Creek. The adjusted peak flows were input into the FFA program to produce the final peak flow frequency curves for the Susquehanna River Upstream of Fishing Creek at Bloomsburg and Fishing Creek at Bloomsburg. They are presented in Figures 1 and 2 respectively.

The June 1972 event was determined to have an existing conditions discharge of 322,600 cubic feet per second (cfs) on the Susquehanna River at Bloomsburg upstream of Fishing Creek. Using the frequency curve for the Susquehanna River upstream of Fishing Creek, it was determined that the recurrence frequency of a June 1972 event is 440 years. The June 1972 event was determined to have an existing



EXCEEDANCE FREQUENCY IN PERCENT
98 95 90 80 70 60 50 40 30 20 10 5 2 1 .5 .2
FLOW IN CFS
400000. 350000. 300000. 250000. 200000. 150000. 100000. 90000. 80000. 70000. 60000. 50000. 45000.
--- FLOW Frequency (with Exp. Prob.)
▪ Weibull Plotting Positions
.... 5% and 95% Confidence Limits
FREQUENCY STATISTICS
LOG TRANSFORM OF FLOW, CFS
NUMBER OF EVENTS
MEAN 5.0721
STANDARD DEV .1316
SKEW .3371
REGIONAL SKEW .3000
ADOPTED SKEW .3000
HISTORIC EVENTS 0
HIGH OUTLIERS 1
LOW OUTLIERS 1
ZERO OR MISSING 0
SYSTEMATIC EVENTS 99
HISTORIC PERIOD(1900-1998) 99
Susquehanna River
upstream of Fishing Creek
BASIN AREA = 10560 SQ. MI.
WATER YEARS IN RECORD
1900-1998



--- Flow Frequency (with Exp. Prob.)
▪ Weibull Plotting Positions
······· 5% and 95% Confidence Limits

FREQUENCY STATISTICS
LOG TRANSFORM OF FLOW, CFS

		NUMBER OF EVENTS	
MEAN	4.0367	HISTORIC EVENTS	0
STANDARD DEV	.2488	HIGH OUTLIERS	0
SKEW	.1405	LOW OUTLIERS	0
REGIONAL SKEW	.4500	ZERO OR MISSING	0
ADOPTED SKEW	.2000	SYSTEMATIC EVENTS	61

Fishing Creek at Bloomsburg,
BASIN AREA = 385 SQ. MI.
WATER YEARS IN RECORD
1936,1939-1998

conditions discharge of 39,900 cfs on Fishing Creek at Bloomsburg. Using the frequency curve for Fishing Creek at Bloomsburg, it was determined that the recurrence frequency of a June 1972 event is 53 years. The frequency curve for Fishing Creek was developed for independent events on the creek. The frequency analysis does not take into account any backwater effects from the Susquehanna River should a highwater event occur on Fishing Creek while the Susquehanna River is also high.

1.3 FFA Results and Comparison of Estimated Flood Flows at Bloomsburg with Other Agency Studies

The FFA results are shown in Tables 1 and 2 below, along with estimated flood flows from:

- *Flood Insurance Study, Town of Bloomsburg, Pennsylvania.* FEMA, 1979.
- *Comparison of Methods for Computing Streamflow Statistics for Pennsylvania Streams.* USGS, 1999.
- *Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams.* USGS, 2000.

Because methods for estimating flood peaks vary, the reports do not yield the same results. However, in each case, the estimated flows from other agencies were within the FFA 5% and 95% confidence limits.

TABLE 1
Comparison of Estimated Peak Flood Flows for Fishing Creek at Bloomsburg

Return Period of Flood Event	2001 Bloomsburg LFPP Flood Frequency Analysis Peak Discharge in CFS	Peak Discharge in CFS from 1999 USGS Report Using Flood-Flow Statistics	Peak Discharge in CFS from 2000 USGS Report Using Regression Equations	Peak Discharge (CFS) from 1979 FEMA FIS Using Flood-Flow Statistics
	Area 385 sq.mi.	Area 355 sq.mi.	Area 355 sq.mi.	Area 385 sq.mi.
2 years	10,700	-	-	-
5 years	17,600	-	-	-
10 years	23,300	22,400	22,100	24,300
25 years	31,800	28,400	29,600	-
50 years	39,100	33,000	36,000	45,700
100 years	47,400	37,800	43,300	58,500
500 years	71,600	49,300	64,000	102,000

TABLE 2
Comparison of Estimated Peak Flood Flows for the Susquehanna River above its Confluence with Fishing Creek

Return Period of Flood Event	2001 Bloomsburg LFPP Flood Frequency Analysis Peak Discharge in CFS	Bloomsburg 1979 FEMA Flood Insurance Study Peak Discharge in CFS
	Area 10,560 sq. mi.	Area 10,576 sq.mi.
2 years	116,000	-
5 years	152,000	-
10 years	177,000	173,000
25 years	209,000	-
50 years	234,000	243,000
100 years	260,000	274,000
500 years	326,000	356,000

2. Hydraulics

2.1 Summary

A HEC-RAS (Hydraulic Engineering Center, River Analysis System) computer model was developed for the Susquehanna River and Fishing Creek in the Bloomsburg Project area. Cross sections were surveyed by the Hunt Engineering Co. and used for the model. The survey consisted of a total of 9 river cross sections and 2 bridge cross sections across the Susquehanna River and 32 stream cross sections and 8 bridge cross sections across Fishing Creek. The model was calibrated using high water marks from the June 1972, September 1975 and January 1996 events. The model was used to analyze 3 different levee alignments along the Susquehanna River and Fishing Creek and 2 depths of dredging along the Susquehanna River. Plans, which include the levee alignments, were analyzed for two different frequency events.

2.2 HEC-RAS Computer Modeling

- The HEC River Analysis System (RAS) is a computer model used for performing one-dimensional, steady flow, water surface profile calculations. It was used to estimate hydraulic variables at Bloomsburg. Model assumptions are as follows:
- A rating curve was used for starting water surface elevations. It was derived from a RAS model that was extended an additional 1,500 feet downstream and used normal depth as the starting condition.
- Floating debris at bridges was assumed to be 4 ft. wide and 2 ft. high. The basis of the assumption was information from Christine Haney at the Town of Bloomsburg that substantial debris collects at several of the bridges during flooding situations. A relatively large debris size was used.
- Contraction and expansion coefficients were assumed to be 0.1 and 0.3, except in the vicinity of bridges where values of 0.3 and 0.5 were assumed.

In order to evaluate existing conditions, survey data relative to the North American Vertical Datum 88 (NAVD 88) were used as the basis for the HEC-RAS model geometry. A map of the cross section locations on Fishing Creek is presented in Figure 3 and a map of the cross section locations on the Susquehanna River and lower Fishing Creek is presented in Figure 4. A table relating cross section location to river station is shown in Table 3 below.

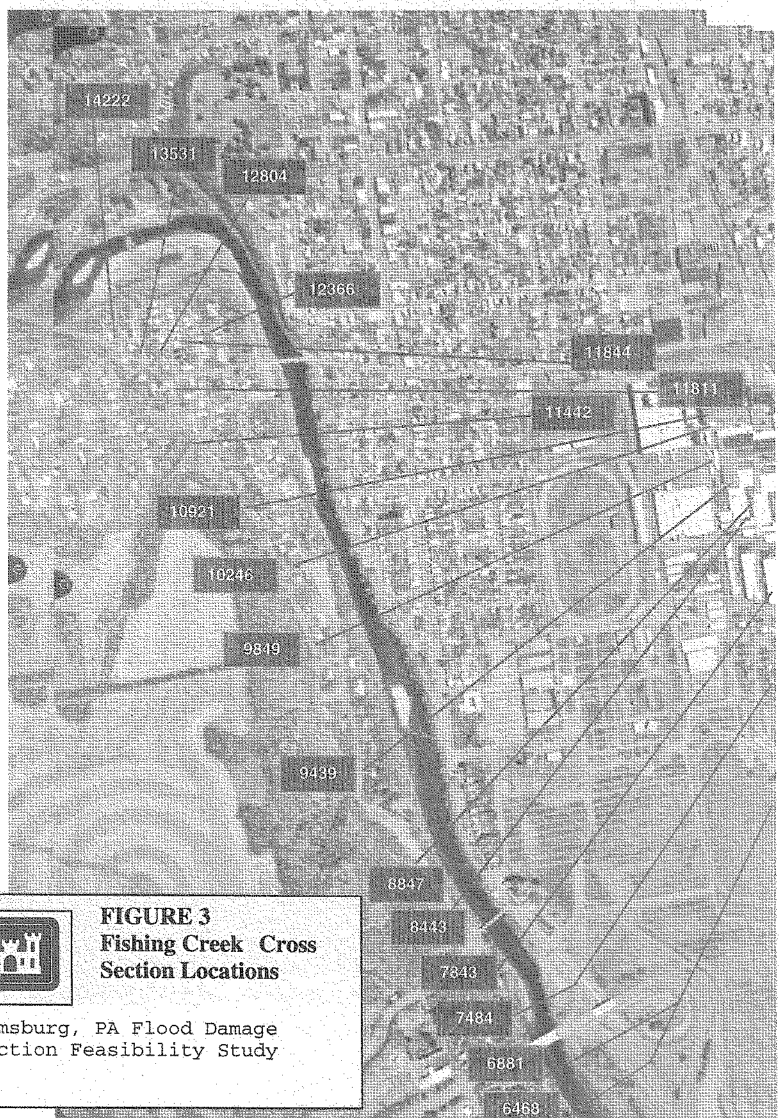


FIGURE 3
Fishing Creek Cross Section Locations

Bloomsburg, PA Flood Damage Reduction Feasibility Study

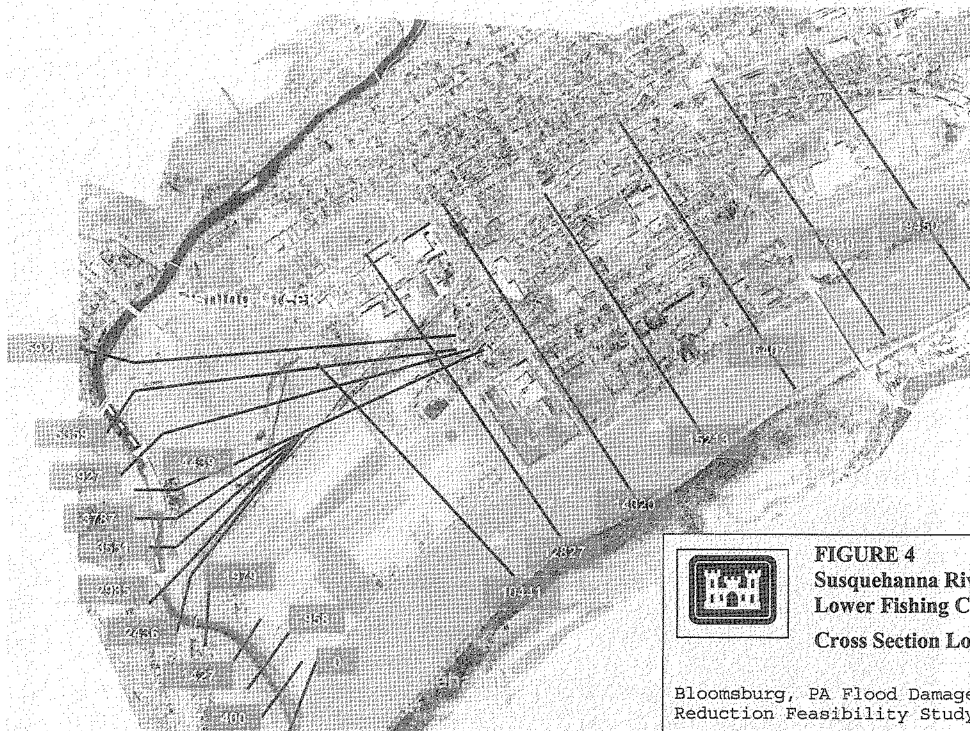


FIGURE 4
Susquehanna River and Lower Fishing Creek
Cross Section Locations

Bloomsburg, PA Flood Damage Reduction Feasibility Study

TABLE 3
HEC-RAS model - River station vs. Cross section name

SUSQUEHANNA RIVER		FISHING CREEK	
River Station	Cross Section Name	River Station	Cross Section Name
0	1	0	1
135	1A	400	2
148	Rt 42 d/s	958	3
196	P1 - Rt 42 bridge	1427	4
206	Rt 42 u/s	1618	4A Old bridge piers
306	1B	1979	5
1628	2	2015	Covered bridge d/s
3650	2A	2038	P1 - Covered bridge
5672	3	2048	Covered bridge u/s
6325	3A	2100	Lackawanna RR bridge d/s
6827	RR mitigation bridge d/s	2113	P2 – Lackawanna RR bridge
6870	RR mitigation bridge	2123	Lackawanna RR bridge u/s
6880	RR mitigation bridge u/s	2179	Reading RR bridge d/s
7380	3B	2201	P3 – Reading RR bridge
8430	3C	2211	Reading RR bridge u/s
9241	4	2436	6
10441	4A	2985	7
11634.2	4B	3551	8
12827.4	4C	3787	9
14020.6	4D	3847	Inline weir d/s
15213.8	4E	3851	P4 - Inline weir
16407	5	3861	Inline weir u/s
17802	50 ft d/s of Rt 487 bridge	4439	10
17852	Rt 487 bridge d/s	4927	11
17900	P2 - Rt 487 bridge	5359	12
17910	Rt 487 bridge u/s	5423	50 ft d/s of Rt 11 bridge
19450	6A	5473	Rt 11 bridge d/s
20985	7	5574	P5 – Rt 11 bridge
23095	7A	5584	Rt 11 bridge u/s
25200	8	5634	50 ft u/s of Rt 11 bridge
27280	9	5928	13
		6468	14
		6881	15
		6981	Rt 42 bridge d/s
		7058	P6 – Rt 42 bridge
		7068	Rt 42 bridge u/s
		7484	16
		7843	17
		7889	Rt 44 (double track) bridge d/s
		7920	P7 - Rt 44 (double track) bridge
		7930	Rt 44 (double track) bridge u/s
		8443	18
		8847	19
		9439	20
		9849	21
		10246	22
		10921	23
		11442	24
		11811	25
		11844	Railroad St bridge d/s
		11879	P8 – Railroad St bridge
		11886	Railroad St bridge u/s
		12366	26
		12804	27

		14222	29
		14984	30
		15621	31
		15996	32
		16596	33E Estimated Cross Section
		17296	34E Estimated Cross Section
		17996	35E Estimated Cross Section
		18696	36E Estimated Cross Section
		19396	37E Estimated Cross Section

Interpolated sections were placed for the following reasons:

- Near bridges to provide sections for the purpose of estimating expansion and contraction of flow. Table 5.1 from the 2001 *HEC-RAS Hydraulic Reference Manual* was used to derive distances.
- To provide better accuracy in the floodplain where the distance between sections was too great.
- To better estimate hydraulic variables at the confluence of Fishing Creek and the Susquehanna River.
- Interpolated values were replaced with survey data in overbanks, where available.

Estimated flows for Fishing Creek and the Susquehanna River at Bloomsburg were based on the flood frequency analysis for the 2, 5, 10, 25, 50, 100, 200, and 500-year flooding events. Flooding was assumed to peak at the same time for Fishing Creek and the Susquehanna River at Bloomsburg, and downstream of the confluence of the Susquehanna River and Fishing Creek the sum of the flood peaks for Fishing Creek and the Susquehanna River in Bloomsburg were used as flow data.

Manning's "n" values were used to estimate roughness. Observations from field reconnaissance were used along with guidance in EM 1110-2-1416 and Chow (1959) to estimate Manning's "n" values for the channel, left overbank, and right overbank along the Susquehanna River and Fishing Creek.

2.3 Calibration of HEC-RAS Model

To determine highwater marks to use in calibrating the HEC-RAS model, 42 citizens were contacted that owned properties in the flood prone areas of Bloomsburg. Of those 42 properties, 12 highwater marks were found to be useable for three flood events: June 1972, September 1975 and January 1996. The Manning's "n" values used in the HEC-RAS model were adjusted within reasonable limits to produce existing conditions water surface profiles for the three events that matched closely (+ or - 0.5 ft.) with the highwater marks.

2.4 Comparision of Water Surface Profiles with FEMA Flood Insurance Study (FIS) Profiles

The water surface profiles presented in the Flood Insurance Study for the Town of Bloomsburg, prepared by FEMA and dated November 1979 were compared with the without project water surface profiles computed for this study. The water surface profile elevations for this feasibility study are consistently greater than those presented in the FIS. This is due to the fact that the hydraulic analysis for this study has been performed with the most up to date mapping and best computer modeling methods available to date. This study has been conducted to assure a safe levee design and has taken into account risk and uncertainty. The comparison of water surface elevations at select locations is presented in Table 4.

TABLE 4
Bloomsburg, PA
Comparison of Water Surface Profiles

River Station	Location	Bloomsburg LFPP 2004 Water Surface Elevation 100-year event	Bloomsburg 1979 FEMA Flood Ins. Insurance Study 100-year event	Bloomsburg LFPP 2004 Water Surface Elevation 50-year event	Bloomsburg 1979 FEMA Flood Ins. Insurance Study 50-year event	Bloomsburg LFPP 2004 Water Surface Elevation 10-year event	Bloomsburg 1979 FEMA Flood Ins. Insurance Study 10-year event
Fishing Creek							
FC-6 2436	235 ft. u/s of Reading Railroad Bridge	482.6	477.4	479.1	475.3	473.5	470.1
FC-12 5359	215 ft. d/s of Rt. 11 Bridge	482.6	477.8	479.3	475.7	473.9	470.3
FC-18 8443	523 ft. u/s of Rt. 44 Bridge	482.9	477.9	479.8	475.9	476.9	474.0
FC-24 11442	Along Scott Ave.	483.6	483.2	481.6	481.8	479.0	478.9
Susquehanna							
SR-4D 14020.6	Along Railroad Street	479.6	478.0	477.6	476.0	473.7	470.9
SR-5 16407	400 ft. d/s of Catherine Street	480.3	478.5	478.3	476.5	474.5	471.6

2.5 Risk Analysis

2.5.1 Summary

A risk and uncertainty analysis was performed for the calibrated existing conditions HEC-RAS model in accordance with EM 1110-2-1619, Risk-Based Analysis for Flood Damage Reduction Studies. High, expected and low stage scenarios were determined. A standard deviation of error was determined for three index locations for the 8 hypothetical events for use in the economic analysis.

2.5.2 Expected Stage Scenario

The calibrated existing conditions model is the expected stage scenario model. The debris at the bridges was set at 4 feet wide and 2 feet high. The Manning's "n" values were set at the values determined during the field reconnaissance, using observations and following the guidance in EM 1110-2-1416 and Chow (1959). The coefficients of contraction and expansion were set at typical values of 0.1 and 0.3 and increased to 0.3 and 0.5 in the vicinity of bridges. The discharge values were determined using the peak flow frequency curves for Fishing Creek and the Susquehanna River.

2.5.3 High Stage Scenario

The high stage scenario model was determined by increasing the debris at the bridges, making the debris 6 feet wide and 3 feet high. The Manning's "n" values were increased using the maximum values for the conditions surveyed during the field reconnaissance as stated in EM 1110-2-1619. The coefficients of contraction and expansion were increased to 0.3 and 0.5 at stream cross sections and increased to 0.5 and 0.8 in the vicinity of bridges. The discharge values were determined using the 95% confidence limits on the peak flow frequency curves for Fishing Creek and Susquehanna River.

2.5.4 Low Stage Scenario

The low stage scenario model was determined by decreasing the debris at the bridges, making the debris 3 feet wide and 1 foot high. The Manning's "n" values were decreased using the minimum values for the conditions surveyed during the field reconnaissance as stated in EM 1110-2-1619. The coefficients of contraction and expansion were set to 0.1 and 0.3 at stream cross sections and set to 0.3 and 0.5 in the vicinity of bridges. The discharge values were determined using the 5% confidence limits on the peak flow frequency curves for Fishing Creek and Susquehanna River. A summary table of the risk analysis parameters is shown below in Table 5.

TABLE 5
HEC-RAS Parameters Used for Low, Expected and High Risk Scenarios

Coefficients of contraction and expansion

		Low	Expected	High
Contraction	Channel	0.1	0.1	0.3
	Bridge Secs	0.3	0.3	0.5
Expansion	Channel	0.3	0.3	0.5
	Bridge Secs	0.5	0.5	0.8

	Low	Expected	High
Debris at Bridges	3'x1'	4'x2'	6'x3'

	Low	Expected	High
Mannings n in Channels	0.03	0.035	0.04
	0.031	0.036	0.041
	0.032	0.038	0.043
	0.033	0.04	0.045
	0.034	0.043	0.048

	Low	Expected	High
Mannings n in Overbanks	0.025	0.03	0.035
	0.03	0.035	0.05
	0.03	0.036	0.05
	0.03	0.038	0.05
	0.03	0.04	0.05
	0.033	0.045	0.06
	0.035	0.05	0.07
	0.04	0.06	0.08
	0.045	0.07	0.11
	0.055	0.08	0.1
	0.08	0.1	0.12
	0.1	0.12	0.16
	0.11	0.14	0.18
	0.11	0.15	0.2
	0.15	0.2	0.25

TABLE 5 (cont.)
HEC-RAS Parameters Used for Low, Expected and High Risk Scenarios

RAS Flow Used for Low, Expected and High Risk Scenarios

Fishing Creek	Return Period	Low	Expected	High
	2-yr	9400	10300	12000
	5-yr	15300	17000	20500
	10-yr	19500	22000	27500
	25-yr	26000	30000	39500
	50-yr	30500	38000	48500
	100-yr	36000	47000	59000
	200-yr	42500	56000	72000
	500-yr	50000	70000	90000

Upstream	Return Period	Low	Expected	High
Susquehanna	2-yr	110000	116000	122000
	5-yr	143000	152000	161000
	10-yr	165000	177000	189000
	25-yr	191000	209000	226000
	50-yr	211000	234000	256000
	100-yr	230000	260000	285000
	200-yr	255000	288000	320000
	500-yr	280000	326000	360000

Downstream	Return Period	Low	Expected	High
Susquehanna	2-yr	119400	126300	134000
	5-yr	158300	169000	181500
	10-yr	184500	199000	216500
	25-yr	217000	239000	265500
	50-yr	241500	272000	304500
	100-yr	266000	307000	344000
	200-yr	297500	344000	392000
	500-yr	330000	396000	450000

3. With-Project Conditions

3.1 Summary

Three different levee alignments were analyzed using the calibrated HEC-RAS model: 1) Interior alignment, 2) Fringe alignment, and 3) Fringe with Fernville alignment. The alignments are pictured in Figure 5. Note that in Figure 5 the location of the Fernville alignment is approximate. In addition, the two (2) ramps shown at the fairgrounds have been reduced to one (1). Refer to Plates C-13 through C-17 in the Engineering Appendix for alignment plan and profiles. The 2, 5, 10, 25, 50, 100, 200, and 500-year hypothetical events and June 1972 historic event were analyzed. Five-foot and ten-foot depths of dredging of the Susquehanna River were also analyzed for the 10, 100, and 200-year events.

3.2 Bridges Considered for Removal

Two bridges were considered for removal: the railroad bridge across the Susquehanna River downstream of the junction with Fishing Creek at river station 6870 and the Double Track bridge (Rt. 44) on Fishing Creek. Water surface profiles were computed to determine the amount of reduction in existing conditions water surface elevations due to the removal of these bridges. The results are presented in Table 6.

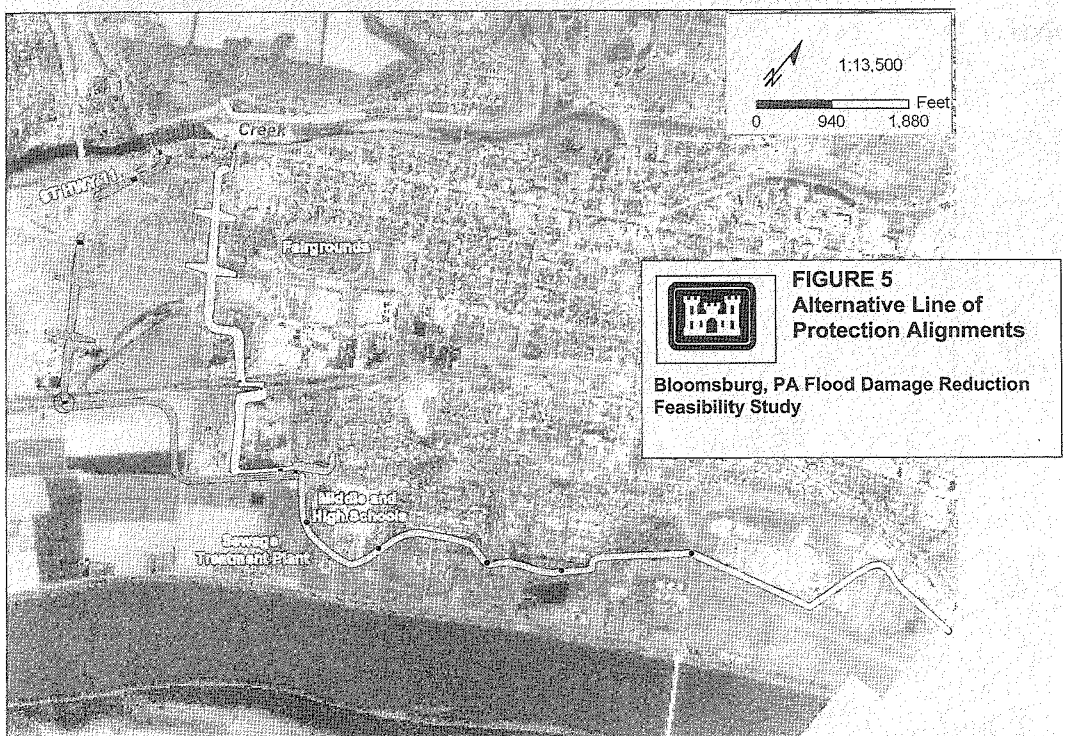

1:13,500
Feet
0 940 1,880
Creek
Fairgrounds
Middle and High Schools
Sewage Treatment Plant
FIGURE 5
Alternative Line of Protection Alignments
Bloomsburg, PA Flood Damage Reduction Feasibility Study

TABLE 6
Bloomsburg, PA
Effect of Bridge Removal
Summary Table

100-Year Event

River Station	Location	Existing Conditions Water Surface Elevation	Existing Conditions w/o Rt.44 Bridge	Difference	Existing Conditions w/o Railroad Bridge	Difference	Existing Conditions w/o Rt.44 & Railroad Bridges	Difference
Fishing Creek								
FC-6 2436	235 ft. u/s of Reading Railroad Bridge	482.6	482.6	0	482.1	0.5	482.1	0.5
FC-12 5359	215 ft. d/s of Rt. 11 Bridge	482.6	482.6	0	482.2	0.4	482.2	0.4
FC-18 8443	523 ft. u/s of Rt. 44 Bridge	482.9	482.9	0	482.5	0.4	482.5	0.4
FC-24 11442	Along Scott Ave.	483.6	483.5	0.1	483.3	0.3	483.2	0.4
Susquehanna								
SR-4D 14020.6	Along Railroad Street	479.6	479.6	0	479.1	0.5	479.1	0.5
SR-5 16407	400 ft. d/s of Catherine Street	480.3	480.3	0	479.8	0.5	479.8	0.5

TABLE 6 (cont.)
Bloomsburg, PA
Effect of Bridge Removal
Summary Table

June 1972 Event River Station	Location	Existing Conditions Water Surface Elevation	Existing Conditions w/o Rt.44 Bridge	Differ-ence	Existing Conditions w/o Railroad Bridge	Differ-ence	Existing Conditions w/o Rt.44 & Railroad Bridges	Differ-ence
Fishing Creek								
FC-6 2436	235 ft. u/s of Reading Railroad Bridge	481.7	481.7	0.0	481.0	0.7	481.0	0.7
FC-12 5359	215 ft. d/s of Rt. 11 Bridge	481.7	481.7	0.0	481.1	0.6	481.1	0.6
FC-18 8443	523 ft. u/s of Rt. 44 Bridge	481.7	481.7	0.0	481.1	0.6	481.1	0.6
FC-24 11442	Along Scott Ave.	481.8	481.8	0.0	481.6	0.2	481.4	0.4
Susquehanna								
SR-4D 14020.6	Along Railroad Street	482.4	482.4	0.0	481.9	0.5	481.9	0.5
SR-5 16407	400 ft. d/s of Catherine Street	483.2	483.2	0.0	482.8	0.4	482.8	0.4

The removal of the Rt. 44 bridge does not reduce the water surface elevations for a June 1972 and 100-year event and therefore was kept in the HEC-RAS model. The removal of the railroad bridge reduces the water surface profile a maximum of 0.7 feet for a June 1972 event and a maximum of 0.5 feet for a 100-year event. This was not considered a substantial amount of decrease and since the town of Bloomsburg has stated a preference to have the bridge remain in place, this bridge was also left in the model. Keeping the bridges in the model provides for a conservative estimate of the water surface elevations for future conditions if the bridges were to be removed in the future. During the Wyoming Valley Levee Raising study, the removal of the railroad bridge was proposed as a mitigation measure for the increased flooding caused by the construction of the Wyoming Valley project. In the Wyoming Valley study the amount of reduction in water surface elevations with the removal of the railroad bridge was reported as 1.0 foot for a June 1972 event. The difference in reduction amounts between the Wyoming Valley study and the present study for Bloomsburg is attributed to the fact that this Bloomsburg LFPP study has been performed with the most up-to-date surveys. In addition, the analysis has been performed with computer models that were developed with site specific data for the Susquehanna River and Fishing Creek channels and floodplains. The reduction amounts determined during this study are the best estimate of the actual reduction in flooding levels that would result from the removal of the railroad bridge.

3.3 Interior Alignment

This alignment consists of a levee along the left bank of Fishing Creek and the right bank of the Susquehanna River. It runs along the left bank of Fishing Creek beginning at the Railroad Street Bridge and continues downstream until it makes a turn to the left at the Bloomsburg fair grounds entrance. It then runs approximately parallel to Fishing Creek and makes another left bend at 11th Street. It then proceeds upstream parallel to the Susquehanna River and ties out at Barton Street. This alignment allows for storage of floodwaters on the flood plain between the levee and Fishing Creek. It does not protect the right bank of Fishing Creek. The alignment minimally affects the flood plain in the project area along the Susquehanna River. Because the alignment preserves a large portion of the existing flood plain, the potential for increased flooding downstream of Bloomsburg is unlikely. Additional analysis will be performed in the Preconstruction Engineering and Design (PED) phase to confirm this assumption regarding the potential for increased flooding. Also, the water surface profiles for with and without project conditions on the Susquehanna River are identical for both the 100-year and June 1972 events. Table 7 below presents water surface elevations for selected cross sections. Water surface profiles for with and without project conditions 100-year and June 1972 events are presented in Figures 6 & 7 below.

TABLE 7
Bloomsburg, PA
Water Surface Elevation and Top of Protection Elevation Summary Table

100 year design level of protection

River Station	Location	100 year Existing Conditions Water Surface Elevation	100 year Interior Alignment Water Surface Elevation	100 year Interior Alignment Estimated Top of Protection Elev	100 year Fringe Alignment Water Surface Elevation	100 year Fringe Alignment Estimated Top of Protection Elev	100 year Fringe with Fernville Alignment Water Surface Elevation	100 year Fringe with Fernville Alignment Estimated Top of Protection Elev
Fishing Creek								
FC-6 2436	235 ft. u/s of Reading Railroad Bridge	482.6	482.6	486.1	482.6	486.1	482.6	486.1
FC-12 5359	215 ft. d/s of Rt. 11 Bridge	482.6	482.7	486.3	482.7	486.3	482.7	486.4
FC-18 8443	523 ft. u/s of Rt. 44 (Double Track) Bridge	482.9	483.3	486.9	486.7	489.7	486.7	489.8
FC-24 11442	Along Scott Ave.	483.6	485.4	488.7	488.4	491.6	488.5	491.8
Susquehanna								
SR-4D 14020.6	Along Railroad Street	479.6	479.6	483.2	479.6	483.3	479.6	483.3
SR-5 16407	400 ft. d/s of Catherine Street	480.3	480.3	484.1	480.3	484.2	480.3	484.2

June 1972 design level of protection

River Station	Location	June 1972 Existing Conditions Water Surface Elevation	June 1972 Interior Alignment Water Surface Elevation	June 1972 Interior Alignment Estimated Top of Protection Elev	June 1972 Fringe Alignment Water Surface Elevation	June 1972 Fringe Alignment Estimated Top of Protection Elev	June 1972 Fringe with Fernville Alignment Water Surface Elevation	June 1972 Fringe with Fernville Alignment Estimated Top of Protection Elev
Fishing Creek								
FC-6 2436	235 ft. u/s of Reading Railroad Bridge	481.7	481.7	486.1	481.7	486.1	481.7	486.2
FC-12 5359	215 ft. d/s of Rt. 11 Bridge	481.7	481.7	486.3	481.7	486.3	481.7	486.4
FC-18 8443	523 ft. u/s of Rt. 44 (Double Track) Bridge	481.8	481.8	486.9	484.3	489.7	484.3	489.8
FC-24 11442	Along Scott Ave.	481.8	482.7	488.7	486.0	491.6	486.0	491.8
Susquehanna								
SR-4D 14020.6	Along Railroad Street	482.4	482.4	486.2	482.4	486.2	482.4	486.2
SR-5 16407	400 ft. d/s of Catherine Street	483.2	483.2	487.2	483.3	487.2	483.3	487.2

FIGURE 6

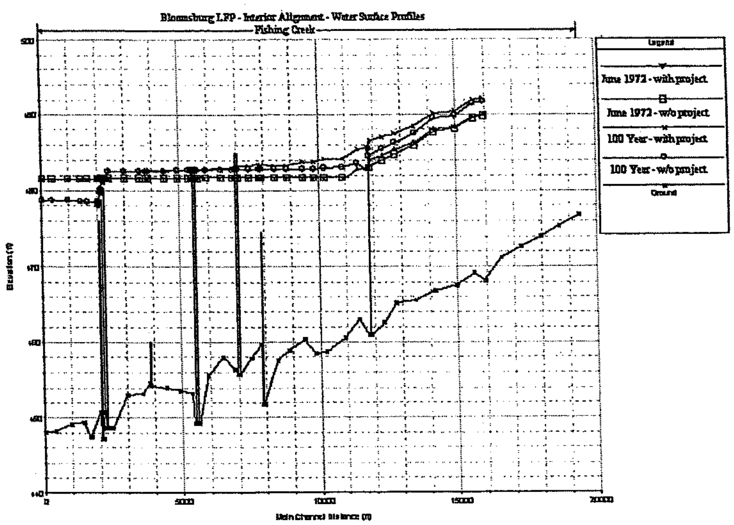
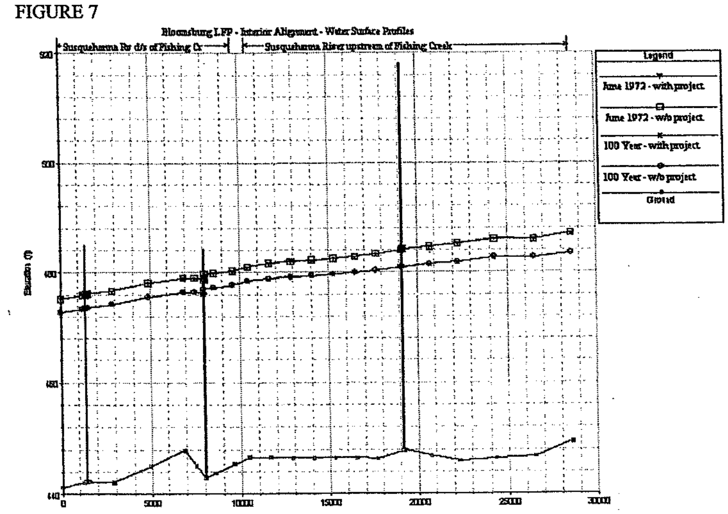


FIGURE 7



3.4 Fringe Alignment

This alignment consists of a levee along the left bank of Fishing Creek and the right bank of the Susquehanna River. It runs along the left bank of Fishing Creek beginning at the Railroad Street bridge and continues downstream until it makes a turn to the left at the Route 11 overpass. It then runs approximately parallel to Fishing Creek and makes another left bend at the railroad tracks and proceeds parallel to the tracks. The alignment bends around the landfill and then runs upstream parallel to the Susquehanna River and ties out at Barton Street. This alignment allows for less storage in the flood plain between the levee and Fishing Creek and does not protect the right bank of Fishing Creek. The alignment minimally affects the flood plain in the project area along the Susquehanna River. Because the alignment preserves a large portion of the existing flood plain, the potential for increased flooding downstream of Bloomsburg is unlikely. Additional analysis will be performed in the Preconstruction Engineering and Design (PED) phase to confirm this assumption regarding the potential for increased flooding. Also, the water surface profiles for with and without project conditions on the Susquehanna River are nearly identical for both the 100-year and June 1972 events. The previously presented Table 7 shows water surface elevations for selected cross sections. Water surface profiles for with and without project conditions 100-year and June 1972 events are presented in Figures 8 & 9 below.

FIGURE 8

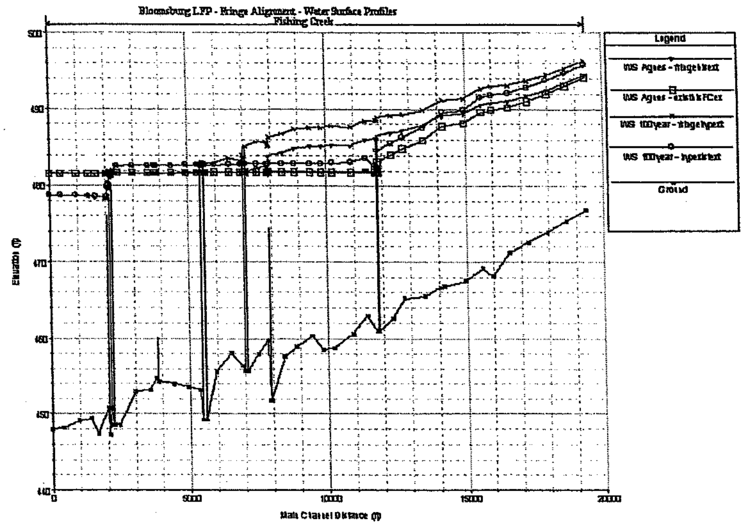
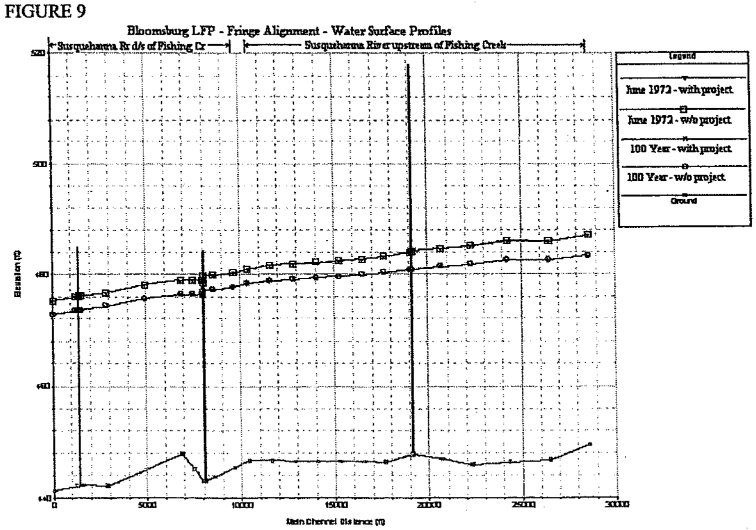


FIGURE 9



3.5 Fringe with Fernville Alignment

This alignment consists of the Fringe Alignment and also an alignment along the right bank of Fishing Creek referred to as the Fernville Alignment. The Fernville alignment begins upstream at Bloom Street and continues downstream along the right bank of Fishing Creek tying out at about river station 8847, and is included as a mitigation measure to address increased flooding that would result from the Fringe alignment. This alignment affects the flood plain storage the most by restricting the flow of Fishing Creek between the right and left banks of Fishing Creek for about 3000 feet. The alignment minimally affects the flood plain in the project area along the Susquehanna River. Because the alignment preserves a large portion of the existing flood plain, the potential for increased flooding downstream of Bloomsburg is unlikely. Additional analysis will be performed in the Preconstruction Engineering and Design (PED) phase to confirm this assumption regarding the potential for increased flooding. Also, the water surface profiles for with and without project conditions on the Susquehanna River are nearly identical for both the 100-year and June 1972 events. The previously presented Table 7 shows water surface elevations for selected cross sections. Water surface profiles for with and without project conditions 100-year and June 1972 events on the Susquehanna River and Fishing Creek are presented in Figures 10 & 11 below.

FIGURE 10

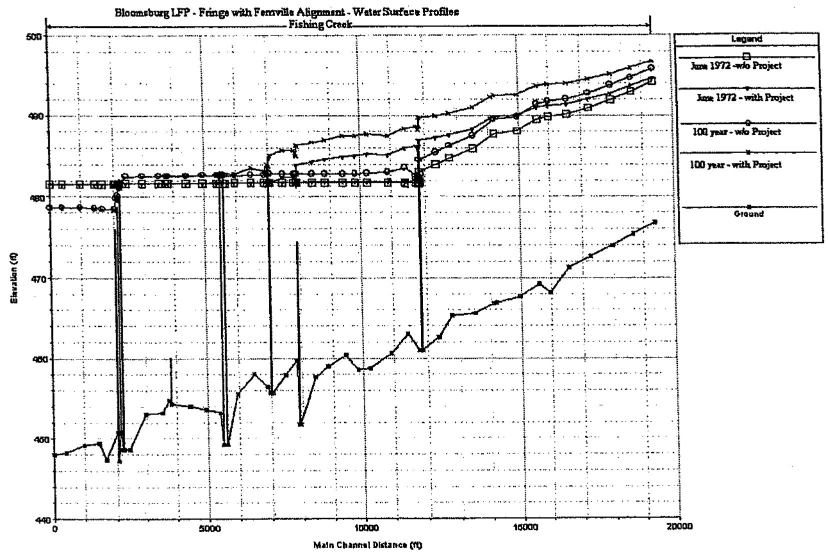
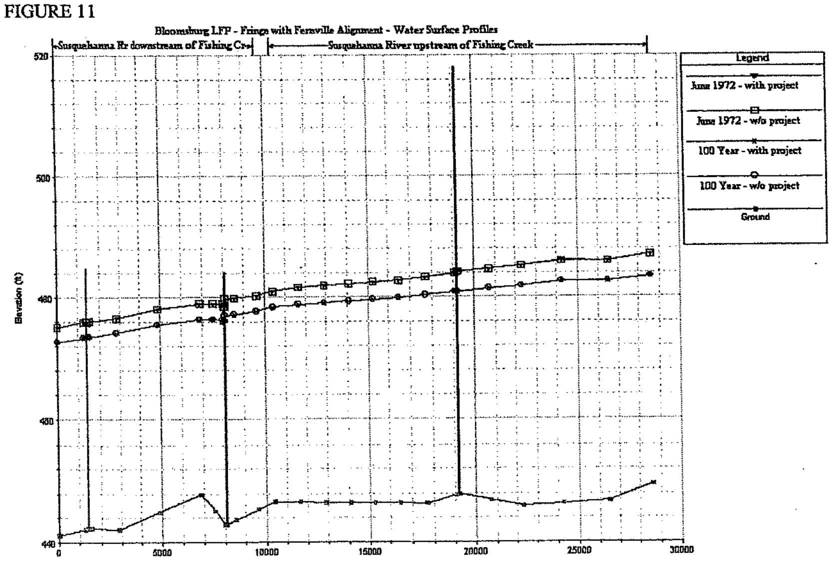


FIGURE 11



3.5 Dredging

Channel improvements to deepen Fishing Creek to reduce flood damages were considered in earlier Corps evaluations, but were eliminated due to excessive costs. Fishing Creek is underlain by sandstone a few feet below the channel bottom and would require blasting and excavation of rock in order to deepen the channel and would require significant, frequent operation and maintenance to maintain the channel depth. The affect of dredging the Susquehanna River was analyzed using the HEC-RAS model. Five-foot and ten foot deep channels were modeled starting upstream of the Rt. 42 bridge to about 7000 feet upstream of the Rt. 487 bridge (a total of approx 24,000 feet of dredging distance). The channels were modeled as 1000 feet wide trapezoidal channels with the slope determined using the average existing channel bottom slope. The results of this analysis are shown in Table 8 below.

TABLE 8

BLOOMSBURG, PA
DREDGING ANALYSIS SUMMARY TABLE

10-YEAR EVENT

Station		Location	10-year Existing Conditions Water Surface Elevation w/both bridges in	10-year WSEL with 5 ft dredging from Susquehanna River Sta 1628 to 25200	10-year WSEL with 10 ft dredging from Susquehanna River Sta 1628 to 25200
FISHING CREEK					
FC-6	2436	235 ft. u/s of Reading Railroad Bridge	473.5	472.4	471.9
FC-12	5359	215 ft. d/s of Rt. 11	473.9	473.0	472.6
FC-18	8443	523 ft. u/s of Rt. 44 Bridge	476.8	476.8	476.8
FC-24	11442	Along Scott Ave.	479.0	479.0	479.0
SUSQUEHANNA R.					
SR-4D	14020.6	Along Railroad Street	473.7	472.2	471.3
SR-5	16407	400 ft. d/s of Catherine Street	474.5	472.8	471.7

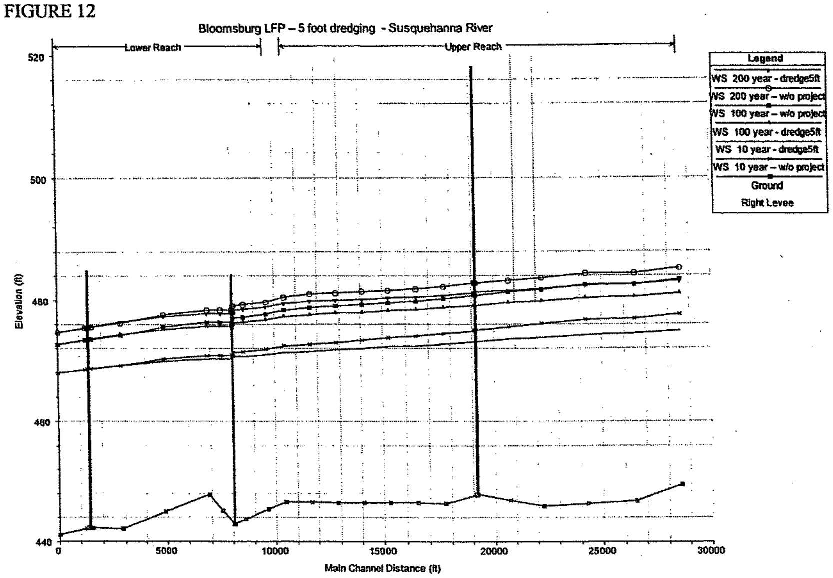
TABLE 8 (cont.)

100-YEAR EVENT					
Station		Location	100-year Existing Conditions Water Surface Elevation w/both bridges in	100-year WSEL with 5 ft dredging from Susquehanna River Sta 1628 to 25200	100-year WSEL with 10 ft dredging from Susquehanna River Sta 1628 to 25200
FISHING CREEK					
FC-6	2436	235 ft. u/s of Reading Railroad Bridge	482.6	481.6	480.9
FC-12	5359	215 ft. d/s of Rt. 11	482.6	481.7	481.0
FC-18	8443	523 ft. u/s of Rt. 44 Bridge	482.9	482.0	481.4
FC-24	11442	Along Scott Ave.	483.6	482.2	481.8
SUSQUEHANNA R.					
SR-4D	14020.6	Along Railroad Street	479.6	478.2	477.3
SR-5	16407	400 ft. d/s of Catherine Street	480.3	478.7	477.7

200-YEAR EVENT					
Station		Location	200-year Existing Conditions Water Surface Elevation w/both bridges in	200-year WSEL with 5 ft dredging from Susquehanna River Sta 1628 to 25200	200-year WSEL with 10 ft dredging from Susquehanna River Sta 1628 to 25200
FISHING CREEK					
FC-6	2436	235 ft. u/s of Reading Railroad Bridge	485.5	485.0	484.6
FC-12	5359	215 ft. d/s of Rt. 11	485.6	485.0	484.6
FC-18	8443	523 ft. u/s of Rt. 44 Bridge	485.8	485.3	484.9
FC-24	11442	Along Scott Ave.	486.2	485.7	485.4
SUSQUEHANNA R.					
SR-4D	14020.6	Along Railroad Street	481.7	480.4	479.5
SR-5	16407	400 ft. d/s of Catherine Street	482.3	480.9	479.9

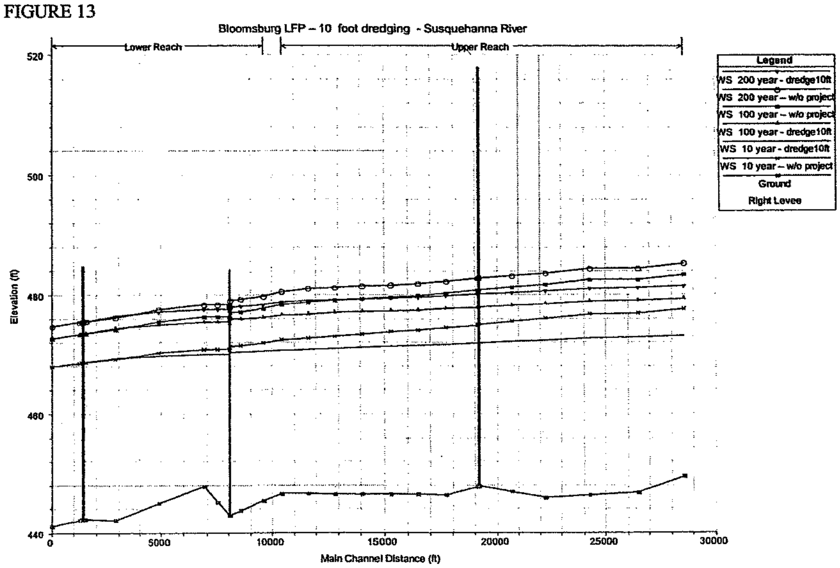
With 5 feet of dredging on the Susquehanna River, the maximum difference in the 100-year water surface elevation is a decrease of 1.6 feet. With and without project conditions water surface profiles for the Susquehanna River with 5 foot dredging depth is shown below in Figure 12.

FIGURE 12


Bloomsburg LFP – 5 foot dredging - Susquehanna River
Lower Reach
Upper Reach
Legend
WS 200 year - dredge5ft
WS 200 year – w/o project
WS 100 year – w/o project
WS 100 year - dredge5ft
WS 10 year - dredge5ft
WS 10 year – w/o project
Ground
Right Levee
Elevation (ft)
Main Channel Distance (ft)
520
500
480
460
440
0
5000
10000
15000
20000
25000
30000

With 10 feet of dredging on the Susquehanna River, the maximum difference in the 100-year water surface elevation is a decrease of 2.6 feet. With and without project conditions water surface profiles for the Susquehanna River with 10 foot dredging depth is shown below in Figure 13.

FIGURE 13



3.6 Preliminary Top of Protection

A top of protection was determined for the interior alignment, fringe alignment, and fringe with Fernville alignment. A preliminary top of protection was determined to establish a preliminary height of the levee. A final top of protection, incorporating a risk and uncertainty analysis in accordance with EM 1110-2-1619, Risk-Based Analysis for Flood Damage Reduction Studies, will be performed when a final levee alignment is chosen and studied further in the preconstruction engineering and design phase. Two design floods were used: the 100-year flood, and the June 1972 flood. For each design flood, the methodology consisted of the following steps:

- Use the expected value RAS model and generate a rating curve (discharge vs. stage) at the downstream end of the proposed levee.
- Identify the water surface elevation that is expected for the design flood.
- Add a nominal increment of 3 feet as an uncertainty factor and 0.2 feet to account for expected sediment deposition to determine the maximum expected water surface elevation.
- Use the rating curve to solve for the overtopping discharge that could be contained at that elevation.
- Use RAS to determine the expected water surface elevation for other locations along the levee, using the overtopping discharge as RAS input.
- Add 0.2 to 0.5 feet to the computed overtopping discharge water surface profile as a levee superiority factor so that the downstream end of the levee would overtop first, if the design flood is exceeded.

The 100-year flood with-project conditions water surface profile was determined to be higher then the June 1972 flood with-project water surface profile along Fishing Creek upstream of the Reading Railroad Bridge. This is because the June 1972 event along the Susquehanna River at Bloomsburg was a 440-year event but was only a 53-year event on Fishing Creek at Bloomsburg. The peak discharge on Fishing Creek occurred before the Susquehanna River rose substantially. The backwater from the Susquehanna River effected the lower portion of Fishing Creek downstream of the Reading Railroad bridge causing water surface elevations to be higher. Therefore, to provide maximum protection for Fishing Creek for the June 1972 levee design, the top of protection of the levee alignment along Fishing Creek was determined as the greater of the top of protection profiles determined for the 100-year and the June 1972 flood. The top of protection elevations for stations on the proposed levee alignments is shown in the previously presented Table 7.

4. Interior Flooding Analysis

4.1 Summary

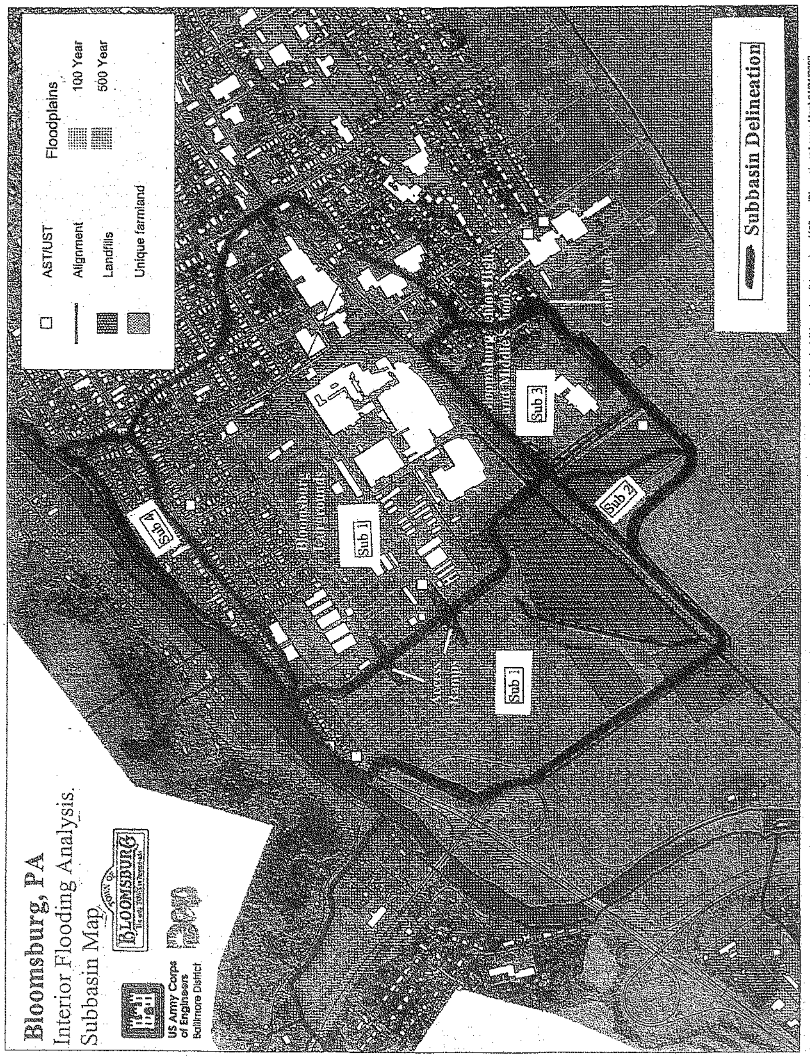
A preliminary interior flooding analysis was performed for the area behind the Bloomsburg fringe and interior alignments. A cursory look at the drainage behind the Fernville alignment was performed. A detailed analysis for the selected plan will be performed in the preconstruction engineering and design phase of study. The area behind the Bloomsburg interior and fringe alignments was divided into subbasins. Drainage structure capacity, pond storage volume, unit hydrograph data, loss rate coefficients, and hypothetical rainfall for each subbasin were determined for use in the HEC-IFH (Interior Flood Hydrology) computer model. The analysis was performed for hypothetical events only, with the drainage structures through the proposed levee alignment assumed as either totally blocked or totally unblocked at its outlet. For the Fernville levee, five drainage structures have been included to allow for the drainage of interior runoff through the levee.

4.2 Subbasin Delineation

The subbasins were delineated using 1inch = 100 feet topographic mapping with a contour interval of 2 feet. The mapping was used to determine the overland flow patterns and low areas for runoff storage. Existing storm sewer information received from the Town of Bloomsburg was also used when determining subbasin boundaries. The area behind the interior alignment was divided into 3 subbasins. The area behind the fringe alignment was divided into 4 subbasins. The subbasin delineation can be seen in Figure 14.

4.3 Storm Sewer Data and Capacity Calculations

Existing storm sewer data was gathered from the Town of Bloomsburg files. A storm water drainage plan developed in July 1972 was used to determine the location and size of the existing storm sewers. The invert and slope of the pipes was estimated by measuring the drop in elevation from the ground to the inlet invert and the length from inlet to outlet. Using the known outlet elevation and the topographic mapping, the inlet elevation and slope was determined. This information was used to calculate the outlet capacity of the drainage structures using the computer program HY-8, Culvert Analysis by the U.S. Department of Transportation. The runoff in subbasin 1 is collected by Snyders Run, which is an open channel upstream at the Bloomsburg State College and runs through the Town to its 4-foot diameter outlet at the Magee plant. It again runs through a combination of open channel and conduit until it flows into Fishing Creek. The runoff in subbasin 2 consists of overland flow with no drainage structure. The runoff in subbasin 3 is collected by a 2-foot diameter pipe that drains to the Susquehanna River. The runoff in subbasin 4 is collected by a series of drainage structures including 12-inch, 15-inch, 3-foot and 4-foot diameter pipes that all drain to Fishing Creek.



s:\gis\projects\bloomsburg\bloomsburg4102.apr (Bloomsburg Levee Map) 04/01/2002

28

FIGURE 14

4.4 Ponding Storage Volumes

Two-foot contour topographic mapping was used to measure the surface area of each contour of the low areas where runoff ponds in each subbasin. This elevation versus surface area data was input into the HEC-IFH model for each subbasin. The HEC-IFH program determines the pond storage volume using the average end-area method.

4.5 Unit Hydrograph Data

The Soil Conservation Service (SCS) dimensionless unitgraph method was used to determine the unit hydrograph parameters. This consists of determining a lag time between the center of mass of the rainfall excess and the peak of the unit hydrograph. This is calculated by measuring the length and slope of runoff flow lines and storm sewer lines to determine the hydraulic length of the subbasin along with the average slope. These values, together with the SCS curve number were used to determine the SCS lag time for each subbasin. The resulting lag time for each subbasin is presented in the Table 9 below.

TABLE 9
Bloomsburg LFP
Interior Flooding Model Data

Interior Alignment			
Subbasin	Drainage Area (sq miles)	Curve Number	SCS Lag (hours)
1	0.34	72	1.08
3	0.05	73	0.78
4	0.04	76	0.25
Fringe Alignment			
Subbasin	Drainage Area (sq miles)	Curve Number	SCS Lag (hours)
1	0.48	71	1.92
2	0.01	67	0.18
3	0.07	67	0.85
4	0.04	76	0.25

4.6 Loss Rate Determination

The SCS curve number method was used to determine the loss rate for each subbasin. The interior area is comprised of a variety of land uses. There is a large amount of residential and commercial development, and also some industrial development. There are some sparse forests, meadows, parks and farmland. Land use and soil type information was determined using USGS soil maps, topographic mapping, and aerial photographic mapping. This data was used together with the SCS curve number tables to calculate a composite curve number for each subbasin. The curve number for each subbasin is shown in Table 9 above.

4.7 Hypothetical Storm Development

Hypothetical frequency rainfall for the project area were developed using National Oceanic and Atmospheric Administration (NOAA) Technical Memorandum NWS HYDRO-35 and National Weather Service (NWS) Technical Paper No. 40. Point rainfall values for durations of 60 minutes and less were determined using the NOAA Technical Memorandum NWS HYDRO-35, while the NWS Technical Paper

No. 40 was used for durations greater than 60 minutes. The rainfall patterns for the 10, 25, 50 and 100-year storms were developed by the HEC-IFH program. The hypothetical rainfall depth-duration-frequency values are shown in Table 10.

TABLE 10
Basin Average Precipitation

	Rainfall Depth (inches) for each Hypothetical Event					
Duration	50%	20%	10%	4%	2%	1%
5 mins	0.413	0.49	0.55	0.63	0.69	0.76
15 mins	0.78	0.96	1.09	1.28	1.42	1.57
1 hour	1.20	1.56	1.81	2.16	2.44	2.71
2 hours	1.55	1.98	2.35	2.61	3.00	3.31
3 hours	1.77	2.22	2.57	2.95	3.40	3.65
6 hours	2.06	2.70	3.10	3.55	4.00	4.49
12 hours	2.51	3.25	3.70	4.40	4.80	5.40
24 hours	2.91	3.80	4.45	5.05	5.61	6.13

4.8 HEC-IFH Modeling and Results

The subbasin information was input into a HEC-IFH model for each subbasin. The models were run under the following conditions: (1) with-project and existing facilities with outlet structures totally unblocked, (2) with-project and existing facilities with outlet structures totally blocked, (3) with-project and the inclusion of additional drainage structures with outlet structures totally unblocked and (4) with-project and the inclusion of pumping facilities. The results are presented in Table 11 below.

TABLE 11
Bloomsburg Interior Flooding Analysis Results

	100 Yr Peak Pond Elev	50 Yr Peak Pond Elev	25 Yr Peak Pond Elev	10 Yr Peak Pond Elev
SUB 1				
W/O Project Conditions (river elev @ outlet)	478.9	476.7	474.6	472.7
Fringe Alignment				
minimum ground elev	464.0	464.0	464.0	464.0
blocked outflow	471.1	470.9	470.6	470.2
50 cfs pump*	470.2	469.7	469.3	468.7
100 cfs pump*	469.4	468.9	468.4	467.6
unblocked 4' outlet*	469.3	469.0	468.6	468.1
unblocked 5' outlet*	469.0	468.7	468.3	467.8
unblocked 6' outlet*	468.8	468.5	468.1	467.6
unblocked 7' outlet*	468.7	468.4	468.0	467.5

TABLE 11 (cont.)
Bloomsburg Interior Flooding Analysis Results

	100 Yr Peak Pond Elev	50 Yr Peak Pond Elev	25 Yr Peak Pond Elev	10 Yr Peak Pond Elev
Interior Alignment				
minimum ground elev	466.0	466.0	466.0	466.0
blocked outflow	472.1	471.9	471.6	471.2
50 cfs pump*	471.0	470.6	470.2	469.6
100 cfs pump*	470.3	469.9	469.3	468.5
unblocked 4' outlet**	470.4	470.1	469.7	469.3
unblocked 5' outlet*	470.1	469.8	469.5	469.0
unblocked 7' outlet*	469.8	469.5	469.1	468.7
SUB 2				
W/O Project Conditions (river elev @ outlet)	479.1	477.0	474.9	473.0
Fringe Alignment				
minimum ground elev	467.7	467.7	467.7	467.7
blocked outflow	469.6	469.4	469.3	469.0
unblocked 1' outlet*	469.0	468.9	468.7	468.6
Interior Alignment				
N/A				
SUB 3				
W/O Project Conditions (river elev @ outlet)	479.4	477.3	475.3	473.4
Fringe Alignment				
minimum ground elev	465.8	465.8	465.8	465.8
blocked outflow	468.1	467.9	467.7	467.5
unblocked 2' outlet**	468.1	467.9	467.7	467.5
Interior Alignment				
minimum ground elev	465.8	465.8	465.8	465.8
blocked outflow	468.1	467.9	467.7	467.5
unblocked 2' outlet**	468.1	467.9	467.7	467.5
SUB 4				
W/O Project Conditions (river elev @ outlet)	483.1	480.0	479.6	478.3
Fringe Alignment				
minimum ground elev	477.0	477.0	477.0	477.0
blocked outflow	479.1	478.9	478.8	478.6
unblocked outlets** (4', 3', 1.25', and 1')	477.0	477.0	477.0	477.0

TABLE 11 (cont.)
Bloomsburg Interior Flooding Analysis Results

	100 Yr Peak Pond Elev	50 Yr Peak Pond Elev	25 Yr Peak Pond Elev	10 Yr Peak Pond Elev
Interior Alignment				
minimum ground elev	477.0	477.0	477.0	477.0
blocked outflow	479.1	478.9	478.8	478.6
unblocked outlets** (4', 3', 1.25', and 1')	477.0	477.0	477.0	477.0

* Proposed structures
** Existing Structures

The interior ponding elevations in Bloomsburg are decreased substantially with the project in place when compared with the river flooding elevations that exist without the project in place. However, some ponding still remains, as can be seen in Figures 15 through 18.

Since the project does not increase the ponding elevations in any of the subbasins, no additional facilities are justified. The minimum facilities consist of extending the existing storm sewers through the line-of-protection. These drainage structures will handle interior runoff so that ponding elevations will not be higher than for without-project conditions. Any measure to reduce residual interior flooding will need to be incrementally justified as a separate project feature from the line-of-protection project. A separate benefit-cost analysis would need to be performed during the final interior flooding analysis to determine if any additional drainage structures or possibly a pumping station could be justified to help reduce the residual interior flooding, particularly in subbasins 1 and 4.

4.9 Fernville Levee

Very little mapping and drainage structure information exists behind the Fernville levee alignment. An interior flooding analysis could not be performed. Additional mapping and data will be obtained during preconstruction engineering and design for use in performing an interior flooding analysis for the Fernville levee. For this study it is assumed that 5- 24" drainage structures will be provided through the line of protection to allow for drainage of the interior runoff through the alignment.

5. Riprap Analysis

A preliminary analysis was performed to determine the riprap requirements along the line of protection. The channel velocities from the HEC-RAS output for the fringe with Fernville alignment were used. Riprap was considered to be necessary where the channel velocity for the 100-year event was equal to or greater than 6 feet per second. Under this assumption, riprap will be required along both banks of Fishing Creek wherever a levee section exists, beginning at the upstream tie out of the Fernville levee and continuing downstream to about 50 feet past the Route 44 Bridge. Riprap will be required beginning at the upstream tie out and continuing downstream to levee station 52+00. A more detailed analysis determining riprap location, size and placement will be performed in the next phase of study, during preconstruction engineering and design. Every effort to minimize the necessity for riprap and provide alternative methods for erosion protection will be made.

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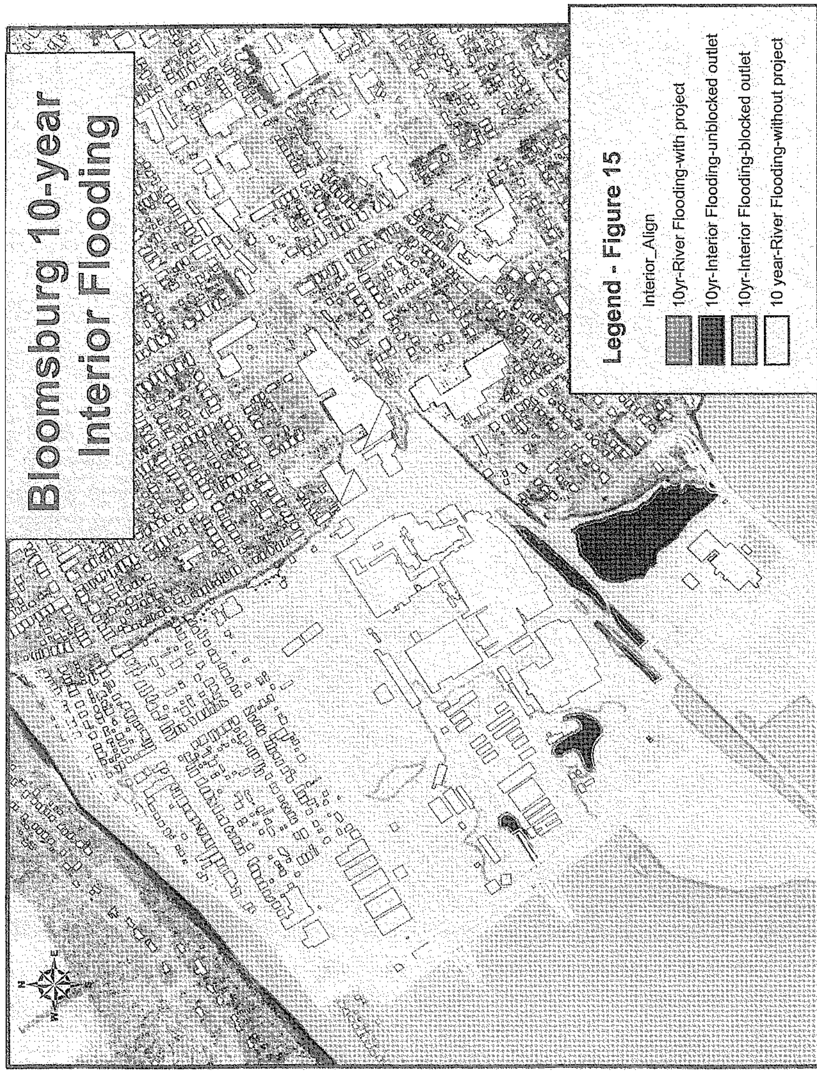
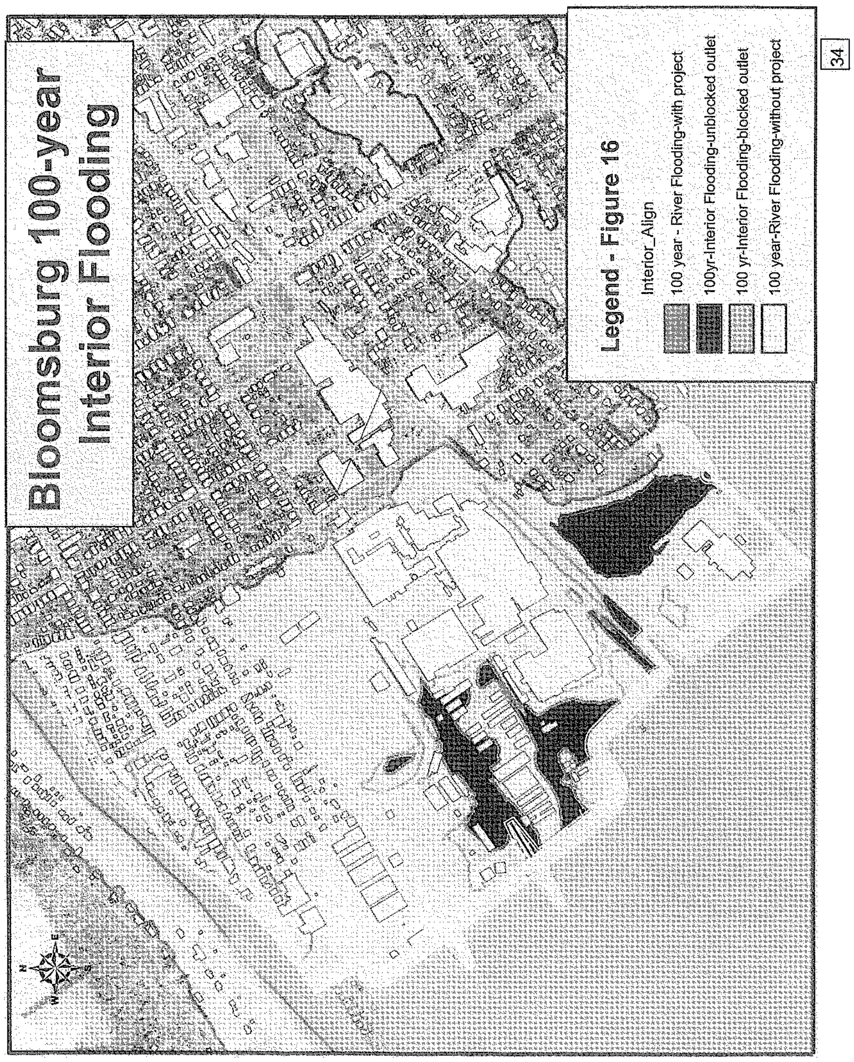

Bloomsburg 10-year
Interior Flooding
Legend - Figure 15
Interior_Align
10yr-River Flooding-with project
10yr-Interior Flooding-unblocked outlet
10yr-Interior Flooding-blocked outlet
10 year-River Flooding-without project


Bloomsburg 100-year
Interior Flooding
Legend - Figure 16
Interior_Align
100 year - River Flooding-with project
100yr-Interior Flooding-unblocked outlet
100 yr-Interior Flooding-blocked outlet
100 year-River Flooding-without project
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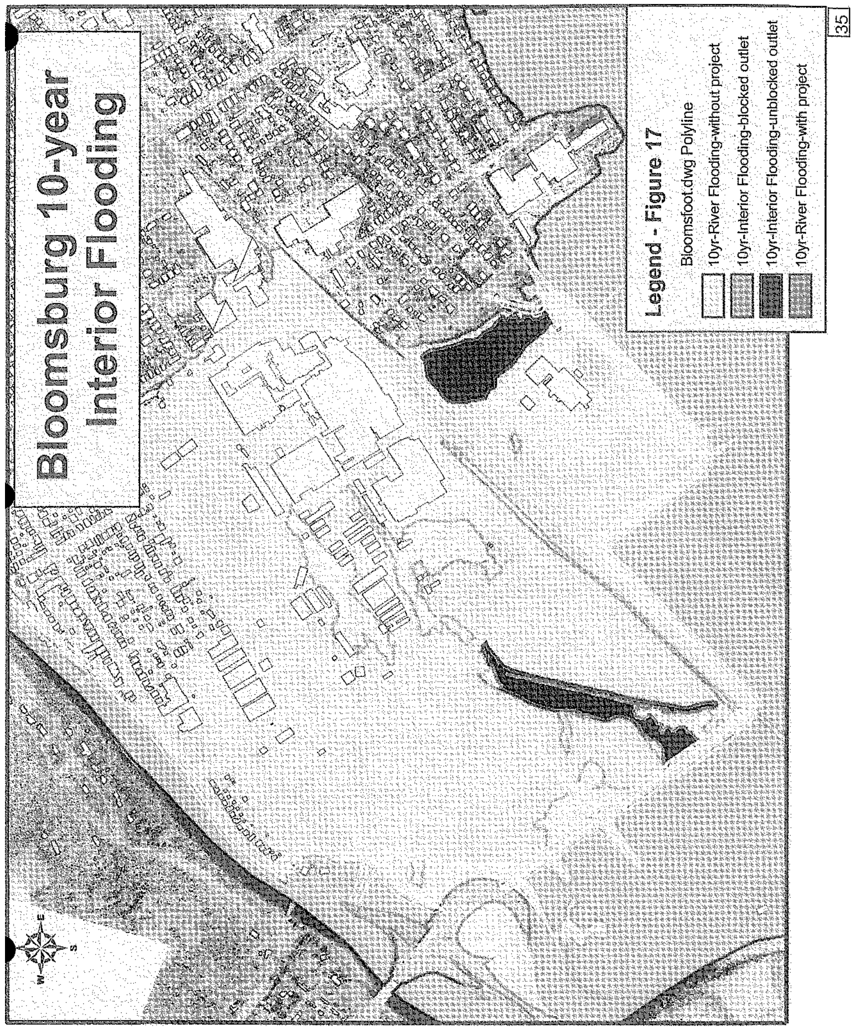
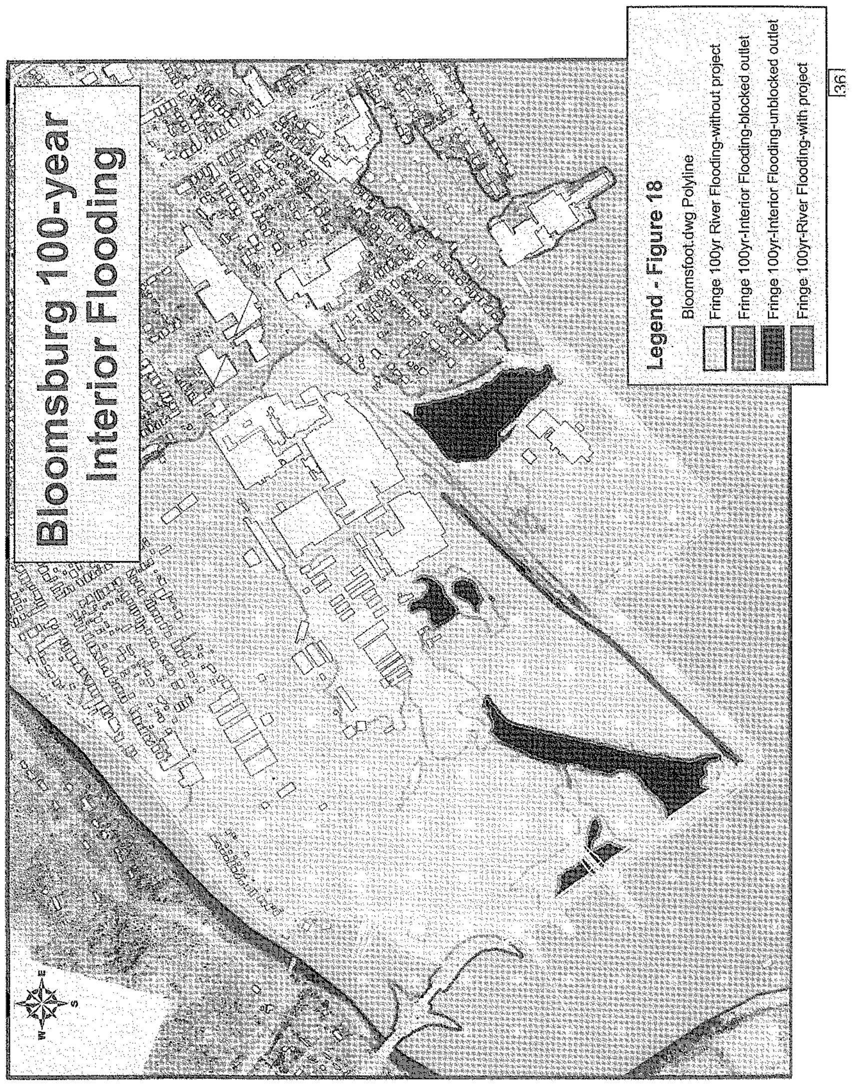

Bloomsburg 10-year
Interior Flooding
Legend - Figure 17
Bloomsfoot.dwg Polyline
10yr-River Flooding-without project
10yr-Interior Flooding-blocked outlet
10yr-Interior Flooding-unblocked outlet
10yr-River Flooding-with project
35


Bloomsburg 100-year
Interior Flooding
Legend - Figure 18
Bloomsfoot.dwg Polyline
Fringe 100yr River Flooding-without project
Fringe 100yr-Interior Flooding-blocked outlet
Fringe 100yr-Interior Flooding-unblocked outlet
Fringe 100yr-River Flooding-with project
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THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment B – Civil Engineering

May 2004

Bloomsburg Local Flood Protection Project
Bloomsburg, PA
Feasibility Level Design
Attachment B
Civil Engineering Appendix

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Bloomsburg Local Flood Protection Project
Bloomsburg, PA
Civil Engineering Appendix

1. Executive Summary: The project area is located in the Town of Bloomsburg in Columbia County, Pennsylvania, on the Susquehanna River and Fishing Creek, but will include structural flood mitigation measures on the right bank of Fishing Creek across from Bloomsburg in the Village of Fernville, and real estate acquisition as a mitigtaion measure in downstream portions of and Hemlock and Montour Townships.

The recommended project will consist of a system of earthen levees, mechanically stabilized earth (MSE) floodwalls, concrete floodwalls, railroad and road closure structures, and roadway relocations and/or ramping over the line of protection. Earthen levees are proposed for the majority of the flood protection in Bloomsburg and Fernville. MSE Walls will be required in Bloomsburg and Fernville. A concrete floodwall (H-Pile Wall) will be required Bloomsburg. Limited riprap will be utilized to protect the steep banks of Fishing Creek from bank crest to below the stream invert, along the lower project reaches along Fishing Creek.

2. Surveys: Topographic - In accordance with the Federal Cost Share Agreement (FCSA), the Town of Bloomsburg (Town) as non-Federal sponsor agreed to provide all mapping and survey resources as specified in the Project Study Plan (PSP). The project delivery team later determined that the scope, coverage and content of the Town's mapping was less than desired. As a means of reducing study costs, the Town's original aerial photogrammetry and ground control were used obtain the necessary detailed 1"=50' (50 scale), 2' contour interval topographical mapping within the limits of the Town of Bloomsburg. However, due to limited flight coverage and inadequate ground control, the Town's the existing data was not suitable for detailed mapping in the potential mitigation areas of Fernville, Hemlock and Rupert. (The original intent for the Town's mapping was GIS coverage for planning purposes within the Town limits only.)

Based on the best available information at the time, the project delivery team decided that the Wyoming Valley Mitigation Mapping would be of sufficient detail and coverage to be utilized during the Feasibility Study for any mapping needs within the potential mitigation areas. As a result, the Mitigation Mapping does not cover the upper most portion of Fernville, resulting in limited mapping data available for a significant portion of the upstream Fernville segment. Upon the start of the Preconstruction Engineering and Design (PED) phase of this project, detailed 50-scale topographical mapping will need to be obtained for the north bank of Fishing Creek (Montour and Hemlock Townships).

The detailed 50-scale topographical mapping used in the feasibility phase investigation for the project area was provided by ADR Inc. (now BAE Systems ADR) under contract with the Pennsylvania Department of the Environmental Protection (PA-DEP), with contract administration by the Town. Datums are Pennsylvania State Grid North NAD 83/NAVD 88.

Hydrology and Hydraulics- Field run surveyed cross sections for HEC-RAS modeling were completed. Nine river cross sections were field surveyed on the Susquehanna River starting just downstream of the Rt. 42 bridge and continuing 24,000 linear feet downstream. In addition, two (2) bridges crossing the Susquehanna River required separate structural profiles for modeling efforts. A total of 31 river cross sections were surveyed on Fishing Creek starting at the confluence with the Susquehanna and continuing upstream approximately 16,000 linear feet. Cross sections were taken at approximately 500' intervals. In addition six (6) separate structural profiles of bridges crossing Fishing Creek as well as two (2) profiles for bridge remnants and one (1) low head dam profile were completed for the Fishing Creek modeling effort. The field run cross sections were field surveyed by Hunt Engineering Company from the winter/spring of 2000 until the spring of 2001. Hunt Engineering Co. was under contract with PA-DEP. Datums are Pennsylvania State Grid North NAD 83/NAVD 88.

3. **Bloomsburg Layout**: The Bloomsburg portion of the project can be divided into three generalized segments: A. Fishing Creek (Stations 1+33 to 52+00±), B. Bloomsburg Fairgrounds (Stations 60+00 to 81+00±), and C. Susquehanna River (Stations 81+00 to Tie-out (126+00±).

A. The Fishing Creek Segment: 100 year flood level of protection. Begins immediately to the East of Railroad St. where the earthen levee ties into high ground at Sta. 1+33 - Elev. 493.3 top of protection. The line of protection proceeds westward across Railroad St. (Elev. 490.0 +/-) where the Elev. 493.3 is accomplished by a 3.3' high sandbag closure across Railroad Street. On the West side of Railroad St. at Sta. 1+95± the line of protection is accomplished by an earthen levee with land side toe drain. The earthen levee proceeds Westward adjacent to and parallel with Fishing Creek from Sta. 2+95 to Sta. 20+00. The top of protection elevation descends from Elev. 493.3 at the high ground tie-out down to Elev. 490.94 at Sta. 20+00. Along this reach a thirteen foot deep seepage cutoff slurry wall is provided from Sta. 1+33+/- to Sta. 10+00. Through this reach the levee crest is 10' wide with a land side slope of 2.5 Horizontal to 1 Vertical (2.5H:1V) and a riverside side slope of 2H:1V. This reach of the LFP is through a residential area and the river side toe will be maintained a minimum of twenty feet from the bank crest of Fishing Creek. The riverside levee slope will be protected by 18" riprap, and the south bank of Fishing Creek will remain undisturbed.

Starting at Sta. 20+00 - Elev. 491.0±, the line of protection will be accomplished by a 14' high Mechanically Stabilized Earth (MSE) Wall. The MSE wall proceeds westward adjacent to and parallel with Fishing Creek to Sta. 27+60 - Elev. 490.5±. This MSE wall will have a 14' wide crest with vertical wall faces, fall protection railings and a landside toe drain. This reach of the line of protection is through a residential area. The river side toe of the MSE wall will be maintained twenty feet from the bank crest of Fishing Creek from Sta. 20+00 to Sta. 23+50 with 24" riprap at the top of bank only. From Sta. 23+50 to 27+60 the MSE wall will be maintained ten feet from the bank crest and 24" riprap will be placed on the banks of Fishing Creek from the toe of the MSE wall to below the Creek invert.

Beginning at Sta. 27+60 - Elev. 490.5± start Concrete Flood (H-Pile) Wall proceeding westward directly adjacent to and parallel to Fishing Creek to Sta. 39+00± - Elev. 489.6±, where the wall turns southward away from Fishing Creek. The H-pile wall will be approximately 12' to 12.5' high and will consist of concrete panels on steel H-piles on 6' centers. This reach of the line of protection is in a narrow open strip of land between West 2nd St. / US Route 11 and Fishing Creek. The banks of Fishing Creek through this reach require 24" Riprap to stabilize the banks and protect the H-pile wall. At station 39+39 the line of protection crosses West 2nd St. / US Route 11 as it enters Bloomsburg just East of the old Rt. 42 "double track bridge." The line of protection is accomplished by a 52' wide and 12' high stop log closure maintaining the top of protection of 489.6.

At Sta. 39+65 – Elev. 489.6 begin earthen levee and continue to Sta. 45+52± – Elev. 489.3 where the line of protection meets the combined relocated roadways of the Fairgrounds Access and Fairground Entry/River Road (ramp). The top of protection is maintained across the ramp by a 3' high sandbag closure. From Sta. 46+62± continue earthen levee to tieout at the Rt. 42 / Rt. 11 access ramp embankment Sta. 52+00 – Elev. 488.7±. Through this reach the levee crest is 10' wide with a riverside side slope of 2H:1V and a land side slope of 2.5H:1V. The riverside side slope is protected by 18' riprap.

The Fairgrounds Access and Fairgrounds Entry /River Road Access ramp is in a Y shape with the one leg accessing Rt. 11 and the two arms being the Fairgrounds access road and the River Road relocation. The combined roads accessing Rt. 11 will have a paved width of 62' and provide adequate sight distance and turning radii onto Rt. 11. Both the Fairgrounds access and River Road ramps will have 24' wide paving and will be designed for 25 MPH and 35 MPH speeds respectively. These ramps may undergo significant revisions based on user input and local guidance during the next design phase.

<u>B. The Bloomsburg Fairgrounds Segment:</u> 100 year flood level of protection. Begins at Sta. 60+00 - Elev. 486.40 where the line of protection starts at and ties into the Rt. 11 / Rt. 42 interchange embankment and extends to Sta. 81+00 at the Rail Road Gate Closure. This reach of the LFP is an earthen levee with a 10' crest and side slopes of 2.5H:1V and a land side toe drain. At Sta. 61+07 River Road is to be relocated by ramping the roadway up and over the line of protection. A two foot high sandbag closure will be required to maintain the line of protection at the River Road ramp. At Sta. 68+17 the Fair Ground Ramp will provide for vehicular traffic over the line of protection on a limited basis, with a design speed of 25 MPH. A three foot high removable barrier will maintain the level of protection across the ramp. This barrier will be removed only as required for limited periods due to required vehicular traffic. The typical earthen levee continues to Sta. 74+00 – Elev. 486.27 where six foot deep over excavation begins within the levee foot print. From Sta. 74+00 to Sta. 80+00 the line of protection is in close proximity and/or over anticipated abandoned land fill. This over excavation is required to insure the integrity of the foundation for the levee. At Sta. 80+80 there is a 24' wide gate closure

over the existing single line SEDA-COG railroad. The line of protection is accomplished by a 24' wide and 11.25' high gated closure maintaining the top of protection of 486.20.

C. Susquehanna River Segment: Agnes level flood protection (440-year flood). Begins after the line of protections crosses the railroad and turns East and follows the railroad embankment, Sta. 81+00 to Sta. 96+00. Along this reach, the line of protection is maintained as close as possible to the R.R. to minimize the impact to the adjacent agricultural lands. This reach of the LFP is an earthen levee with a 10' crest and side slopes of 2.5H:1V. At Sta. 96+00 – Elev. 486.20 the LFP turns South and runs adjacent to and outside of the closed Town landfill. At Sta. 106+00 – Elev. 486.2 the LFP crosses and closes Sands St., where it turns from North/South to East/West and crosses West 11th St. adjacent to the closed Town landfill. Sands St. will be barricaded at this location. From Sta. 106+00 to 121+00 the LFP parallels W. 11th St. on the South side. West 11th. St. will be open along this reach providing access to the closed landfill and Bernoulli Foods Corp. The LFP turns north just prior to the Bloomsburg Elementary/ Middle School and crosses West 11th St. at Sta. 121+50. West 11th is to be relocated up and over the line of protection by utilizing an earthen ramp and the level of protection is to be maintained by a 3' high sandbag closure. The ramp is to be paved and has a design speed of 25 MPH . From Sta. 122+00 to 126+35 the LFP remains an earthen levee with a 10' crest and side slopes of 2.5H:1V to the tie out at high ground at Sta. 126+35 - Elev. 486.20 near Barton St.

4. **Fernville Layout**: 100 year flood level of protection. The Fernville portion of the project can be divided into two generalized segments: A. Upstream Fernville (Stations 10+00 to 28+00±) above the Blooms St. bridge, and B. Downstream Fernville (Stations 28+00 to 60+85±) across from Bloomsburg downstream from the Blooms St. bridge to the tie-out just North of Hemlock St. at high ground (Sta. 60+85.5). The Downstream Fernville segment maintains a level of protection and elevation corresponding with the adjacent Bloomsburg segment directly across Fishing Creek.

A. Upstream Fernville Segment: Detailed topography for this reach will be the first priority during the next phase of design. The segment consists of an earthen levee with 10' wide crest and 2.5H:1V land side slope and 2H:1V river side slope with 18" riprap on the levee slope for protection. Field investigations indicate that sufficient space is available for an earthen levee with minimal impact to existing residential structures. The upstream tie-out to high ground Sta. 10+00 – Elev. 496.0 will be near Blooms St. as it heads north along Fishing Creek across from and upstream of the Bloomsburg water treatment plant. The segment follows Fishing Creek to the Blooms St. bridge and is to be maintained a minimum of 15' from the top of bank along Fishing Creek to minimize impacting Fishing Creek. The segment ties into the north approach ramp to the Blooms St. Bridge at Sta. 28+00+/- - Elev. 493.30.

B. Downstream Fernville Segment: The north approach to the Blooms St. Bridge in Fernville is to be realigned and ramped up above the elevation of the existing bridge deck, and the full level of protection at the bridge will be provided by a 4.8' high stoplog closure. From Sta. 28+50 to Sta. 34+25 the segment is an earthen levee with 10' wide crest a land side slope of 2.5H:1V and a river side slope of 2H:1V with 18" riprap as protection on the levee slope. The levee toe is maintained a minimum of 15' from the crest of the Creek bank to minimize disturbance to Fishing Creek. Beginning at Sta. 34+25 – Elev. 494.8 the line of protection is a 17' to 19' high MSE wall that is 14' to 16' wide and will have fall protection railings. MSE wall is utilized in this reach to provide protection for and minimize impacts to approximately 12 residential structures. This reach of MSE wall requires 24" riprap at the toe of the wall and extends a minimum of 15' to the crest of the creek bank to provide protection to the wall. The MSE wall terminates at Sta. 41+40 – Elev. 491.2 and the earthen levee resumes. The remainder of the Fernville segment is an earthen levee with a 10' wide crest, river side slope of 2H:1V and land side slope of 2.5H:1V. The river side levee slope is to be protected with 18" riprap along this entire reach and project tie-out at Sta. 60+85 – Elev. 490.2. At approximately Sta. 50+00 - Elev. 490.7 the instability of the Fishing Creek banks and the close proximity of the levee to the bank crest necessitates the use of 24" riprap on the creek banks to provided stability and erosion protection to the levee. This riprap is in addition to the 18' riprap on the river side levee side slope. At Sta. 59+65 Hemlock St. is to be relocated up and over the line of protection by an earthen ramp. This ramp will be at the full height of protection (Elev. 490.4) thus avoiding the need for a sand bag closure structure. The existing intersection of Hemlock and Drinker Streets will be maintained by ramping up Drinker St. to meet Hemlock within the line of protection. The levee ties into high ground just North of Hemlock St. at Sta. 60+85.5.

5. Future Investigations. During preconstruction engineering and design, additional subsurface investigations will be undertaken to refine the design features and to identify the currently unknown foundation conditions in Fernville and portions of Bloomsburg. The future investigations will consist of additional soil borings, rock coring, test pits, and permeability tests. Samples recovered will be tested as required. Additional topographical mapping resources will be required as identified. Design of the recommended plan will be refined during the next phase of study (design), based the additional information investigations and data that will be recovered or developed at that time.

6. Next Phase of Design. The next phase of design will be the preconstruction engineering and design (PED) phase. Final design for the levee, MSE walls, floodwall, closure structures, roadway relocations (ramps) and drainage control structures will be performed based on the additional new data and the information collected to date. Plans and specifications will be prepared based upon the Feasibility Design.

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment C – Geotechnical Engineering

May 2004

Bloomsburg Local Flood Protection Project
Bloomsburg, PA
Feasibility Level Design
Attachment C
Geotechnical Engineering

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LIST OF SUB-ATTACHMENTS*

*Due to volume of these items, they are been reserved at the District and are available on request.

Bloomsburg Local Flood Protection Project
Bloomsburg, PA
Geotechnical Engineering

1. **Executive Summary.** The project site is located on the Susquehanna River in the Town of Bloomsburg in Central Pennsylvania. The project consists of a system of Earthen Levees, Mechanically Stabilized Earth (MSE) Floodwalls, Concrete Floodwalls, and both Railroad and Road Closure Structures. Additional flood protection is being provided in the community of Fernville, located directly across Fishing Creek from the Town of Bloomsburg.

For geotechnical purposes, the project can be divided into four segments: Fishing Creek (Stations 1+00 to 52+00), Bloomsburg Fairgrounds (Stations 61+00 to 81+00), Susquehanna (Stations 81+00 to Tie-out (126+00)), and Fernville. No explorations were performed in Fernville, thus foundation conditions in Fernville were assumed to be similar to the conditions found in Bloomsburg between Stations 1+00 and 39+50 (directly across Fishing Creek).

An earthen levee is proposed for the majority of the flood protection. MSE Walls will be required in Fernville from Station 34+25 to 41+35, and in Bloomsburg from Station 20+00 to Station 27+60. A concrete floodwall (H-Pile Wall) will be required from Station 27+60 to 39+13 in Bloomsburg.

The levee section in the Fishing Creek segment will consist of riprap on a bedding layer on the riverside slope, a random material zone on the riverside 1/3 of the levee (underneath the riprap), with the rest of the trapezoidal cross-section requiring select impervious material. The crest of the levee will be 10-feet wide, with 2.5H:1V slopes for maintenance purposes. 2.5H:1V is the steepest slope that mowing equipment can practically work. Where riprap is used, the slopes can be steepened to 2H:1V due to the fact that mowing will not be required for sections with riprap. A 6-ft wide, 5-ft deep inspection trench will be required for the entire levee section. A toe drain will be required for this segment at the landside toe of the levee. The toe drain will collect and safely discharge underseepage during high water events. Due to the very permeable soils in the upstream portion of this segment (Station 1+33 to 10+00), a slurry trench cutoff will be extended 13 feet below existing grade. This will help to reduce some of the underseepage quantities during high water events. It will be a partial cutoff, cutting off an upper pervious zone, which will not interfere with normal groundwater flow. The levee will transition into a MSE wall at Station 20+00.

The MSE wall in this segment will be 14 feet high above final grade and 14 feet wide. It will be embedded 2 feet into existing ground. The wall will be double-sided, having concrete modular block facing on each side of the wall. Railing will be required atop the wall and a toe drain will be required at the landside toe of the wall. The double-sided MSE wall design will be re-assessed during the next design phase. While designed well within applicable standards and industry experience, the wall heights proposed for this project are above what have been used on other Baltimore District projects using double-sided MSE walls. Additional performance monitoring of existing double-sided MSE floodwalls will be conducted. Changes in geogrid spacing and/or wall embedment may be considered in the next design phase. The MSE wall will transition into a concrete floodwall at station 27+60. The concrete floodwall will consist of drilled H-piles spaced at 6 feet on center, with precast concrete panels placed between the piles. The wall height will be approximately 12-12.5 feet for most of the reach from Station 27+60 to 39+13. At Station 39+13, a 12-ft high, 52-ft wide, stoplog closure structure will be required. This closure will span across US Route 11 as it enters Bloomsburg. The closure will transition into a levee section at Station 39+65. This levee section will consist of riprap on the riverside, a random material zone, a select impervious material zone, a 5-ft deep inspection trench, and a toe drain. The levee section terminates at the Rt. 42 interchange embankment at approximately Station 52+00.

The Bloomsburg Fairgrounds segment begins at approximately Station 60+00. This segment consists of a levee section without riprap. The levee section consists of a random material zone on the riverside 1/3, with a select impervious material zone comprising the rest of the levee trapezoid. This portion of levee will also have a 5-ft deep, 6-ft wide inspection trench, in addition to a landside toe drain. Several access ramps will cross over the levee in this segment. The ramps will most likely consist of random material with a gravel surface for vehicle use. In the section from Station 74+00 to Station 80+00, overexcavation will be required to account for waste material from carpet debris disposal operations. Test pits in this area encountered carpet fragments, coal ash, and other debris to a depth of approximately 4 feet. In this section, the overexcavation will extend to the full depth of fill (estimated at 6 feet) and will span the entire footprint of the levee. At this time, it is proposed that the overexcavated portion be backfilled with select impervious material. Further consideration will be given to using random material for backfill in the next design phase. At Station 80+80 a 24-ft wide, 11.25-ft high swing gate closure is proposed across the railroad track.

The Susquehanna segment begins at approximately Station 81+00. This entire section consists of levee. The foundation conditions in this segment consist of impervious soils (clays and silts) to bedrock. This segment is also located far from the Susquehanna River. Thus, underseepage is not expected to be much of an issue in this segment. The levee section consists of a random material zone on the riverside 1/3, with a select impervious material zone comprising the rest of the levee trapezoid. A 2-ft thick sand blanket drain will be required on the landside of the levee. There will be a 5-ft deep, 6-ft wide inspection trench under the center of the levee. However, due to the lack of underseepage expected, no toe drain is proposed in this segment. This will be further analyzed in the next design phase with additional subsurface investigations. One vehicle access ramps will be located in this segment, eliminating the need for a closure structure on Eleventh Street and Sands Street.

The Fernville segment is located across Fishing Creek from Bloomsburg and consists of approximately 4350 lf of levee, 710 lf of MSE wall, and a stoplog closure structure. No subsurface investigations were performed in Fernville due to the late addition of protection to this area. Reviews of soil surveys show that soils similar to those in the Fishing Creek segment should be found in Fernville. This is the assumption that has been made for this portion of work. The levee section consists of riprap on the riverside slope, with a random material zone located beneath the riprap on the riverside 1/3 of the levee. The remainder of the trapezoidal cross-section will consist of select impervious material. A 5-ft deep, 6-ft wide inspection trench will be located beneath the levee, with a landside toe drain provided for underseepage pressure relief. In addition, as in the Fishing Creek segment, a section of slurry trench cutoff wall has been estimated as being necessary in Fernville.

The MSE wall section will consist of 150 lf of 17-ft high, 16-ft wide, double-sided wall, and 560 lf of 14-ft high, 14-ft wide double-sided wall. Railing will be required atop the wall on each side, and a landside toe drain has been incorporated. The stoplog closure structure at Railroad Street is estimated to be 5-ft high and 24-ft wide. The roadway will be ramped approaching the closure structure, resulting in a lower closure structure height. The foundation conditions for the entire Fernville segment will need to be explored in detail during the next design phase to verify assumptions used in this report.

2. **Subsurface Conditions.**

a. **Regional Geology.** The study area is in the Appalachian Mountain Section of the Ridge and Valley physiographic province. The long, parallel ridges and valleys in this physiographic region were produced by differential erosion of folded strata. Bloomsburg is located beyond the southern terminus of the late Wisconsinan glacier. That glacial episode produced most of the prominent glacial landforms found in northeast Pennsylvania. Meltwater from the Wisconsinan glacier carried significant quantities of materials through the Fishing Creek and Susquehanna River valleys.

Much of Bloomsburg consists of a low terrace, where glacial meltwaters and more recent floodwaters deposited material up to boulder-size. Published geologic reports indicate that this material is stratified and moderately to poorly graded. The thickness of these deposits is 3 to 50 feet near Bloomsburg.

The soil unit mapped by the U.S. Department of Agriculture in the study area is the Chenango silt loam. It formed in sand & gravel outwash and is well-drained. The surface layer of this soil consists of silt loam and gravelly sand loam. Below that is gravelly sandy loam to a depth of 20 to 50 inches, followed by stratified gravel and sand. Bedrock is reportedly at a depth greater than 30 feet; however, borings drilled for this project encountered bedrock at shallower depths.

Bedrock underlying most of the study area is part of the Wills Creek Formation. Part of the study area, near the northeast end, is underlain by Bloomsburg Formation rocks. The strike of bedrock bedding at the Railroad Street Bridge is north 65° east; dip is 28° to the south. That bedding dip is within the range measured in test boring

cores. Bedrock strike at the test boring locations should be similar to that measured at the outcrop. A bedrock geologic map of the area is included as Figure 1.
The Wills Creek Formation is mostly calcareous claystone or shale, but also consists of calcareous limestone and dolostone. Laminated to thin bedding predominates in Wills Creek rocks. Wills Creek rocks are usually highly weathered to a moderate depth, due to lithology, bedding characteristics, joints, and calcareous content.

The Bloomsburg Formation is mostly claystone and shale, with abundant siltstone and sandstone interbeds. The claystones and shales are medium to thick-bedded. Sandstones and siltstones are thin to medium-bedded. Bloomsburg Formation rocks are also highly susceptible to weathering, but not to the extent that Wills Creek rocks are.

b. **Exploration Program.** The subsurface conditions were investigated in two phases, Phase One in November 2000 along Fishing Creek, and Phase Two in April-July 2002 along the southern and eastern parts of the alignment. Drilling was performed by contractors to Pennsylvania Department of Environmental Protection (DEP). DEP provided the drilling services as in-kind services to this project. Multiple borings along the proposed alignment were unable to be drilled due to inability to obtain rights-of-entry. Also, no investigations were performed in Fernville for this project phase. A total of 31 borings (9-Phase One, 22-Phase Two) were performed to investigate the foundation conditions in the area of the flood protection alignment in Bloomsburg. An overall boring location plan is attached as Figure 2. See the study drawings for more detailed boring location information. Field boring logs are included as Attachment 1 to this Appendix. Final boring logs will be prepared in the next design phase, which will include additional drilling and testing.

The borings in Phase One were advanced by means of the Standard Penetration Test (SPT) method with continuous sampling. The borings in Phase Two were advanced by means of the SPT method with continuous sampling in the upper 10.5 feet and sampling at 2.5-ft intervals below a depth of 10.5 feet, with augering between samples. The SPT consists of driving a 1 3/8-inch ID by 2-ft 8-inch long split spoon sampler a total of 18 inches with a 140-pound hammer falling 30 inches. The SPT provides a disturbed sample for defining soil consistency and relative density. Rock coring was performed with NWD4 (2 1/8 inch diameter) bit and double tube barrel.

c. **Laboratory Testing.** All jar samples were visually inspected and assigned a Unified Soil Classification System (USCS) classification by an experienced laboratory technician. Additionally, grain size distributions and Atterberg Limits tests were performed on selected samples. Results of all laboratory tests are included as Attachment 2 to this Appendix.

d. **Description of Subsurface Conditions.** The average soil thickness for the area is approximately 20 feet. Bedrock depths are highly variable over the entire project area. Bedrock was encountered as shallow as 8 feet in DH-124 and between 12-16

feet in several other borings, while it was not encountered at depths greater than 30 feet in several borings.
Along Fishing Creek from approximately Station 1+00 to 39+50, foundation soils are moderately pervious to very pervious with little to no impervious blanket above. A layer of dense gravel was encountered in most borings at a depth of approximately 10 feet. The soils had varying amounts of fines (material passing No. 200 sieve), but most of the soils were classified as sands and gravels. Also along Fishing Creek, Bedrock was encountered between depths of 16 feet to 32 feet along the project alignment.

Borings along the Bloomsburg Fairgrounds portion of the alignment (approximately Station 62+00 to Station 80+00) show a silt/clay blanket (average thickness of 4 feet) overlying a sand/gravel layer. Beneath this sand/gravel layer, highly weathered bedrock was encountered at depths of 10 feet to 20 feet.

Borings near the Susquehanna-side tie-out (approximately Station 106+00 to Station 126+00) show a 10-ft thick silt/clay blanket overlying sands and gravels. Bedrock was encountered beneath the sands and gravels at depths between 15 feet and 25 feet in three of the tie-out borings. One boring did not encounter bedrock at a depth of 30 feet.

Borings were also performed for a second potential alignment for the flood protection structure. This alignment was subsequently removed from consideration. The field logs for these borings (DH-102 to DH-108) are included, however no subsurface characterization or design analysis was performed using this information.

3. **Seepage and Slope Stability Analysis.** Seepage and slope stability analyses were performed for the study. This consisted of analyzing levee, MSE wall, and floodwall sections of varying heights with varying foundation conditions. The foundation conditions were based upon the foundation drilling described earlier. The seepage and stability calculations are presented at the end of this appendix.

With the pervious soils located in the foundation for the levee, it was necessary to perform an underseepage analysis to estimate seepage quantities and the effect on the stability of the levee and MSE wall sections. Due to the proximity of the levee to the bank of Fishing Creek, it was assumed that the foundation zones are directly connected hydraulically to the Creek in the seepage analysis. In the other project reaches, the levee is located much farther from the Creek and the Susquehanna River. In that case, the conservative assumption of direct hydraulic connection was also made; however, additional investigations in the next project phase will be required to confirm this assumption.

Underseepage raises pore pressures in the blanket material, decreases the effective weight of the material, decreases effective stress, and reduces stability on the landside portion of the levee. The increased pore pressures can also lead to piping of the foundation material and undermining of the levee foundation. Many of the foundation soils are silty sands and silty gravels which could be susceptible to piping. Appropriate underseepage control measures will be implemented if the stability of the levee or foundation material is not adequate during high water events. Typical underseepage control measures are seepage cutoffs (slurry trenches, sheetpile, overexcavation and replacement with impervious material), seepage collection measures (toe drains, relief wells) or weighted landside filters (seepage blankets).

The seepage analysis was performed using the finite element program *SEEP2D*, along with the pre- and post-processor *GMS 4.0*. *SEEP2D* was developed by the United States Army Engineer Waterways Experiment Station to model a variety of problems involving seepage. *GMS* was developed by the Brigham Young University Environmental Modeling Research Laboratory in cooperation with the Waterways Experiment Station (now Engineering Research and Development Center). The slope stability analysis was performed using the computer program *UTEXAS4*, which was developed for the US Army Corps of Engineers by Dr. Stephen Wright. Pore pressures computed in the seepage analysis were used in the slope stability analysis.

Permeabilities were estimated based on the Unified Classification System for soils (Powers, 1981, pg 45), pump test results, and material gradations. The following table contains the various soil types encountered and the respective horizontal permeabilities used in the analysis. Vertical permeabilities were assumed to be 1/10 of the horizontal permeabilities, due to the layering effect in alluvial soil deposits.

Horizontal Permeability (ft/min)									
Levee (CL)	**CL**	**CL-ML**	**ML**	**MSE Fill**	**SC**	**SM**	**SC-SM**	**SP**	**GP-GM**
2.0×10^{-6}	2.0×10^{-6}	2.0×10^{-5}	2.0×10^{-5}	5.0×10^{-5}	2.0×10^{-4}	2.0×10^{-3}	2.0×10^{-3}	1.0×10^{-2}	1.0×10^{-1}
		GP	**GP-GC**	**GW-GM**	**GC-GM**	**Toe Drain**	**Sand Drain**		
		2.0×10^{-3}	5.0×10^{-2}	2.0×10^{-2}	4.0×10^{-3}	1.0×10^{-1}	5.0×10^{-2}		

Shear strengths used in the stability analysis were determined by using correlations for the Standard Penetration Test, based on soil type. The chart found in NAVFAC Manual 7.1, page 149, was used to determine the effective shear strength parameters. Since pore pressures were included in the stability analysis, effective shear strength parameters were the only parameters necessary for use.

A seepage analysis for the case with water to the top of the levee/MSE wall/floodwall was performed. Stability analyses were performed using the information from the seepage analysis. In some reaches, the factor of safety for global stability for the MSE wall was below 1.4 for water to the top of the wall. In these reaches, the design water elevation with steady seepage developed through the MSE wall and foundation was analyzed additionally. These analyses are considered somewhat conservative, since the water should not be at a flood height for a period long enough to create steady seepage conditions through a levee section. However, the foundation may quickly experience saturation and seepage due to the higher permeabilities. Thus, a steady seepage condition was analyzed. Sections were analyzed at each boring location from the Phase One drilling and selected borings from the Phase Two drilling, using the foundation profile encountered. The sudden drawdown case was not analyzed. Sudden drawdown analysis is highly dependent upon the material used for the levee section. With a typical 2.5H:1V slope, most levee sections are stable against sudden drawdown. In the next design phase, once a levee material is specified, a sudden drawdown analysis will be performed. From previous experience, the material type most susceptible to sudden drawdown failure is highly plastic clay (CH). Most other material types are typically stable against sudden drawdown when compacted in a controlled manner.

From the analysis for the case with steady seepage conditions developed and water to the top of the levee, underseepage becomes a major concern. With no foundation improvements, the levee section is unstable due to the excess pore water pressures in the landside portion of the foundation. Reasonable variations in permeability and material strength do not affect the factors of safety tremendously. From the seepage and slope stability analyses, in addition to engineering judgment and experience, underseepage must be reduced and/or controlled in order to provide a stable levee section during high water events.

As mentioned previously, typical options for reducing or controlling underseepage are aquifer cutoffs, toe drains, seepage berms, and relief wells. The aquifer cutoffs can consist of slurry trenches backfilled with impervious material, sheetpile, concrete cutoffs, or standard excavate and replace procedures. Cutoffs reduce seepage amounts and seepage pressures, with the magnitude of reduction depending upon the materials used.

Toe drains or relief wells reduce seepage pressures at the landside toe of the levee by providing an efficient outlet for the underseepage water. The toe drains or relief wells are designed to allow water to enter, but to not allow piping of the foundation soils into the drains or wells. Stability and protection against foundation piping is then provided by allowing the pore pressures to dissipate safely and quickly.

The seepage and slope stability analyses modeled cutoffs of the upper aquifer layer, a toe drain, and combinations of the two where appropriate. The normal groundwater level is well below the bottom of the cutoff. Thus, the cutoff should not interfere greatly with groundwater discharge/recharge with Fishing Creek and groundwater should not impact construction of the cutoff. The toe drain sections analyzed all penetrated into a pervious layer, allowing seepage pressures to be relieved safely.

A toe drain is the preferred method of handling the underseepage. This is due to the fact stated above that a cutoff can alter groundwater movement by blocking the groundwater from the river. Therefore, where cutoffs are used, it is considered best not to use long stretches of cutoffs. A toe drain is proposed for the extent of the levee/floodwall alignment along Fishing Creek. However, from approximately Station 1+33 to 10+00, underseepage is estimated to be very high. In this reach, a slurry trench cutoff is proposed. A sheetpile cutoff is not considered feasible, due to the potential problems with driving the sheetpile through the dense sands and gravels that exist. The cutoff will be of a short enough depth to minimize effects to the groundwater-river interaction, while still reducing underseepage quantities adequately. The cutoff will be constructed in addition to the toe drain. The toe drain will allow for any underseepage not cut-off to be safely controlled as well as safely controlling any seepage through the levee.

A toe drain is also proposed for the portion of levee that crosses the Fairgrounds, from approximately Station 62+00 to 80+00. The sand and gravel aquifers in this portion have the potential to destabilize the landside toe of the levee, thus a toe drain will safely relieve the high seepage pressures. In addition, the toe drain will keep underseepage pressures minimized in the portion of levee near the Magee Carpet landfill located adjacent to the Fairgrounds between Station 70+00 and Station 74+00.

The toe drain will most likely consist of open-graded gravel wrapped in a geotextile. The geotextile will prevent the finer foundation materials from moving into and clogging the gravel drain. The geotextile must also be permeable enough to allow water to freely enter the gravel drain without clogging. Additionally, a soil filter will be investigated further in the next design phase. However, a graded soil filter will be more expensive and more difficult to place than the geotextile. Performance of the soil filter would be similar to the geotextile. In addition, the use of seepage relief wells will be considered during the final design phase.

The typical levee section will consist of a random material zone (for drawdown protection) on the riverside 1/3, adjacent to a select fill zone, which will in effect be an impervious material. In sections without toe drains, a landside blanket drain will be used. In areas where riprap is determined to be necessary, a layer of riprap on 6 inches of bedding soil will be provided. Exterior levee slopes will be 2.5H:1V for areas receiving topsoil. Areas requiring riprap can be steepened to 2H:1V.

Overexcavation will most likely be required in the levee section adjacent to the Magee Carpet Landfill. Test pits performed for HTRW purposes exposed carpet remnants and other waste that could compromise the levee stability if left in place. Overexcavation will be required to an approximate depth of 6 feet in a reach estimated from Station 74+00 to 80+00. The overexcavation would extend under the entire levee section.

Further drilling and testing will be required to refine the analyses. No subsurface exploration has been performed in Fernville. A large difference in foundation conditions in Fernville compared to Bloomsburg, will most likely cause changes to be made in the next phase of design.

Included as Sub-Attachments 3 and 4 to this Geotechnical Attachment to the Engineering Appendix are selected seepage and slope stability trials. These are intended to give an illustration of the conditions in the various reaches. Details and typical proposed levee sections are shown in the study drawings.

4. **Settlement Analysis.** No extensive areas of soft, fine-grained materials were encountered in the two phases of drilling. Due to the granular foundation materials encountered in much of the project area, a long-term settlement analysis was not performed. The settlement caused by the levee/floodwall construction will occur during construction, thus an overbuild due to long-term settlement concerns is not deemed necessary at this time. The area of landfilling between Stations 74+00 and 80+00 is an area where settlement and stability could be an issue. Test pits performed in this area found colored carpet fragments, ash, and fill material. The test pits were terminated at a depth of 4 feet, but for estimating purposes, it is assumed that the depth of fill in this area is 6 feet. Due to the potential for settlement and stability issues from the loose fill, this entire reach will be overexcavated, removed, and replaced by compacted fill during construction. The settlement analysis for the entire project will be revisited pending additional drilling and testing in the next phase of design.

5. **MSE Wall Analysis.** MSE walls are planned as part of the project from on both the Bloomsburg (approx. station 20+00 to 27+60) and Fernville (approx. station 34+25 to 41+35) sides of Fishing Creek. The attached calculations in Attachment 5 to this appendix address sliding, overturning, bearing and internal stability aspects of back to back MSE wall systems of varying height. Also, as discussed in paragraph 3, global stability (slope stability) analyses were conducted for several wall sections. Analysis of seismic criteria, and settlement are not included herein but will be addressed during the final project design. Bloomsburg is located in a low seismic acceleration zone, and flood loadings will typically govern in the design of walls in these zones, therefore the seismic design check should not change the wall dimensions greatly, if at all.

General Description: MSE walls consist of three main components: 1) Facing, 2) Reinforcement, and 3) Backfill. The reinforcement for this project, and most projects near water bodies, will be geogrid. Geogrid is a polymeric material generally consisting of polypropylene, polyethylene, or polyester. Metallic reinforcement (the other predominant type of reinforcement for MSE walls) is very prone to deterioration when exposed to water. Since these walls will be used along a river as floodwalls, they will be subjected to water relatively often.

In MSE wall construction, a leveling pad of lean concrete or compacted aggregate is placed along the wall face alignment. The concrete panels or concrete modular blocks are then placed on the leveling pad one row at a time. Once a row of block is placed, soil is placed and compacted in the reinforced soil zone behind the block or panels. Reinforcement is then placed at specified elevations. Additional soil is placed and compacted above the reinforcement layer. By placing the tensile reinforcements in the soil, the strength of the soil is improved significantly. With the geogrid (or metallic) reinforcement, the reinforced soil mass is essentially self-supporting.

The facing for the MSE walls is provided mainly to keep the soil from eroding and for aesthetic reasons. The entire wall is built in lifts in this fashion.

Both an internal and external stability analysis are required for MSE wall design. The MSE wall is considered to act as a mass to resist external forces, much like a concrete gravity wall. External design consists of determining what external loads will be acting on the wall, and what size of wall is required to resist those forces. Internally, the reinforcing must be designed to have the required length and strength to hold the reinforced soil together. Vertical spacing of geogrid is generally kept at a maximum of 2 feet. At spacings larger than 2.5-3 feet, the reinforced soil begins not to act as a reinforced mass.

The MSE walls proposed for this project are currently designed as double-sided walls. This means that the wall has facing on both the riverside and landside of the wall. Most MSE walls are built with one face, retaining soil behind the reinforced soil zone. However, due to narrow site constraints, double-sided walls have been proposed in order to minimize the footprint in the project areas. While the design is well within industry standards and experience, the Baltimore District has not built double-sided MSE walls of this height previously. Therefore, close monitoring of existing Baltimore District double-sided MSE floodwalls will be conducted and this design will be revisited in the next project phase. If required, changes to the geogrid spacing or wall embedment may be made in the next design phase.

Subsurface Information: Soil parameters used in the analysis are based on those observed in DH-3 through DH-7 of the November 2000 exploration. The limited exploration performed to date will be supplemented with a more detailed exploration prior to the final design. The analyses included herein are therefore preliminary and must be re-visited after completion of this full subsurface investigation program. Additionally, as no borings were performed on the Fernville side of the river, the current design assumes that conditions on both sides of the river will be similar.

It should be noted that DH-101 performed in April 2002 also falls within the general area of the planned wall and was reviewed as part of the design. The conditions observed in DH-101 were significantly less dense (i.e. lower SPT blow counts) than those observed in the other nearby borings and are not represented in the assumed design parameters. It is currently assumed that the conditions observed in DH-101 are considered to be isolated and possibly associated with previous fills in the area (indications of previous filling activities also seen in other borings). The extent of such "soft" soil areas will be further investigated during the future exploration. Specific wall heights, etc in those areas can then be more closely reviewed and the design adjusted as necessary. The final design may determine that specific "foundation improvement" measures are required in such areas in order to meet the design assumptions or the wall design may require revision. Refer to the "Insitu Soil Parameters for MSE Wall" paragraph included with the design for further discussion.

Wall Heights Analyzed and Resulting Required Widths:

(Required width measured from wall face to wall face of back to back wall system)

Analyzed Wall Height (ft) (includes 2' embedment)	Wall Height above final grade (ft)	Width of wall (ft) (from wall face to wall face)
15'	13'	13'
16'	14'	14'
17'	15'	14' (see note)
19'	17'	16' (see note)

Note: Analyzing bearing capacity for the 17' and 19' walls with the widths shown resulted in factors of safety slightly below those required by typical criteria (1.93 and 1.96 respectively versus the typically required value of 2). As these values are just slightly below the required, and given the extreme condition analyzed, they will be considered acceptable at this point in the design. They will be re-visited during the final design after the more detailed exploration program and after the project specifics have been further defined (such as distance from wall to slope, etc which affect the calculated factors of safety).

It should be noted that the current design requires the ground surface at the base of the MSE wall to extend a minimum distance of 10' from the wall before sloping downwards. It also requires that any slopes beyond this minimum distance be no steeper than 2H:1V. This will be further investigated in the next design phase for reaches requiring 1.5H:1V riprapped slopes.

Insitu Soil Parameters for MSE Wall Design:

Insitu soils are primarily silty sands and silty gravels. Standard Penetration Test blow counts in the upper 10 feet of soils at the site are generally in the range of N=7 to 20 and govern the design. Typical SPT blows in the dense sands and gravels below this depth are N>50. When corrected for overburden pressure, the lowest N values increase to approximately N = 10.

Based on conservative correlations, a friction angle of $\phi = 30°$ and a unit weight of $\gamma =$ 115 pcf will be used for the insitu soils below the planned MSE wall for the sliding analysis. For the bearing capacity analysis, values of $\phi = 32°$ and a unit weight of $\gamma = 120$ pcf will be used. This is appropriate as the shear failure is affected by soils to a significant depth as compared to the sliding.

6. **Material Source.** No material source investigation was performed in this phase of the project. For cost estimating purposes, borrow material for levee construction was assumed to be available from a commercial source located within ten miles of the project area. Material source investigations will be undertaken in the next phase of design.

7. **Closure Structures.**

a. Route 11 Stop Log Closure. This structure is located at Sta. 39+65 and is connected to the end of the concrete floodwall. The stop log structure will be 52 feet wide, 12 feet high and consist of 4 bays of closure panels. On both ends of the closure, a concrete abutment will be constructed to support the end spans of the stop log panels and to retain the levee embankment. A foundation key parallel to the wall below the foundation will be built to increase the abutment factor of safety against sliding failure.

The subsurface condition at this closure is currently represented by drill hole DH-1. The upper 4 feet of overburden consist of Fill materials. The fill contains silt, sand and gravel materials. The second strata consists mainly of sand (SC, SM, and combinations thereof) with some silty and clayey zones and is 16 feet deep. The last 7 feet of drive is in decomposed shale.

b. Railroad Street Stop Log Closure. This stop log closure is located in Fernville at Railroad Street. The final roadway surface is approximately 5 feet below top of levee. Fill will be placed to raise the elevation of the roadway through the closure to reduce the grade change from the Railroad Street bridge. All new fill material shall be structural fill on which the proposed closure abutments and roadway will be constructed.

No subsurface information is available at this time. A drilling and test program will commence during the PED phase.

c. RR Gate Closure Structure. The closure for the railroad is a steel swing gate, 24 feet wide by approximately 11 feet high. Concrete abutments at each end of the closure will hold the gate in place as well as act as retaining walls for the levee material. Due to the large uplift force on the concrete abutment during a flood event, the net weight of the steel gate and abutment may not be able to resist the sliding force from the flood. Since rock is shallow in the vicinity of the gate closure (see DH-125), piles are not an option to resist sliding. Therefore, the overburden shall be removed down to competent rock, approximately a depth of 12.5 feet, and a massive concrete foundation be placed in rock. A shoring system will be required to perform the mass excavation.

d. Geotechnical Design Parameters. The following geotechnical design parameters were provided to the Structural Engineer to analyze the closure structures for stability (i.e. determine forces, moments, and FS against sliding and overturning).

Angle of Internal Friction = 30°
Moist Unit Weight of Soil = 125 pounds/ft^3
Active Lateral Earth Pressure Coefficient = Ka = .33
Passive Lateral Earth Pressure Coefficient = Kp = 3.0

8. **H-Pile Supported Concrete Floodwall.** The concrete floodwall begins at the end of the MSE wall, Sta. 27+60, and goes to the Route 11 Stop log Closure, Sta. 39+13. The main reason for using this type of floodwall verses traditional earthen levee, MSE wall, or T-wall is space constraints. The narrowest horizontal distance from the pavement shoulder to the edge of Fishing Creek slope is only about 10 feet. Without impacting real estate and current roadway alignments, an H-pile supported floodwall is the best option. One lane of Route 11 will periodically be out of service during the construction of the wall.

The subsurface conditions along the H-pile wall alignment consist of four strata. The upper 4 to 6 feet of overburden consist of Fill materials, as shown on the field logs. The fill contains silt, sand and gravel materials. The second strata consists mainly of sandy and gravelly materials (SC, SM, GP, GC, GM and combinations thereof) with some silty and clayey zones. This second strata varies in thickness from 6 to 16 feet. The third strata is decomposed shale varying in thickness from 4 to 10 feet. Lastly, bedrock consists of shale. See drilling logs for DH-1, DH-2, DH-3, DH-4 and DH-102.

Geotechnical Design Values. During the Concept Design phase, the average top of competent rock and the lateral subgrade reaction coefficient (n_h) were provided to the Structural Engineer for analyzing the required pile section. The Structural designer used the following geotechnical values to analyze the pile section, spacing and determine the maximum wall deflection under load:

Average Top of Competent Rock = Elevation +453 feet
Lateral Subgrade Reaction Coefficient (n_h) = 8 pci [based on Terzaghi (1955)]

Geotechnical Aspects of the Design. The Structural Engineer's analysis concluded that the piles needed to be embedded 33 feet into the ground. Based on the estimated top of rock elevation, it can be assumed that the piles are to be placed approximately 10 feet into competent rock. The rock will be pre-drilled prior to placing the pile. A non-shrink grout will be used to fill the void after placing the piles. The diameter to be pre-drilled will be based on the final H-pile section selected. Conceptually, a 24-inch diameter hole will be pre-drilled. All of these proportions are conceptual and are reflected in the cost estimate. The final pile section, length, spacing, and pre-drilling will be designed during the next design phase.

The precast wall panels will be placed into the H-piles. The H-piles are to be placed on 6-feet spacings. The panels will bear a minimum of frost depth below final grade, conservatively 4 feet. Additionally, due to potential underseepage concerns, a toe drain will be placed on the landside of the wall. This will consist of backfilling the landside portion of the excavation with a compacted gravel. This detail will be designed during the next design phase.

9. **Future Investigations.** During the next phase of design, additional subsurface investigations will be undertaken to refine the design features and to identify the currently unknown foundation conditions in Fernville and portions of Bloomsburg. The

future investigations will consist of additional soil borings, rock coring, test pits, and permeability tests. Samples recovered will be tested as required. Changes to this 35% level feasibility design will likely result from the additional information recovered.

10. **Next Phase of Design.** The next phase of design will be the preconstruction engineering and design (PED) phase. Final design for the levee, MSE walls, floodwall, and closure structures will be performed based on the additional subsurface explorations and the information recovered to date. Plans and specifications will be prepared based upon the final designs.

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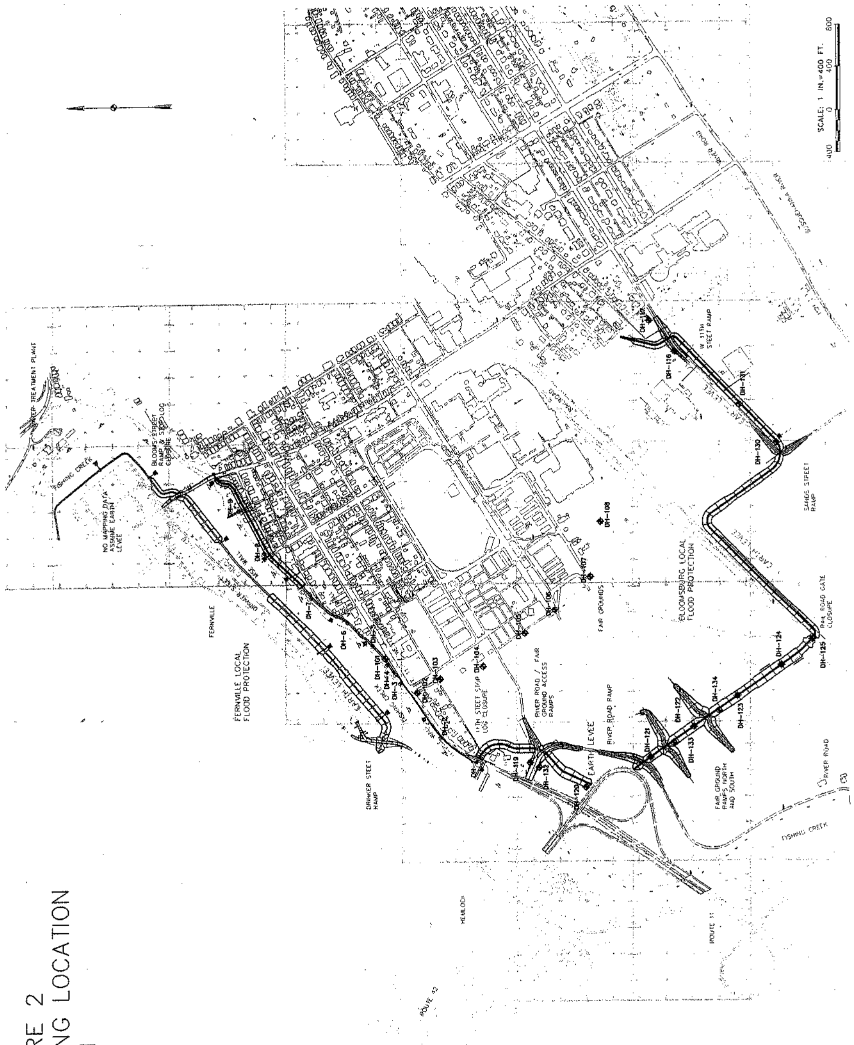


FIGURE 2
BORING LOCATION
PLAN

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment D – Structural Design Analysis

May 2004

BLOOMSBURG LOCAL FLOOD PROTECTION
COLUMBIA COUNTY, PA

August 13, 2003 (Revised February 13, 2004)

FEASIBILITY REPORT
EXECUTIVE SUMMARY FOR STRUCTURAL:

There will be four structural items in this flood protection project.

1. Route 11 Stop Log Closure:

This structure is located at Sta. 39+65.00 and is connected to the end of a concrete floodwall. This structure will only be erected during a flood and will temporarily close Rt. 11 to through traffic. The stop log closure structure will consist of aluminum skin plates and standard channels to form a typical 13-ft long by 4-ft height panel. Three panels stack together to make a 12 ft high wall section. Since the roadway is 52 ft wide, there will be 4 bays of closure panels to close off the opening. In addition to aluminum panels, three 15 ft long (3 ft will be below roadway surface) steel posts will be installed between the closure panels to provide support. The whole closure structure should be able to be completely installed within 3 hours once mobile crane, operator and helpers are ready on the site. Since the aluminum panels and steel columns are specially fabricated for the closure, they shall be properly maintained and kept in a nearby storage facility when not in use. This can be a building with the size of 16-ft wide by 32-ft long and shall be furnished by local sponsor. On both ends of the closure, a concrete abutment will be constructed to support the end spans of the stop log panels and to retain the levee embankment. The elevation view of the abutment will be similar to the section of earthen levee with a slope of 1 vertical to 2 horizontal. The heel portion of the abutment foundation is about 10-ft long, covered by levee earth with a 3-ft thickness, reduced to 2-ft thickness at the ends of wingwalls. A 3-ft deep foundation key parallel to the wall below the foundation will be built to increase the abutment factor of safety against sliding failure.

2. Bloom Street Stop Log Closure:

This is part of flood protection work located in Fernville. A mechanically stabilized earth (MSE) wall and earth levee will be constructed along Fishing Creek to protect Fernville. At Bloom Street, the roadway surface will be ramped, but it will still be 5-ft below top of levee, so it is required to build a removable closure structure to close off this opening during a flood. Since the opening is only 24-ft wide by 5-ft high, two pieces of standard 6 inch I-shaped aluminum beams lying side by side, and stacked up to 5-ft high will seal off the opening during flood time. This is a single span of aluminum beam (weighing about 100 pounds apiece) to fit into the recess slots of two abutments. Faced to waterside it will be covered with an EPDM (roofing material used on flat roof) membrane to prevent water seeping through any gaps between the aluminum I-beams. A manually operated davit shall be provided to assist in lifting I-beams into the slots, but would not be necessary to use. A storage facility, a 10-ft wide by 28-ft long prefabricated building, shall also be provided by local sponsor at nearby location to keep and maintain the closure materials when not in use. At each end of the closure there will be a concrete abutment similar to the ones discussed for the Rt. 11 closure. Since the new roadway surface will be 6-ft above existing surface, new compacted fill shall be required to make the slope of the roadway more gentle and match bridge surface and existing roadway surface of nearby neighborhood area.

Another option has been considered to build a higher ramp to match top of the levee so the stop log closure would not be required. Since proper gentle slope could not be obtained between nearby bridge surface and existing roadway surface in residential area, this option was determined to be unfeasible.

Please note that the road is known as Bloom Street in Fernville, and Railroad Street in Bloomsburg. On the calculations that follow, the name of the structure was inadvertently mislabeled the Railroad Street Stoplog Closure.

3. Rail Road Gate Closure Structure:

Where the levee crosses a single railroad track, a 24-ft wide opening needs to be provided to allow for train traffic. During a flood event, this opening needs to be closed. Since this closure is located in a fairly remote and not easy accessible area, a steel swing gate, 24 ft wide by 11ft-3 inch high, was designed to close off the opening rapidly with minimum manpower and equipment. Concrete abutments at each end of the closure will hold the gate in place as well as act as retaining walls for the levee material. The railroad track will be provided with a rubber crossing panel to provide a flush surface for the gate to seal against. The steel swing gate will consist of two horizontal 24 inch I-beam girders, vertical stiffeners, diagonal bracing rods and a 3/8 inch thick steel skin plate. The gate will be designed to be operated manually, but will be provided with a portable winch system to assist if necessary. Due to a large uplift (buoyancy) force on the concrete abutment during a flood event, the net weight of the steel gate and abutment may not be able to resist the sliding force from the flood. Steel piles or concrete caissons were considered to resist this sliding force. However, in this particular case, the rock bed was found to be only 12 ft below surface, making standard piles not deep enough to develop the lateral resistance. The recommended solution is to build a mass concrete foundation with steel anchors connected to the rock bed. This is more cost effective and feasible than to build a pile foundation.

4. H-Pile Supported Concrete Flood Wall:

The concrete floodwall begins at the end of MSE wall from Sta. 27+60.00 to Sta. 39+13.00, at the beginning of the Rt. 11 stop log closure. The total length of concrete floodwall is 1,153 ft. An H-pile supported wall is more expensive than other types of flood protection, such as a MSE wall or earthen levee, in terms of comparing the cost per linear foot of flood protection. The main reason that this type of wall was selected is due to limited land for construction. There is not much space available between Fishing Creek and Route 11 to build a traditional 12-ft high concrete retaining wall. An inverted T-wall would require at least a 16-ft wide foundation. Route 11 can not be realigned without residential property owners giving up their front yard or being condemned by the Government. Because of this situation, the cost of realigning Rt. 11, purchasing the houses or front yards and constructing an inverted T-wall would be cost more than an H-pile supported concrete flood wall. To install the H-piles, a 24-inch diameter hole will be drilled in the ground to reach 10-ft into sound rock. The rock bed is located at 16-ft to 30-ft below ground surface along the alignment. The total length of the H-piles would be up to 45-ft (33-ft buried in the ground, 12-ft above the ground). The H-piles would be installed at a 6-ft spacing along Fishing Creek. Above ground and 4 feet below ground, the piles will be encased in concrete. In between the concrete encased H-pile posts there will be three stacked sections of precast concrete wall panels. All joints will be properly sealed with waterstops or gasket material to ensure watertightness.

5. Miscellaneous Structures:

To allow for interior storm water drainage through the line of flood protection, approximately 14 drainage structures will be constructed. A typical drainage structure would consist of a landside inlet structure, a control manhole located near the center of the levee, and an outlet structure on the riverside. The control manholes would be provided with sluice gates, manual operators, aluminum access hatches and aluminum ladders. The outlet structures would be provided with flap gates or tide-flex type valves. The structures would be either precast or cast-in-place concrete with an average wall thickness of 12".

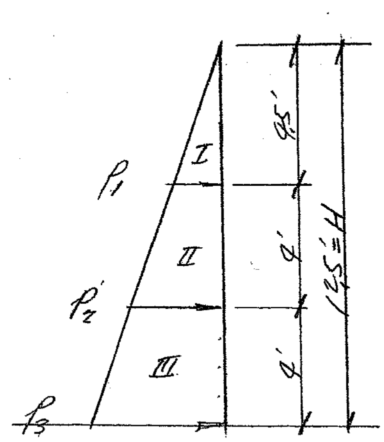
BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT Bloomsburg LPP. Rt 11 Stop Log

COMPUTATIONS Flood Load SHEET 1 OF ____ SHEETS

COMPUTED BY JCC CHECKED BY ________ DATE 6-12-03

Stop Log Closure @ Rt 11. 52' Wide x 12.5' H



$P_1 = 62.5(4.5') = 281.3$ psf

$P_2 = 62.5(8.5') = 531.3$ psf

$P_3 = 62.5(12.5) = 781.3$ psf

Avg. Hydrostatic Pressure on Lower Panel III

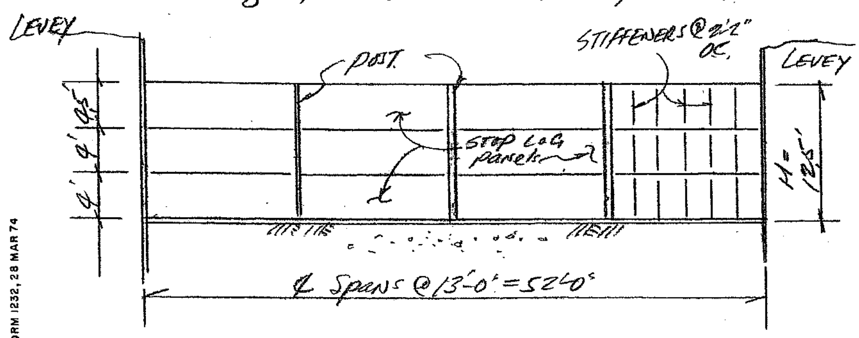
$w = \frac{1}{2}(531.3 + 781.3)4'$

$w = 2625$ #/LF (4' wide panel)

52' Wide Closure Will be divided into 4 Spans,

$52'/4 = 13'$

Moment $= \frac{1}{8}(2{,}625\ \#/')(13')^2 = 55.5$ 1-k/4' Wide Panel



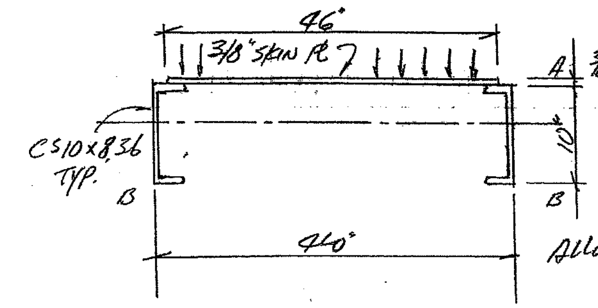
NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT Bloomsburg LFP Rt 11 Stop Log

COMPUTATIONS Stop Log Panel SHEET 2 OF ____ SHEETS

COMPUTED BY [signature] CHECKED BY ________ DATE 6-12-03



Aluminum 1974-75 Standard Channels Table 13.9 p.176

Try C510x8.36

$A = 7.109^{\square''}$

$I_x = 116.15\ in^4$

Alloy 6061-T6 for Bridge Construction (Alum. Example p.30)

Locate Neutral Axis of Combined Section

Element	$A^{\square''}$	Y''	AY	AY^2	I_N
PL 3/8"x46"	17.25	10.188	175.73	1,790.3 +	0
2-C510x8.36	7.109x2 = 14.218	5.0"	71.09	355.5 +	116.15x2
	31.47	7.843"	246.82	2145.8 +	232.3 = 2,378.1

$Y_{bottm} = \frac{246.82}{31.47} = 7.843''$

$Y_{top} = 10.375 - 7.843 = 2.532''$

$I_X = \Sigma(A_n Y^2) + \Sigma I_N - Y_b^2 \Sigma A = 2,378.1 - 31.47(7.843)^2$

$I_X = 442.3\ in^4$

$S_{top} = 442.3/2.532 = 174.7\ in^3, \quad S_{bottm} = 442.3/7.843 = 56.4\ in^3$

$f_b^{top} = \frac{M}{S_{top}} = \frac{55.5^{1\text{-}k}(12'')}{174.7} = 3.81^{ksi}$ Compression

$f_b^{Bott} = \frac{M}{S_{bott}} = \frac{55.5(12'')}{56.4} = 11.81^{ksi}$ Tension $< 19\ ksi$

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ____

SUBJECT Bloomsburg LFP Rt 11 Stop Log

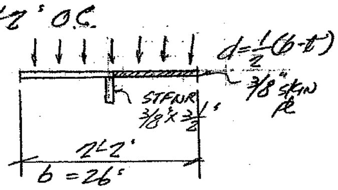
COMPUTATIONS Skin PL & Stiffeners SHEET 3 OF ____ SHEETS

COMPUTED BY ____ CHECKED BY ____ DATE 6-13-03

STIFFENER PL DESIGN:

Assume: 3/8" x 3 1/2" Spacing @ 2'-2" O.C.

Check b/t of outstanding Flange



$$\frac{b}{t} = \frac{(26-0.375)}{2(0.375)} = 34.2$$

Table A.6 (P.71) Alum Spec. 1986 Bridge 5th Edition

For Compression in Beams
Solid Rectangular Element Spec NO. 13, Slenderness limit S_2

$$S_2 = \frac{d}{t}\sqrt{\frac{L_b}{d}} = 34.2\sqrt{\frac{26}{(26-0.375)/2}} = 48.7 > S_2 = 29$$

$$F_{b1} = \frac{10200}{(d/t)^2(L_b/d)} = \frac{10200}{(34.2)^2\left[\frac{26}{(26-0.375)0.5}\right]} = 4.29 \text{ KSI } \underline{\text{Use}}$$

or Check Spec NO. 15. $b/t = 34.2 > 10$

$$F_{b2} = \frac{162}{(b/t)} = \frac{162}{34.2} = 4.74 \text{ KSI}$$

Locate Neutral Axis

Element	A"	Y	AY	AY²	I₀
3.5 x 0.375	1.313	1.75	2.30	4.02	1.34
26 x 0.375	9.75	3.688	35.95	132.60	0.114
	11.063	3.457	38.25	136.62	1.454
				138.07	

$I_N = 138.07 - 38.25(3.457) = 5.83 \text{ in}^4$
132.25

$Y_{bot} = 38.25/11.063 = 3.457"$ $Y_{top} = 3.5 + .375 - 3.457 = 0.418"$

$S_{bot} = 5.83/3.457 = 1.68$ Tension $S_{top} = 5.83/0.418 = 13.9 \text{ in}^3$ Compression

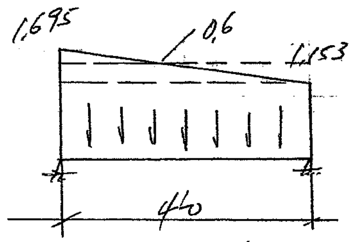
NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT Bloomsburg LFP. PA

COMPUTATIONS Stop Log, Stiffeners & Skin Pl SHEET 4 OF ______ SHEETS

COMPUTED BY Jcc CHECKED BY ______ DATE 6-13-03



STAAD Printout

$P_1 = 531.3^{psf}(2.17') = 1.153^{k/'}$

$P_2 = 781.3^{psf}(2.17') = 1.695^{k/'}$

Use ~~Avg~~ @ .6 x ~~Difference~~

$W = 1.153 + 0.6(1.695 - 1.153)$

$W = 1.478^{k/'}$

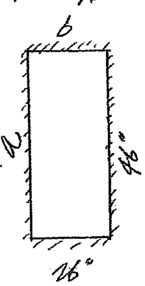
$M = \frac{1}{8}(1.478)(4')^2 = 2.96^{'-k}/2.17'$ Panel

$f_b^{bott} = \frac{23.7^{k''}}{1.68} = 14.1^{ksi}$ Tension $< 17^{ksi}$ Spec No. 1 & 2

$f_b^{Top} = \frac{23.7^{k''}}{13.9} = 1.7^{ksi} < 9.29^{ksi}$ Comp. ok

Check Skin Pl w/ EM 1110-2-2703 June 94 P.2-5.

Stress @ ℄ of the long edge



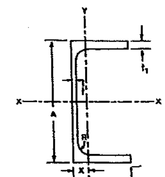
$\beta = b/a = 26''/46'' = 0.5652$

$f_b = \frac{0.5 W b^2}{t^2[1 + 0.623\beta^6]} = \frac{0.5(12 \times 62.5^{pcf})(26'')^2/(12'')^3}{(3/8'')^2[1 + 0.623(.5652)^6]}$ 1.0203

$f_b = 12.27^{ksi}$ Tension $< 19^{ksi}$ ok

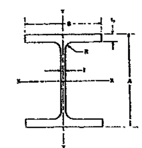
NADB FORM 1232, 28 MAR 74

TABLE 13.9 Aluminum Association Standard Channels— Dimensions, Areas, Weights and Section Properties



Size: Depth A in.	Size: Width B in.	Area① in.²	Weight② lb/ft	Flange Thickness t_1 in.	Web Thickness t in.	Fillet Radius R in.	Section Properties③ Axis X-X: I in.⁴	Axis X-X: S in.³	Axis X-X: r in.	Axis Y-Y: I in.⁴	Axis Y-Y: S in.³	Axis Y-Y: r in.	Axis Y-Y: x in.
2.00	1.00	0.491	0.577	0.13	0.13	0.10	0.288	0.288	0.766	0.045	0.064	0.303	0.298
2.00	1.25	0.911	1.071	0.26	0.17	0.15	0.546	0.546	0.774	0.139	0.178	0.391	0.471
3.00	1.50	0.965	1.135	0.20	0.13	0.25	1.41	0.94	1.21	0.22	0.22	0.47	0.49
3.00	1.75	1.358	1.597	0.26	0.17	0.25	1.97	1.31	1.20	0.42	0.37	0.55	0.62
4.00	2.00	1.478	1.738	0.23	0.15	0.25	3.91	1.95	1.63	0.60	0.45	0.64	0.65
4.00	2.25	1.982	2.331	0.29	0.19	0.25	5.21	2.60	1.62	1.02	0.69	0.72	0.78
5.00	2.25	1.881	2.212	0.26	0.15	0.30	7.88	3.15	2.05	0.98	0.64	0.72	0.73
5.00	2.75	2.627	3.089	0.32	0.19	0.30	11.14	4.45	2.06	2.05	1.14	0.88	0.95
6.00	2.50	2.410	2.834	0.29	0.17	0.30	14.35	4.78	2.44	1.53	0.90	0.80	0.79
6.00	3.25	3.427	4.030	0.35	0.21	0.30	21.04	7.01	2.48	3.76	1.76	1.05	1.12
7.00	2.75	2.725	3.205	0.29	0.17	0.30	22.09	6.31	2.85	2.10	1.10	0.88	0.84
7.00	3.50	4.009	4.715	0.38	0.21	0.30	33.79	9.65	2.90	5.13	2.23	1.13	1.20
8.00	3.00	3.526	4.147	0.35	0.19	0.30	37.40	9.35	3.26	3.25	1.57	0.96	0.93
8.00	3.75	4.923	5.789	0.41	0.25	0.35	52.69	13.17	3.27	7.13	2.82	1.20	1.22
9.00	3.25	4.237	4.983	0.35	0.23	0.35	54.41	12.09	3.58	4.40	1.89	1.02	0.93
9.00	4.00	5.927	6.970	0.44	0.29	0.35	78.31	17.40	3.63	9.61	3.49	1.27	1.25
10.00	3.50	5.218	6.136	0.41	0.25	0.35	83.22	16.64	3.99	6.33	2.56	1.10	1.02
10.00	4.25	7.109	8.360	0.50	0.31	0.40	116.15	23.23	4.04	13.02	4.47	1.35	1.34
12.00	4.00	7.036	8.274	0.47	0.29	0.40	159.76	26.63	4.77	11.03	3.86	1.25	1.14
12.00	5.00	10.053	11.822	0.62	0.35	0.45	239.69	39.95	4.88	25.74	7.60	1.60	1.61

TABLE 13.10 Aluminum Association Standard I-Beams — Dimensions, Areas, Weights and Section Properties



Size: Depth A in.	Size: Width B in.	Area① in.²	Weight② lb/ft	Flange Thickness t_1 in.	Web Thickness t in.	Fillet Radius R in.	Section Properties③ Axis X-X: I in.⁴	Axis X-X: S in.³	Axis X-X: r in.	Axis Y-Y: I in.⁴	Axis Y-Y: S in.³	Axis Y-Y: r in.
3.00	2.50	1.392	1.637	0.20	0.13	0.25	2.24	1.49	1.27	0.52	0.42	0.61
3.00	2.50	1.726	2.030	0.26	0.15	0.25	2.71	1.81	1.25	0.68	0.54	0.63
4.00	3.00	1.965	2.311	0.23	0.15	0.25	5.62	2.81	1.69	1.04	0.69	0.73
4.00	3.00	2.375	2.793	0.29	0.17	0.25	6.71	3.36	1.68	1.31	0.87	0.74
5.00	3.50	3.146	3.700	0.32	0.19	0.30	13.94	5.58	2.11	2.29	1.31	0.85
6.00	4.00	3.427	4.030	0.29	0.19	0.30	21.99	7.33	2.53	3.10	1.55	0.95
6.00	4.00	3.990	4.692	0.35	0.21	0.30	25.50	8.50	2.53	3.74	1.87	0.97
7.00	4.50	4.932	5.800	0.38	0.23	0.30	42.89	12.25	2.95	5.78	2.57	1.08
8.00	5.00	5.256	6.181	0.35	0.23	0.30	59.69	14.92	3.37	7.30	2.92	1.18
8.00	5.00	5.972	7.023	0.41	0.25	0.30	67.78	16.94	3.37	8.55	3.42	1.20
9.00	5.50	7.110	8.361	0.44	0.27	0.30	102.02	22.67	3.79	12.22	4.44	1.31
10.00	6.00	7.352	8.646	0.41	0.25	0.40	132.09	26.42	4.24	14.78	4.93	1.42
10.00	6.00	8.747	10.286	0.50	0.29	0.40	155.79	31.16	4.22	18.03	6.01	1.44
12.00	7.00	9.925	11.672	0.47	0.29	0.40	255.57	42.60	5.07	26.90	7.69	1.65
12.00	7.00	12.153	14.292	0.62	0.31	0.40	317.33	52.89	5.11	35.48	10.14	1.71

①Areas listed are based on nominal dimensions.
②Weights per foot are based on nominal dimensions and a density of 0.098 pound per cubic inch which is the density of alloy 6061.
③I=moment of inertia; S=section modulus; r=radius of gyration.

Table A.6
Allowable Stresses for BRIDGE and Similar Type Structures

6061–T6, –T651, –T6510, –T6511 Extrusions, Sheet and Plate, Standard Structural Shapes, Rolled Rod and Bar, Drawn Tube, Pipe 6351-T5 Extrusions

Type of Stress	Type of Member or Component	Spec. No.	Allowable Stress, ksi	
TENSION, axial, net section	Any tension member:	1	17	[illegible]
TENSION IN BEAMS, extreme fiber, net section	Rectangular tubes, structural shapes bent about strong axis	2	17	[illegible]
	Round or oval tubes	3	21	[illegible]
	Shapes bent about weak axis, rectangular bars, plates	4	25	[illegible]
BEARING	On rivets and bolts	5	30	[illegible]
	On flat surfaces and pins and on bolts in slotted holes	6	20	[illegible]

Type of Stress	Type of Member or Component	Spec. No.	Allowable Stress, ksi, Slenderness $\le S_1$	Slenderness Limit, S_1	Allowable Stress, ksi Slenderness Between S_1 and S_2	Slenderness Limit, S_2	Allowable Stress, ksi Slenderness $\ge S_2$
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	17	$\frac{L}{r} = 8.0$	$17.9 - 0.112\frac{L}{r}$	$\frac{L}{r} = 66$	$\frac{45{,}000}{(L/r)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COMPRESSION IN COMPONENTS OF COLUMNS, gross section	Outstanding flanges and legs	8	17	$\frac{b}{t} = 5.0$	$20.5 - 0.70\frac{b}{t}$	$\frac{b}{t} = 12$	$\frac{1{,}740}{(b/t)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Flat plates with both edges supported	9	17	$\frac{b}{t} = 16$	$20.5 - 0.22\frac{b}{t}$	$\frac{b}{t} = 33$	$\frac{430}{(b/t)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Curved plates supported on both edges, walls of round or oval tubes	10	17	$\frac{R}{t} = 13$	$19.6 - 0.71\sqrt{\frac{R}{t}}$	$\frac{R}{t} = 141$	$\frac{2{,}800}{(R/t)(1 + \sqrt{R/t}/35)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COMPRESSION IN BEAMS, extreme fiber, gross section	Single web beams bent about strong axis	11	19	$\frac{L_b}{r_y} = 21$	$21.3 - 0.11\frac{L_b}{r_y}$	$\frac{L_b}{r_y} = 79$	$\frac{78{,}000}{(L_b/r_y)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Round or oval tubes	12	22	$\frac{R_b}{t} = 29$	$35.0 - 2.4\sqrt{\frac{R_b}{t}}$	$\frac{R_b}{t} = 83$	Same as Specification No. 10 (See Par. 3.4.12)
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Solid rectangular beams	13	25	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 13$	$36.1 - 0.83\frac{d}{t}\sqrt{\frac{L_b}{d}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 29$	$\frac{10{,}200}{(d/t)^2(L_b/d)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Rectangular tubes and box sections	14	19	$\frac{L_b S_c}{I_y} = 120$	$21.3 - 0.21\sqrt{\frac{L_b S_c}{I_y}}$	$\frac{L_b S_c}{I_y} = 1700$	$\frac{21{,}000}{(L_b S_c/I_y)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Outstanding flanges	15	19	$\frac{b}{t} = 6.4$	$24.3 - 0.83\frac{b}{t}$	$\frac{b}{t} = 10$	$\frac{162}{(b/t)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Flat plates with both edges supported	16	19	$\frac{b}{t} = 20$	$24.3 - 0.26\frac{b}{t}$	$\frac{b}{t} = 33$	$\frac{520}{(b/t)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane), gross section	Flat plates with compression edge free, tension edge supported	17	25	$\frac{b}{t} = 8.8$	$36.1 - 1.26\frac{b}{t}$	$\frac{b}{t} = 19$	$\frac{4{,}400}{(b/t)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Flat plates with both edges supported	18	25	$\frac{h}{t} = 46$	$36.1 - 0.24\frac{h}{t}$	$\frac{h}{t} = 75$	$\frac{1{,}350}{(h/t)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Flat plates with horizontal stiffener, both edges supported	19	25	$\frac{h}{t} = 107$	$36.1 - 0.104\frac{h}{t}$	$\frac{h}{t} = 173$	$\frac{3{,}100}{(h/t)}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SHEAR IN WEBS, gross section	Unstiffened flat webs	20	11	$\frac{h}{t} = 33$	$13.9 - 0.089\frac{h}{t}$	$\frac{h}{t} = 65$	$\frac{34{,}000}{(h/t)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Stiffened flat webs $a_e = a_1/\sqrt{1 + 0.7(a_1/a_2)^2}$	21	11	— — —	11	$\frac{a_e}{t} = 65$	$\frac{47{,}000}{(a_e/t)^2}$
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

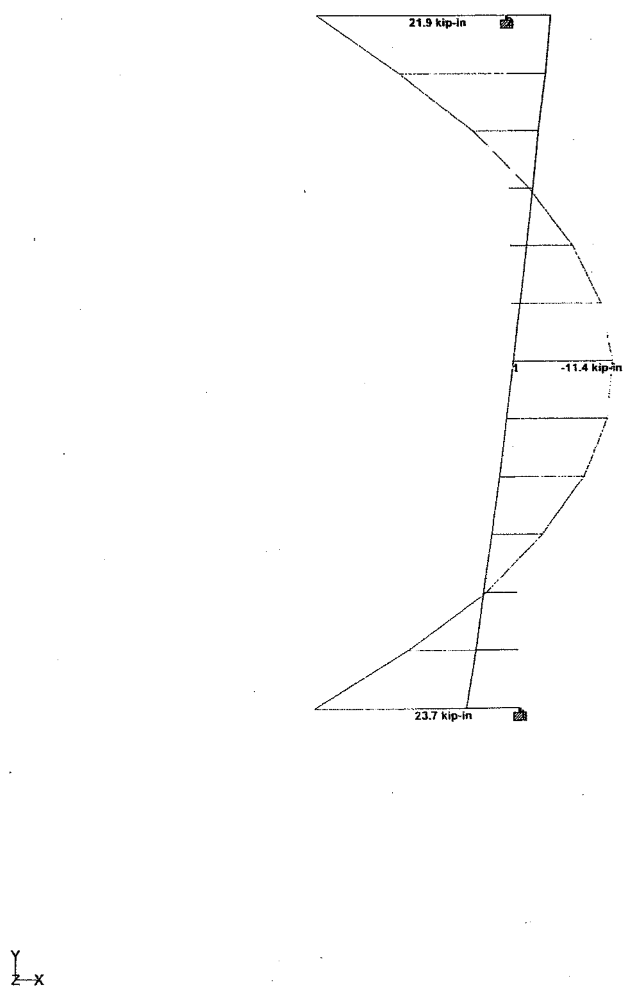
WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld. SHADED BARS apply within 1.0 in. of a weld.

(1) For all thicknesses with filler alloys 5356 or 5556. With filler alloys 4043, 5554 or 5654 values apply (2) For all thicknesses with filler alloys 5356 or 5556; for metal ... alloys 4043, 5554 or 5654.

4,a

```
STAAD PLANE HYDRO LOAD ON STIFFENER OF STOP LOG  4 FT HT, 2'-2" SPACING
START JOB INFORMATION
JOB NAME STIFFENER OF STOP LOG AT ROUTE 11, H=4 Ft
JOB CLIENT TOWN OF BLOOMSBURG, PA
JOB NO 2ND VERTICAL MEMBER
ENGINEER DATE 19-Jun-03
END JOB INFORMATION
INPUT WIDTH 79
UNIT FEET KIP
JOINT COORDINATES
1 0 0 0; 2 0 4 0;
MEMBER INCIDENCES
1 1 2;
MEMBER PROPERTY AMERICAN
1 PRISMATIC AX 11.063 IZ 5.83
UNIT INCHES KIP
CONSTANTS
E 29000 ALL
POISSON STEEL ALL
PRINT MEMBER INFORMATION
SUPPORTS
1 2 FIXED
UNIT FEET KIP
LOAD 1 BEAM DEAD LOAD
MEMBER LOAD
1 UNIT GY 0.038
LOAD 2 HYDROSTATIC LOAD
MEMBER LOAD
1 TRAP GX 1.693 1.151
LOAD COMB 3 AT 100 PERCENT
1 1.0 2 1.0
PERFORM ANALYSIS
PRINT MEMBER FORCES
PRINT SUPPORT REACTION
PRINT ANALYSIS RESULTS
FINISH
```

4b.



BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT: BLOOMSBURG Rt 11 STOP LOG

COMPUTATIONS: MAIN POST SHEET 5 OF ______ SHEETS

COMPUTED BY: ____ CHECKED BY: ______ DATE: 6-16-03

MAIN POST @ BASE Use A36 struct steel.

Max Moment, $P = 781.3^{PSF}(12.5')\frac{1}{2}(13') = 63.48^{K/panel}$

$M = 63.48^{k}(12.5')\frac{1}{3} = 264.5^{1\text{-}k/panel}$

The better arrangement of Cover Pl's on W24x62 would be 1-Pl 3/8x12" on flange faced to Water side. The other Pl 3/8"x10" on Landside. The result fiber stresses are 13.76 ksi Comp. & 14.55 ksi Tens. respectively for Water & Landside.

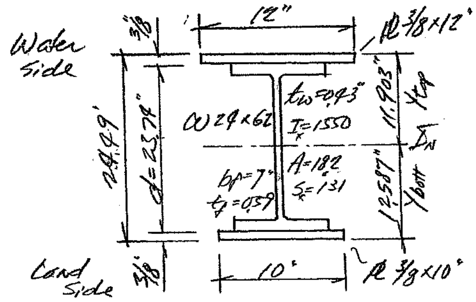
W24x62 w/2-Pl's 3/8"x12" & 3/8"x10"

Total $A = 26.45^{\square''}$

$I = 2746.43^{in^4}$

$S_{top} = 230.7^{in^3}$

$S_{bot} = 218.2^{in^3}$



I. of Compression Flanges & $\frac{1}{3}$ of Compression Web area about Y-Y axis

$I_{oy} = \frac{0.375}{12}(12)^3 + \frac{7^3}{12}(0.59) = 54 + 16.86 = 70.86$ Ref. AISC 9th Ed. Spec F1.3 P. 5-47

$A_f = 0.375(12) + 7(0.59) = 4.5 + 4.13 = 8.63$

$\frac{1}{3}A_w = \frac{1}{3}(11.903" - 0.375 - 0.59")0.43" = 1.57$

$\left.\right\} 10.2^{\square''} = A_f$

$r_T = \sqrt{I_y/(A_f + \frac{1}{3}A_w^{comp})} = \sqrt{\frac{70.86}{10.2}}$ 2.64" (W24x62 r_T=1.71)

$l = 12.5'(12") = 150"$ $C_b = 1.75 + 1.05(M_1/M_2) + 0.3(M_1/M_2)^2$

$C_b = 1.75$

$l/r_T = \frac{150}{2.64} = 56.8$

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT Bloomsburg LFP. Rt 11 Stop Log

COMPUTATIONS Post Design SHEET 6 OF SHEETS

COMPUTED BY [initials] CHECKED BY DATE 6-17-03

Check Compact Section

Top Flange $\frac{3}{8}" \times 12"$ Edge $b = (12" - 7")\frac{1}{2} = 2.5"$

$b/t = 2.5/0.375 = 6.67 < 65/\sqrt{F_y} = 10.83$ Compact

Web: $d/t = 23.74/0.43 = 55.2 < 640/\sqrt{F_y} = 106.7$

$L_b = 12.5' > L_c = 7.9'$ $\left[76b_f/\sqrt{F_y} = 7.87 \text{ or } \frac{20000}{(d/A_f)F_y} = 96.6 \right]$

Formula F1-2

Compact Section but $L_b > L_c$.

$F_b = \frac{12 \times 10^3 C_b}{l d/A_f} \leq 0.6 F_y$ $\quad A_f = 0.375(12) + 0.59(7") = 4.5 + 4.13 = 8.63$

$F_b = \frac{12000(1.75)}{150"(0.43)/8.63} = 2810 \leq 0.6(36) = 21.6^{KSI} \leftarrow$ Use

$F_b = 21.6$ KSI for Tension & Compression

Moment @ Base of Post $= 62.5^{pcf}(12.5)^3\frac{1}{2} \cdot \frac{1}{3}(13') = 264.5'^{k}$

Mom't @ 3' above base $= 62.5(12.5)^2\frac{1}{2} \cdot \frac{(9.5)^3}{3(12.5)^2}(13') = 116.1'^{k}$

$f_b = \frac{264.5(12)}{218.137} = 14.55^{KSI}$ Comp on top Flg $< 21.6^{KSI}$ ok

$f_b = \frac{264.5(12)}{230.73} = 13.76^{KSI}$ Tension on bottom Flg < 21.6 ok

@ 3' above base Cut off Cover Pl's for top & bottom Flg's

$f_b = \frac{116.1(12)}{131} = 10.64^{KSI} < 21.6$ Tension & Comp

NADB FORM 1232, 28 MAR 74

PA BLOOMSBURG LFP, RT 11 STOP LOG POST DESIGN

6a.

MOMENT OF INERTIA CALCULATION

FIRST TRY

ELEMENT	AREA = A	Y-distance	A x Y	A x Y ^2	Mom Inertia
W24x62	18.2	0	0	0	1550
PL 3/8x12"	4.5	12.058	54.26	654.22	0.0527
2PL 9/16x4"	4.5	11.870	53.42	634.04	1.4238
SUM	27.2	3.9586	107.6738	1288.26	1551.47656
				2839.74	

Mom Inertia = 2413.50

Y bott =	15.829		Y top =	8.286
S bott =	152.477		S top =	291.260
	Moment =	264.5 k-ft		
Fiber Stress f bott =	**20.82 Ksi**		**f top =**	**10.90 Ksi**
	Tension			Compress

SECOND TRY

ELEMENT	AREA = A	Y-distance	A x Y	A x Y ^2	Mom Inertia
W24x62	18.2	0	0	0	1550
PL 3/8x12"	4.5	12.058	54.26	654.22	0.0527
2PL 9/16x4"	4.5	11.870	53.42	634.04	1.4238
PL 3/8x10"	3.75	-12.058	-45.22	545.19	0.0527
SUM	30.95	2.0180	62.45813	1833.45	1551.529
				3384.98	

Mom Inertia = 3258.94

Y bott =	14.263		Y top =	10.227
S bott =	228.488		S top =	318.661
	Moment =	264.5 k-ft		
Fiber Stress f bott =	**13.89 Ksi**		**f top =**	**9.96 Ksi**
	Tension			Compress

PA BLOOMSBURG LFP, RT 11 STOP LOG POST DESIGN

6b

THIRD TRY

ELEMENT	AREA = A	Y-distance	A x Y	A x Y ^2	Mom Inertia
W24x62	18.2	0	0	0	1550
PL 3/8x12"	4.5	12.058	54.26	654.22	0.0527
2PL 9/16x4"	0	0.000	0.00	0.00	0.0000
PL 3/8x10"	3.75	-12.058	-45.22	545.19	0.0527
SUM	26.45	0.342	9.043	1199.41	1550.105
				2749.52	

Mom Inertia = 2746.43

Y bott =	12.587	Y top =	11.903
S bott =	218.197	S top =	230.732

Moment = 264.5 k-ft

Fiber Stress f bott = 14.55 Ksi Tension   **f top = 13.76 Ksi** Compress

NO COVERED PLATES

ELEMENT	AREA = A	Y-distance	A x Y	A x Y ^2	Mom Inertia
W24x62	18.2	0	0	0	1550
SUM	18.2	0.000	0.000	0	1550.00
				1550	

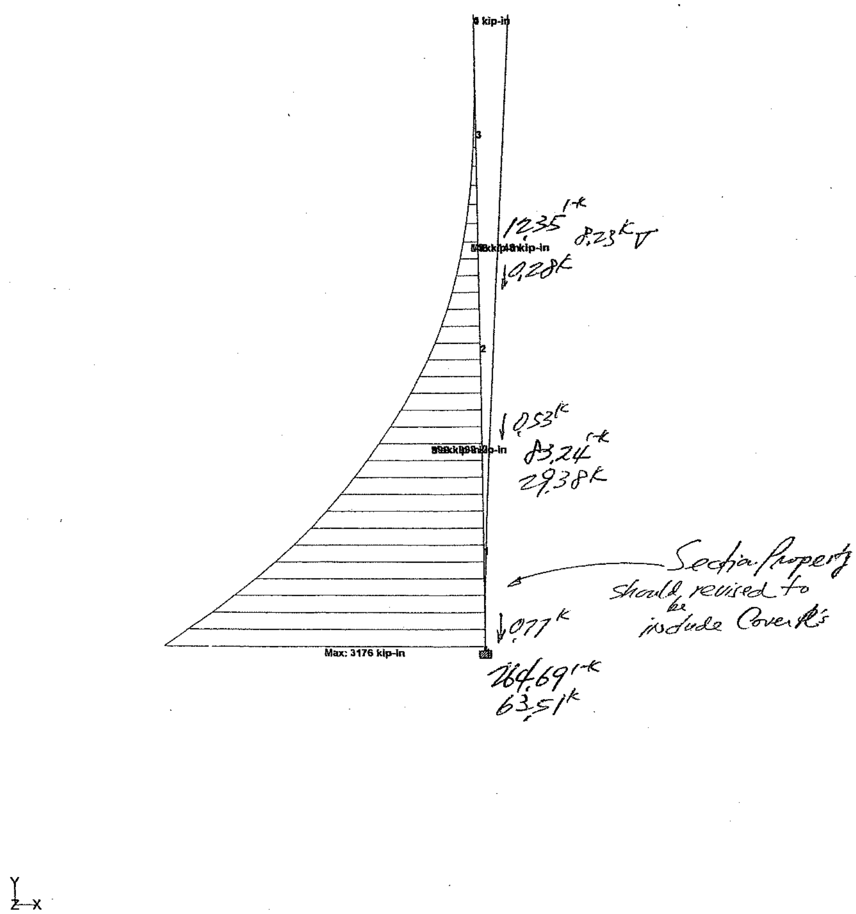
Mom Inertia = 1550.00   Moment = 116.1k-ft

Y bott =	12.245	use AISC	Y top =	12.245	use AISC
S bott =	126.582	131	S top =	126.582	131

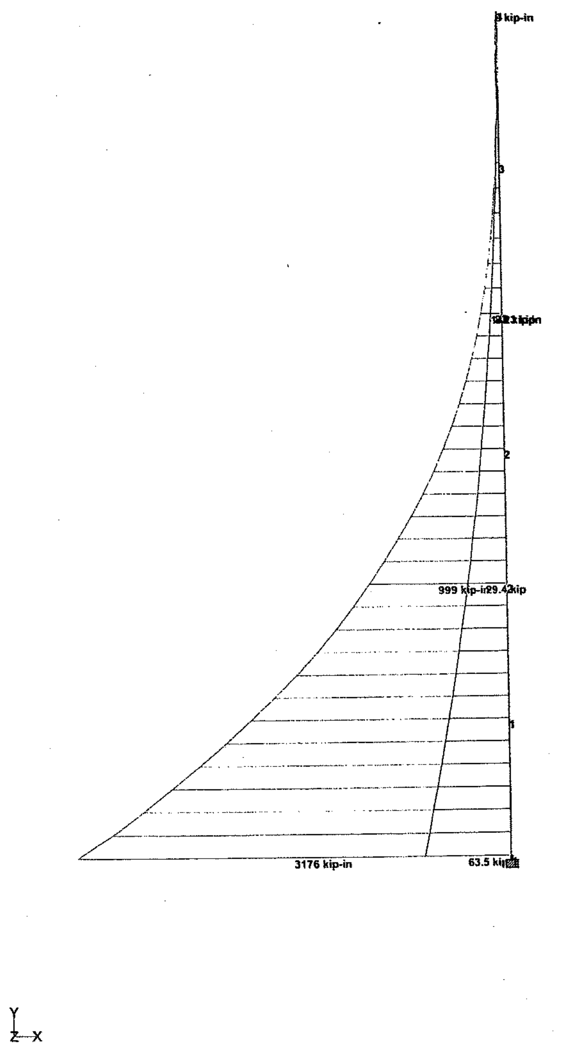
Fiber Stress f bott = 10.64 Ksi Tension   **f top = 10.64 Ksi** Compress

3.5ft above base

6c.

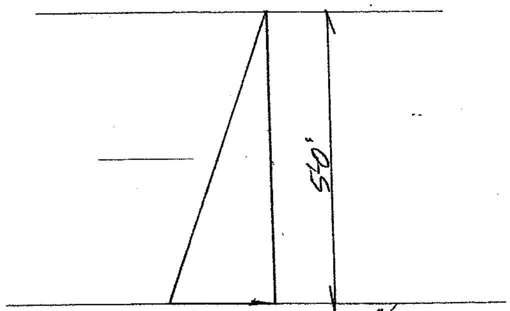

0 kip-in
3
12.35 1-k
8.23 k V
0.28 k
2
0.53 k
83.24 1-k
29.38 k
1
Section Property should be revised to include Cover Pl's
0.77 k
Max: 3176 kip-in
264.69 1-k
63.51 k
Y
Z—X

6d



BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ____
SUBJECT BLOOMSBURG LFP RR STREET BRIDGE
COMPUTATIONS STOP LOG CLOSURE 5'H × 24' WIDE SHEET 7 OF ____ SHEETS
COMPUTED BY Lee CHECKED BY ____ DATE 6-20-03

STOP LOG CLOSURE 5'HIGH × 24' WIDE



$P_1 = 62.5H = 312.5$ #/SF

Try to Use Aluminum Std I-Beams for Bridge Material
ALLOY 6061-T6 Table A.6. P.71

2-I 6×4.03 #/' $S = 7.33$, $t_f = 0.29"$ $b_f = 4"$ $d = 6"$

$P_1 = 62.5^{pcf}(5') = 312.5$ #/' $A = 3.427\ \square"$ $t_w = 0.19"$

$P_2 = 62.5\ (4.5') = 281.3$ #/' $r_y = 0.95$

Avg $= (312.5 + 281.3)\frac{1}{2} = 296.9$ #/' $= W$ #/LF $\times \frac{6"}{12"} = 148.5$ #/6" Wide

$M = \frac{1}{8}(.1485)(24')^2 = 10.69$ 'K/6" Wide

$b/t = (4 - 0.19)0.5/0.29 = 6.57$

P.71. Spec No. 11. $\frac{L_b}{r_y} = \frac{24'(12")}{0.95} = 303.2 > S_2 = 79$

$F_b = \frac{78000}{(L_b/r_y)^2} = \frac{78000}{(303.2)^2} = 0.85$ KSI for Allow. Compressive stress

Add stiffeners @ 6'0 o.c. to reduce $L_b = 6'$

$\frac{L_b}{r_y} = \frac{6'(12")}{0.95} = 75.79 < 79 = S_2$

$F_b = 21.3 - 0.111(L_b/r_y) = 21.3 - 0.111(75.9) = 12.88$ Allow. Compress

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ____

SUBJECT Bloomsburg LFP. 5'H Stop Log

COMPUTATIONS Stop Log Closure 5'H x 24'W SHEET 8 OF ____ SHEETS

COMPUTED BY ____ CHECKED BY ____ DATE 6-20-03

Since two I-Beams Set Side by Side
I_x Value would be increased.

Bm 1

X — X

Bm 2

	$A^{\square''}$	Y''	AY	AY^2	I_o
Beam 1	3.427	3"	10.281	30.843	21.99
Beam 2	3.427	-3	-10.281	30.843	21.99
	6.854	0	0	61.686	43.98

I 6x4 - 4.03 #/' TYP.

New $I_{x-x} = 61.686 + 43.98 = 105.67$

$S_x = 105.67/6 = 17.61$

$f_b = \frac{M}{S} = \frac{10.69(12)}{17.61} = 7.28^{ksi} < 12.88^{ksi}$ ok Compression

For Tension, $F_b = 17^{ksi} > 7.28$ ok.

Check Flange b/t ratio: $b/t = (4-0.19)0.5/0.29 = 6.57 \begin{smallmatrix} < 10 = S_2 \\ > 6.4 = S_1 \end{smallmatrix}$

Spec No. 15.

$\therefore F_b = 24.3 - 0.83(b/t) = 24.3 - 0.83(6.57) = 18.85^{ksi}$

Check Web h/t ratio: $h/t = [6-2(0.29)]/0.19 = 28.526 < S_1 = 46$

Spec No. 18. $F_b = 25^{ksi}$

Check Shear in Web $h/t = 28.56 < S_1 = 33$. $F_v = 11^{ksi}$

Spec. No. 20

$f_v = \frac{0.1485^{k}/6'' \text{ wide}}{[6-2(.29)]0.19} = 0.144^{ksi} < 11$ ok.

Use 2 - I 6"x4" - 4.03#/' From Base up. (Pavement Surface)

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT BLOOMSBURG LPP 5'H×24'W STOP LOG

COMPUTATIONS Stop Log @ 2'-0" Above Base SHEET 9 OF SHEETS

COMPUTED BY Acc CHECKED BY DATE 6-20-03

STOP LOG Reduce to 1-Beam only I-6"×4"-4.03#/'

@ 2'-0" Above Pavement. $H_3 = 3'0$

$P_3 = 3'(62.5) = 187.5$ #/$\square'$

$P_4 = 2.5(62.5) = 156.3$ #/$\square'$

Avg $(187.5+156.3)\,0.5\,(6"/12") = 86$ #/'/6" wide

$M = \frac{1}{8}(86)(24')^2 = 6.19$ 'K

$f_b = \frac{6.19(12")}{7.33} = 10.13^{ksi} < F_b = 12.88$ Spec #11 Compression in Flange

All other b/t ratio in Flange

& h/t ratio in Web are ok by Inspection.

$f_v = \frac{0.086^k/6"\text{ wide}}{[6-2(.29)]0.19} = 0.084^{ksi} < 11^{ksi}$ ok.

NAB FORM 1232

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT: BLOOMSBURG LFP R.R. GATE CLOSURE 11.2'H x 24'W

COMPUTATIONS: SKIN PLATE & STIFFENERS SHEET 10 OF ______ SHEETS

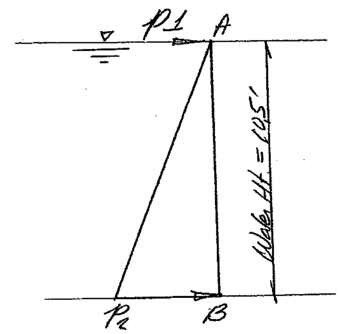
COMPUTED BY: [signature] CHECKED BY: ______ DATE: 6-25-03

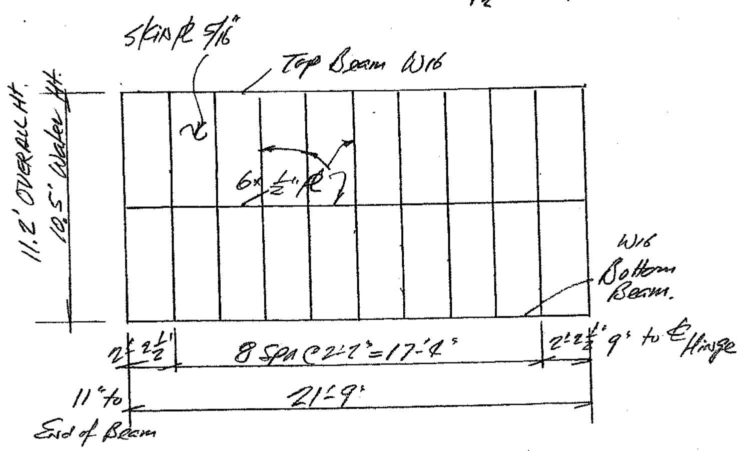
RAILROAD GATE CLOSURE

11.2'H (Include: Free Board 1.5' ±)

SPAN WIDTH - 24'

ENTIRE GATE Will be Strengthened W/ Vertical stiffeners @ 2'-2" O.C. Plus 2 END PLATES (Vertically). Then the GATE Will be Supported by Two Horizontal STL BEAMS @ Top & BOTTOM of the Gate.





BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

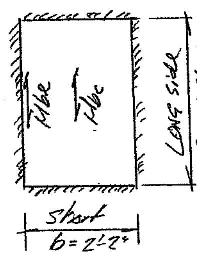
SUBJECT Bloomsburg LPP RR Gate Closure

COMPUTATIONS Skin PL SHEET 11 OF ______ SHEETS

COMPUTED BY [initials] CHECKED BY ______ DATE 6-25-03

Skin PL are Fixed Supported on All 4 sides.

Ref. Advanced Mechanics of Materials
Seely & Smith. 2nd Ed. 1966
John Wiley & Sons P. 234. Fig 131.



Rectangular PL on 4 Sides fixed

$\alpha = \text{Ratio} = \frac{b}{a} = \frac{2.167}{5.25} = 0.413$

Moment along the Edge

$$M_{be} = \frac{\frac{1}{12} Wb^2}{1+\alpha^4} = \frac{Wb^2}{12(1+0.413^4)} = 0.081 Wb^2$$

$M_{be} = 0.081(10.5 \times 62.5^{pcf})(2.167)^2 = 250'^{\#}/' \leftarrow$ Governs

Moment @ ℄ Span

$$M_{bc} = \frac{\frac{1}{8} Wb^2}{3+4\alpha^4} = \frac{Wb^2}{8[3+4(0.413)^4]} = 0.04 Wb^2$$

$M_{bc} = 0.04(10.5 \times 62.5)(2.167)^2 = 124'^{\#}/'$

Assume Skin PL $t = 5/16" = 0.313"$

$$f_b = \frac{250^{\#'}(12")}{\frac{12(5/16)^2}{6}} = \underline{15.36^{ksi}} < 0.6F_y = 21.6 \text{ (Tension or Compression)}$$

$f_b = \frac{M}{S} = \frac{M}{6t^2/6}$. Note: Compare w/ EM 1110-2-2703 Jun 94 P. 2-5

Stress at ℄ of the long edge

$$f_b = \frac{0.5Wb^2}{t^2(1+0.623\alpha^6)} = \frac{0.5(10 \times 62.5^{pcf})(26")^2}{(5/16)^2[1+0.623(.413)^6]} = 14.98^{ksi} \doteq 15.36^{ksi}$$

OK.

NAB FORM 1232

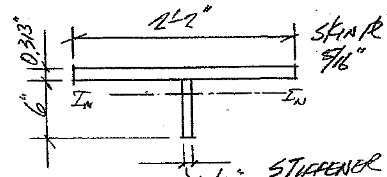
BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT: BLOOMSBURG LFP R.R. GATE CLOSURE

COMPUTATIONS: SKIN PL & STIFFENERS SHEET 12 OF ______ SHEETS

COMPUTED BY: [signature] CHECKED BY: ______ DATE: 6-26-03

FIND I_{N-N} for SKIN PL & Stiffener Combined

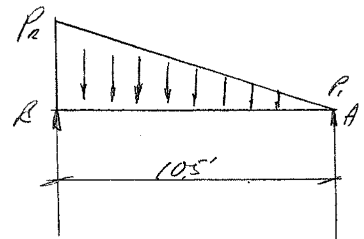


Element	A	Y	AY	AY^2	I_o
5/16×2'-2"	8.125	6.156	50.02	307.92	0
1/2"×6"	3	3	9	27.0	9
	11.125	5.305"	59.02	334.92 +	9

$I_N = 334.92 + 9.0 - 11.125(5.305)^2 = 30.81\ in^4$ (313.11)

$Y_{bott} = 59.02/11.125 = 5.305"$ $S_{bott} = 30.81/5.305 = 5.81\ in^3$

$Y_{top} = 6.313 - 5.305 = 1.008"$ $S_{top} = 30.81/1.008 = 30.57\ in^3$



$P_2 = 62.5^{PCF}(10.5') = 656.3\ \#/SF$

$W = \frac{1}{2}(656.3)10.5' = 3445.3\ \#/'$

Max $M = 0.1283\ Wl$ (AISC P.2-296)

@ $X = 0.5774\ l$ from "A"

$M = 0.1283(3445.3\ \#/')10.5' = 4641.4\ '\text{-}\#/'$

for 2'-2" Wide $M = 4641.4(2.167') = 10.06\ ^{'K}/2'\text{-}2"$ Wide

$f_b^{bott} = \frac{10.06(12)}{5.81} = 20.77\ ksi$ Comp (-) $< F_b = 0.6F_y = 21.6\ ksi$

$f_b^{top} = \frac{10.06(12)}{30.57} = 3.95\ ksi$ Tens (+) < " " OK

RAILROAD GATE CLOSURE VERTICAL STIFFENERS

Moment of Inertia & Bending Stresses

Sht. 13

FIRST TRY

ELEMENT	Area	Y-distance	A x Y	A x Y ^2	Mom Inertia
WT6X11	3.24	1.630	5.28	8.61	11.7
PL5/16x26"	8.125	6.311	51.28	323.63	0.066
SUM	11.365	4.977	56.56	332.24	11.77
				344.01	

Mom Inertia = 62.53

Y bott = 4.977 Y top = 1.491

S bott = 12.564 S top = 41.941

Moment = 10.06 k-ft

Fiber Stres: f bott = **9.61 Ksi** f top = **2.88** Ksi

Compresn Tension

SECOND TRY

ELEMENT	Area	Y-distance	A x Y	A x Y ^2	Mom Inertia
WT6X9.5	2.79	1.650	4.60	7.60	10.1
PL5/16x26"	8.125	6.236	50.67	315.99	0.066
SUM	10.915	5.064	55.27	323.58	10.17
				333.75	← use

Mom Inertia = 53.85

Y bott = 5.064 Y top = 1.329

S bott = 10.634 S top = 40.533

Moment = 10.06 k-ft

Fiber Stres: f bott = **11.35 Ksi** f top = **2.98** Ksi

Compresn Tension

THIRD TRY

ELEMENT	Area	Y-distance	A x Y	A x Y ^2	Mom Inertia
WT6X8	2.36	1.740	4.11	7.15	8.7
PL5/16x26"	8.125	6.156	50.02	307.93	0.066
SUM	10.485	5.162	54.13	315.08	8.77
				323.84	

Mom Inertia = 44.43

Y bott = 5.162 Y top = 1.145

S bott = 8.607 S top = 38.797

Moment = 10.06 k-ft

Fiber Stres: f bott = **14.03 Ksi** f top = **3.11** Ksi

Compresn Tension

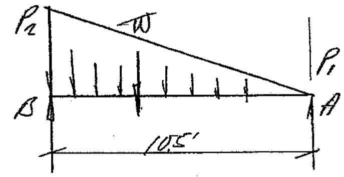
BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT BLOOMSBURG LFP RR GATE CLOSURE

COMPUTATIONS HORIZ BEAM SHEET 15 OF SHEETS

COMPUTED BY JER CHECKED BY DATE 6-30-03

MAIN HORIZ BEAM (LOWER)



Hydro Press @ bottom of Gate

$P_2 = 62.5^{PCF}(10.5') = 656.3^{PSF}$

Total $\varpi = 656.3(10.5')\frac{1}{2} = 3445.3^{Lbs/\prime}$

$R_A = \frac{\varpi}{3} = \frac{1}{3}(3445.3) = 1,148.4^{Lbs/\prime}$

$R_B = \frac{2\varpi}{3} = 2(1148.4) = 2,296.8^{Lbs/\prime} \doteq 2.35^{K/\prime}$ (Add Bm D.L.)

$M = \frac{1}{8}(2.35)(22')^2 = 142^{\prime\text{-}K}$

$$\text{Min } I = \frac{5(2.35)(22')^4(12'')^3}{384(29{,}000)\left[\frac{22'(12'')}{360}\right]} = 582^{in^4}$$ Use W16×45

$I = 586^{in^4}$ $S = 72.7^{in^3}$

If limit $\Delta = \frac{22'(12'')}{360} = 0.733''$ $L_c = 7.4'$ $L_u = 11.4'$

Since Vertical stiffeners are welded to one side of flange at 11'2" spacing, $L_b < L_c$. Another ℘ may be welded on the other side of web @ spacing 5'6" to be $< L_c$. Then Allow. $F_b = 0.66F_y = 23.7^{ksi}$

$f_b = \frac{142(12)}{72.7} = 23.44^{ksi} < 23.7^{ksi}$ ok

Check Compact Section

$\frac{b_f}{2t_f} = 6.2 < \frac{65}{\sqrt{F_y}} = 10.83$, $\frac{d}{t_w} = 46.8 < \frac{640}{\sqrt{F_y}} = 106.7$

Compact Section $F_b = 0.66F_y = 23.7^{ksi}$

If Use W16×50 $I = 659$, $S = 81.0$ $L_c = 7.5'$, $L_u = 12.7'$

$f_b = \frac{142(12)}{81} = 21.04^{ksi} < 23.7$ ok

NAB FORM 1232

12' Ht ft Abutment Load Case I Normal Dry & Surcharge Load

Element	Vertical Load	kips	M. Arm	ft	Moment
1.Conc Wall	13.5(1.25).15	2.531	1.25/2+5	5.625	14.238
2.Conc Wall	.583(13.5).5(.15)	0.590	6.25+.194	6.444	3.804
3.FootngLwr	2(17.583)(.15)	5.275	17.583(.5)	8.7915	46.374
4.FootngToe	1.5(5)(.15)	1.125	5(.5)	2.5	2.813
5.B.Soil Trian	.583(13).5(.125)	0.474	6.25+.389	6.639	3.145
6.B.Soil Rect	10.67(13).(125)	17.339	6.83+10.67/2	12.165	210.926
7.B.Watr Tria					
8.B.Watr Rect					
9.Surcharge	(11.25).1	1.125	6.25+11.25/	11.875	13.359
Sum(1 - 6)	Sum Vert Load	27.33		10.29	281.30
	Footing size	F.S. Ovt	10.473	> 2.0	OK
	17'-6" L x 2' Deep	F.S.Slidi	5.316	>1.5	OK

Load	Calculation Form	Ver,Hor	C.Form	M. Arm	Moment
					k-ft/ft
+V1-10		27.33		10.291	281.30
Scharg>	0.1*0.333*15.5	0.516	15.5/2	-7.750	-4.00
M.S.H9>	(.125)*(15.5^2).333/2	5.00	15.5/3	-5.167	-25.83
W.H10>					
M.S.H14<	(.125)(3.5^2)3.33/2	-2.550	-3.5/3	-1.167	2.97
W.H.15<					
Vert	Net Weight	27.33		Sum+M	281.30
Horiz	Total Horiz Load	-2.97		Sum-M	-26.86
				Net M	254.44
eccentric	=(N13)/K11	9.309	> 17.5/3	5.830	OK
	C.G. within 1/3 base Length		Max Pres	[redacted]	Ksf
	Eccentricity =	-0.559	Min Pres	[redacted]	Ksf

Note: This was prepared on July 23, 2003
Actual Abutmt Ht =11.9', Soil 11.5', Flood 12'

Total Wall Ht. 13'-6" to make Fdn Base 3'-6" below grade.
Tangent Phi =.577, Ka=.333, Kp=3.0

12' ft Ht Abutment Load Case II Flood Load on Water Side

Element	Vertical Load	kips	Moment Ar	ft	Moment
1.Conc Wall	13.5(1.25).15	2.531	1.25/2+5	5.625	14.238
2.Conc Wall	.583(13.5).5(.15)	0.590	6.25+.194	6.444	3.804
3.FootngLwr	2(17.583)(.15)	5.275	17.583(.5)	8.7915	46.374
4.FootngToe	1.5(5)(.15)	1.125	5(.5)	2.5	2.813
5.B.Soil Trian	.583(13).5(.125-.0	0.237	6.25+.389	6.639	1.572
6.B.Soil Rect	10.67(13).(125-.0	8.669	6.83+10.67/2	12.165	105.463
7.B.Watr Tria	.583(13.5).5(.0625	0.246	6.25+.389	6.639	1.633
8.B.Watr Rec	10.75(13.5).0625	9.070	6.83+10.67/	12.165	110.340
9.Water Toe	12(5)0.0625	3.750	5/2	2.5	9.375
10.Uplift Rect					
11.Uplift Triar	.0625(15.5)17.5	-16.95	17.5/2	8.75	-148.34
Sum(1 - 9)		28.96			281.37
Sum(10 - 11)		-16.95			-148.34
	Sum Vert Load	12.01		11.08	133.03
	Footing size	F.S. Ovt	11.639	> 2.0	OK
	17'-6" L x 2' Deep	F.S.Slidi	5.655	>1.5	OK

Load	Calculation Form	Vert,Horiz	C.Form	Mom Arm	Moment
					k-ft/ft
+V1-10		12.01		11.077	133.03
Scharg>					
M.S.H9>	.125-.0625)*(15.5^2).333/	2.50	15.5/3	-5.167	-12.92
W.H10>					
M.S.H14<	(.125-.0625)(3.5^2)3.33/2	-1.275	-3.5/3	-1.167	1.49
W.H.15<					
Vert	Net Weight	12.01		Sum+M	133.03
Horiz	Total Horiz Load	1.23		Sum-M	-11.43
				Net M	121.60
eccentric	=N65/K63	10.126	> 17.5/3	=5.83	OK
	C.G. within 1/3 base Length		Max Pres	[redacted]	Ksf
	Eccentricity =	-1.376	Min Pres	[redacted]	Ksf

12' ft Ht Abutment Load Case III Flood Load on Protected Land Side.

Element	Vertical Load	kips	Moment Ar	ft	Moment
1.Conc Wall	13.5(1.25).15	2.531	1.25/2+5	5.625	14.238
2.Conc Wall	.583(13.5).5(.15)	0.590	6.25+.194	6.444	3.804
3.FootngLwr	2(17.583)(.15)	5.275	17.583(.5)	8.7915	46.374
4.FootngToe	1.5(5)(.15)	1.125	5(.5)	2.5	2.813
5.B.Soil Trian	.583(13).5(.125-.0	0.237	6.25+.389	6.639	1.572
6.B.Soil Rect	10.67(13).(125-.0	8.669	6.83+10.67/	12.165	105.463
7.B.Watr Trial	.583(13.5).5(.0625	0.246	6.25+.389	6.639	1.633
8.B.Watr Rec	10.75(13.5).0625	9.070	6.83+10.67/	12.165	110.340
9.Water Toe					
10.Uplift Rect	-.0625(17.5)7.75	-8.48	17.5/2	8.75	-74.17
11.Uplift Trial	.0625(15.5-7.75)1	-4.24	17.5(2)/3	11.67	-49.45
Sum(1 - 9)		25.21			272.00
Sum(10 - 11)		-12.71			-123.62
	Sum Vert Load	12.50		11.87	148.38
	Footing size	F.S. Ovt	2.981	> 2.0	OK

[redacted]

Load		Vert,Horiz		Mom Arm	Moment
					k-ft/ft
+V1-10		12.50		11.873	148.38
Scharg>					
M.S.H9>	.125-.0625)*(15.5^2).333/	2.50	15.5/3	-5.167	-12.92
W.H10>	(.0625)*(15.5^2)/2	7.51	15.5/3	-5.167	-38.79
M.S.H14<	(.125-.0625)(3.5^2)3.33/2	-1.275	-3.5/3	-1.167	1.49
W.H.15<	(.0625)(3.5^2)/2	-0.383	-3.5/3	-1.167	0.45
Vert	Net Weight	12.50		Sum+M	148.38
Horiz	Total Horiz Load	8.35		Sum-M	-49.77
				Net M	98.61

eccentric =N65/K63 7.890 > 17.5/3 =5.83 OK

C.G. within 1/3 base Length Max Pres [redacted] Ksf

Eccentricity = 0.860 Min Pres [redacted] Ksf

12' ft Ht Abutment Load Case IV Sudden Drawn after Flood

Element	Vertical Load	kips	Moment Ar	ft	Moment
1.Conc Wall	12(1.25).15	2.531	1.25/2+5	5.625	14.238
2.Conc Wall	.583(12).5(.15)	0.590	6.25+.194	6.444	3.804
3.FootngLwr	2(17.583)(.15)	5.275	17.583(.5)	8.7915	46.374
4.FootngToe	1.5(5)(.15)	1.125	5(.5)	2.5	2.813
5.B.Soil Trian	.583(13).5(.125-.0	0.237	6.25+.389	6.639	1.572
6.B.Soil Rect	10.67(13).(125-.0	8.669	6.83+10.67/	12.165	105.463
7.B.Watr Trial	.583(13.5).5(.0625	0.246	6.25+.389	6.639	1.633
8.B.Watr Rec	10.75(13.5).0625	9.070	6.83+10.67/	12.165	110.340
9.Surcharge					
10.Uplift Rect	-.0625(17.5)3.5	-3.83	17.5/2	8.75	-33.50
11.Uplift Trial	.0625(15-3.5)17.5	-6.32	17.5(2)/3	11.67	-73.72
Sum(1 - 9)		27.74			286.24
Sum(10 - 11)		-10.15			-107.22
	Sum Vert Load	15.07		10.94	164.78
	Footing size	F.S. Ovt	3.311	> 2.0	OK

[redacted]

Load		Vert,Horiz		Mom Arm	Moment
					k-ft/ft
+V1-10		15.07		10.938	164.78
Scharg>					
M.S.H9>	.125-.0625)*(15.5^2).333/	2.50	15.5/3	-5.167	-12.92
W.H10>	(.0625)*(15.5^2)/2	7.51	15.5/3	-5.167	-38.79
M.S.H14<	(.125-.0625)(3.5^2)3.33/2	-1.275	-3.5/3	-1.167	1.49
W.H.15<	.0625(3.5^2)/2	-0.383	-3.5/3	-1.167	0.45
Vert	Net Weight	15.07		Sum+M	164.78
Horiz	Total Horiz Load	8.35		Sum-M	-49.77
				Net M	115.01

eccentric =N65/K63 7.634 > 17.5/3 =5.83 OK

C.G. within 1/3 base Length Max Pres [redacted] Ksf

Eccentricity = 1.116 Min Pres [redacted] Ksf

12' ft Ht Abutment Load Case V Flood Load on Larger Foundation Water Si(

Element	Vertical Load	kips	Moment Ar	ft	Moment
1.Conc Wall	13.5(1.25).15	2.531	1.25/2+7.5	8.125	20.566
2.Conc Wall	.583(13.5).5(.15)	0.590	8.75+.194	8.944	5.280
3.FootngLwr	3(20)(.15)	9.000	20(.5)	10	90.000
4.FootngToe	1.5(7.5)(.15)	1.688	7.5(.5)	3.75	6.328
5.B.Soil Trian	.583(13).5(.125-.0	0.237	8.75+.389	9.139	2.165
6.B.Soil Rect	10.67(13).(125-.0	8.669	9.33+10.67/	14.665	127.136
6.B.Watr Tria	.583(13.5).5(.0625	0.246	8.75+.389	9.139	2.248
7.B.Watr Rec	10.67(13.5).0625	9.003	9.33+10.67/	14.665	132.026
8.Surcharge					
9.Uplift Rect	-.0625(20)16.5	-20.63	20/2	10.00	-206.25
10.Uplift Trian					
Sum(1 - 8)		31.96			385.75
Sum(9 - 10)		-20.63			-206.25
	Sum Vert Load	11.34		14.02	158.93
	Footing size	F.S. Ovti	12.795	> 2.0	OK
	20' L x 3' Deep	F.S.Slidi	9.014	> 1.5	OK
	'worked done 7-23-2003				

Load		Vert,Horiz		Mom Arm	Moment
					k-ft/ft
+V1-10		11.34		14.016	158.93
Scharg>					
M.S.H9>	.125-.0625)*(16.5^2).333/	2.83	16.5/3	-5.500	-15.58
W.H10>					
M.S.H14<	(.125-.0625)(4.5^2)3.33/2	-2.107	-4.5/3	-1.500	3.16
W.H.15<					
Vert	Net Weight	11.34		Sum+M	158.93
Horiz	Total Horiz Load	0.73		Sum-M	-12.42
				Net M	146.51
eccentric	=N65/K63	12.921	> 20/3	=6.667	OK
	C.G. within 1/3 base Length		Max Pres	[redacted]	Ksf
	Eccentricity =	-2.921	Min Pres	[redacted]	Ksf

12' ft Ht Abutment Load Case VI Flood Load on Larger Foundation landsie

Element	Vertical Load	kips	Moment Ar	ft	Moment
1.Conc Wall	13.5(1.25).15	2.531	1.25/2+7.5	8.125	20.566
2.Conc Wall	.583(13.5).5(.15)	0.590	8.75+.194	8.944	5.280
3.FootngLwr	3(20)(.15)	9.000	20(.5)	10	90.000
4.FootngToe	1.5(7.5)(.15)	1.688	7.5(.5)	3.75	6.328
5.B.Soil Trian	.583(13).5(.125-.0	0.237	8.75+.389	9.139	2.165
6.B.Soil Rect	10.67(13).(125-.0	8.669	9.33+10.67/	14.665	127.136
6.B.Watr Tria	.583(13.5).5(.0625	0.246	8.75+.389	9.139	2.248
7.B.Watr Rec	10.67(13.5).0625	9.003	9.33+10.67/	14.665	132.026
8.Surcharge					
9.Uplift Rect	-.0625(20)4.5	-5.63	20/2	10.00	-56.25
10.Uplift Trian	-.0625(20)(16.5-4	-7.50	20*2/3	13.33	-100.00
Sum(1 - 8)		31.96			385.75
Sum(9 - 10)		-13.13			-156.25
	Sum Vert Load	18.84		11.09	208.93
	Footing size	F.S. Ovti	3.586	> 2.0	OK
	[redacted]				
	'worked done 7-23-2003				

Load		Vert,Horiz		Mom Arm	Moment
					k-ft/ft
+V1-10		18.84		11.090	208.93
Scharg>					
M.S.H9>	.125-.0625)*(16.5^2).333/	2.83	16.5/3	-5.500	-15.58
W.H10>	(.0625)*(16.5^2)/2	8.51	16.5/3	-5.500	-46.79
M.S.H14<	(.125-.0625)(4.5^2)3.33/2	-2.107	-4.5/3	-1.500	3.16
W.H.15<	(.0625)(4.5^2)/2	-0.633	-4.5/3	-1.500	0.95
Vert	Net Weight	18.84		Sum+M	208.93
Horiz	Total Horiz Load	8.60		Sum-M	-58.26
				Net M	150.67
eccentric	=N65/K63	7.998	> 20/3	=6.667	OK
	C.G. within 1/3 base Length		Max Pres	[redacted]	Ksf
	Eccentricity =	2.002	Min Pres	[redacted]	Ksf

5' ft Hi StpLog Closure Abutment Load Case I Normal Dry period

Element	Vertical Load	kips	M. Arm	ft	Moment
					k-ft/ft
1.Alm Panels	12(1.25).15	2.726	3+1.083	4.083	11.130
2.Stem Wall	1*(5).15	0.750	1+.5	1.5	1.125
3.Stem Wall	(.25)5*(.5).15	0.094	2+.25/3	2.083	0.195
4.Foundat'n	67*1.5(.15)	1.35	6/2	3	4.050
5.Soil	(.125-.0625)4.75(	1.336	7-4.75/2	4.625	6.179
6. Surcharg	.1(3.75)	0.375	6-3.75/2	4.125	1.547
Sum (1 - 7)	Sum+Vert Load	6.63		3.65	24.23
	Footing size	F.S. Ovti	4.995	> 2.0	OK
	6' L x 1.5' Deep	F.S.Slidi	-8.413	>1.5	OK

Load	Calculation Form	Ver,Hor	C.Form	M. Arm	Moment
					k-ft/ft
+V1-10		6.63		3.654	24.23
ScharH11:	.1*(.4)*6.5	-0.26	6.5/2	3.250	-0.85
Sol.H12>	-(.125-.0625)*(6.5^2)*.4/2	-0.53	6.5/3	2.167	-1.14
W.H13>	-(.0625)*6.5^2/2	-1.32	6.5/3	2.167	-2.86
Vert	Net Weight	6.63		Sum+M	24.23
Horiz	Total Horiz Load	-0.79		Sum-M	-4.85
				Net M	19.38
eccentric	=(N12)/K10	2.922	> 6/3	2	OK
	C.G. within 1/3 base Length		Max Pres	1.191	
	Eccentricity =	0.078	Min Pres	1.019	

This was prepared on July 15, 2003

5 ft Hi StpLog closure Abutment Load Case II During Flood Condition

Element	Vertical Load	kips	M. Arm	ft	Moment
					k-ft/ft
1.Alm Panels	12(1.25).15	2.726	3+1.083	4.083	11.130
2.Stem Wall	1*(5).15	0.750	1+.5	1.5	1.125
3.Stem Wall	(.25)5*(.5).15	0.094	2+.25/3	2.083	0.195
4.Foundat'n	67*1.5(.15)	1.35	6/2	3	4.050
5.Soil	(.125-.0625)4.75(	1.336	7-4.75/2	4.625	6.179
6.Water Frnt	1*5*.0625/2	0.1563	1/2	0.5	0.078
7.Water Back	-.0625*(3.75)*5	-1.172	2.25+3.75/2	4.125	-4.834
8.Uplift Rect	.0625(6)6.5/2	-1.219	6/2	3.00	-3.656
9.Uplift Trian	.0625(6.5-3.25)6/	-0.609	'6(2/3)	4.000	-2.438
Sum (1 - 7)	Sum+Vert Load	5.24		3.42	17.92
Sum (8 - 9)	Sum -Vert Load	-1.83		3.33	-6.09
Sum (1 - 9)	Sum Vert Load	3.41		3.47	11.83
	Footing size	F.S. Ovti	2.954	> 2.0	
	6' L x 1.5' Deep	F.S.Slidi	-1.846	>1.5	

Load	Calculation Form	Ver,Hor	C.Form	M. Arm	Moment
					k-ft/ft
+V1-9		3.41		3.467	11.83
Sol.H10	-(.125-.0625)*(6.5^2)*.4/2	-0.53	6.5/3	2.167	-1.14
W.H11>	-(.0625)*6.5^2/2	-1.32	6.5/3	2.167	-2.86
Vert	Net Weight	3.41		Sum+M	11.83
Horiz	Total Horiz Load	-1.86		Sum-M	-4.00
				Net M	7.82
eccentric	=(N11)/K9	2.293	> 6/3	2	
	C.G. within 1/3 base Length		Max Pres	0.971	
	Eccentricity =	0.707	Min Pres	0.167	

5 ft Hi StpLog closure Abutment Load Case III

Element	Vertical Load	kips	M. Arm	ft	Moment k-ft/ft
1.Alm Panels	12(1.25).15	2.726	3+1.083	4.083	11.130
2.Stem Wall	1*(5).15	0.750	1+.5	1.5	1.125
3.Stem Wall	(.25)5*(.5).15	0.094	2+.25/3	2.083	0.195
4.Foundat'n	67*1.5(.15)	1.35	6/2	3	4.050
5.Soil	(.125-.0625)4.75(	1.336	7-4.75/2	4.625	6.179
6. Surcharg	.1(3.75)	0.375	6-3.75/2	4.125	1.547
7.Water Frnt	1*5*.0625/2	0.1563	1/2	0.5	0.078
8.Water Back	.0625*(3.75)*5	1.172	2.25+3.75/2	4.125	4.834
9.Uplift Rect	.0625(6)6.5/2	-1.219	6/2	3.00	-3.656
10.Uplift Tria	.0625(6.5-3.25)6/2	-0.609	'6(2/3)	4.000	-2.438
Sum (1 - 8)	Sum+Vert Load	7.96		3.66	29.14
Sum (9 - 10)	Sum -Vert Load	-1.83		3.33	-6.09
Sum (1 - 10)	Sum Vert Load	6.13		3.76	23.04
	Footing size	F.S. Ovt	4.751	> 2.0	
	6' L x 1.5' Deep	F.S.Slidi	-2.908	>1.5	

Surcharge during Flood Condition

Load	Calculation Form	Ver,Hor	C.Form	M. Arm	Moment k-ft/ft
+V1-10		6.13		3.759	23.04
ScharH11:	.1*(.4)*6.5	-0.26	6.5/2	3.250	-0.85
Sol.H12	-(.125-.0625)*(6.5^2)*.4/2	-0.53	6.5/3	2.167	-1.14
W.H13>	-(.0625)*6.5^2/2	-1.32	6.5/3	2.167	-2.86
Vert	Net Weight	6.13		Sum+M	23.04
Horiz	Total Horiz Load	-2.11		Sum-M	-4.85
				Net M	18.19
eccentric	=(N11)/K9	2.968	> 6/3	2	
	C.G. within 1/3 base Length		Max Pres	1.055	
	Eccentricity =	0.032	Min Pres	0.989	

5 ft Hi StpLog Closure Abutment Load Case IV

Element	Vertical Load	kips	M. Arm	ft	Moment k-ft/ft
1.Alm Panels	12(1.25).15	2.726	3+1.083	4.083	11.130
2.Stem Wall	1*(5).15	0.750	1+.5	1.5	1.125
3.Stem Wall	(.25)5*(.5).15	0.094	2+.25/3	2.083	0.195
4.Foundat'n	67*1.5(.15)	1.35	6/2	3	4.050
5.Soil	(.125-.0625)4.75(	1.336	7-4.75/2	4.625	6.179
6. Surcharg	.1(3.75)	0.375	6-3.75/2	4.125	1.547
8.Water Back	.0625*(3.75)*5	1.172	2.25+3.75/2	4.125	4.834
9.Uplift Rect	.0625(6)1.5/2	-0.281	6/2	3.00	-0.844
10.Uplift Tria	.0625(6.5-1.5)6/2	-0.938	'6(2/3)	4.000	-3.750
Sum (1 - 8)	Sum+Vert Load	7.80		3.72	29.06
Sum (9 - 10)	Sum -Vert Load	-1.22		3.77	-4.59
Sum (1 - 10)	Sum Vert Load	6.58		3.72	24.47
	Footing size	F.S. Ovt	5.045	> 2.0	
	6' L x 1.5' Deep	F.S.Slidi	-3.123	>1.5	

Dudden Drawdown after Flood Condition

Load	Calculation Form	Ver,Hor	C.Form	M. Arm	Moment k-ft/ft
+V1-10		6.58		3.716	24.47
ScharH11:	.1*(.4)*6.5	-0.26	6.5/2	3.250	-0.85
Sol.H12	-(.125-.0625)*(6.5^2)*.4/2	-0.53	6.5/3	2.167	-1.14
W.H13>	-(.0625)*6.5^2/2	-1.32	6.5/3	2.167	-2.86
Vert	Net Weight	6.58		Sum+M	24.47
Horiz	Total Horiz Load	-2.11		Sum-M	-4.85
				Net M	19.62
eccentric	=(N11)/K9	2.979	> 6/3	2	
	C.G. within 1/3 base Length		Max Pres	1.120	
	Eccentricity =	0.021	Min Pres	1.075	

Chen, Sun C NAB02

From:	Frey, Charles E NAB02
Sent:	Wednesday, July 16, 2003 1:55 PM
To:	Chen, Sun C NAB02
Subject:	Bloomsburg Soil Parameters

Sun,

Per your request, here are the following soil parameters:

angle of friction = 30 degrees

moist unit weight of soil = 125 pcf

Ka = 0.333

Kp = 3.0

Let me know if you need any other soil parameters.

Chuck Frey, P.E.
USACE - Baltimore District
Engineering Division
Geotechnical Branch
Foundations & Dams Section

```
0100 BLOOMSBURG H-PLIE FLOOD WALL 7-17-2003  CARSLAB
0200 KSI FT IN IN KIP
0300 4 3 1 29000. .3
0400 1 0. 0.  2 0. 25.8  3 0. 26.3  4 0. 39.3
0500 FIX X 1  FIX Y 1  FIX R 1  FIX KX 16.802 2
0600 1 1 2  2 2 3  3 3 4
0700 1050. 30. 9.877  1 TO 3     HP14x102
0800 LOAD CASE 1 0 2 0 0 0  HYDROSTATIC LOAD
1000 0 5.064 .5 4.875 0  2
1100 0 4.875 13. 0. 0  3
```

PROGRAM CFRAME V02.05 24JUL84
--*-*-*-*-*-*-*-*-*-*-*-*-*-*

RUN DATE = 7/17/2003
RUN TIME = 10:47:31

BLOOMSBURG H-PLIE FLOOD WALL 7-17-2003 CARSLAB

*** JOINT DATA ***

JOINT	X	Y	FIXITY X	FIXITY Y	FIXITY R	KX	KY	KR
	---FT	---				---KIP /IN	---	IN -KIP/RAD
1	.00	.00	*	*	*			
2	.00	25.80				.168E+02		
3	.00	26.30						
4	.00	39.30						

*** MEMBER DATA ***

MEMBER	END A	END B	LENGTH	I	A	AS	E	G
			FT	IN **4	IN **2	IN **2	KSI	KSI
1	1	2	25.80	.1050E+04	.3000E+02	.9877E+01	.2900E+05	.1115E+05
2	2	3	.50	.1050E+04	.3000E+02	.9877E+01	.2900E+05	.1115E+05
3	3	4	13.00	.1050E+04	.3000E+02	.9877E+01	.2900E+05	.1115E+05

*** LOAD CASE 1 HYDROSTATIC LOAD

MEMBER	LA	PA	LB	PB	ANGLE
	FT	KIP /FT	FT	KIP /FT	DEG
2	.00	.5064E+01	.50	.4875E+01	.00
3	.00	.4875E+01	13.00	.0000E+00	.00

1 LOAD CASE 1 HYDROSTATIC LOAD

JOINT DISPLACEMENTS

JOINT	DX	DY	DR
	IN	IN	RAD

1	.0000E+00	.0000E+00	.0000E+00
2	.2168E+01	.0000E+00	-.1522E-01
3	.2262E+01	.0000E+00	-.1557E-01
4	.4967E+01	.0000E+00	-.1768E-01

MEMBER END FORCES

MEMBER	JOINT	AXIAL KIP	SHEAR KIP	MOMENT IN -KIP	MOMENT EXTREMA IN -KIP	LOCATION IN
1	1	.0000E+00	-.2248E+01	-.1149E+04	-.1149E+04	.00
	2	.0000E+00	.2248E+01	-.1845E+04	-.1845E+04	309.60
2	2	.0000E+00	.3417E+02	-.1845E+04	-.1648E+04	6.00
	3	.0000E+00	-.3169E+02	-.1648E+04	-.1845E+04	.00
3	3	.0000E+00	.3169E+02	-.1648E+04	.0000E+00	156.00
	4	.0000E+00	.0000E+00	.0000E+00	-.1648E+04	.00

STRUCTURE REACTIONS

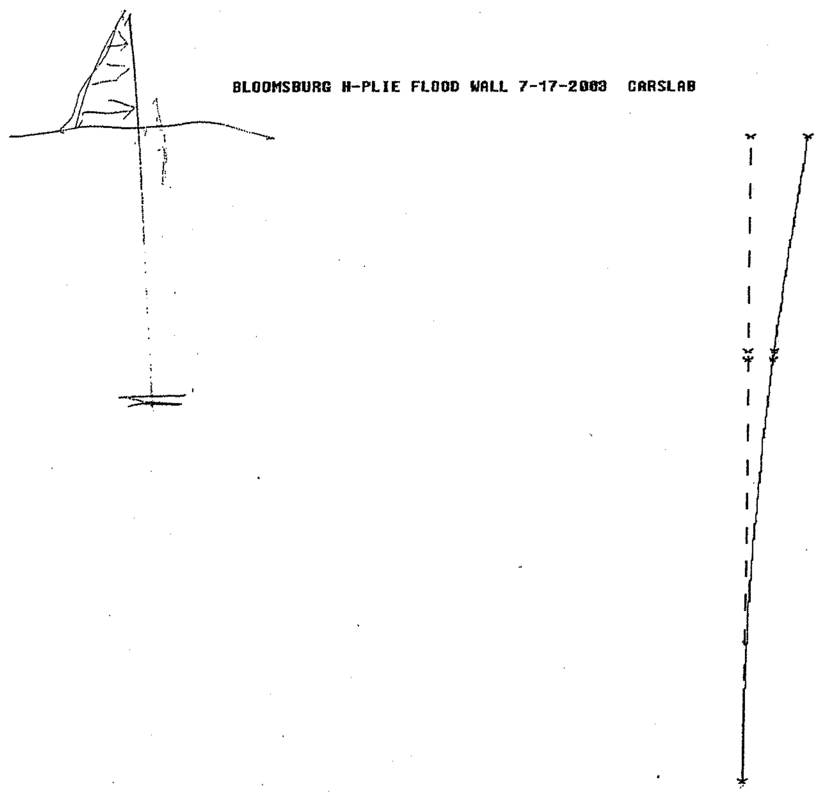
JOINT	FORCE X KIP	FORCE Y KIP	MOMENT IN -KIP
1	.2248E+01	.0000E+00	.1149E+04
2	-.3642E+02	.0000E+00	.0000E+00
TOTAL	-.3417E+02	.0000E+00	

BLOOMSBURG H-PLIE FLOOD WALL 7-17-2003 CARSLAB

= 1845. IN -KIP MOMENT 7/17/2003 10:47:31

LOAD CASE 1 HYDROSTATIC LOAD

BLOOMSBURG H-PLIE FLOOD WALL 7-17-2003 CARSLAB



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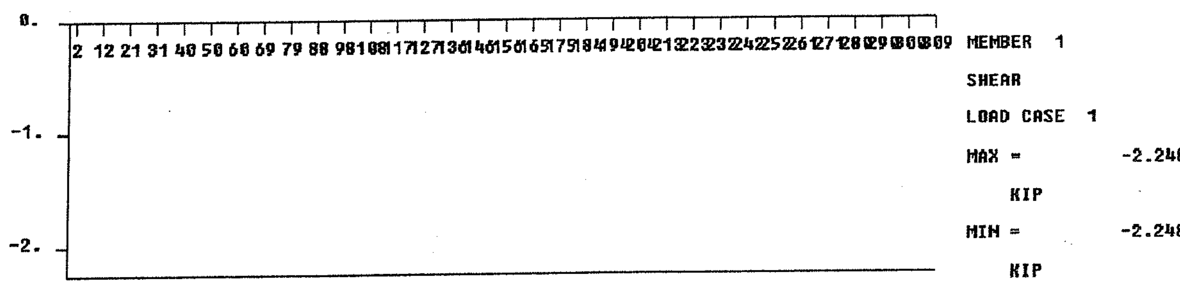
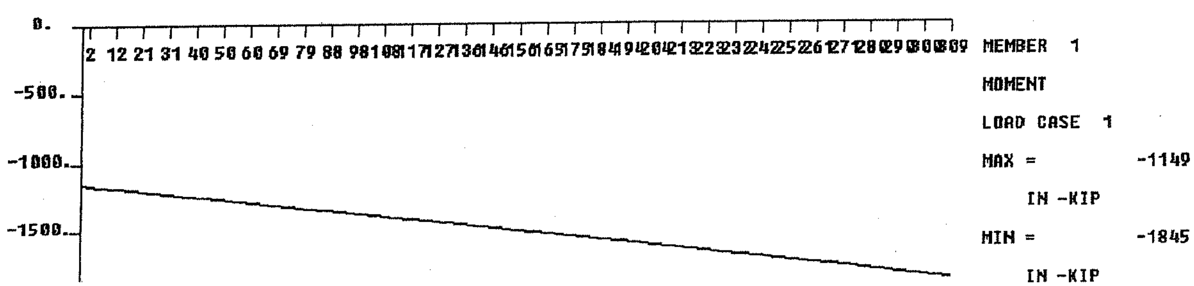
LOAD CASE 1 HYDROSTATIC LOAD

BLOOMSBURG H-PLIE FLOOD WALL 7-17-2003 CARSLAB





7/17/2003 10:47:31

LOAD CASE 1 HYDROSTATIC LOAD

BLOOMSBURG
LOCAL FLOOD PROTECTION

COLUMBIA COUNTY, PA

STRUCTURAL
QUANTITY

BLOOMSBURG Local Flood Protection, PA
35% PRELIMINARY STUDY

Bloomsburg, PA, LFP, Structural Quantity **July 31, 2003**

	Concrete	Reinf Stl	Aluminum	A-36 Steel	Precast Conc
	CY	Tons	Lbs	Tons	CY
1. Rt 11 Stop Log Closure					
11.9 ft Ht x 52 ft Wide	198	16	6,940	2.3	
2. Rail Road Gate Closure					
11.25 ft Ht x 24ft Wide	731	51		4.0	
3. H-Piles Flood Wall, 1153 ft Length				HP14x102	Precast Conc for wall panels
12 ft above ground, 30 ft below gr incl. 5 ft in rock.	444	56		430	485
4. RR Street Closure					
5 ft Ht above ground x 24 ft Wide 11.5 ft below grade	117	9.4	1,490		
	1,490	**132.4**	**8,430**	**436.3**	**485**
	CY	**Tons**	**Lbs**	**Tons**	**CY**

P:\My Projects\Bloomsburg\Closure Struct\35%quantity 8/14/2003 4:49 PM

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT Bloomsburg LFP PA Struct Quantity

COMPUTATIONS Rt 11, Closure Abutment SHEET 1 OF ____ SHEETS

COMPUTED BY Ace CHECKED BY ______ DATE 7-4-03

Rt. 11. Stoplog Closure Abutment.

1. Wall ▯ 13.5'(1.25') = 16.9 SF
2. Wall △ .583(13.5')½ = 3.94
3. Footing 17.5'(2') = 35.0

55.84 SF

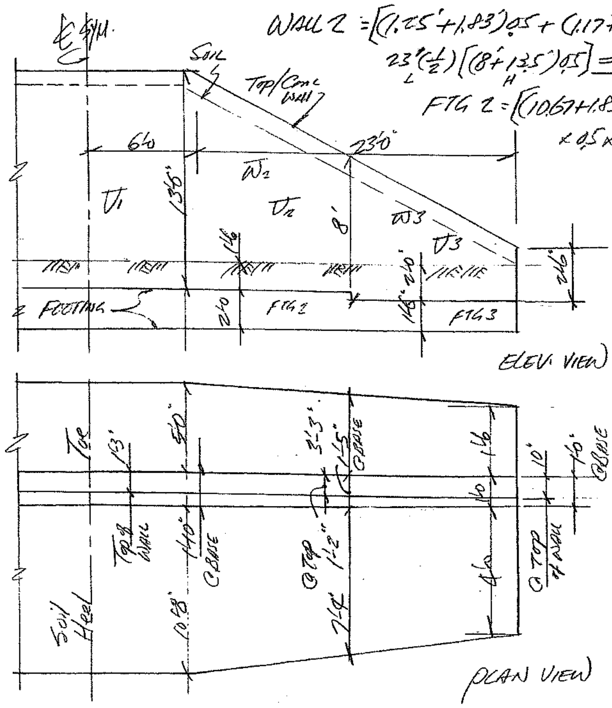
For 6' length $V_1 = 55.84^{SF}(6')$

$V_1 = 335^{CF}$

Wingwall 2

Wall 2 = [(1.25'+1.83')0.5 + (1.17+1.92)0.5] 0.5 × 23'(½)[(8'+13.5')0.5] = 175 CF (Thick, L, H)

FTG 2 = [(10.67+1.83+5) + (7.33+1.42+3.25)] × 0.5 × 23 × 0.5 (2') = 339 CF



NAB FORM 1232

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT BLOOMSBURG LFP CONC QUANTITY

COMPUTATIONS Rt 11 CLOSURE ABUTMENT SHEET 2 OF SHEETS

COMPUTED BY JCC CHECKED BY DATE 7-24-03

Wing Wall 3, WALL 3:

[(1.17+1.92)0.5+(0.833+1.0)0.5] $\frac{1}{2}$ (23)0.5(8+25) $\frac{1}{2}$ = 66.8 CF

FTG 3: [(7.33+1.42+3.25)+(4+1+1.5)] $\frac{1}{2}$ (23) $\frac{1}{2}$ (1.5) = 160 CF

18.5

Total $\frac{1}{2}$ Abutment = 335+175+339+66.8+160+171 = 1,247 CF

Seep Wall 0.75(13.5)9.5(0.5) = 48 CF

Addition Conc above Toe of FTG

[5(6)+(5+3.25)0.5(11.5)]1.5+(3.25+1.5)0.5(11.5)2 = 171 CF

77.44 116 54.6

Total 1 Abutment V = 1,247(2)+48 = 2,542 CF

Two Abutments 2,542(2) = 5,084 CF (1.05)/27

= 198 CY

REINF STEEL:

160 lbs/CY (198) = 32,000 lbs = 16 TONS

BALTIMORE DISTRICT, CORPS OF ENGINEERS — PAGE ____

SUBJECT: Bloomsburg LFP. Rt 11. Closure

COMPUTATIONS: Aluminum Panels — SHEET 3 OF ____ SHEETS

COMPUTED BY: [signature] CHECKED BY: ____ DATE: 7-30-03

Rt 11. STPLUG. CLOSURE. ALUMINUM PANEL Consists of
2-[CS 10 x 8.36 w/ Alum Pl 3/8" x 3'-10"   Alloy 6061-T6
For Bridge Construction

Alumin. Standards & data 1970-71. P.122
Sheet & Plate Table 7.37 Alloy 6061. Density 0.098 lbs/cu in.
0.375" (= 3/8") Pl. wt = 5.6 lbs/sq ft.

1 Panel 12'-6" x 3'-10" = 12.5'(3.83')5.6(3)(4) = 3,217 lbs
2-CS10x8.36 = 8.36#/'(2)12.5'(3)4 = 2,508 lbs
8-Stiffener Pl = 3/8" x 3½" = 12.5'(.292')5.6(8) = 164 lbs
5-½" x 6' Stay 7.5#/' [4'-2(.354')]0.5'(5)3(4) = 721 lbs

Σ 6610 lbs (1.05) + Misc
= 6940 lbs

POST: A36 STEEL

W24x62 = (12.5+3')3(62#/') = 2883 lbs
70° Pl ½" x 4" x 24" = 6.81#/'(2')3 = 41
Pl 3/8" x 12" = 15.3#/'(15.5'-2')3 = 620
Pl 3/8 x 10" = 12.8#/'(15.5)3 = 595
½" Stiffener Pl = [23.74"-2(0.59")]1/12 · [(7"-0.43")/2]1/12 (490)(0.5/12)6(3) = 189
1.88'   .274'

Σ 4328 lbs (1.07) ~ + Misc
= 4631 lbs

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT Bloomsburg LPP RR Gate Closure

COMPUTATIONS Abutment Concrete SHEET 4 OF ______ SHEETS

COMPUTED BY Lee CHECKED BY ______ DATE 7-30-03

Abutment Concrete:

Wall 1 (Mid): (1+3.5)0.5(12')14.25' = 385 CF

Wall 2 (Wing): [(1'+3.5)+(1+1.25')] ½ · ½ (27.0')(14.25+1)0.5(2) = 695 CF

Footing: 12'(12')12' + [15'(4')2'+(15+4)0.5(23')2']2 = 2,842 CF
(1,728)

One Abutment Σ 3922 CF

2-Abutments 3922(1.08) 2/27 = 731 CY.

Reinf. Steel:
Assume 140 lbs/CY (731) = 102299 lbs ≐ 51 Tons.

A-36 Steel Gate = 24 Wide span × 10'-6" Ht

Skin Pl 5/16:	12.8 #/sf (10.5) 21.75'	= 2,923 lbs
Stiffener WT6x9.5:	9.5 #/' (10.5') 9 pc	= 906
End Pl ½"x3":	5.1 #/' (10.5') 2	= 107
End Pl ½"x16:	20.9 #/' (1.33') 11 (2)	= 597
Horiz Pl ½"x6":	10.2 #/' (21.75')	= 222
Horiz Bm W16x50:	50 #/' (23.42') 2	= 2342
X-stl Rods ¾" φ:	1.503 #/' [$\sqrt{(5)^2+(21/2)^2}$] 4 (11.63)	= 70

Misc
Σ 7,167 (1.10)
= 7,884 lbs
= 3.94 Tons ≈ 4 Tons

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

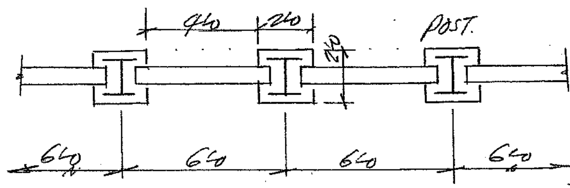
SUBJECT Bloomsburg CPP, PA H-Pile Flood Wall

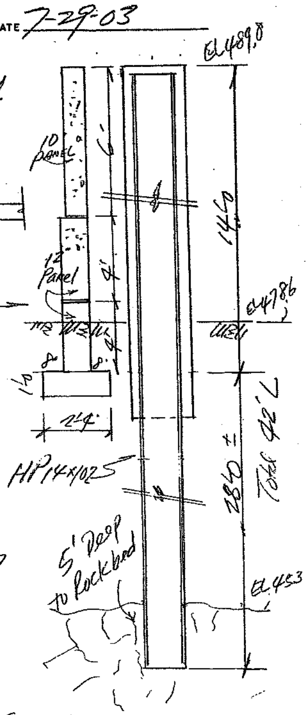
COMPUTATIONS Conc Quantity & HPiles SHEET 5 OF SHEETS

COMPUTED BY Lee CHECKED BY DATE 7-29-03

Total Length of H-Pile Flood Wall

Sta. 27+60 ~ Sta 39+13: = 1,153 ft





1153'/6' = 192 Unit + 2'

Precast Conc Panel

1'x4'-5L: (1)4(5)'(192) = 7,680 CF

10"x6'-5L: 0.833(6)5'(192) = 4,800 CF

Σ 12,480 CF (1.05)/27

Precast Conc = 485 CY

Pour in Place Conc FTG: 2'4"(1)5'(192) = 2,240 CF

Post Conc [2'(2')16' - 1(1)16]191 = 9,170 CF

Σ 11,410 CF x 1.05 (+Misc)

= 444 CY Pour in Place Conc

H-Piles HP14x102

42' Deep x 102#/' (191)(1.05) = 859,156 lbs = 430 Tons

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE ______

SUBJECT BLOOMSBURG LFP H-PILE FLOOD WALL

COMPUTATIONS REINF STEEL SHEET 6 OF ______ SHEETS

COMPUTED BY [signature] CHECKED BY [signature] DATE 7-29-03

REINF. STEEL BARS =

IN POST

VERT. #5 = 42'(4)191(1.043 #/') = 33468 lbs

TIES #3 = (85"/12)[42'(12)/8+1]191(0.376) = 32,557 lbs

} 66,025

TOP & MID PANELS · 6'H & 4'H × 5' WIDE

HORZ #5 @ 12" (6+1)2(5)192(1.043 #/') = 14,018 lbs

VERT. #4 @ 12" (4+1)2(5)192(1.043) = 10,013

6(2)10'(192).668 = 15,391

} 39,422

≈ 120 lbs/CY. CONC

Σ 105447(1.06)/2,000 = 56 TONS

BALTIMORE DISTRICT, CORPS OF ENGINEERS FERNVILLE PAGE

SUBJECT BLOOMSBURG LFP PA CONC QUANTITY

COMPUTATIONS RR St. Bridge Abutment 5'H SHEET 2 OF SHEETS

COMPUTED BY jcc CHECKED BY DATE 7-28-03

5'H RR Street Bridge Abutment

1. WALL 1: (1.5'+1.0')0.5(6.5'+5')10 = 144 CF
   WALL 2 = [(1+0.5)0.5 + (0.75+1.5)0.5]0.5(11.5'+4')½(15')2 = 218 CF
   SEEP WALL: 7'(10)0.75' = 52.5 CF
   Σ 415 CF

2. FOOTING = (12.5')10'(3') = 375 CF
   (12.5'+10.583')0.5(3')5'(2) = 346 CF
   (10.583'+6.25')0.5(11')2'(2) = 370 CF
   1091 CF

Total 1 Abutment 415+1091 = 1506 CF

2 Abutments (1,506)(2) = 3012 CF (1.05)/27

= 117 CY

REINF STEEL: 160 lbs/CY (117) = 18,720 lbs = 9.4 TONS

Aluminum Std I-Beam, Alloy 6061-T6 for Bridge Material

2-I6x2 - 4.03 #/ @ First 2 Ft from Pavement Surface

24'(2)(24/6')4.03 #/ = 774 lbs

24'(36/6')4.03 #/ = 580 lbs Misc Hook Handle

Σ = 1354 (1.10) = 1490 lbs

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment E – Hazardous, Toxic, and Radioactive Waste Analysis

May 2004

TABLE OF CONTENTS:

CONTENTS

FIGURES

TABLES

LIST OF SUB-ATTACHMENTS

1. Executive Summary.

A preliminary hazardous, toxic, and radioactive waste (HTRW) investigation was conducted to identify areas within the currently proposed limits of construction of the flood protection project that, due to the presence of contamination, could impact the planned construction activities. While the scope of investigation was limited in nature and not designed to fully delineate the extent of contamination in the vicinity of the project location, the data acquired is suitable for identifying the potential constituents of concern (COCs), establishing guidelines for the handling of material generated during construction, and providing generalized recommendations for the subsequent phases of the project.

Based on the results of this investigation, sites of potential concern along the proposed flood protection alignments were identified. Sampling results revealed elevated concentrations of heavy metals in excess of applicable cleanup levels throughout the study area and additional volatile organics and pesticide contamination in the vicinity of the inactive Magee Industries landfill. The data indicate that the heavy metals concentrations throughout the study area are consistent with background levels, and as a result, it is assumed that the majority of the material will be available for reuse in the construction of the flood protection elements. Contaminated soil in the segment of the alignment that passes through "Area E" of the landfill area is unlike material found elsewhere within the study area because of the presence of carpet fibers and other debris. Therefore, it is unsuitable for reuse during construction and will have to be disposed of offsite in a manner consistent with Pennsylvania and Federal regulations.

To pre-characterize the material that is expected to require offsite disposal, additional sampling was conducted in the inactive landfill area. The analytical results indicate that the material that was sampled in this area may be disposed as non-hazardous waste at a permitted disposal facility. Nevertheless, based on past experience related to construction projects at similar sites, and given the heterogeneity typical of uncontrolled dump sites, 25 percent of the material from "Area E" has been assumed to require offsite disposal as hazardous waste for cost estimating purposes. Although no hazardous waste has been identified to date in this area based on the limited sampling program, this assumption offers a reasonable contingency to account for the range of material that may be encountered. As the financial responsibility associated with the cost of any material that requires off-site disposal lies with the Town of Bloomsburg, these are important considerations as the project moves forward.

Due to the characteristics of the contaminated material that is expected to be encountered, appropriate health and safety measures during construction are essential to insure that the workers involved are adequately protected. In addition, measures to minimize the offsite transport of fugitive dust and runoff containing contaminated soil are critical to insure the necessary level of protectiveness to human health and the environment.

To date, no intrusive sampling has been conducted along the Fernville segment of the proposed alignment. Additional investigatory work in the next phase of design will be necessary to characterize any HTRW concerns in this area. In addition, the potential impact of underground storage tanks adjacent to the Fishing Creek on the Bloomsburg side of the alignment must be further defined to determine whether or not relocation or removal is necessary. Additional exploration in the vicinity of the landfills will also be conducted in conjunction with the Pennsylvania Department of Environmental Protection (PADEP) to make fine adjustments to the alignment so as to minimize the amount of waste requiring off-site disposal.

2. Field Investigations.

In May 2003, a Preliminary Assessment (PA) was conducted to focus the subsequent field investigation in those areas with the greatest potential for concern related to adverse environmental conditions and the presence of HTRW. The PA consisted of evaluating existing information via a literature review and database search and was supplemented by a site visit and meeting with Town of Bloomsburg representatives. The literature review evaluated historic aerial photographs from 1973, 1986, and 1994 and Sanborn Fire Insurance Maps from 1929 and 1949. The database search consisted of a review of over 30 Federal, state, and local government databases related to environmental data. Along the proposed alignment, 16 areas of potential concern were initially identified based on meeting one or more of the following evaluation criteria:

- Identified as having a high potential for contamination and lies within 300 feet of the proposed alignment.
- Identified as having a high potential for the release of contaminants during construction.
- May have a significant impact on the project timelines, budgets, or construction relative to areas without HTRW concerns.

Based on this preliminary screening of the 16 sites originally identified, five were determined unlikely to pose HTRW concerns based on the results of the Preliminary Assessment. Samples were collected at the remaining 11 sites during the field investigation. Depending upon the known past and/or present activities at each site, one or more of the following investigatory techniques were employed: (1) soil gas sampling; (2) test pit installation; (3) soil and groundwater sampling for laboratory analysis.

Soil gas sampling was conducted at nine of the eleven sites identified during the Preliminary Assessment. Boreholes were advanced by a mobile hydraulic punch GeoProbe rig equipped with a rotary hammer. Soil gas was field screened at each borehole using a portable photoionization detector (PID) at four-foot intervals, site conditions permitting. A PID is a field instrument used to identify emissions associated with the volatilization of aromatic hydrocarbon contamination. A methane gas probe was also used during the soil gas survey due to the fact that methane is often associated with the decomposition of wastes within a landfill. Based on the results of the field screening, soil gas samples were then collected for analysis by an onsite mobile laboratory.

A total of 12 test pits were excavated during the field activities at nine of the 11 sites identified by the PA. Based on the observed site conditions, multiple test pit installations were necessary at four of the sites. Soil was excavated from each test pit using a wheel-mounted backhoe, and in general, each pit was installed to a maximum depth of eight feet below ground surface (bgs), was 2-3 feet wide, and 9-12 feet long. Each test pit was terminated at the depth at which groundwater was encountered or seven to eight feet below ground surface, whichever came first. Geologic logs describing the soil encountered in each test pit, as well as any anomalies, were also developed. After completion of the test pit excavation and any sampling, the pits were backfilled using the excavated material, which was then compacted to match the surrounding grade to the extent feasible.

Soil was collected from distinct intervals as the excavation of each test pit proceeded, homogenized, and field screened using a PID. At least one sample was collected from each test pit and submitted for laboratory analysis based on the results of the field screening. When encountered, and if deemed appropriate by field personnel, groundwater samples were also collected. Groundwater was filtered in the field before being placed in the sample container to remove excess sediments and provide results that are representative of the dissolved fraction of heavy metals that may be present.

Samples collected during this investigation were analyzed for one or more of the following potential COCs, depending upon the known operational history of each site:

- Heavy metals
- Semi-volatile organic compounds (SVOCs)
- Volatile organic compounds (VOCs)
- Total petroleum hydrocarbons – gasoline range organics (TPH-GRO)
- Total petroleum hydrocarbons – diesel range organics (TPH-DRO)
- Pesticides and herbicides
- Polychlorinated biphenyls (PCBs)

Samples collected during this sampling program were identified and labeled using unique sample identifiers. At least one sample from each test pit was submitted to the PADEP onsite mobile laboratory for metals analysis. Select soil and groundwater samples were also sent to an offsite laboratory to confirm the results of the PADEP lab analyses and to provide greater accuracy.

Various fill materials were encountered at the majority of the sampling locations to a maximum depth of approximately seven feet below ground surface. Across the proposed alignment, the fill material that was encountered was found to contain a combination of ash, brick, gravel, and other debris, including carpet fragments at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00).

Additional sampling was performed in October 2003 to fill data gaps that were identified during the May 2003 investigation. The purpose of this follow-up sampling was to: (1) characterize the contaminated soil found at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) along the proposed fringe alignment for disposal purposes; (2) conduct limited sampling in areas of potential concern along the interior alignment for which rights-of-entry were available; (3) perform sampling in the area to the southwest of Site 7 to delineate the extents of the landfill area; and (4) conduct limited sampling at the canal lock tie-in area.

Waste characterization samples at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) were prepared using the toxicity characteristic leaching procedure (TCLP) and analyzed for the full suite of toxic chemicals required for classification under the Resource Conservation and Recovery Act (RCRA). Samples in the interior alignment, landfill extents, and canal lock tie-in areas were analyzed in a manner analogous to the methods used in the May 2003 sampling event.

3. Analytical Results.

May 2003 Sampling Event

The soil gas survey detected methane gas and VOCs at concentrations that indicate the potential for concern during project construction at three locations: Site 6 (Southwest of Area F and Magee Landfill, Station 66+00 to 74+00), Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) and Site 9 (Northwest of the Secondary Treatment Basin, Station 111+00 to 116+00). The most significant readings were observed at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) and included a significant spike in the reading for toluene, a common chemical component to gasoline, paint, and solvents. This corresponds with a strong odor observed during the test pit installation at this location. Additional health and safety measures will be required during construction in these areas to insure worker safety; additional information is provided in Section 4.

The soil sampling results have been compared to State of Pennsylvania statewide health standards as defined by the Land Recycling and Environmental Remediation Standards Act (PA Act 2). The PA Act 2 regulations include standards that apply to specific environmental media; namely, soil and groundwater. The PA Act 2 soil standards are further divided to include cleanup standards for both residential and non-residential areas, as well as standards for subsurface soil that may come into contact with useable groundwater (the "soil to groundwater standard"). Similarly, there are different PA Act 2 groundwater standards for aquifers identified as suitable for use as residential drinking water wells and those aquifers that are not.

The results of the soil sampling indicate that heavy metals are prevalent in the soil throughout the proposed alignment, with some present at levels exceeding the PA Act 2 regulations. Based on the PADEP mobile laboratory results, arsenic was found to exceed its residential direct contact criteria at every sample location, and antimony concentrations exceeded its residential direct contact criteria in three samples. In addition, antimony was found to exceed its soil to groundwater standard in all samples. None of the samples exceeded the non-residential cleanup standards for any constituent. A summary of the results for each of the sampling locations is presented in Table 1 that provides the alignment station numbers and indicates whether or not the soil sampled at each location was found to exceed any of the PA Act 2 standards previously discussed.

A comparison of the PADEP mobile laboratory results to the offsite laboratory confirmation samples appears to indicate that the mobile laboratory results are biased high, particularly for the metals which were identified to be of greatest potential concern: arsenic and antimony. Since the reuse of excavated soils as construction material is being proposed, it is necessary that sampling be conducted in the next phase of the project to demonstrate that compliance with Pennsylvania's Proposed Clean/Regulated Fill Policy can be achieved. Based on the offsite laboratory results available to date, which are regarded as more accurate and more defensible than the mobile laboratory results, it is currently assumed that the excavated material will meet the requirements for use as regulated fill material pending confirmation in the next phase of the project.

At Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00), the analytical results indicate that heavy metals are not the only COCs. Two pesticides (aldrin and dieldrin) were found in concentrations above their respective soil to groundwater standards in both of the soil samples collected at this location. Several VOCs (most notably 2-methylphenol and xylene) were detected as well but were below their applicable PA Act 2 standards.

Based on available information at the time that this investigation was conducted, nearly all residences in the vicinity of the proposed alignment utilize drinking water delivered by the town of Bloomsburg. Only one compound, aniline, was found in groundwater in excess of the applicable PADEP drinking water standard. Aniline is generally associated with dye formulation products or coal tar, and given that the exceedance was observed in the groundwater sample collected in the area of the former borrow pit and landfill area, it is feasible that it may be related to the carpet debris disposed in this area.

October 2003 Sampling Event

The waste characterization sampling and TCLP analysis at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) revealed no constituents in excess of their respective toxicity characteristic maximum concentrations. However, the sampling confirmed the findings of the initial investigation by documenting the presence of arsenic and pesticides (aldrin and dieldrin) in excess of PA Act 2 standards. Coupled with the presence of several volatile organic compounds at depth in this area, it is being assumed (for cost estimating purposes) that a fraction of the waste generated in this area will be considered hazardous to account for the degree of heterogeneity observed. Pockets of higher contamination may be encountered during construction, and this conservative but realistic assumption is an attempt to account for this.

Sampling of two locations along the interior alignment revealed concentrations of arsenic that, although above the applicable PA Act 2 standards, are consistent with the concentrations observed elsewhere in the project area. No other constituents of concern were identified during this limited sampling event along this section of the interior alignment. At the landfill extents area, other than arsenic, no constituents were identified in excess of their respective PA Act 2 standards.

The canal lock tie-in location is currently utilized as a salvage yard and contains a wide variety of scrap and surplus equipment. Stained soils and petroleum odors were detected at the time of sampling. Petroleum and chlorinated solvent contamination was detected in both near-surface and below-grade locations, but none of the concentrations were found to exceed applicable PA Act standards.

4. Material Handling and Worker Protection.

Based on the analytical results, and as discussed in the previous section, elevated concentrations of heavy metals are present in the surface and subsurface soil along much of the proposed alignment. However, the heavy metals that were detected are likely a local background condition, and soils containing no other regulated constituents are considered uncontaminated from a regulatory perspective. Based on Pennsylvania's proposed Clean Fill Policy, such soils may be used in an unrestricted manner as fill material for the project. Ash and other foreign materials may also be used as fill under PADEP's proposed General Permit for Beneficially Using Regulated Fill (WMGR096), so long as the conditions of the General Permit are met. Any material that exceeds applicable PADEP criteria and is unsuitable for use in the construction would be subject to disposal in a manner consistent with PADEP residual waste regulations. For the purposes of this analysis, it is assumed that all of the excavated material is suitable for reuse in construction with the exception of the material at Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00). This material is expected to be unsuitable for reuse due to the high debris content observed during the field investigation.

The results of the waste characterization sampling conducted in October 2003 indicate that the material that was sampled in this area may be disposed as non-hazardous waste at a permitted disposal facility. Nevertheless, based on past experience related to construction projects at similar sites, and given the heterogeneity typical of uncontrolled dump sites, 25 percent of the material from "Area E" has been assumed to require offsite disposal as hazardous waste for cost estimating purposes. No hazardous waste has been identified to date in this area based on the limited sampling program, but this assumption offers a reasonable contingency to account for the range of material that may be encountered.

The fraction of material being assumed non-hazardous waste (75% of the total volume or approximately 13,600 cubic yards) will be disposed offsite at an actively permitted RCRA Subtitle D disposal facility that is capable of accepting "residual waste" (defined by PADEP as non-hazardous industrial waste). The nearest such facility is the Lycoming County Landfill, located in Montgomery, Pennsylvania, approximately 40 miles from the project site. The remainder (25% of the total volume, or approximately 4,500 cubic yards) is presumed to require disposal as a characteristically hazardous waste.

Hazardous wastes, if indeed they are encountered, are regulated under the authority of the RCRA, and the provisions of RCRA are in effect from the moment the waste is generated. Contaminated soil becomes considered a hazardous waste if, using the TCLP, the extract from a representative sample of the waste contains concentrations equal to or greater than their respective values in RCRA §261.24. Once soil which is determined to be hazardous waste is excavated, it may not be returned to the excavation and must be managed according to the provisions of RCRA to avoid significant future liability. To comply with RCRA, any hazardous waste generated during the construction activities must be properly disposed at a permitted RCRA Subtitle C Treatment, Storage, and Disposal (TSD) facility. For the purposes of cost estimating during this phase of the design, and based on the known contamination, it is expected that the nearest TSD facility capable of accepting the waste is the CWM Chemical Services landfill located in Model City, New York. Additional waste characterization may be conducted at the time any hazardous waste is generated to determine whether or not another disposal facility is more appropriate.

There are several closed landfills in the vicinity of the project site, at least one of which is known to contain unused cells; however, numerous regulatory, environmental, and financial obstacles are present which would likely make placement of contaminated material in these historic landfills impractical. Permitting issues, the potential for uncontrolled releases of contaminants due to the reopening of the landfills, and the costs associated with the redesign of a suitable landfill cap are the most obvious obstacles for such an action.

5. HTRW Construction Considerations.

The alignments under consideration in this project cross or pass very close to several closed landfills. As detailed previously, it is being assumed that some volume of hazardous waste requiring offsite disposal will be generated during the construction in the landfill areas. The extents of the landfills in the vicinity of the proposed alignments are based on user knowledge and best available data, but it should be noted that the true extents are uncertain. Adjustment of the alignment to avoid the landfills may be possible, but additional site characterization efforts would be necessary to identify the most realistic alignment that avoids HTRW concerns to the greatest extent possible in this area. Since current landowners (Magee Industries and Bernardi Foods) have not been willing to offer rights-of-entry for investigations in some of the more critical areas associated with the interior alignment, it is difficult to make concrete conclusions about HTRW in these areas. Moreover, it is clear that construction in the interior alignment landfill areas will present significant administrative and legal hurdles. For these reasons and for the purposes of this analysis, it is assumed that the fringe alignment will be pursued.

Worker exposure to the contaminants discussed in the preceding sections during construction is expected to include inhalation of vapors and fugitive dust, incidental ingestion of soil, and skin absorption. Excavation and management of contaminated soil during construction should be conducted in a manner that minimizes the potential for offsite transport via the air and surface water pathways. It is recommended that an air monitoring program be implemented by an industrial hygienist in this and other areas where the soil gas survey indicated the potential for exposure. This monitoring should include the use of a direct-read, real-time field instrument during intrusive activities in these areas. If visible emissions of dust occur in these areas, whether due to low moisture content of the excavated soils or high winds, dust suppression measures are recommended. Sediment and erosion control measures such as silt fences may also be warranted during excavation and staging of contaminated material, as necessitated by site conditions.

The depth of contaminated material in the vicinity of Site 7 (Former Borrow Pit and Part of Area E of Magee Landfill, Station 74+00 to 80+00) is expected to be on the order of five feet below ground surface, although it may extend into the underlying saturated zone. Due to the limited scope of the test pit installations and the physical limitations of the equipment used to install the test pits, the depth beyond the unsaturated zone is not known at this time. If trench dewatering is necessary during the construction, this fluid will be containerized, tested, and disposed in a manner that is consistent with U.S. Environmental Protection Agency and PADEP guidance.

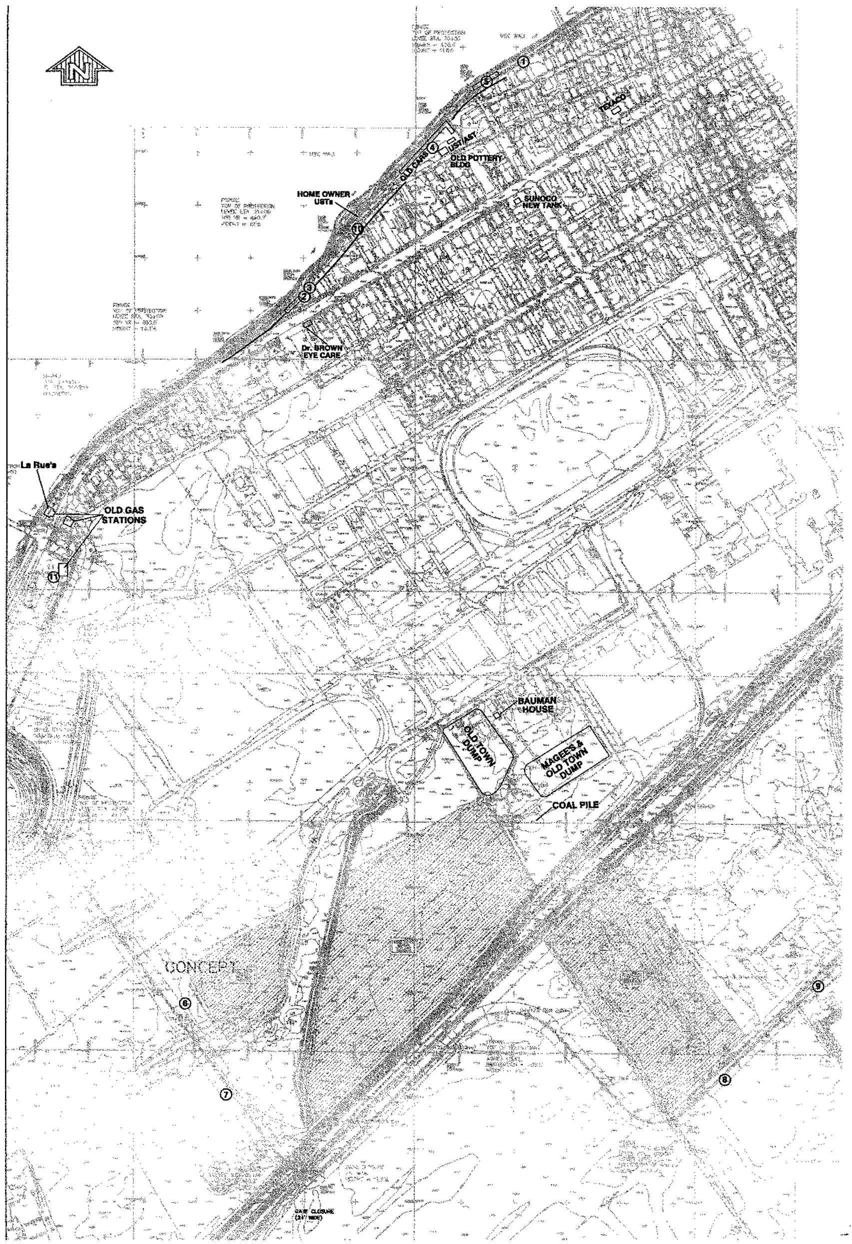
Based on currently available information, two residences in the vicinity of the project have wells and drink the local groundwater. Although it is likely that the construction activities will have no adverse impact on the groundwater quality in the vicinity of these wells, additional consideration will be given to the evaluation of risk to groundwater in the next phase of design (Section 6).

Although not a currently identified source of contamination in the study area, several underground storage tanks (USTs) are known to be present at Site 10 (Proposed Alignment Along Fishing Creek, Station 00+00 to 09+00). Due to the fact that homeowners in this area were not available during the field investigation, the potential for concern is currently unknown. Depending upon the specific methods of construction employed in this area and to accommodate the flood control elements that are currently proposed and whether or not full taking of the properties in this section of the alignment is necessary, these USTs may need to be removed or relocated. Additional characterization of these areas is proposed for the next phase of design (Section 6).

6. Next Phase of Design.

During the pre-construction engineering design (PED) phase to follow, it is expected that HTRW involvement will include a preliminary assessment and limited sampling along the Fernville side of the proposed alignment to identify any potential HTRW concerns. In addition, homeowner interviews will be conducted along the Bloomsburg side of the Fishing Creek segment of the alignment to determine the need for additional sampling and/or a geophysical survey to establish whether or not USTs in the area are expected to have a significant impact on construction activities. In addition, more specific information on the drinking water wells (e.g., exact locations, aquifer characteristics, and the depth to the screened interval) will be obtained to verify that the construction is unlikely to impact groundwater quality in these areas. Additional sampling to confirm that excavated soil can be reused as regulated fill material consistent with Pennsylvania's Proposed Clean/Regulated Fill Policy will also be conducted during PED.

In an attempt to supplement the data obtained during the two previous sampling events, and to further minimize the risk associated with the discovery of previously unidentified waste materials, PADEP and USACE will work together to develop a program to explore the areas adjacent to two landfills along the alignment. This program is expected to include the installation of exploration trenches and/or test pits near the extents of the landfills, in transects parallel and/or perpendicular to the alignment.



La Rue's
OLD GAS STATIONS
HOME OWNER USTs
OLD POTTERY BLDG
SUNOCO NEW TANK
TEXACO
Dr. BROWN EYE CARE
BAUMAN HOUSE
OLD TOWN DUMP
MAGEES & OLD TOWN DUMP
COAL PILE
CONCEPT

USACE - CENAB-EN-HT
BALTIMORE DISTRICT
COMPUTATION WORKSHEET

15 August 2003

BLOOMSBURG FLOOD PROTECTION PROJECT

TABLE 1
QUANTITY OF CONTAMINATED SOIL - STA. 00+00 TO ST.125+00

TYPE OF FLOOD PROTECTION	SAMPLE LOCATION DESIGNATION	SECTION STA. NO. START	END	Excavation Dimensions Length ft	Width ft	Depth ft	Quantity Contaminated Soil (CY)	CATEGORY "A" Q_A (CY)	"B" Q_B (CY)	"C" Q_C (CY)	"D" Q_D (CY)	REMARKS
Earthen Levee	10. Proposed alignment along Fishing Creek	00+00	09+00	1,450	6	6	1,933		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. Homeowner USTs may need to be addressed.
Earthen Levee	1. Stream bank along West First St. at Leonard St.	09+00	12+50	350	6	6	467		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. Homeowner USTs may need to be addressed.
Earthen Levee	4a. Downgradient of the Old Pottery Building	12+50	14+50	200	6	6	267		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. Homeowner USTs may need to be addressed.
MSE Wall	4b. Downgradient of the Old Pottery Building	14+50	16+00	150	6	6	200		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. If full taking is necessary asbestos, LBP and Areas close to the building will need to be investigated.
MSE Wall	2. & 3. Dr. Brown Eyecare / Magee Monument Park	16+00	28+00	1,200	6	6	1,600		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable.
H-Pile Wall	Areas not included for Site Investigation based on PA	28+00	40+00				0					Unlikely to encounter HTRW contaminatation based on Preliminary Assessment information
MSE Wall	11. Old gas stations on Route 11 near River Road	40+00	43+00	300	6	6	400		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable.
MSE Wall	Areas not included for Site Investigation based on PA	43+00	60+00				0					Unlikely to encounter HTRW contamination based on Preliminary Assessment information
Earthen Levee	Areas not included for Site Investigation based on PA	60+00	66+00				0					Unlikely to encounter HTRW contaminatation based on Preliminary Assessment information
Earthen Levee	6. Southwest of Area E of Old Magee Landfill	66+00	74+00	800	6	6	1,067		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. Methane gas and VOCs were detected which will need to be specifically addressed in the Site Safety and Health Specification.
Earthen Levee	7. Former Borrow pit and part of Area E of Old Magee Landfill	74+00	80+00	600	125	6	16,667	Y	Y	N	Y	Excavated waste from the vicinity of the old town dump should be disposed off-site at a permitted facility. Additional waste classification sampling will be required during the PED phase. Methane gas and VOCs were detected which will need to be specifically addressed in the Site Safety and Health Specification.
Earthen Levee	Areas not included for Site Investigation based on PA	80+00	81+00				0					Unlikely to encounter HTRW contaminatation based on Preliminary Assessment information
Earthen Levee	Areas not included for Site Investigation based on PA	81+00	104+000				0					Unlikely to encounter HTRW contaminatation
Earthen Levee	8. Southeastern Edge of Town Dump	104+00	111+00	700	6	6	933		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable.
Earthen Levee	9. Northwest of the Secondary Basin	111+00	116+00	500	6	6	667		Y	N	Y	Excavated soil may be used as non-residential fill in areas where groundwater is not classified as usable. Methane gas and VOCs were detected which will need to be specifically addressed in the Site Safety and Health Specification.
Earthen Levee	Areas not included for Site Investigation based on PA	116+00	125+00				0					Unlikely to encounter HTRW contaminatation

NOTES:
Category "A" - Potential Characteristic (Toxic) Hazardous Waste - Disposal at RCRA Subtitle C Facility
Category "B" - Potential Contaminated Soil Exceeding Residential PADEP ACT2 Criteria
Category "C" - Potential Contaminated Soil Exceeding Non-Residential PADEP ACT2 Criteria
Category "D" - Potential Contaminated Soil Exceeding Exceeding the Soil to Groundwater Impact PADEP ACT2 Criteria

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment F – MCACES Cost Estimate

May 2004

CENAB-EN-DT (340)

16 Apr 04
Bland/3973

MEMORANDUM FOR Chief, Design Management Branch, Civil Works Section, ATTN: Mr. Smith

SUBJECT: Bloomsburg LFP Project, PA – Revise Cost Estimate and Construction Schedule/Escalation

1. Reference electronic message CENAB-EN-MC, 16 Apr 04, SAB.

2. As requested, the 26 Feb 04 baseline cost estimate was revised to reflected the correct account 01, Real Estate Payment to match the current recommended plan.

3. Also, provided for your use and information, are the revised Cost Summary Report for the subject project, see enclosures 1 and 2.

4. The revised baseline Cost estimate for the Recommended Plan is **$33,587,636** for Bloomsburg, and **$12,650,884** for Fernville for a total amount of **$46,238,521.** The Recommended Plan reflects a longer levee and a shorter MSE wall on the Bloomsburg side, and is at an Agnes level of event for the fringe alignments.

5. The project construction duration is 1,095 days, with an award date of Mar 09 and the midpoint of construction is Sep 10. The project design duration is 730 days, with a start date of Jan 05 and the midpoint of design being Jan 06.

6. It is noted that account 32 – Hazardous and Toxic Waste was deleted from the recommended plan. The cost for the non-hazardous waste was added to account 11 of the recommended plan, and the hazardous waste is a stand-alone cost estimate and is being provided as enclosure 3.

7. The baseline cost estimate was peer reviewed by Mr. Samuel Wright, CENAB-EN-DT on 26 Feb 04.

8. Please contact Mr. Cedric Bland at ext. 3973 if you should require any additional information.

2 Encls

David J. Roberts
DAVID I. ROBERTS, P.E.
Acting Chief, Estimating and
Specifications Section
Engineering Division

Bloomsburg/Fernville LFP Project
Agnes Level of Protection
Columbia County, PA
Feasibility Study
Recommended Plan (Rev: 4/16/04)

Designed By: Baltimore District
Estimated By: Cost Engineering Branch

Prepared By: Cedric Bland
QC Review: Sam Wright

Preparation Date: 02/26/04
Effective Date of Pricing: 02/01/04
Est Construction Time: 1095 Days

Sales Tax: 6.0%

THE ESTIMATE IS BASED ON THE PROPOSED DESIGN CHANGES AS STATED IN THE 1 OCT 03 MEETING. THOSE PROPOSED CHANGES CONSISTS OF THE FOLLOWING:

PROPOSED DESIGN CHANGES: The technical and cost feasibility of each suggestion has been evaluated. Changes which are feasible technically and may significantly reduce project cost have been considered more carefully during the feasibility phase, and changes outside this category have been deferred for consideration during the design phase.

Town-side project:

1. Project alignment between station 2+00 and 10+00-Can the alignment along this stretch be moved closer to Fishing Creek to avoid taking so many properties? Given the 15-20 feet easement required for construction, is this feasible? Geotechnical and EIS impacts will need to be assessed as well. Real Estate will need to participate to determine if takings can be reduced.

Answer: This change has been implemented. Dave Capka and Dennis Seibel walked the area on 14 Oct 03 and determined that streambank riprap can be eliminated along this stretch, provided the toe of the levee is at least 15' from the top of the bank. If we move the alignment approximately 40 feet riverward, we will be able to save 7 houses, saving $704,500 in real estate acquisitions. Seven residences which were full fee takes would become partial easement takes, since most backyards and outbuildings will be taken. Riprap will still be required on the levee slope.

2. Project alignment between station 15+00 to 20+00-Because earthen levee is less costly than MSE, can the earthen levee be extended to include this stretch in lieu of the MSE wall currently shown? Even though one or two properties may still need to be acquired, this may reduce cost. The Town is willing to close W. First Street to accomplish this.

Answer: This change has been implemented. This change saves $585,000 in construction costs and $1,576,000 in real estate costs.

3. Routes 11 and 42-As shown, there is one stoplog and one sand bag closure at this location. Can the stoplog closure be moved closer to the interchange to eliminate the sand bag closure and the "Y" ramp? Would this change affect project economics? While eliminating one closure, this change necessitates that the one closure still required may be a massive one, possibly 125-feet wide which is very costly. If this change cannot be made during the feasibility phase, the Town requests that the River Road access ramp to the Fairgrounds be eliminated.

Answer: This suggestion is not feasible. Neither a swing gate nor a roller gate can be economically built due to the approximately 12-foot height and 125-foot width. A stoplog closure would take an entire day to erect, and removable panels would require that a large crane be available. A stoplog closure of 6' height and 80' width in Kingston, PA cost $495,000 to construct, and ours would be expected to cost approximately twice that amount. An additional 1,000 feet of H-pile wall would need to be built along Fishing Creek to tie into the closure structure, at approximately 7 times the cost of the levee which would not be required across the road. Additional land would be removed from the floodplain, pushing more water into Fernville. We also do not recommend that the River Road access ramp to the fairgrounds be eliminated because the cost savings is insignificant, approximately $50,000, and will result in more difficult access to the fairgrounds.

4. Fairground ramps-In lieu of the two ramps shown, provide just one ramp, straighten the alignment and reduce the height by using a sand-bag closure.

Answer: We have eliminated one ramp, resulting in a savings of $415,000, and additional savings will be realized from lowering the ramp that remains. For the ramp which remains, we intend to use a removable closure panel, which would be normally left in place, rather than sandbags. The panel would be removed only for special events on the fairgrounds where the additional parking is needed.

5. Sand Street ramp-Eliminate the Sand Street ramp since it is seldom used and no longer maintained by the Town. The Town agrees that Sand Street can be closed.

Answer: The ramp has been deleted, resulting in a savings of $245,000. A barricade, approximately 30' long, will be required at the end of the road near the levee to keep vehicles from driving onto the levee.

6. Tie-out near the Canal Lock-Can the tie-out occur at the high school to avoid the potentially costly mitigation for the canal lock? Corps will need to assess the mitigation costs for the Section 106 resources and H&H impact (drainage issue) if this tie-out is revised to make the high school part of the tie-out. The school district is in the middle of a renovation project and is willing to partner so that its changes are compatible with this project. A suggestion was also proposed to sample and test for contaminated soils at this tie-out location given anecdotal information provided by SEDA-COG that this area was previously used as a dump.

Answer: This change will not be implemented. The tie-out has been sited to avoid potential mitigation for the canal lock. If the locktender's house is found within the footprint of the levee, the levee will be relocated slightly to miss the footprint. The impact to the high school is substantial if we make the suggested change. Each opening for access to the high school would require a closure structure. For the foundation of the high school to be used as part of the flood protection, it would need to be modified to meet Corps standards. The levee itself in the vicinity of the high school would cause interior drainage problems and damage to homes along 11th Street. The recommended change would be a cost increase, not a decrease. Aside from the cost issue, using the high school to tie into introduces more problems (and opportunities for cost increases) than it generates in significant savings. HTRW sampling in the area of the tie-out near the canal lock from Sta. 122+00 to Sta. 126+00 revealed two compounds that indicate chlorinated solvent contamination in the 3-6' below ground surface (bgs) sample interval, but at levels that did not exceed PADEP standards. A fair bit of petroleum contamination was found, but none of the 14 individual compounds detected were above the cleanup criteria.

7. Railroad closure structure-Can this structure be a stop-log type rather

than the swing gate currently shown? Would this reduce the foundation requirements and lower cost? This change will impact O&M costs.

Answer: This suggestion will not be implemented. The foundation requirements could not be reduced, because we are combating uplift. Since the bedrock is so shallow, rock anchors must be used to overcome the buoyancy forces. Given that the location is difficult to access, we do not recommend a stop-log structure. A crane would be necessary to place the stop logs. While there would be a small construction cost savings by using stop logs, it would be more than offset by the increase in both cost and difficulty in operation and maintenance.

8. Riprap along the Kissler property and 11th Street -Is this rip-rap necessary given the distance of the project at this location from the River?

Answer: The riprap has been deleted. An analysis was performed to determined the necessity of riprap along the Fringe Alignment on the Susquehanna River. Previously, riprap was estimated to be needed on the levee along the Susquehanna River from the upstream tie-out to the bend in the levee at levee station 78+00. This area includes the Kissler Farm property. An analysis utilizing computer program CHANLPRO has determined that riprap is not required along this reach. The reduction in cost is approximately $455,000.

Fernville-side project:

9. Fernville levee tie-out at the east end-Can the alignment be moved to avoid taking the property at Station 24+00 (that is, 48 Drinker Street)?

Answer: This suggestion has been implemented. This change has no effect the project cost, for the simple reason that we had planned to make this change previously so the acquisition of 48 Drinker Street was never included in the real estate costs.

10. Closure at Bloom Street-H&H needs to assess if the new water surface elevation for the 100-yr event is above or below the bridge deck. If the water surface elevation is below the deck, can we do a sand bag closure in lieu of the stoplog closure shown? While this would result in two residential property takings, this would provide the Fernville residents an egress during high flows. Also, is there a need for this closure foundation to be so big?

Answer: We recommend this bridge be added to PennDOT's list for replacement. That way, the bridge deck can be designed to be above the 100-year water surface elevation, and the road can be ramped up to eliminate the Bloom Street closure on the Fernville side, and possibly the Railroad Street closure on the Bloomsburg side. Real estate could then be acquired as part of the PennDOT project, and therefore would not be included in our project costs. In the interim, we intend to keep our design the same. The bridge survey already completed confirms that the 100-year water surface elevation is above the current bridge deck, so a sandbag closure will not be sufficient. The 100 year water surface elevation at the Railroad Street bridge on Fishing Creek is 489.7 ft. This compares with the minimum low chord bridge elevation of 482.1. The 100 year water surface is not contained under the bridge deck but instead flows around the bridge into the right bank (Fernville side).

Design Changes common to both sides

11. Can we pull the levee back far enough from the creek bank so that the banks of the creek no longer need to be armored? Dave Capka and Dennis Seibal walked Fishing Creek on Tuesday, October 14th, to assess the stability of the soils, the need for riprap on the banks of the creek, and the practicality of pulling the levees back. Pulling the levees back will be coordinated with Real Estate to get the costs and degree of the taking implications.

Answer: In general, stream riprap has been eliminated where the toe of the levee is 15' or greater from the top of the bank. Riprap on the levee slope is still necessary, and will remain as shown on the drawings. The cost savings due to the changes below are approximately $752,000. The drawings have been revised to show changes to the armoring as follows:

Fernville Side

a. Riprap has been eliminated upstream of the Bloom Street bridge, however the riprap parallel to the abutment remains.

b. From the downsteam side of the Bloom Street bridge (Sta. 28+92) to the upstream end of the MSE Wall (Sta. 34+25) the stream bank riprap has been eliminated. Levee slope riprap remains.

c. We will riprap the upper slope in front of the MSE wall from Sta. 34+25 to Sta. 41+35, but will not continue riprap to stream.

d. Stream bank riprap has been eliminated from the downstream end of the MSE wall (Sta. 41+35) to Drainage Structure F4 at Station 48+75. The riprap immediately around the drainage structure remains.

e. Riprap will remain from just downstream of Drainage Structure F4 to the downstream tie-in area.

Bloomsburg Side

a. Stream bank riprap has been eliminated from the upstream tie-out to the end of the levee section at Sta. 15+00. Levee slope riprap remains.

b. Stream bank riprap has been eliminated, but riprap along the MSE wall toe is required from Sta. 15+00 to Sta. 24+00.

c. From Sta. 24 to the end of the H-Pile wall, stream bank riprap is needed for the entire stretch.

12. Engineering will look at armoring the toe of the levee as opposed to armoring the creek banks to adequately protect the levee from being undermined.

Answer: See answer immediately above. We are armoring the MSE wall toe rather than the stream bank where appropriate. We are armoring the levee slope rather than the stream bank where appropriate.

13. Engineering will investigate shortening the southwest end of the Fernville levee and tieing it up to the north towards Drinker Street. What road crossings are needed? How much would shortening the levee reduce the construction costs. Real Estate will determine the costs of full takings of the 7 properties on the Fernville side of the Creek. Engineering, Planning and DMA will investigate creating recreation and/or environmental benefits in the area.

Answer: This change will not be implemented. We've investigated making the tie-off at the downstream end of the MSE wall at Sta. 41+35. We save approximately 1900 feet of levee, but 7 properties are left outside the protection, resulting in 7 additional full takes costing an additional $1,051,000 in real estate costs, while saving only $887,000 in construction cost. While a decrease in mitigation costs of $1,272,000 makes this alternative appear less costly, these are not tangible costs. Also, the increase in real estate is not cost shared, and will make the project less affordable for the Town.

14. Engineering will investigate the practicality of using bioengineering techniques to protect the Fishing Creek shoreline, keeping in mind that this is a flood protection project.

Answer: Where it is appropriate to eliminate riprap, our intent is to use existing vegetation rather than bioengineering techniques.

15. Utilities. The Town has identified which utilities possess easements that are in the Town's right-of-way to determine if the Town or the utility bears the financial responsibility for relocating them. Utilities in both the PennDOT right-of-way and Town of Bloomsburg right-of-way must be relocated at no cost to the project. Electric - There are 6,550 feet of electric utility to be relocated. Of that, 4,700 feet are in the right-of-way, and 1,850 feet are outside the right-of-way. The 4,700 feet represent approximately 70% of the total footage, saving approximately $3,500,000. Water - Total footage was estimated at 850 feet with 400 feet, or 47% located in the right-of-way, saving approximately $97,000.

****
THE RESPONSES TO THE PROPOSED CHANGES REFLECTED ABOVE WERE PROVIDED UNDER ELECTRONIC MESSAGE FROM MR. RAYMOND SMITH, CENANB-EN-MC, 24 Feb 04.
****

- Assume 1,095 calendar days for the construction duration with a construction award date of Mar 09, and the midpoint of construction Sep 10. In addition, the proposed two-year PED phase will be escalated to the midpoint of design. The PED phase will start Jan 05; therefore; the midpoint of design will be Jan 06. The Real Estate Acquisition starts Feb 07 with a two-year duration; therefore; the midpoint is Feb 08.

- Escalation factors are based on the FY05 Civil Works Escalation Table Factors, EC 11-2-184, dated 31 Mar 03.

- Cost for account 31 (Construction Management) was provided by Construction Division as fully funded to Oct 08 and no additional escalation was applied by CENAB-EN-DT. But, the reviesed construction start is Mar 09; therefore; 11% of escalation was applied by CENAB-EN-DT.

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** PROJECT OWNER SUMMARY - Contract **

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA Bloomsburg LFP Project	1.00 EA	25,016,576	4,668,739	3,902,321	33,587,636	33587636
BB Fernville LFP Project	1.00 EA	9,112,937	2,105,654	1,432,293	12,650,884	12650884
TOTAL Bloomsburg/Fernville LFP Project	55.00 EA	34,129,514	6,774,393	5,334,614	46,238,521	840700

:i 16 Apr 2004 Tri-Service Automated Cost Engineering System (TRACES) TIME 13:25:36
Ef. Date 02/01/04 PROJECT BLOMEM: Bloomsburg/Fernville LFP Project - Agnes Level of Protection
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** PROJECT OWNER SUMMARY - Feature **

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA Bloomsburg LFP Project						
AA_01 LANDS AND DAMAGES	1.00 EA	2,933,316	615,996	308,790	3,858,103	3858103
AA_02 RELOCATIONS	1.00 EA	2,786,959	557,392	464,865	3,809,216	3809216
AA_06 FISH AND WILDLIFE FACILITIES	1.00 EA	377,629	94,407	65,613	537,649	537649
AA_11 LEVEES AND FLOODWALLS	1.00 EA	13,496,699	2,699,340	2,251,249	18,447,289	18447289
AA_18 CULTURAL RESOURCE PRESERVATION	1.00 EA	200,000	50,000	34,750	284,750	284750
AA_30 ENGINEERING AND DESIGN	1.00 EA	2,588,135	388,220	458,359	3,434,714	3434714
AA_31 CONSTRUCTION MANAGEMENT	1.00 EA	2,633,838	263,384	318,694	3,215,916	3215916
TOTAL Bloomsburg LFP Project	1.00 EA	25,016,576	4,668,739	3,902,321	33,587,636	33587636
BB Fernville LFP Project						
BB_01 LANDS AND DAMAGES	1.00 EA	2,019,879	424,175	212,633	2,656,686	2656686
BB_02 RELOCATIONS	1.00 EA	1,835,710	367,142	306,196	2,509,048	2509048
BB_06 FISH AND WILDLIFE FACILITIES	1.00 EA	944,072	236,018	164,033	1,344,123	1344123
BB_11 LEVEES AND FLOODWALLS	1.00 EA	4,113,276	1,028,319	714,682	5,856,277	5856277
BB_18 CULTURAL RESOURCE PRESERVATION	1.00 EA	200,000	50,000	34,750	284,750	284750
TOTAL Fernville LFP Project	1.00 EA	9,112,937	2,105,654	1,432,293	12,650,884	12650884
TOTAL Bloomsburg/Fernville LFP Project	55.00 EA	34,129,514	6,774,393	5,334,614	46,238,521	840700

ri 16 Apr 2004 Tri-Service Automated Cost Engineering System (TRACES) TIME 13:25:36
.ff. Date 02/01/04 PROJECT BLOMEM: Bloomsburg/Fernville LFP Project - Agnes Level of Protection
Recommended Plan (Revised 16 Apr 04) SUMMARY PAGE 3
** PROJECT OWNER SUMMARY - Level 5 **

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA Bloomsburg LFP Project						
AA_01 LANDS AND DAMAGES						
AA_01.02 ACQUISITIONS						
AA_01.02.02 By Non-Federal Sponsor (NFS)	1.00 EA	89,700	18,837	9,443	117,980	117980
AA_01.02.04 Review of NFS	1.00 EA	23,800	4,998	2,505	31,303	31303
TOTAL ACQUISITIONS	1.00 EA	113,500	23,835	11,948	149,283	149283
AA_01.03 CONDEMNATIONS						
AA_01.03.02 By Non-Federal Sponsor (NFS)	1.00 EA	9,000	1,890	947	11,837	11837
AA_01.03.04 Review of NFS	1.00 EA	1,500	315	158	1,973	1972.91
TOTAL CONDEMNATIONS	1.00 EA	10,500	2,205	1,105	13,810	13810
AA_01.05 APPRAISALS						
AA_01.05.02 By Non-Federal Sponsor (NFS)	120.01 EA	35,750	7,508	3,763	47,021	391.80
AA_01.05.04 Review of NFS	120.00 EA	28,050	5,891	2,953	36,893	307.44
TOTAL APPRAISALS	1.00 EA	63,800	13,398	6,716	83,914	83914
AA_01.06 PL 91-646 ASSISSTANCE						
AA_01.06.02 By Non-Federal Sponsor (NFS)	1.00 EA	42,000	8,820	4,421	55,241	55241
AA_01.06.04 Review of NFS	1.00 EA	4,600	966	484	6,050	6050.24
TOTAL PL 91-646 ASSISSTANCE	1.00 EA	46,600	9,786	4,906	61,292	61292
AA_01.15 REAL ESTATE PAYMENTS						
AA_01.15.01 Land Payments						
AA_01.15.01_ 02 By Non-Federal Sponsor (NFS)		2,149,116	451,314	226,237	2,826,668	
AA_01.15.01_ 04 Review of NFS		8,200	1,722	863	10,785	
TOTAL Land Payments	1.00 EA	2,157,316	453,036	227,101	2,837,453	2837453
AA_01.15.02 PL 91-646 Assistance Payments						
AA_01.15.02_ 02 By Non-Federal Sponsor (NFS)		537,000	112,770	56,530	706,300	

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_01.15.02_ 04 Review of NFS		4,600	966	484	6,050	
TOTAL PL 91-646 Assistance Payments	1.00 EA	541,600	113,736	57,014	712,350	712350
TOTAL REAL ESTATE PAYMENTS	1.00 EA	2,698,916	566,772	284,115	3,549,803	3549803
TOTAL LANDS AND DAMAGES	1.00 EA	2,933,316	615,996	308,790	3,858,103	3858103
AA_02 RELOCATIONS						
AA_02.01 Roads, Construction Activities						
AA_02.01. 5 Mob, Demob and Preparatory Work						
AA_02.01. 5_ 01 Relocate River Road #1	1.00 JOB	15,585	3,117	2,600	21,302	21302
AA_02.01. 5_ 02 Relocate River Road #2	1.00 JOB	38,016	7,603	6,341	51,960	51960
AA_02.01. 5_ 03 Relocate West 11th Street	1.00 JOB	10,624	2,125	1,772	14,521	14521
TOTAL Mob, Demob and Preparatory Work	1.00 JOB	64,225	12,845	10,713	87,782	87782
AA_02.01.30 Traffic Control						
AA_02.01.30_ 01 Relocate River Road #1	1.00 JOB	77,862	15,572	12,987	106,422	106422
AA_02.01.30_ 02 Relocate River Road #2	1.00 JOB	77,862	15,572	12,987	106,422	106422
AA_02.01.30_ 03 Relocate West 11th Street	1.00 JOB	33,882	6,776	5,652	46,310	46310
TOTAL Traffic Control	1.00 JOB	189,607	37,921	31,626	259,154	259154
AA_02.01.35 Construct Roadbed to Subgrade						
AA_02.01.35_ 01 Relocate River Road #1	1.00 JOB	64,375	12,875	10,738	87,988	87988
AA_02.01.35_ 02 Relocate River Road #2	1.00 JOB	23,976	4,795	3,999	32,771	32771
AA_02.01.35_ 03 Relocate West 11th Street	1.00 JOB	28,198	5,640	4,703	38,541	38541
TOTAL Construct Roadbed to Subgrade	1.00 JOB	116,549	23,310	19,440	159,299	159299
AA_02.01.55 Road Surfacing						
AA_02.01.55_ 01 Relocate River Road #1	1.00 JOB	81,072	16,214	13,523	110,809	110809
AA_02.01.55_ 02 Relocate River Road #2	1.00 JOB	30,199	6,040	5,037	41,276	41276
AA_02.01.55_ 03 Relocate West 11th Street	1.00 JOB	35,485	7,097	5,919	48,501	48501
TOTAL Road Surfacing	1.00 JOB	146,756	29,351	24,479	200,586	200586
AA_02.01.60 Associated General Items						

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_02.01.60_ 01 Relocate River Road #1	1.00 JOB	107,797	21,559	17,981	147,338	147338
AA_02.01.60_ 02 Relocate River Road #2	1.00 JOB	76,238	15,248	12,717	104,203	104203
AA_02.01.60_ 03 Relocate West 11th Street	1.00 JOB	80,386	16,077	13,408	109,871	109871
AA_02.01.60_ 05 Concrete Sill	35.00 LF	84,989	16,998	14,176	116,163	3318.95
TOTAL Associated General Items	1.00 JOB	349,411	69,882	58,282	477,574	477574
TOTAL Roads, Construction Activities	1.00 EA	866,547	173,309	144,540	1,184,397	1184397
AA_02.02 Railroads, Construction Activity						
AA_02.02. 5 Mob, Demob and Preparatory Work	1.00 JOB	12,588	2,518	2,100	17,205	17205
AA_02.02.30 Traffic Control	1.00 JOB	123,359	24,672	20,576	168,607	168607
AA_02.02.55 Track Work						
AA_02.02.55_ 01 Demolish Railroad Track	184.00 LF	5,580	1,116	931	7,627	41.45
AA_02.02.55_ 02 Replace Railroad Track		26,365	5,273	4,398	36,035	
TOTAL Track Work	1.00 JOB	31,945	6,389	5,328	43,663	43663
TOTAL Railroads, Construction Activity	1.00 EA	167,892	33,578	28,004	229,474	229474
AA_02.03 Cemetery, Utilities, & Structure						
AA_02.03. 5 Mob, Demob & Preparatory Work	1.00 JOB	39,729	7,946	6,627	54,301	54301
TOTAL Mob, Demob & Preparatory Work	1.00 JOB	39,729	7,946	6,627	54,301	54301
AA_02.03.10 Utilities						
AA_02.03.10_ 5 OH Utility Relocation (Complex)	315.00 LF	119,582	23,916	19,946	163,445	518.87
AA_02.03.10_ 10 OH Utility Relocation (Major)	555.00 LF	216,696	43,339	36,145	296,180	533.66
AA_02.03.10_ 15 OH Utility Relocation (Minor)	980.00 LF	386,566	77,313	64,479	528,359	539.14
AA_02.03.10_ 20 Water Line Relocation	450.00 LF	147,392	29,478	24,585	201,455	447.68
AA_02.03.10_ 25 Sewer Line Relocation	1550.00 LF	464,974	92,995	77,558	635,527	410.02
AA_02.03.10_ 30 Gas Line Relocation	350.00 LF	128,520	25,704	21,437	175,661	501.89
AA_02.03.10_ 35 Under Ground Cable Relocation	300.00 LF	62,807	12,561	10,476	85,844	286.15
TOTAL Utilities	1.00 JOB	1,526,537	305,307	254,626	2,086,471	2086471
AA_02.03.30 Structures						
AA_02.03.30_ 5 Demo Residential Frame Structure	3.00 EA	76,379	15,276	12,740	104,395	34798
AA_02.03.30_ 10 Demo Mobil Homes	18.00 EA	109,876	21,975	18,327	150,178	8343.22

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
TOTAL Structures	1.00	JOB	186,255	37,251	31,067	254,573	254573
TOTAL Cemetery, Utilities, & Structure	1.00	EA	1,752,520	350,504	292,320	2,395,345	2395345
TOTAL RELOCATIONS	1.00	EA	2,786,959	557,392	464,865	3,809,216	3809216
AA_06 FISH AND WILDLIFE FACILITIES							
AA_06.03 Wildlife Facilities & Sanctuary							
AA_06.03.73 Habitat and Feeding Facilities							
AA_06.03.73_ 01 Wetland Mitigation	1.00	EA	62,938	15,735	10,936	89,608	89608
AA_06.03.73_ 02 Fishing Creek Mitigation	1.00	EA	314,691	78,673	54,678	448,041	448041
TOTAL Habitat and Feeding Facilities	1.00	EA	377,629	94,407	65,613	537,649	537649
TOTAL Wildlife Facilities & Sanctuary	1.00	EA	377,629	94,407	65,613	537,649	537649
TOTAL FISH AND WILDLIFE FACILITIES	1.00	EA	377,629	94,407	65,613	537,649	537649
AA_11 LEVEES AND FLOODWALLS							
AA_11.01 Mob, Demob & Preparatory Work	1.00	EA	26,843	5,369	4,477	36,689	36689
TOTAL Mob, Demob & Preparatory Work	1.00	EA	26,843	5,369	4,477	36,689	36689
AA_11.02 Drainage							
AA_11.02.01 12" Drainage Structure #1							
AA_11.02.01_ 5 12" Control Manhole	1.00	EA	20,967	4,193	3,497	28,657	28657
AA_11.02.01_ 10 12" RCP Culvert	130.00	LF	6,065	1,213	1,012	8,290	63.77
AA_11.02.01_ 15 12" Outlet Structure	1.00	EA	4,185	837	698	5,720	5720.20
AA_11.02.01_20 Excavation and Backfilling	1.00	JOB	762	152	127	1,041	1041.26
TOTAL 12" Drainage Structure #1	130.00	LF	31,979	6,396	5,334	43,709	336.22
AA_11.02.02 12" Drainage Structure #2							
AA_11.02.02_ 5 12" Control Manhole	1.00	EA	21,622	4,324	3,607	29,553	29553
AA_11.02.02_ 10 12" RCP Culvert	50.00	LF	4,084	817	681	5,583	111.65
AA_11.02.02_ 15 12" Outlet Structure	1.00	EA	4,185	837	698	5,720	5720.20
AA_11.02.02_20 Excavation and Backfilling	1.00	JOB	736	147	123	1,006	1006.03
TOTAL 12" Drainage Structure #2	50.00	LF	30,627	6,125	5,109	41,862	837.23

Item	Description	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_11.02.03	24" Drainage Structure #1							
AA_11.02.03_ 5	24" Control Manhole	1.00	EA	24,992	4,998	4,169	34,159	34159
AA_11.02.03_ 10	24" RCP Culvert	830.00	LF	42,111	8,422	7,024	57,557	69.35
AA_11.02.03_ 15	24" Outlet Structure	1.00	EA	5,882	1,176	981	8,039	8039.05
AA_11.02.03_ 20	24" Inlet Structure	2.00	EA	4,268	854	712	5,834	2916.95
AA_11.02.03_ 25	Excavation and Backfilling	1.00	JOB	11,288	2,258	1,883	15,428	15428
	TOTAL 24" Drainage Structure #1	830.00	LF	88,541	17,708	14,769	121,018	145.80
AA_11.02.04	24" Drainage Structure #2							
AA_11.02.04_ 5	24" Control Manhole	1.00	EA	24,992	4,998	4,169	34,159	34159
AA_11.02.04_ 10	24" RCP Culvert	425.00	LF	22,595	4,519	3,769	30,882	72.66
AA_11.02.04_ 15	24" Outlet Structure	1.00	EA	5,882	1,176	981	8,039	8039.05
AA_11.02.04_ 20	24" Inlet Structure	2.00	EA	4,268	854	712	5,834	2916.95
AA_11.02.04_ 25	Excavation and Backfilling	1.00	JOB	8,845	1,769	1,475	12,089	12089
	TOTAL 24" Drainage Structure #2	425.00	LF	66,582	13,316	11,106	91,004	214.13
AA_11.02.05	36" Drainage Structure #1							
AA_11.02.05_ 5	36" Control Manhole	1.00	EA	100,926	20,185	16,835	137,946	137946
AA_11.02.05_ 10	36" RCP Culvert	130.00	LF	19,995	3,999	3,335	27,329	210.22
AA_11.02.05_ 15	Excavation and Backfilling	1.00	JOB	957	191	160	1,308	1307.51
AA_11.02.05_ 20	36" Outlet Structure	1.00	EA	9,331	1,866	1,556	12,753	12753
	TOTAL 36" Drainage Structure #1	130.00	LF	131,209	26,242	21,886	179,336	1379.51
AA_11.02.06	36" Drainage Structure #2							
AA_11.02.06_ 5	36" Control Manhole	1.00	EA	97,844	19,569	16,320	133,733	133733
AA_11.02.06_ 10	36" RCP Culvert	40.00	LF	8,965	1,793	1,495	12,254	306.34
AA_11.02.06_ 15	Excavation and Backfilling	1.00	JOB	406	81	68	555	554.58
AA_11.02.06_ 20	36" Outlet Structure	1.00	EA	9,331	1,866	1,556	12,753	12753
AA_11.02.06_ 25	36" Inlet Structure	1.00	EA	2,134	427	356	2,917	2916.95
	TOTAL 36" Drainage Structure #2	40.00	LF	118,679	23,736	19,796	162,211	4055.27
AA_11.02.07	36" Drainage Structure #3							
AA_11.02.07_ 5	36" Control Manhole	1.00	EA	93,836	18,767	15,652	128,256	128256
AA_11.02.07_ 10	36" RCP Culvert	600.00	LF	73,284	14,657	12,224	100,165	166.94
AA_11.02.07_ 15	Excavation and Backfilling	1.00	JOB	6,171	1,234	1,029	8,435	8434.60
AA_11.02.07_ 20	36" Outlet Structure	1.00	EA	9,304	1,861	1,552	12,717	12717
AA_11.02.07_ 25	36" Inlet Structure	5.00	EA	10,671	2,134	1,780	14,585	2916.95

		QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
	TOTAL 36" Drainage Structure #3	600.00	LF	193,267	38,653	32,237	264,157	440.26
AA_11.02.08	84" Drainage Structure #1							
AA_11.02.08_ 5	84" Control Manhole	1.00	EA	123,908	24,782	20,668	169,358	169358
AA_11.02.08_ 10	84" RCP Culvert	90.00	LF	68,472	13,694	11,421	93,587	1039.86
AA_11.02.08_ 15	Excavation and Backfilling	1.00	JOB	2,281	456	380	3,118	3117.56
AA_11.02.08_ 20	84" Outlet Structure	1.00	EA	50,887	10,177	8,489	69,552	69552
	TOTAL 84" Drainage Structure #1	90.00	LF	245,548	49,110	40,957	335,615	3729.05
AA_11.02.09	84" Drainage Structure #2							
AA_11.02.09_ 5	84" Control Manhole	1.00	EA	120,185	24,037	20,047	164,268	164268
AA_11.02.09_ 10	84" RCP Culvert	80.00	LF	61,909	12,382	10,326	84,617	1057.72
AA_11.02.09_ 15	84" Outlet Structure	1.00	EA	51,117	10,223	8,526	69,867	69867
AA_11.02.09_ 20	84" Inlet Structure	1.00	EA	17,310	3,462	2,887	23,660	23660
AA_11.02.09_ 25	Excavation and Backfilling	1.00	JOB	1,873	375	312	2,560	2559.63
	TOTAL 84" Drainage Structure #2	80.00	LF	252,394	50,479	42,099	344,973	4312.16
	TOTAL Drainage	1.00	EA	1,158,825	231,765	193,292	1,583,882	1583882
AA_11.03	Care & Diversion of Water							
AA_11.03. 5	Dewatering	60.00	LF	13,650	2,730	2,277	18,656	310.94
	TOTAL Care & Diversion of Water	1.00	EA	13,650	2,730	2,277	18,656	18656
AA_11.99	Associated General Items							
AA_11.99.01	Construct Levee							
AA_11.99.01_ 5	Clearing and Grubbing	101561	SY	22,290	4,458	3,718	30,466	0.30
AA_11.99.01_ 10	Top Soil	13841	CY	71,617	14,323	11,946	97,887	7.07
AA_11.99.01_ 15	Excavation	34895	CY	161,465	32,293	26,932	220,691	6.32
AA_11.99.01_ 20	Geotextile	17928	SY	49,964	9,993	8,334	68,291	3.81
AA_11.99.01_ 25	Cutoff Trench Selectfill Materia	972.00	CY	71,512	14,302	11,928	97,743	100.56
AA_11.99.01_ 30	Random Fill	62277	CY	802,901	160,580	133,924	1,097,406	17.62
AA_11.99.01_ 35	18" Riprap	9855.00	SY	210,214	42,043	35,064	287,320	29.15
AA_11.99.01_ 45	Select Fill	195780	CY	2,900,644	580,129	483,827	3,964,600	20.25
AA_11.99.01_ 50	Drainage Material/Toe Drain	15775	CY	687,946	137,589	114,749	940,284	59.61
AA_11.99.01_ 55	Seeding	83046	SY	22,835	4,567	3,809	31,211	0.38
	TOTAL Construct Levee	9700.00	LF	5,001,389	1,000,278	834,232	6,835,898	704.73

		QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_11.99.02	Construct 16' MSE Wall							
AA_11.99.02_ 5	Clearing and Grubbing	8750.00	SY	2,129	426	355	2,910	0.33
AA_11.99.02_ 10	Top Soil	347.00	CY	1,795	359	299	2,454	7.07
AA_11.99.02_ 15	Excavation	1250.00	CY	5,784	1,157	965	7,905	6.32
AA_11.99.02_ 20	Geotextile	667.00	SY	1,859	372	310	2,541	3.81
AA_11.99.02_ 30	24" Riprap	2083.00	SY	44,406	8,881	7,407	60,694	29.14
AA_11.99.02_ 35	Drainage Material	389.00	CY	16,964	3,393	2,830	23,187	59.61
AA_11.99.02_ 40	MSE Wall Facing	2667.00	SY	344,636	68,927	57,485	471,048	176.62
AA_11.99.02_ 45	MSE Wall Geogrid	17333	SY	221,433	44,287	36,935	302,654	17.46
AA_11.99.02_ 50	MSE Wall Fill	5333.00	CY	153,754	30,751	25,646	210,151	39.41
AA_11.99.02_ 55	Seeding	2083.00	SY	1,636	327	273	2,236	1.07
AA_11.99.02_ 60	Concrete Leveling Pad	56.00	CY	6,353	1,271	1,060	8,684	155.07
AA_11.99.02_ 65	Railing	1500.00	LF	43,477	8,695	7,252	59,425	39.62
AA_11.99.02_ 70	Piping	750.00	LF	6,286	1,257	1,048	8,591	11.46
	TOTAL Construct 16' MSE Wall	750.00	LF	850,512	170,102	141,865	1,162,480	1549.97
AA_11.99.03	H-Piles							
AA_11.99.03_ 5	Steel H-Pile Mob/demob	1.00	EA	62,938	12,588	10,498	86,024	86024
AA_11.99.03_ 10	Steel H-Pile Lengths	9750.00	VLF	632,699	126,540	105,534	864,772	88.69
AA_11.99.03_ 15	Pre-Drill Pilot Holes	7800.00	LF	182,320	36,464	30,411	249,195	31.95
AA_11.99.03_ 20	Grout for Pre-Drill Pilot Holes	22659	CF	96,047	19,209	16,021	131,277	5.79
AA_11.99.03_ 25	Steel H-Piles Withdrawn	1.00	EA	5,880	1,176	981	8,036	8036.32
AA_11.99.03_ 30	Concrete Panel H-Pile Wall	1618.00	SY	594,784	118,957	99,210	812,950	502.44
AA_11.99.03_ 35	Clearing and Grubbing	1942.00	SY	1,071	214	179	1,463	0.75
AA_11.99.03_ 40	Random Fill Materail	431.00	CY	5,957	1,191	994	8,142	18.89
AA_11.99.03_ 45	Top Soil	431.00	CY	2,230	446	372	3,048	7.07
AA_11.99.03_ 50	Excavation	431.00	CY	1,995	399	333	2,726	6.33
AA_11.99.03_ 55	24" Riprap	3883.00	SY	55,559	11,112	9,267	75,938	19.56
AA_11.99.03_ 60	Seeding	2589.00	SY	2,034	407	339	2,779	1.07
AA_11.99.03_ 65	Traffic Control	1.00	JOB	33,882	6,776	5,652	46,310	46310
	TOTAL H-Piles	1155.00	LF	1,677,394	335,479	279,789	2,292,662	1984.99
AA_11.99.04	Stop Log Closure at Route 11							
AA_11.99.04_ 5	Concrete	1.00	EA	263,376	52,675	43,931	359,982	359982
AA_11.99.04_ 10	Aluminum	1.00	EA	46,852	9,370	7,815	64,038	64038
AA_11.99.04_ 15	Structural Steel	1.00	EA	59,652	11,930	9,950	81,532	81532
AA_11.99.04_ 25	Traffic Control	1.00	JOB	33,276	6,655	5,551	45,482	45482
	TOTAL Stop Log Closure at Route 11	1.00	JOB	403,157	80,631	67,247	551,035	551035
AA_11.99.05	RR Gated Closure at Sta 81+00							
AA_11.99.05_ 5	Clearing	1.00	EA	230	46	38	315	314.84

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_11.99.05_ 10 Stripping	1.00	EA	259	52	43	354	353.61
AA_11.99.05_ 15 Excavation	1.00	EA	13,474	2,695	2,247	18,416	18416
AA_11.99.05_ 21 Permanent Shoring	1.00	JOB	212,758	42,552	35,488	290,797	290797
AA_11.99.05_ 25 Structural Fill Material	1.00	EA	32,086	6,417	5,352	43,855	43855
AA_11.99.05_ 30 Concrete/Rebar	1.00	EA	59,456	11,891	9,917	81,264	81264
AA_11.99.05_ 35 Metals	1.00	EA	127,623	25,525	21,288	174,436	174436
AA_11.99.05_ 40 Traffic Control	1.00	JOB	33,882	6,776	5,652	46,310	46310
TOTAL RR Gated Closure at Sta 81+00	1.00	JOB	479,767	95,953	80,025	655,746	655746
AA_11.99.07 South Cross Over Ramp							
AA_11.99.07_ 5 Bituninous Side Walk	8460.00	SF	21,038	4,208	3,509	28,755	3.40
AA_11.99.07_ 10 Paved Roadway	12690	SF	49,883	9,977	8,321	68,181	5.37
AA_11.99.07_ 15 Clearing and Grubbing	2150.00	SY	455	91	76	622	0.29
AA_11.99.07_ 20 Top Soil	358.00	CY	1,852	370	309	2,532	7.07
AA_11.99.07_ 25 Random Fill	12200	CY	157,288	31,458	26,236	214,981	17.62
AA_11.99.07_ 30 Seeding	2150.00	SY	591	118	99	807	0.38
TOTAL South Cross Over Ramp	1.00	JOB	231,107	46,221	38,549	315,877	315877
AA_11.99.09 Erosion and Sediment Control							
AA_11.99.09_ 5 Silt Fencing	15000	LF	65,721	13,144	10,962	89,827	5.99
AA_11.99.09_ 10 Temporary Seeding and Mulching	42.00	ACR	147,818	29,564	24,656	202,037	4810.41
AA_11.99.09_ 15 Stablized Construction Entrances	5.00	EA	11,765	2,353	1,962	16,080	3215.98
AA_11.99.09_ 20 Temporary Roads	5.00	EA	121,667	24,333	20,294	166,294	33259
TOTAL Erosion and Sediment Control	1.00	JOB	346,970	69,394	57,875	474,239	474239
AA_11.99.10 Staging and Storage Areas	3.00	EA	74,063	14,813	12,354	101,229	33743
AA_11.99.12 Addition Traffic Control	4.00	EA	136,744	27,349	22,809	186,902	46725
AA_11.99.13 Temp Security Fence @ Fair Groun	7000.00	LF	102,505	20,501	17,098	140,104	20.01
AA_11.99.14 Water Treatment Plant	1.00	JOB	1,573,454	314,691	262,452	2,150,597	2150597
AA_11.99.15 Electrical Substation							
AA_11.99.15_ 4 12" CMU Wall	300.00	LF	49,660	9,932	8,283	67,875	226.25
AA_11.99.15_ 10 Security Fence Relocation	100.00	LF	1,543	309	257	2,109	21.09
AA_11.99.15_ 15 Sandbag Closure	1.00	JOB	11,219	2,244	1,871	15,334	15334
TOTAL Electrical Substation	1.00	JOB	62,422	12,484	10,412	85,318	85318
AA_11.99.17 Structures							
AA_11.99.17_ 4 Demo Residential Frame Structure	13.00	EA	327,228	65,446	54,582	447,255	34404
AA_11.99.17_ 10 Demo Garages	10.00	EA	33,096	6,619	5,520	45,235	4523.54

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
TOTAL Structures	1.00 JOB	360,324	72,065	60,102	492,490	492490
AA_11.99.32 Non-hazardous Waste (Landfill)						
AA_11.99.32_ 01 Mob, Demob & Preparatory Work	1.00 EA	10,266	2,053	1,712	14,032	14032
AA_11.99.32_ 06 Collection & Disposal of Wastes	13608 CY	987,309	197,462	164,683	1,349,454	99.17
TOTAL Non-hazardous Waste (Landfill)	1360.00 CY	997,575	199,515	166,395	1,363,485	1002.56
TOTAL Associated General Items	1.00 EA	12,297,381	2,459,476	2,051,203	16,808,061	16808061
TOTAL LEVEES AND FLOODWALLS	1.00 EA	13,496,699	2,699,340	2,251,249	18,447,289	18447289
AA_18 CULTURAL RESOURCE PRESERVATION						
AA_18.AA Cultural Resources	1.00 EA	200,000	50,000	34,750	284,750	284750
TOTAL CULTURAL RESOURCE PRESERVATION	1.00 EA	200,000	50,000	34,750	284,750	284750
AA_30 ENGINEERING AND DESIGN						
AA_30.08 Plans and Specifications						
AA_30.08.25 All Other						
AA_30.08.25_ AA Engineering Division	1.00 EA	1,292,171	193,826	228,843	1,714,840	1714840
AA_30.08.25_ BB Planning Division	1.00 EA	148,000	22,200	26,211	196,411	196411
AA_30.08.25_ CC PPMD	1.00 EA	210,000	31,500	37,191	278,691	278691
AA_30.08.25_ DD Utility and Real Estate Surveyin	1.00 EA	89,500	13,425	15,850	118,775	118775
AA_30.08.25_ EE Real Estate Division	1.00 EA	50,918	7,638	9,018	67,573	67573
TOTAL All Other	1.00 EA	1,790,589	268,588	317,113	2,376,291	2376291
TOTAL Plans and Specifications	1.00 JOB	1,790,589	268,588	317,113	2,376,291	2376291
AA_30.10 Engineering During Construction						
AA_30.10.09 All Other EDC						
AA_30.10.09_ AA Engineering Division	1.00 EA	556,275	83,441	98,516	738,233	738233
AA_30.10.09_ CC PPMD	1.00 EA	141,271	21,191	25,019	187,481	187481
TOTAL All Other EDC	1.00 EA	697,546	104,632	123,535	925,713	925713
TOTAL Engineering During Construction	1.00 JOB	697,546	104,632	123,535	925,713	925713

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
AA_30.11 Value Engineering	1.00 JOB	100,000	15,000	17,710	132,710	132710
TOTAL ENGINEERING AND DESIGN	1.00 EA	2,583,135	388,220	458,359	3,434,714	3434714
AA_31 CONSTRUCTION MANAGEMENT						
AA_31.AA Construction Management FY 06		490,139	49,014	59,307	598,460	
AA_31.BB Construction Management FY 07		953,587	95,359	115,384	1,164,330	
AA_31.CC Construction Management FY 08		971,045	97,105	117,496	1,185,646	
AA_31.DD Construction Management FY 09		219,067	21,907	26,507	267,481	
TOTAL CONSTRUCTION MANAGEMENT	1.00 EA	2,633,838	263,384	318,694	3,215,916	3215916
TOTAL Bloomsburg LFP Project	1.00 EA	25,016,576	4,668,739	3,902,321	33,587,636	33587636
BB Fernville LFP Project						
BB_01 LANDS AND DAMAGES						
BB_01.02 ACQUISITIONS						
BB_01.02.02 By Non-Federal Sponsor (NFS)	1.00 EA	101,700	21,357	10,706	133,763	133763
BB_01.02.04 Review of NFS	1.00 EA	29,600	6,216	3,116	38,932	38932
TOTAL ACQUISITIONS	1.00 EA	131,300	27,573	13,822	172,695	172695
BB_01.03 CONDEMNATIONS						
BB_01.03.02 By Non-Federal Sponsor (NFS)	1.00 EA	12,000	2,520	1,263	15,783	15783
BB_01.03.03 By Government on Behalf of NFS	1.00 EA	10,000	2,100	1,053	13,153	13153
BB_01.03.04 Review of NFS	1.00 EA	2,000	420	211	2,631	2630.54
TOTAL CONDEMNATIONS	1.00 EA	24,000	5,040	2,526	31,566	31566
BB_01.05 APPRAISALS						
BB_01.05.02 By Non-Federal Sponsor (NFS)	120.01 EA	43,000	9,030	4,527	56,557	471.25
BB_01.05.04 Review of NFS	120.00 EA	35,800	7,518	3,769	47,087	392.39
TOTAL APPRAISALS	1.00 EA	78,800	16,548	8,295	103,643	103643
BB_01.06 PL 91-646 ASSISSTANCE						
BB_01.06.02 By Non-Federal Sponsor (NFS)	1.00 EA	74,000	15,540	7,790	97,330	97330
BB_01.06.04 Review of NFS	1.00 EA	7,400	1,554	779	9,733	9733.00

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
TOTAL PL 91-646 ASSISSTANCE	1.00 EA	81,400	17,094	8,569	107,063	107063
BB_01.15 REAL ESTATE PAYMENTS						
BB_01.15.01 Land Payments						
BB_01.15.01_ 02 By Non-Federal Sponsor (NFS)		1,223,929	257,025	128,843	1,609,797	
BB_01.15.01_ 04 Review of NFS		10,800	2,268	1,137	14,205	
TOTAL Land Payments	1.00 EA	1,234,729	259,293	129,980	1,624,002	1624002
BB_01.15.02 PL 91-646 Assistance Payments						
BB_01.15.02_ 02 By Non-Federal Sponsor (NFS)		462,250	97,073	48,661	607,984	
BB_01.15.02_ 04 Review of NFS		7,400	1,554	779	9,733	
TOTAL PL 91-646 Assistance Payments	1.00 EA	469,650	98,627	49,440	617,717	617717
TOTAL REAL ESTATE PAYMENTS	1.00 EA	1,704,379	357,920	179,420	2,241,719	2241719
TOTAL LANDS AND DAMAGES	1.00 EA	2,019,879	424,175	212,633	2,656,686	2656686
BB_02 RELOCATIONS						
BB_02.01 Roads, Construction Activities						
BB_02.01. 5 Mob, Demob and Preparatory Work						
BB_02.01. 5_ 01 Road Relocation at Drinker St	1.00 JOB	8,999	1,800	1,501	12,299	12299
BB_02.01. 5_ 02 Relocate Hemlock Street	1.00 JOB	10,831	2,166	1,807	14,803	14803
BB_02.01. 5_ 03 Relocate Blooms Street	1.00 JOB	13,463	2,693	2,246	18,402	18402
TOTAL Mob, Demob and Preparatory Work	1.00 JOB	33,293	6,659	5,553	45,504	45504
BB_02.01.30 Traffic Control						
BB_02.01.30_ 01 Road Relocation at Drinker St	1.00 JOB	33,882	6,776	5,652	46,310	46310
BB_02.01.30_ 02 Relocate Hemlock Street	1.00 JOB	77,862	15,572	12,987	106,422	106422
BB_02.01.30_ 03 Relocate Blooms Street	1.00 JOB	77,862	15,572	12,987	106,422	106422
TOTAL Traffic Control	1.00 JOB	189,607	37,921	31,626	259,154	259154
BB_02.01.35 Construct Roadbed to Subgrade						
BB_02.01.35_ 01 Road Relocation at Drinker St	1.00 JOB	19,225	3,845	3,207	26,277	26277
BB_02.01.35_ 02 Relocate Hemlock Street	1.00 JOB	6,656	1,331	1,110	9,097	9097.40

	QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
BB_02.01.35_ 03 Relocate Blooms Street	1.00 JOB	6,656	1,331	1,110	9,097	9097.40
TOTAL Construct Roadbed to Subgrade	1.00 JOB	32,537	6,507	5,427	44,471	44471
BB_02.01.55 Road Surfacing						
BB_02.01.55_ 01 Road Relocation at Drinker St	1.00 JOB	24,229	4,846	4,041	33,116	33116
BB_02.01.55_ 02 Relocate Hemlock Street	1.00 JOB	8,386	1,677	1,399	11,461	11461
BB_02.01.55_ 03 Relocate Blooms Street	1.00 JOB	8,386	1,677	1,399	11,461	11461
TOTAL Road Surfacing	1.00 JOB	41,000	8,200	6,839	56,039	56039
BB_02.01.60 Associated General Items						
BB_02.01.60_ 01 Road Relocation at Drinker St	1.00 JOB	59,489	11,899	9,923	81,310	81310
BB_02.01.60_ 02 Relocate Hemlock Street	1.00 JOB	5,278	1,056	880	7,214	7214.18
BB_02.01.60_ 03 Relocate Blooms Street	1.00 JOB	17,627	3,525	2,940	24,092	24092
TOTAL Associated General Items	1.00 JOB	82,394	16,479	13,743	112,617	112617
BB_02.01.90 Permanent Access Roads & Parking						
BB_02.01.90_ 02 Concrete Sill	35.00 LF	46,620	9,324	7,776	63,721	1820.59
TOTAL Permanent Access Roads & Parking	1.00 EA	46,620	9,324	7,776	63,721	63721
TOTAL Roads, Construction Activities	1.00 EA	425,451	85,090	70,965	581,506	581506
BB_02.03 Cemetery, Utilities, & Structure						
BB_02.03. 5 Mob, Demob & Preparatory Work	1.00 JOB	39,729	7,946	6,627	54,301	54301
TOTAL Mob, Demob & Preparatory Work	1.00 JOB	39,729	7,946	6,627	54,301	54301
BB_02.03.10 Utilities						
BB_02.03.10_ 5 OH Utility Relocation (Complex)	500.00 LF	182,835	36,567	30,497	249,899	499.80
BB_02.03.10_ 10 OH Utility Relocation (Major)	900.00 LF	341,268	68,254	56,924	466,445	518.27
BB_02.03.10_ 15 OH Utility Relocation (Minor)	1600.00 LF	616,361	123,272	102,809	842,442	526.53
BB_02.03.10_ 20 Water Line Relocation	150.00 LF	48,272	9,654	8,052	65,978	439.85
BB_02.03.10_ 25 Sewer Line Relocation	150.00 LF	44,769	8,954	7,467	61,190	407.94
BB_02.03.10_ 30 Gas Line Relocation	150.00 LF	53,810	10,762	8,976	73,548	490.32
BB_02.03.10_ 35 Under Ground Cable Relocation	150.00 LF	31,403	6,281	5,238	42,922	286.15
TOTAL Utilities	1.00 JOB	1,318,719	263,744	219,962	1,802,425	1802425

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
BB_02.03.30 Structures							
BB_02.03.30_ 5 Demo Residential Frame Structure	1.00	EA	29,919	5,984	4,991	40,894	40894
BB_02.03.30_ 10 Demo Garages	5.00	EA	21,892	4,378	3,652	29,922	5984.44
TOTAL Structures	1.00	JOB	51,812	10,362	8,642	70,816	70816
TOTAL Cemetery, Utilities, & Structure	1.00	EA	1,410,259	282,052	235,231	1,927,542	1927542
TOTAL RELOCATIONS	1.00	EA	1,835,710	367,142	306,196	2,509,048	2509048
BB_06 FISH AND WILDLIFE FACILITIES							
BB_06.03 Wildlife Facilities & Sanctuary							
BB_06.03.73 Habitat and Feeding Facilities							
BB_06.03.73_ 01 Fishing Creek Mitigation	1.00	EA	944,072	236,018	164,033	1,344,123	1344123
TOTAL Habitat and Feeding Facilities	1.00	EA	944,072	236,018	164,033	1,344,123	1344123
TOTAL Wildlife Facilities & Sanctuary	1.00	EA	944,072	236,018	164,033	1,344,123	1344123
TOTAL FISH AND WILDLIFE FACILITIES	1.00	EA	944,072	236,018	164,033	1,344,123	1344123
BB_11 LEVEES AND FLOODWALLS							
BB_11.01 Mob, Demob & Preparatory Work							
BB_11.01.01 Mob, Demob & Preparatory Work	1.00	EA	13,247	3,312	2,302	18,860	18860
TOTAL Mob, Demob & Preparatory Work	1.00	EA	13,247	3,312	2,302	18,860	18860
BB_11.02 Drainage							
BB_11.02.01 24" Drainage Structure #1							
BB_11.02.01_ 5 24" Control Manhole	1.00	EA	36,546	9,137	6,350	52,033	52033
BB_11.02.01_ 10 24" RCP Culvert	110.00	LF	10,289	2,572	1,788	14,649	133.18
BB_11.02.01_ 15 24" Outlet Structure	1.00	EA	6,231	1,558	1,083	8,872	8871.79
BB_11.02.01_ 20 24" Inlet Structure	1.00	EA	2,134	534	371	3,038	3038.49
BB_11.02.01_ 25 Excavation and Backfilling	1.00	JOB	4,356	1,089	757	6,201	6201.41
TOTAL 24" Drainage Structure #1	110.00	LF	59,556	14,889	10,348	84,794	770.85
BB_11.02.02 24" Drainage Structure #2							

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
BB_11.02.02_ 5 24" Control Manhole	1.00	EA	36,546	9,137	6,350	52,033	52033
BB_11.02.02_ 10 24" RCP Culvert	110.00	LF	10,289	2,572	1,788	14,649	133.18
BB_11.02.02_ 15 24" Outlet Structure	1.00	EA	6,199	1,550	1,077	8,827	8826.54
BB_11.02.02_ 20 24" Inlet Structure	1.00	EA	2,134	534	371	3,038	3038.49
BB_11.02.02_ 25 Excavation and Backfilling	1.00	JOB	4,356	1,089	757	6,201	6201.41
TOTAL 24" Drainage Structure #2	110.00	LF	59,525	14,881	10,342	84,748	770.44
BB_11.02.03 24" Drainage Structure #3							
BB_11.02.03_ 5 24" Control Manhole	1.00	EA	44,219	11,055	7,683	62,957	62957
BB_11.02.03_ 10 24" RCP Culvert	60.00	LF	7,540	1,885	1,310	10,735	178.92
BB_11.02.03_ 15 24" Outlet Structure	1.00	EA	6,199	1,550	1,077	8,827	8826.54
BB_11.02.03_ 20 24" Inlet Structure	1.00	EA	2,134	534	371	3,038	3038.49
BB_11.02.03_ 25 Excavation and Backfilling	1.00	JOB	529	132	92	753	752.72
TOTAL 24" Drainage Structure #3	60.00	LF	60,621	15,155	10,533	86,309	1438.49
BB_11.02.04 24" Drainage Structure #4							
BB_11.02.04_ 5 24" Control Manhole	1.00	EA	36,546	9,137	6,350	52,033	52033
BB_11.02.04_ 10 24" RCP Culvert	100.00	LF	9,807	2,452	1,704	13,963	139.63
BB_11.02.04_ 15 24" Outlet Structure	1.00	EA	6,231	1,558	1,083	8,872	8871.79
BB_11.02.04_ 20 24" Inlet Structure	1.00	EA	2,134	534	371	3,038	3038.49
BB_11.02.04_ 25 Excavation and Backfilling	1.00	JOB	5,270	1,318	916	7,503	7503.31
TOTAL 24" Drainage Structure #4	100.00	LF	59,989	14,997	10,423	85,409	854.09
BB_11.02.05 24" Drainage Structure #5							
BB_11.02.05_ 5 24" Control Manhole	1.00	EA	36,546	9,137	6,350	52,033	52033
BB_11.02.05_ 10 24" RCP Culvert	110.00	LF	10,289	2,572	1,788	14,649	133.18
BB_11.02.05_ 15 24" Outlet Structure	1.00	EA	6,231	1,558	1,083	8,872	8871.79
BB_11.02.05_ 20 24" Inlet Structure	1.00	EA	2,134	534	371	3,038	3038.49
BB_11.02.05_ 25 Excavation and Backfilling	1.00	JOB	4,356	1,089	757	6,201	6201.41
TOTAL 24" Drainage Structure #5	110.00	LF	59,556	14,889	10,348	84,794	770.85
TOTAL Drainage	1.00	EA	299,248	74,812	51,994	426,054	426054
BB_11.03 Care & Diversion of Water							
BB_11.03. 5 Dewatering	60.00	LF	13,650	3,412	2,372	19,434	323.90
TOTAL Care & Diversion of Water	1.00	EA	13,650	3,412	2,372	19,434	19434

		QUANTY UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
BB_11.99	Associated General Items						
BB_11.99.01	Construct Levee						
BB_11.99.01_ 5	Clearing and Grubbing	37721 SY	8,473	2,118	1,472	12,064	0.32
BB_11.99.01_ 10	Top Soil	3772.00 CY	19,517	4,879	3,391	27,788	7.37
BB_11.99.01_ 15	Excavation	12898 CY	59,682	14,921	10,370	84,973	6.59
BB_11.99.01_ 20	Geotextile	14510 SY	40,438	10,110	7,026	57,574	3.97
BB_11.99.01_ 25	Random Fill	25440 CY	327,983	81,996	56,987	466,966	18.36
BB_11.99.01_ 30	Select Fill	81823 CY	1,212,276	303,069	210,633	1,725,978	21.09
BB_11.99.01_ 35	Drainage Material/Toe Drain	4837.00 CY	210,941	52,735	36,651	300,327	62.09
BB_11.99.01_ 40	Seeding	22635 SY	6,175	1,544	1,073	8,791	0.39
BB_11.99.01_ 45	18" Riprap	17268 SY	368,302	92,075	63,992	524,369	30.37
BB_11.99.01_ 50	24" Riprap	4539.00 SY	96,831	24,208	16,824	137,864	30.37
BB_11.99.01_ 55	Cutoff Trench Selectfill Materia	579.00 CY	42,521	10,630	7,388	60,539	104.56
	TOTAL Construct Levee	4390.00 LF	2,393,140	598,285	415,808	3,407,233	776.14
BB_11.99.02	Construct 17' MSE Wall						
BB_11.99.02_ 5	Clearing and Grubbing	996.00 SY	258	64	45	367	0.37
BB_11.99.02_ 10	Top Soil	145.00 CY	750	188	130	1,068	7.37
BB_11.99.02_ 15	Excavation	2074.00 CY	9,596	2,399	1,667	13,663	6.59
BB_11.99.02_ 20	Geotextile	622.00 SY	1,733	433	301	2,468	3.97
BB_11.99.02_ 28	24" Riprap	1244.00 SY	26,575	6,644	4,617	37,836	30.42
BB_11.99.02_ 30	Drainage Material	415.00 CY	18,098	4,525	3,145	25,767	62.09
BB_11.99.02_ 35	MSE Wall Facing	2116.00 SY	273,377	68,344	47,499	389,220	183.94
BB_11.99.02_ 40	MSE Wall Geogrid	13751 SY	175,672	43,918	30,523	250,113	18.19
BB_11.99.02_ 42	MSE Wall Fill	4231.00 CY	105,348	26,337	18,304	149,989	35.45
BB_11.99.02_ 45	Seeding	871.00 SY	690	173	120	983	1.13
BB_11.99.02_ 50	Concrete Leveling Pad	5169.00 SF	4,652	1,163	808	6,623	1.28
BB_11.99.02_ 55	Railing	1120.00 LF	32,463	8,116	5,640	46,219	41.27
BB_11.99.02_ 60	Piping	560.00 LF	4,689	1,172	815	6,676	11.92
	TOTAL Construct 17' MSE Wall	560.00 LF	653,901	163,475	113,615	930,992	1662.49
BB_11.99.03	Construct 19' MSE Wall						
BB_11.99.03_ 5	Clearing and Grubbing	300.00 SY	105	26	18	149	0.50
BB_11.99.03_ 10	Top Soil	44.00 CY	228	57	40	324	7.37
BB_11.99.03_ 15	Excavation	556.00 CY	2,573	643	447	3,663	6.59
BB_11.99.03_ 20	Geotextile	167.00 SY	465	116	81	663	3.97
BB_11.99.03_ 28	24" Riprap	500.00 SY	10,707	2,677	1,860	15,244	30.49
BB_11.99.03_ 30	Drainage Material	111.00 CY	4,841	1,210	841	6,892	62.09
BB_11.99.03_ 35	MSE Wall Facing	633.33 SY	81,841	20,460	14,220	116,521	183.98
BB_11.99.03_ 40	MSE Wall Geogrid	4750.00 SY	60,682	15,171	10,544	86,396	18.19
BB_11.99.03_ 42	MSE Wall Fill	1478.00 CY	36,801	9,200	6,394	52,395	35.45
BB_11.99.03_ 45	Seeding	267.00 SY	211	53	37	301	1.13
BB_11.99.03_ 50	Concrete Leveling Pad	423.00 SF	1,248	312	217	1,777	4.20

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT
BB_11.99.03_ 55 Railing	300.00	LF	8,695	2,174	1,511	12,380	41.27
BB_11.99.03_ 60 Piping	150.00	LF	1,262	316	219	1,797	11.98
TOTAL Construct 19' MSE Wall	150.00	LF	209,658	52,415	36,428	298,501	1990.01
BB_11.99.04 Bloom Street Stoplog Closure							
BB_11.99.04_ 5 Concrete	1.00	EA	81,276	20,319	14,122	115,717	115717
BB_11.99.04_ 10 Aluminum	1.00	EA	11,846	2,961	2,058	16,865	16865
BB_11.99.04_ 15 Structural Steel	1.00	EA	31,590	7,897	5,489	44,976	44976
TOTAL Bloom Street Stoplog Closure	1.00	JOB	124,711	31,178	21,669	177,558	177558
BB_11.99.06 Erosion and Sediment Control							
BB_11.99.06_ 5 Silt Fencing	6000.00	LF	26,288	6,572	4,568	37,428	6.24
BB_11.99.06_ 10 Temporary Seeding and Mulching	10.00	ACR	35,195	8,799	6,115	50,108	5010.85
BB_11.99.06_ 15 Stablized Construction Entrances	5.00	EA	11,765	2,941	2,044	16,750	3349.98
BB_11.99.06_ 20 Temporary Roads	5.00	EA	121,667	30,417	21,140	173,223	34645
TOTAL Erosion and Sediment Control	1.00	JOB	194,914	48,729	33,866	277,509	277509
BB_11.99.07 Staging and Storage Areas	3.00	EA	74,063	18,516	12,868	105,447	35149
BB_11.99.08 Addition Traffic Control	4.00	EA	136,744	34,186	23,759	194,689	48672
TOTAL Associated General Items	1.00	EA	3,787,132	946,783	658,014	5,391,929	5391929
TOTAL LEVEES AND FLOODWALLS	1.00	EA	4,113,276	1,028,319	714,682	5,856,277	5856277
BB_18 CULTURAL RESOURCE PRESERVATION							
BB_18.AA Cultural Resources	1.00	EA	200,000	50,000	34,750	284,750	284750
TOTAL CULTURAL RESOURCE PRESERVATION	1.00	EA	200,000	50,000	34,750	284,750	284750
TOTAL Fernville LFP Project	1.00	EA	9,112,937	2,105,654	1,432,293	12,650,884	12650884
TOTAL Bloomsburg/Fernville LFP Project	55.00	EA	34,129,514	6,774,393	5,334,614	46,238,521	840700

AA_01. LANDS AND DAMAGES	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA. Bloomsburg LFP Project										
AA_01. LANDS AND DAMAGES										
AA_01.02. ACQUISITIONS										
AA_01.02.02. By Non-Federal Sponsor (NFS)										
USR 01 Survey & Legals					0.00	0.00	0.00	20500.00	20500.00	
	1.00	LS		0.00	0	0	0	20,500	20,500	20500
USR 01 Title Evidence					0.00	0.00	0.00	25200.00	25200.00	
	1.00	LS		0.00	0	0	0	25,200	25,200	25200
USR 01 Negotiations					0.00	0.00	0.00	44000.00	44000.00	
	1.00	LS		0.00	0	0	0	44,000	44,000	44000
TOTAL By Non-Federal Sponsor (NF	1.00	EA			0	0	0	89,700	89,700	89700
AA_01.02.04. Review of NFS										
JSR 01 Survey & Legals					0.00	0.00	0.00	8200.00	8200.00	
	1.00	LS		0.00	0	0	0	8,200	8,200	8200.00
USR 01 Title Evidence					0.00	0.00	0.00	8200.00	8200.00	
	1.00	LS		0.00	0	0	0	8,200	8,200	8200.00
USR 01 Negotiations					0.00	0.00	0.00	7400.00	7400.00	
	1.00	LS		0.00	0	0	0	7,400	7,400	7400.00
TOTAL Review of NFS	1.00	EA			0	0	0	23,800	23,800	23800
TOTAL ACQUISITIONS	1.00	EA			0	0	0	113,500	113,500	113500
AA_01.03. CONDEMNATIONS										
AA_01.03.02. By Non-Federal Sponsor (NFS)										
USR 01 Base					0.00	0.00	0.00	9000.00	9000.00	
	1.00	LS		0.00	0	0	0	9,000	9,000	9000.00
TOTAL By Non-Federal Sponsor (NF	1.00	EA			0	0	0	9,000	9,000	9000.00
AA_01.03.04. Review of NFS										
USR 01 Base					0.00	0.00	0.00	1500.00	1500.00	
	1.00	LS		0.00	0	0	0	1,500	1,500	1500.00

_01. LANDS AND DAMAGES	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Review of NFS	1.00	EA			0	0	0	1,500	1,500	1500.00
TOTAL CONDEMNATIONS	1.00	EA			0	0	0	10,500	10,500	10500
AA_01.05. APPRAISALS										
AA_01.05.02. By Non-Federal Sponsor (NFS)										
USR 01 Base					0.00	0.00	0.00	35750.00	35750.00	
	1.00	LS		0.00	0	0	0	35,750	35,750	35750
TOTAL By Non-Federal Sponsor (NF	120.01	EA			0	0	0	35,750	35,750	297.88
AA_01.05.04. Review of NFS										
USR 01 Base					0.00	0.00	0.00	28050.00	28050.00	
	1.00	LS		0.00	0	0	0	28,050	28,050	28050
TOTAL Review of NFS	120.00	EA			0	0	0	28,050	28,050	233.75
TOTAL APPRAISALS	1.00	EA			0	0	0	63,800	63,800	63800
AA_01.06. PL 91-646 ASSISSTANCE										
AA_01.06.02. By Non-Federal Sponsor (NFS)										
USR 01 Base					0.00	0.00	0.00	42000.00	42000.00	
	1.00	LS		0.00	0	0	0	42,000	42,000	42000
TOTAL By Non-Federal Sponsor (NF	1.00	EA			0	0	0	42,000	42,000	42000
AA_01.06.04. Review of NFS										
USR 01 Base					0.00	0.00	0.00	4600.00	4600.00	
	1.00	LS		0.00	0	0	0	4,600	4,600	4600.00
TOTAL Review of NFS	1.00	EA			0	0	0	4,600	4,600	4600.00
TOTAL PL 91-646 ASSISSTANCE	1.00	EA			0	0	0	46,600	46,600	46600

AA_01. LANDS AND DAMAGES	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_01.15. REAL ESTATE PAYMENTS								
AA_01.15.01. Land Payments								
AA_01.15.01_ 02. By Non-Federal Sponsor (NFS)								
USR 01 Base			0.00	0.00	0.00	2149116	2149116.00	
	1.00 LS	0.00	0	0	0	2,149,116	2,149,116	2149116
TOTAL By Non-Federal Sponsor (NF			0	0	0	2,149,116	2,149,116	
AA_01.15.01_ 04. Review of NFS								
USR 01 Base			0.00	0.00	0.00	8200.00	8200.00	
	1.00 LS	0.00	0	0	0	8,200	8,200	8200.00
TOTAL Review of NFS			0	0	0	8,200	8,200	
TOTAL Land Payments	1.00 EA		0	0	0	2,157,316	2,157,316	2157316
AA_01.15.02. PL 91-646 Assistance Payments								
AA_01.15.02_ 02. By Non-Federal Sponsor (NFS)								
USR 01 Base			0.00	0.00	0.00	537000.00	537000.00	
	1.00 LS	0.00	0	0	0	537,000	537,000	537000
TOTAL By Non-Federal Sponsor (NF			0	0	0	537,000	537,000	
AA_01.15.02_ 04. Review of NFS								
USR 01 Base			0.00	0.00	0.00	4600.00	4600.00	
	1.00 LS	0.00	0	0	0	4,600	4,600	4600.00
TOTAL Review of NFS			0	0	0	4,600	4,600	
TOTAL PL 91-646 Assistance Payme	1.00 EA		0	0	0	541,600	541,600	541600
TOTAL REAL ESTATE PAYMENTS	1.00 EA		0	0	0	2,698,916	2,698,916	2698916
TOTAL LANDS AND DAMAGES	1.00 EA		0	0	0	2,933,316	2,933,316	2933316

.02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02. RELOCATIONS									
AA_02.01. Roads, Construction Activities									
AA_02.01. 5. Mob, Demob and Preparatory Work									
AA_02.01. 5_ 01. Relocate River Road #1 Road Relocation at Fair Ground 1									
AA_02.01. 5_ 01_ 5. Mob and Demob (USER)									
USR AA Allowance for the the mob and demob cost for reolcation effort	1.00 LS		0.00	0.00 0	0.00 0	0.00 0	10000.00 10,000	10000.00 10,000	10000
TOTAL Mob and Demob	1.00 JOB			0	0	0	10,000	10,000	10000
AA_02.01. 5_ 01_ 15. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w /335 HP dozer, trees to 12" dia	1.00 EA	CODTB10M	18.75	2.68 3	4.83 5	0.00 0	0.00 0	7.52 8	7.52
AF AA Clear & grub, clear site w /335 HP dozer, light trees to 24" dia	1.00 EA	CODTB10M	12.50	4.03 4	7.25 7	0.00 0	0.00 0	11.28 11	11.28
AF AA Clearing, brush w/dozer & brush rake, medium brush	0.60 ACR	CODTB11A	1.00	65.14 39	60.77 36	0.00 0	0.00 0	125.91 76	125.91
M MIL AA Clearing, machine load spoils, 2 mi haul to dump	13.00 CY	COEIB17	11.00	11.56 150	5.13 67	11.55 150	0.00 0	28.25 367	28.25
TOTAL Clearing and Grubbing	2800.00 SY			196	115	150	0	462	0.16
AA_02.01. 5_ 01_ 20. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul , 6" deep, 200 HP dozer, remove/pile on site	467.00 CY	CODTB10B	108.13	0.47 217	0.56 263	0.00 0	0.00 0	1.03 480	1.03
MIL AA Loam or topsoil, frtn loader, 1.5 CY, spread from pile to	467.00 CY	CODFB10S	25.00	2.01 940	1.07 499	0.00 0	0.00 0	3.08 1,440	3.08

AA_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Top Soil	467.00	CY			1,158	762	0	0	1,920	4.11
TOTAL Relocate River Road #1	1.00	JOB			1,354	877	150	10,000	12,381	12381
AA_02.01. 5_ 02. Relocate River Road #2 Road Relocation at Fair Ground 2										
AA_02.01. 5_ 02_ 5. Mob and Demob (USER)										
USR AA Allowance for the the mob					0.00	0.00	0.00	25000.00	25000.00	
and	1.00	LS		0.00	0	0	0	25,000	25,000	25000
demob cost for reolcation effort										
TOTAL Mob and Demob	1.00	JOB			0	0	0	25,000	25,000	25000
AA_02.01. 5_ 02_ 15. Clearing and Grubbing (USER)										
AF AA Clear & grub, clear site w					2.68	4.83	0.00	0.00	7.52	
/335	8.75	EA	CODTB10M	18.75	23	42	0	0	66	7.52
HP dozer, trees to 12" dia										
AF AA Clear & grub, clear site w					4.03	7.25	0.00	0.00	11.28	
/335	8.75	EA	CODTB10M	12.50	35	63	0	0	99	11.28
HP dozer, light trees to 24" dia										
AF AA Clearing, brush w/dozer &					65.14	60.77	0.00	0.00	125.91	
brush	3.85	ACR	CODTB11A	1.00	251	234	0	0	485	125.91
rake, medium brush										
M MIL AA Clearing, machine load spo					11.56	5.13	11.55	0.00	28.25	
ils, 2	87.50	CY	COEIB17	11.00	1,011	449	1,011	0	2,472	28.25
mi haul to dump										
TOTAL Clearing and Grubbing	18375	SY			1,321	789	1,011	0	3,121	0.17
AA_02.01. 5_ 02_ 20. Top Soil (USER)										
MIL AA Loam or topsoil, 200' haul					0.47	0.56	0.00	0.00	1.03	
, 6"	506.00	CY	CODTB10B	108.13	236	284	0	0	520	1.03
deep, 200 HP dozer, remove/pile										
on site										
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	506.00	CY	CODFB10S	25.00	1,019	541	0	0	1,560	3.08
1.5 CY, spread from pile to										

A_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Top Soil	506.00 CY			1,254	826	0	0	2,080	4.11
TOTAL Relocate River Road #2	1.00 JOB			2,575	1,614	1,011	25,000	30,201	30201
AA_02.01. 5_ 03. Relocate West 11th Street Road Relocation at West 11th St									
AA_02.01. 5_ 03_ 5. Mob and Demob (USER)									
USR AA Allowance for the the mob and demob cost for reolcation effort	1.00 LS		0.00	0.00 0	0.00 0	0.00 0	7000.00 7,000	7000.00 7,000	7000.00
TOTAL Mob and Demob	1.00 JOB			0	0	0	7,000	7,000	7000.00
AA_02.01. 5_ 03_ 15. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w /335 HP dozer, trees to 12" dia	1.00 EA	CODTB10M	18.75	2.68 3	4.83 5	0.00 0	0.00 0	7.52 8	7.52
AF AA Clear & grub, clear site w /335 HP dozer, light trees to 24" dia	1.00 EA	CODTB10M	12.50	4.03 4	7.25 7	0.00 0	0.00 0	11.28 11	11.28
AF AA Clearing, brush w/dozer & brush rake, medium brush	0.35 ACR	CODTB11A	1.00	65.14 23	60.77 21	0.00 0	0.00 0	125.91 44	125.91
M MIL AA Clearing, machine load spo ils, 2 mi haul to dump	8.00 CY	COEIB17	11.00	11.56 92	5.13 41	11.55 92	0.00 0	28.25 226	28.25
TOTAL Clearing and Grubbing	1680.00 SY			122	75	92	0	289	0.17
AA_02.01. 5_ 03_ 20. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul , 6" deep, 200 HP dozer, remove/pile on site	280.00 CY	CODTB10B	108.13	0.47 130	0.56 157	0.00 0	0.00 0	1.03 288	1.03
MIL AA Loam or topsoil, frtn load er, 1.5 CY, spread from pile to	280.00 CY	CODFB10S	25.00	2.01 564	1.07 299	0.00 0	0.00 0	3.08 863	3.08

AA_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Top Soil	280.00	CY			694	457	0	0	1,151	4.11
TOTAL Relocate West 11th Street	1.00	JOB			816	531	92	7,000	8,440	8440.07
TOTAL Mob, Demob and Preparatory	1.00	JOB			4,745	3,023	1,254	42,000	51,022	51022
AA_02.01.30. Traffic Control										
AA_02.01.30_ 01. Relocate River Road #1 Road Relocation at Fair Ground 1										
AA_02.01.30_ 01_ 5. Traffic Control (USER) Complex										
L CIV AA Signs, placement and remov					385.46	56.02	0.00	0.00	441.48	
al of	75.00	EA	CLABB80	0.33	28,910	4,202	0	0	33,111	441.48
signs, including supports, 21 SF to 40 SF										
\F AA Sign, hi-intensity					0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00	SF	N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.										
MIL AA Flagmen, Laborers,					29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	480.00	HR	B-LABORER	1.00	14,210	0	0	0	14,210	29.60
M MIL AA Provide 28" High Traffic C					29.60	0.00	20.97	0.00	50.57	
ones.	200.00	EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &										
CIV AA Barricades, 10' sections,					3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00	LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00	JOB			49,289	4,239	7,078	1,250	61,856	61856
TOTAL Relocate River Road #1	1.00	JOB			49,289	4,239	7,078	1,250	61,856	61856

A_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.30_ 02. Relocate River Road #2										
Road Relocation at Fair Ground 2										
AA_02.01.30_ 02_ 5. Traffic Control (USER)										
Complex										
L CIV AA Signs, placement and remov					385.46	56.02	0.00	0.00	441.48	
al of	75.00	EA	CLABB80	0.33	28,910	4,202	0	0	33,111	441.48
signs, including supports, 21 SF to 40 SF										
AF AA Sign, hi-intensity					0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00	SF	N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.										
MIL AA Flagmen, Laborers,					29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	480.00	HR	B-LABORER	1.00	14,210	0	0	0	14,210	29.60
M MIL AA Provide 28" High Traffic C					29.60	0.00	20.97	0.00	50.57	
ones.	200.00	EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &										
CIV AA Barricades, 10' sections,					3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00	LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00	JOB			49,289	4,239	7,078	1,250	61,856	61856
TOTAL Relocate River Road #2	1.00	JOB			49,289	4,239	7,078	1,250	61,856	61856
AA_02.01.30_ 03. Relocate West 11th Street										
Road Relocation at West 11th St										
AA_02.01.30_ 03_ 5. Traffic Control (USER)										
Simple - Close road during construction.										
L CIV AA Signs, placement and remov					385.46	56.02	0.00	0.00	441.48	
al of	20.00	EA	CLABB80	0.33	7,709	1,120	0	0	8,830	441.48
signs, including supports, 21 SF to 40 SF										
AF AA Sign, hi-intensity					0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00	SF	N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf.										

AA_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
Say $25 per post times 50 posts									
equals $1,250 / 25 sf = $50 per									
sign for a pair of posts.									
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	120.00 HR	B-LABORER	1.00	3,553	0	0	0	3,553	29.60
M MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones.	200.00 EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &									
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB			17,431	1,158	7,078	1,250	26,917	26917
TOTAL Relocate West 11th Street	1.00 JOB			17,431	1,158	7,078	1,250	26,917	26917
TOTAL Traffic Control	1.00 JOB			116,009	9,637	21,234	3,750	150,629	150629
AA_02.01.35. Construct Roadbed to Subgrade									
AA_02.01.35_ 01. Relocate River Road #1									
Road Relocation at Fair Ground 1									
AA_02.01.35_ 01_ 10. Construct Roadbed (USER)									
MIL AA Base course, bituminous				0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course	726.00 CY	COFGB36E	175.00	710	865	22,581	0	24,157	33.27
MIL AA Base course, crushed 3/4"				0.27	0.30	4.66	0.00	5.23	
stone,	4360.00 SY	COFGB36C	625.00	1,195	1,328	20,301	0	22,824	5.23
compacted, 6"D, large areas									
MIL AA Base, prepare & roll sub-b				0.06	0.05	0.00	0.00	0.11	
ase,	39240 SF	COFGB32A	1687.51	2,343	1,818	0	0	4,160	0.11
small areas to 2500 SY									
TOTAL Construct Roadbed	39240 SF			4,248	4,011	42,882	0	51,141	1.30
TOTAL Relocate River Road #1	1.00 JOB			4,248	4,011	42,882	0	51,141	51141

AA_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.35_ 02. Relocate River Road #2 Road Relocation at Fair Ground 2										
AA_02.01.35_ 02_ 10. Construct Roadbed (USER)										
MIL AA Base course, bituminous					0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course ,	270.40	CY	COFGB36E	175.00	265	322	8,410	0	8,997	33.27
MIL AA Base course, crushed 3/4"					0.27	0.30	4.66	0.00	5.23	
stone, compacted, 6"D, large areas	1623.84	SY	COFGB36C	625.00	445	495	7,561	0	8,501	5.23
MIL AA Base, prepare & roll sub-b					0.06	0.05	0.00	0.00	0.11	
ase, small areas to 2500 SY	14616	SF	COFGB32A	1687.51	873	677	0	0	1,550	0.11
TOTAL Construct Roadbed	14616	SF			1,582	1,494	15,971	0	19,047	1.30
TOTAL Relocate River Road #2	1.00	JOB			1,582	1,494	15,971	0	19,047	19047
AA_02.01.35_ 03. Relocate West 11th Street Road Relocation at West 11th St										
AA_02.01.35_ 03_ 10. Construct Roadbed (USER)										
MIL AA Base course, bituminous					0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course ,	318.00	CY	COFGB36E	175.00	311	379	9,891	0	10,581	33.27
MIL AA Base course, crushed 3/4"					0.27	0.30	4.66	0.00	5.23	
stone, compacted, 6"D, large areas	1910.00	SY	COFGB36C	625.00	523	582	8,893	0	9,999	5.23
MIL AA Base, prepare & roll sub-b					0.06	0.05	0.00	0.00	0.11	
ase, small areas to 2500 SY	17181	SF	COFGB32A	1687.51	1,026	796	0	0	1,822	0.11
TOTAL Construct Roadbed	17181	SF			1,860	1,757	18,784	0	22,401	1.30
TOTAL Relocate West 11th Street	1.00	JOB			1,860	1,757	18,784	0	22,401	22401
TOTAL Construct Roadbed to Subgr	1.00	JOB			7,690	7,262	77,638	0	92,590	92590

AA_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.55. Road Surfacing										
AA_02.01.55_ 01. Relocate River Road #1 Road Relocation at Fair Ground 1										
AA_02.01.55_ 01_ 10. Surface Roadway (USER)										
MIL AA Asphaltic conc pavement,					3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	726.00	TON	COKCB25	106.25	2,354	929	21,667	0	24,949	34.37
MIL AA Asphaltic conc pavement,					3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	1024.00	TON	COKCB25B	100.00	3,891	1,847	33,719	0	39,457	38.53
Say 3954 Lbs/CY										
TOTAL Surface Roadway	39240	SF			6,244	2,775	55,386	0	64,406	1.64
TOTAL Relocate River Road #1	1.00	JOB			6,244	2,775	55,386	0	64,406	64406
AA_02.01.55_ 02. Relocate River Road #2 Road Relocation at Fair Ground 2										
AA_02.01.55_ 02_ 10. Surface Roadway (USER)										
MIL AA Asphaltic conc pavement,					3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	270.40	TON	COKCB25	106.25	877	346	8,070	0	9,292	34.37
MIL AA Asphaltic conc pavement,					3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	381.48	TON	COKCB25B	100.00	1,450	688	12,562	0	14,699	38.53
Say 3954 Lbs/CY										
TOTAL Surface Roadway	14616	SF			2,326	1,034	20,631	0	23,991	1.64
TOTAL Relocate River Road #2	1.00	JOB			2,326	1,034	20,631	0	23,991	23991
AA_02.01.55_ 03. Relocate West 11th Street Road Relocation at West 11th St										

A_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.55_ 03_ 10. Surface Roadway (USER)									
MIL AA Asphaltic conc pavement,				3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	318.00 TON	COKCB25	106.25	1,031	407	9,490	0	10,928	34.37
MIL AA Asphaltic conc pavement,				3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	448.00 TON	COKCB25B	100.00	1,702	808	14,752	0	17,262	38.53
Say 3954 Lbs/CY									
TOTAL Surface Roadway	17181 SF			2,733	1,215	24,243	0	28,190	1.64
TOTAL Relocate West 11th Street	1.00 JOB			2,733	1,215	24,243	0	28,190	28190
TOTAL Road Surfacing	1.00 JOB			11,304	5,024	100,260	0	116,587	116587
AA_02.01.60. Associated General Items									
AA_02.01.60_ 01. Relocate River Road #1 Road Relocation at Fair Ground 1									
AA_02.01.60_ 01_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader,				0.37	0.35	0.00	0.00	0.72	
3 CY, medium matl. Swell factor 15% .	9545.00 CY	CODFB10T	137.50	3,494	3,358	0	0	6,853	0.72
M MIL AA Hauling, hwy haulers, 16.5				0.97	1.31	5.60	0.00	7.88	
CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)	9545.00 CY	CTDHB34C	35.00	9,276	12,474	53,487	0	75,238	7.88
USR AA Placement of Fill				0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Embankment 8"(20cm) Lift w/300 HP Tractor	9545.00 CY	CODTP	2000.00	1,457	1,463	0	0	2,919	0.31
TOTAL Random Fill	8300.00 CY			14,227	17,296	53,487	0	85,010	10.24
AA_02.01.60_ 01_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mix,				144.41	73.62	634.89	0.00	852.93	
mechanical seeding, 450#/acre.	0.60 ACR	COELB66	0.24	87	44	381	0	512	852.9

AA_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	0.24 TON	COELB66	0.50	16	8	92	0	116	483.76
lb/acre. Say 0.6 acres x 800									
lb / 2,000 lb = 0.24 ton.									
TOTAL Seeding	2800.00 SY			103	52	472	0	628	0.22
TOTAL Relocate River Road #1	1.00 JOB			14,330	17,348	53,960	0	85,638	85638
AA_02.01.60_ 02. Relocate River Road #2									
Road Relocation at Fair Ground 2									
AA_02.01.60_ 02_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled l				0.37	0.35	0.00	0.00	0.72	
oader,	6727.50 CY	CODFB10T	137.50	2,463	2,367	0	0	4,830	0.72
3 CY, medium matl. Swell									
factor 15%.									
MIL AA Hauling, hwy haulers, 16.5				0.97	1.31	5.60	0.00	7.88	
CY, 6	6727.50 CY	CTDHB34C	35.00	6,538	8,792	37,699	0	53,029	7.88
mi round trip @ 40 MPH (2.1									
cyc/hr)									
USR AA Placement of Fill				0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Emba	6727.50 CY	CODTP	2000.00	1,027	1,031	0	0	2,058	0.31
nkment									
8"(20cm) Lift w/300 HP Tractor									
TOTAL Random Fill	5850.00 CY			10,027	12,190	37,699	0	59,917	10.24
AA_02.01.60_ 02_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mi				144.41	73.62	634.89	0.00	852.93	
x,	0.62 ACR	COELB66	0.24	90	46	394	0	529	852.93
mechanical seeding, 450#/acre.									
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	0.25 TON	COELB66	0.50	17	9	95	0	120	483.76
lb/acre. Say 1.8 acres x 800									
lb / 2,000 lb = 0.72 ton.									
TOTAL Seeding	3035.00 SY			107	54	489	0	650	0.21
TOTAL Relocate River Road #2	1.00 JOB			10,134	12,245	38,188	0	60,566	60566

02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.60_ 03. Relocate West 11th Street Road Relocation at West 11th St										
AA_02.01.60_ 03_ 25. Random Fill (USER)										
MIL AA Excavate & load, wheeled l					0.37	0.35	0.00	0.00	0.72	
oader,	7130.00	CY	CODFB10T	137.50	2,610	2,509	0	0	5,119	0.72
3 CY, medium matl. Swell factor 15% .										
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	5.60	0.00	7.88	
CY, 6	7130.00	CY	CTDHB34C	35.00	6,929	9,318	39,954	0	56,202	7.88
mi round trip @ 40 MPH (2.1 cyc/hr)										
USR AA Placement of Fill					0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Emba	7130.00	CY	CODTP	2000.00	1,088	1,093	0	0	2,181	0.31
nkment 8"(20cm) Lift w/300 HP Tractor										
TOTAL Random Fill	6200.00	CY			10,627	12,920	39,954	0	63,501	10.24
AA_02.01.60_ 03_ 30. Seeding (USER)										
MIL AA Seeding, athletic field mi					144.41	73.62	634.89	0.00	852.93	
x,	0.34	ACR	COELB66	0.24	50	25	218	0	293	852.93
mechanical seeding, 450#/acre.										
RSM AA Seeding, apply fertilizer,					67.87	34.60	381.28	0.00	483.76	
800	0.14	TON	COELB66	0.50	9	5	52	0	67	483.76
lb/acre.										
TOTAL Seeding	1680.00	SY			59	30	271	0	360	0.21
TOTAL Relocate West 11th Street	1.00	JOB			10,686	12,950	40,225	0	63,861	63861
AA_02.01.60_ 05. Concrete Sill										
AA_02.01.60_ 05_ 5. Construct Concrete Sill (USER)										
USR AA Allowance for the construc					20000.00	3270.00	17331.00	0.00	40601.00	
tion	1.00	LS		0.00	20,000	3,270	17,331	0	40,601	40601
of a concrete sill at Sta 1+25										
TOTAL Construct Concrete Sill	35.00	LF			20,000	3,270	17,331	0	40,601	1160.03

\A_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.01.60_ 05_ 10. Traffic Control Full closure of the road during construction.								
L CIV AA Signs, placement and remov			385.46	56.02	0.00	0.00	441.48	
al of signs, including supports, 21 SF to 40 SF	20.00 EA CLABB80	0.33	7,709	1,120	0	0	8,830	441.48
AF AA Sign, hi-intensity			0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.	25.00 SF N/A	0.00	0	0	404	1,250	1,654	66.15
MIL AA Flagmen, Laborers,			29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	120.00 HR B-LABORER	1.00	3,553	0	0	0	3,553	29.60
MIL AA Provide 28" High Traffic C			29.60	0.00	20.97	0.00	50.57	
ones. Means 2000 Site Work &	200.00 EA ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
CIV AA Barricades, 10' sections,			3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB		17,431	1,158	7,078	1,250	26,917	26917
TOTAL Concrete Sill	35.00 LF		37,431	4,428	24,409	1,250	67,518	1929.09
TOTAL Associated General Items	1.00 JOB		72,581	46,971	156,781	1,250	277,583	277583
TOTAL Roads, Construction Activi	1.00 EA		212,328	71,917	357,166	47,000	688,412	688412
AA_02.02. Railroads, Construction Activity								
AA_02.02. 5. Mob, Demob and Preparatory Work								
USR AA Allowance for mob and demo			0.00	0.00	0.00	10000.00	10000.00	
b	1.00 LS	0.00	0	0	0	10,000	10,000	10000
TOTAL Mob, Demob and Preparatory	1.00 JOB		0	0	0	10,000	10,000	10000

_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.02.30. Traffic Control										
USR AA Allowance for shutting dow					0.00	0.00	0.00	98000.00	98000.00	
n	1.00	LS		0.00	0	0	0	98,000	98,000	98000
railroad during construction.										
TOTAL Traffic Control	1.00	JOB			0	0	0	98,000	98,000	98000
AA_02.02.55. Track Work ,										
AA_02.02.55_ 01. Demolish Railroad Track										
9 USR AA Remove 110 Lb Rail					3.33	0.48	0.00	0.00	3.80	
	368.00	LF	UOEHD	50.00	1,224	176	0	0	1,400	3.80
M MIL AA Railroad, ties, wood, pres					16.26	1.26	0.00	0.00	17.52	
sure	140.00	EA	CLABB14	11.25	2,277	176	0	0	2,453	17.52
treated, 6" x 8" x 8'-6", CL										
lots										
USR AA Track Bolts And Nuts 1 In					0.00	0.00	3.03	0.00	3.03	
	120.00	EA	N/A	0.00	0	0	363	0	363	3.03
USR AA Lockwashers 1 In					0.00	0.00	0.61	0.00	0.61	
	120.00	EA	N/A	0.00	0	0	73	0	73	0.61
USR AA Ballast					1.03	1.50	0.00	0.00	2.53	
	57.00	TON	CODLC	50.00	59	86	0	0	144	2.53
TOTAL Demolish Railroad Track	184.00	LF			3,560	437	437	0	4,433	24.09
TOTAL Replace Railroad Track					9,500	3,815	7,630	0	20,945	
TOTAL Track Work	1.00	JOB			13,060	4,252	8,067	0	25,378	25378
TOTAL Railroads, Construction Ac	1.00	EA			13,060	4,252	8,067	108,000	133,378	133378
AA_02.03. Cemetery, Utilities, & Structure										
AA_02.03. 5. Mob, Demob & Preparatory Work										
USR AA Mob, Demob & Prep Work for					8134.86	2426.70	0.00	21000.00	31561.56	
	1.00	LS	UTDHA	0.02	8,135	2,427	0	21,000	31,562	31562
TOTAL Mob, Demob & Preparatory W	1.00	JOB			8,135	2,427	0	21,000	31,562	31562

AA_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT

AA_02.03.10. Utilities

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

The costs for the bid items reflected under this task are based on cost data provided by James Hawk, CENAB-EN-M, 28 Aug 03.

AA_02.03.10_ 5. OH Utility Relocation (Complex) (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 6,550 feet of electric utility to be relocated which 4,700 feet is in the right-of-way, and 1,850 feet is outside the right-of-way. Mr. Seigal determined that there would be no cost to the project for 4,700 feet of electric utility relocations. So, based on the fore mention the 1,850 feet of electric utility relocations will be divided as such: Complex - 315', Major - 555', and Minor - 980'. The following decreases are Complex - 685', Major - 1,245' and Minor - 2,220'.

USR EL Demolition of overhead uti				0.00	0.00	0.00	65.00	65.00	
lity	315.00 LF		0.00	0	0	0	20,475	20,475	65.00
USR EL Installation of overhead u				0.00	0.00	0.00	65.00	65.00	
tility	315.00 LF		0.00	0	0	0	20,475	20,475	65.00
USR EL Installation of utility po				0.00	0.00	0.00	3200.00	3200.00	
les.	6.00 EA		0.00	0	0	0	19,200	19,200	3200.00
USR EL Installation of undergroun				0.00	0.00	0.00	850.00	850.00	
d	32.00 LF		0.00	0	0	0	27,200	27,200	850.00
USR EL New Easement Work				0.00	0.00	0.00	350.00	350.00	
	5.00 HR		0.00	0	0	0	1,750	1,750	350.00
USR EL Transformer ($5,000), pad				0.00	0.00	0.00	5900.00	5900.00	
	1.00 EA		0.00	0	0	0	5,900	5,900	5900.00
TOTAL OH Utility Relocation (Com	315.00 LF			0	0	0	95,000	95,000	301.59

!02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT

AA_02.03.10_ 10. OH Utility Relocation (Major) (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 6,550 feet of electric utility to be relocated which 4,700 feet is in the right-of-way, and 1,850 feet is outside the right-of-way. Mr. Seigel determined that there would be no cost to the project for 4,700 feet of electric utility relocations. So, based on the fore mention the 1,850 feet of electric utility relocations will be divided as such: Complex - 315', Major - 555', and Minor - 980'. The following decreases are Complex - 685', Major - 1,245' and Minor - 2,220'.

!02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Demolition of overhead uti				0.00	0.00	0.00	70.00	70.00	
lity	555.00 LF		0.00	0	0	0	38,850	38,850	70.00
USR EL Installation of overhead u				0.00	0.00	0.00	70.00	70.00	
tility	555.00 LF		0.00	0	0	0	38,850	38,850	70.00
USR EL Installation of utility po				0.00	0.00	0.00	2700.00	2700.00	
les.	14.00 EA		0.00	0	0	0	37,800	37,800	2700.00
USR EL Installation of undergroun				0.00	0.00	0.00	850.00	850.00	
d	56.00 LF		0.00	0	0	0	47,600	47,600	850.00
USR EL New Easement Work				0.00	0.00	0.00	350.00	350.00	
	9.00 HR		0.00	0	0	0	3,150	3,150	350.00
USR EL Transformer ($5,000), pad				0.00	0.00	0.00	5900.00	5900.00	
	1.00 EA		0.00	0	0	0	5,900	5,900	5900.00
TOTAL OH Utility Relocation (Maj	555.00 LF			0	0	0	172,150	172,150	310.18

AA_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT

AA_02.03.10_ 15. OH Utility Relocation (Minor) (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 6,550 feet of electric utility to be relocated which 4,700 feet is in the right-of-way, and 1,850 feet is outside the right-of-way. Mr. Seigel determined that there would be no cost to the project for 4,700 feet of electric utility relocations. So, based on the fore mention the 1,850 feet of electric utility relocations will be divided as such: Complex - 315', Major - 555', and Minor - 980'. The following decreases are Complex - 685', Major - 1,245' and Minor - 2,220'.

AA_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Demolition of overhead uti				0.00	0.00	0.00	75.00	75.00	
lity	980.00 LF		0.00	0	0	0	73,500	73,500	75.00
USR EL Installation of overhead u				0.00	0.00	0.00	75.00	75.00	
tility	980.00 LF		0.00	0	0	0	73,500	73,500	75.00
USR EL Installation of utility po				0.00	0.00	0.00	2200.00	2200.00	
les.	33.00 EA		0.00	0	0	0	72,600	72,600	2200.00
USR EL Installation of undergroun				0.00	0.00	0.00	850.00	850.00	
d	98.00 LF		0.00	0	0	0	83,300	83,300	850.00
USR EL New Easement Work				0.00	0.00	0.00	350.00	350.00	
	12.00 HR		0.00	0	0	0	4,200	4,200	350.00
TOTAL OH Utility Relocation (Min	980.00 LF			0	0	0	307,100	307,100	313.37

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT

AA_02.03.10_ 20. Water Line Relocation (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 850 feet of water utility to be relocated which 400 feet is in the right-of-way, and 450 feet is outside the right-of-way. Mr. Seigel determined that there would be no cost to the project for 400 feet of water utility relocations. So, based on the fore mention the 450 feet of water utility relocations will be relocated. This is an increase of 150 feet.

	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Relocation of 12" water li				0.00	0.00	0.00	75.00	75.00	
ne	450.00 LF		0.00	0	0	0	33,750	33,750	75.00
USR EL Road Crossing				0.00	0.00	0.00	6500.00	6500.00	
	6.00 EA		0.00	0	0	0	39,000	39,000	6500.00
USR EL Real Estate cost associate				0.00	0.00	0.00	320.00	320.00	
d with	60.00 HR		0.00	0	0	0	19,200	19,200	320.00
USR EL Connection Charges				0.00	0.00	0.00	3800.00	3800.00	
	1.50 LS		0.00	0	0	0	5,700	5,700	3800.00
B MIL AA Piping, water dist,5'D,8",				1000.00	0.00	2888.50	0.00	3888.50	
fire hydrant,2 way,no exc/bkfl, breakable	5.00 EA		0.00	5,000	0	14,443	0	19,443	3888.50
TOTAL Water Line Relocation	450.00 LF			5,000	0	14,443	97,650	117,093	260.21

AA_02.03.10_ 25. Sewer Line Relocation (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 1,550 feet of sewer utility to be relocated. Mr. Seigel determined that this task would be project cost. So, based on the fore mention the 1,550 feet of sewer utility relocations will be relocated. This is an increase of 1,250 feet.

	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Relocation of 12" sewer li				0.00	0.00	0.00	93.00	93.00	
nes	1550.00 LF		0.00	0	0	0	144,150	144,150	93.00

AA_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Road Crossing			0.00	0.00	0.00	6500.00	6500.00	
	21.00 EA	0.00	0	0	0	136,500	136,500	6500.00
USR EL Real Estate cost associate			0.00	0.00	0.00	320.00	320.00	
d with	207.00 HR	0.00	0	0	0	66,240	66,240	320.00
USR EL Connection Charges			0.00	0.00	0.00	4500.00	4500.00	
	5.00 LS	0.00	0	0	0	22,500	22,500	4500.00
TOTAL Sewer Line Relocation	1550.00 LF		0	0	0	369,390	369,390	238.32

AA_02.03.10_ 30. Gas Line Relocation (USER)

The revised costs for this bid item is based on Mr. William C. Seigel, Program Director, Community Development Program, SEDA COG, letter dated 17 Nov 03. Because I could not determine which estimate he based his cost on, and because the way the COE estimate was developed than I am using Mr. Seigel's measurements for the basis of revising the estimate.

Mr. Seigel measures a total of 350 feet of gas utility to be relocated. So, 350 feet of gas utility relocations will be relocated. This would have been an increase of 50' based on the revised estimate.

AA_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Relocation of 12" Gas line			0.00	0.00	0.00	200.00	200.00	
s	350.00 LF	0.00	0	0	0	70,000	70,000	200.00
USR EL Relocation and Easement			0.00	0.00	0.00	300.00	300.00	
	47.00 HR	0.00	0	0	0	14,100	14,100	300.00
USR EL Road Crossing			0.00	0.00	0.00	4500.00	4500.00	
	4.00 EA	0.00	0	0	0	18,000	18,000	4500.00
TOTAL Gas Line Relocation	350.00 LF		0	0	0	102,100	102,100	291.71

AA_02.03.10_ 35. Under Ground Cable Relocation (USER)

AA_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Allowance for the relocati			126.85	39.47	0.00	0.00	166.32	
on of	300.00 LF	0.00	38,055	11,841	0	0	49,896	166.32
TOTAL Under Ground Cable Relocat	300.00 LF		38,055	11,841	0	0	49,896	166.32
TOTAL Utilities	1.00 JOB		43,055	11,841	14,443	1,143,390	1,212,728	1212728

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.03.30. Structures									
AA_02.03.30_ 5. Demo Residential Frame Structure									
AA_02.03.30_ 5_ 5. Demo Residential Structures									
AF AA Building dml, two family,				0.00	0.00	0.00	6375.00	6375.00	
two	3.00 EA	N/A	0.00	0	0	0	19,125	19,125	6375.00
story house, wood, maximum. 2003 MEANS Site Work, page 36.									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	144.00 CY	COEIB17	15.00	1,221	542	0	1,800	3,563	24.74
loading & trucking,machine loading truck. Say each structure is four 12-cy truck load so, 3(4 x 12) = 144 cy. Price includes dumping fees.									
TOTAL Demo Residential Structure	3.00 EA			1,221	542	0	20,925	22,688	7562.60
AA_02.03.30_ 5_ 10. Demo Basements									
MIL AA Building dml, foundations				1.31	0.00	0.00	0.00	1.31	
walls	3360.00 SF		0.00	4,402	0	0	0	4,402	1.31
(12" block), conc, plain. MEANS Site Work 2003, page 37. Say each structure is 30' x 40' x 8' so, 2(8' x 30') + 2(8' x 40') = 1,120 sf x 3 structures = 3,360 sf									
USR AA Demo 4" thick concrete sla				1.97	0.80	0.00	0.00	2.77	
b,	3600.00 SF	CODFB5	111.49	7,107	2,877	0	0	9,984	2.77
reinforced wire mesh, 2003 MEANS Site Work, page 36. Say 3(30' x 40') = 3,600 sf									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	45.00 CY	COEIB17	15.00	381	169	0	563	1,113	24.74
loading & trucking,machine									
TOTAL Demo Basements	3.00 EA			11,890	3,046	0	563	15,499	5166.26

A_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.03.30_ 5_ 15. Demo Concrete Driveways									
MIL AA Site dml, bituminous drive				1.99	1.16	0.00	0.00	3.15	
ways.	100.00 SY	CLADB38	80.00	199	116	0	0	315	3.15
Say 3(12' x 25' / 9') = 100 sy									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	33.00 CY	COEIB17	15.00	280	124	0	413	816	24.74
loading & trucking,machine loading truck. Say 3(12' x 25' x 1' /27') = 33 cy. Price includes dumping fees.									
TOTAL Demo Concrete Driveways	3.00 EA			479	240	0	413	1,132	377.24
AA_02.03.30_ 5_ 20. Demo Remove/Cap Utilities									
USR AA Allowance to remove and/or				0.00	0.00	0.00	1500.00	1500.00	
cap	3.00 EA		0.00	0	0	0	4,500	4,500	1500.00
utilities after demo of homes									
TOTAL Demo Remove/Cap Utilities	3.00 EA			0	0	0	4,500	4,500	1500.00
AA_02.03.30_ 5_ 25. Demo Oil Tanks									
USR AA Allowance to remove of oil				0.00	0.00	0.00	1200.00	1200.00	
tanks	3.00 EA		0.00	0	0	0	3,600	3,600	1200.00
after demo of homes									
TOTAL Demo Oil Tanks	3.00 EA			0	0	0	3,600	3,600	1200.00
AA_02.03.30_ 5_ 30. Grade and Restore Lots									
M RSM AA Fill, borrow, for embankme				0.79	0.98	7.91	0.00	9.68	
nts,	1067.00 CY	CODTB15	150.00	842	1,042	8,445	0	10,329	9.68
load, 1 mile haul, spread w/dozer. Say 3(30' x 40' x 8' / 27') = 1,067 cy									
L AF AA Fill, spread borrow w/doze				0.55	0.66	0.00	0.00	1.21	
r	1067.00 CY	CODTB10B	91.52	587	709	0	0	1,295	1.21
AF AA Seeding, apply fertilizer,				0.97	1.42	3.05	0.00	5.44	
1#	65.34 MSF	COFWB59	35.00	63	93	199	0	356	5.44
nitrogen/MSF, spray from truck									

A_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Seeding, athletic field mi					144.41	73.62	634.89	0.00	852.93	
x,	1.50	ACR	COELB66	0.24	217	110	952	0	1,279	852.93
mechanical seeding, 450#/acre. Say each lot is 1/2 acre.										
TOTAL Grade and Restore Lots	3.00	EA			1,709	1,954	9,596	0	13,260	4419.86
TOTAL Demo Residential Frame Str	3.00	EA			15,299	5,783	9,596	30,000	60,678	20226
AA_02.03.30_ 10. Demo Mobil Homes										
AA_02.03.30_ 10_ 5. Demo Mobil Homes										
AF AA Allowance demolition of Mo					0.00	0.00	0.00	1525.00	1525.00	
bil	18.00	EA	N/A	0.00	0	0	0	27,450	27,450	1525.00
Homes										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	432.00	CY	COEIB17	15.00	3,662	1,626	0	5,400	10,688	24.74
loading & trucking,machine loading truck. Say each mobil home is two 12-cy truck load so, 18(2 x 12) = 432 cy. Price includes dumping fees.										
TOTAL Demo Mobil Homes	18.00	EA			3,662	1,626	0	32,850	38,138	2118.80
AA_02.03.30_ 10_ 10. Demo Concrete Driveways										
MIL AA Site dml, bituminous drive					1.99	1.16	0.00	0.00	3.15	
ways.	1250.00	SY	CLADB38	80.00	2,489	1,452	0	0	3,941	3.15
Say 18(25' x 25' / 9') = 1,250 sy										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	420.00	CY	COEIB17	15.00	3,560	1,581	0	5,250	10,391	24.74
loading & trucking,machine loading truck. Say 18(25' x 25' x 1' /27') = 420 cy. Price includes dumping fees.										
TOTAL Demo Concrete Driveways	18.00	EA			6,049	3,033	0	5,250	14,332	796.24

AA_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_02.03.30_ 10_ 15. Demo Remove/Cap Utilities										
USR AA Allowance to remove and/or					0.00	0.00	0.00	700.00	700.00	
cap	18.00	EA		0.00	0	0	0	12,600	12,600	700.00
utilities after demo of homes										
TOTAL Demo Remove/Cap Utilities	18.00	EA			0	0	0	12,600	12,600	700.00
AA_02.03.30_ 10_ 20. Demo Oil Tanks										
USR AA Allowance to remove of oil					0.00	0.00	0.00	750.00	750.00	
tanks	18.00	EA		0.00	0	0	0	13,500	13,500	750.00
after demo of homes										
TOTAL Demo Oil Tanks	18.00	EA			0	0	0	13,500	13,500	750.00
AA_02.03.30_ 10_ 25. Grade and Restore Lots										
M RSM AA Fill, borrow, for embankme					0.79	0.98	7.91	0.00	9.68	
nts,	420.00	CY	CODTB15	150.00	331	410	3,324	0	4,066	9.68
load, 1 mile haul, spread w/dozer. Say 18(25' x 25' x 1' / 27') = 420 cy										
L AF AA Fill, spread borrow w/doze					0.55	0.66	0.00	0.00	1.21	
r	420.00	CY	CODTB10B	91.52	231	279	0	0	510	1.21
AF AA Seeding, apply fertilizer,					0.97	1.42	3.05	0.00	5.44	
1#	165.53	MSF	COFWB59	35.00	161	235	505	0	901	5.44
nitrogen/MSF, spray from truck										
MIL AA Seeding, athletic field mi					144.41	73.62	634.89	0.00	852.93	
x,	3.80	ACR	COELB66	0.24	549	280	2,413	0	3,241	852.93
mechanical seeding, 450#/acre. Total park area to be restored is 3.8 acres										
TOTAL Grade and Restore Lots	18.00	EA			1,272	1,204	6,242	0	8,718	484.33
TOTAL Demo Mobil Homes	18.00	EA			10,983	5,863	6,242	64,200	87,289	4849.36
TOTAL Structures	1.00	JOB			26,282	11,646	15,838	94,200	147,966	147966
TOTAL Cemetery, Utilities, & Str	1.00	EA			77,472	25,914	30,280	1,258,590	1,392,256	1392256
TOTAL RELOCATIONS	1.00	EA			302,860	102,083	395,513	1,413,590	2,214,046	2214046

_06. FISH AND WILDLIFE FACILITIES	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_06. FISH AND WILDLIFE FACILITIES									
AA_06.03. Wildlife Facilities & Sanctuary									
AA_06.03.73. Habitat and Feeding Facilities									
AA_06.03.73_ 01. Wetland Mitigation									
USR AA Wetland Mitigation				0.00	0.00	0.00	50000.00	50000.00	
	1.00 LS		0.00	0	0	0	50,000	50,000	50000
TOTAL Wetland Mitigation	1.00 EA			0	0	0	50,000	50,000	50000
AA_06.03.73_ 02. Fishing Creek Mitigation									
USR AA Mitigation for Fishing Cre				0.00	0.00	0.00	250000.00	250000.00	
ek,	1.00 LS		0.00	0	0	0	250,000	250,000	250000
per Bill Abadie, CENAB-PL-P, 28									
Aug 03 during the team meeting									
TOTAL Fishing Creek Mitigation	1.00 EA			0	0	0	250,000	250,000	250000
TOTAL Habitat and Feeding Facili	1.00 EA			0	0	0	300,000	300,000	300000
TOTAL Wildlife Facilities & Sanc	1.00 EA			0	0	0	300,000	300,000	300000
TOTAL FISH AND WILDLIFE FACILITI	1.00 EA			0	0	0	300,000	300,000	300000

'A_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11. LEVEES AND FLOODWALLS								
AA_11.01. Mob, Demob & Preparatory Work								
USR AA Allowance for mob, demob,			10000.00	3815.00	7510.10	0.00	21325.10	
&	1.00 LS	0.00	10,000	3,815	7,510	0	21,325	21325
preparatory work								
TOTAL Mob, Demob & Preparatory W	1.00 EA		10,000	3,815	7,510	0	21,325	21325
AA_11.02. Drainage								
AA_11.02.01. 12" Drainage Structure #1								
AA_11.02.01_ 5. 12" Control Manhole (USER)								
CIV AA Hydraulic structures, 12"			873.64	200.41	5609.87	0.00	6683.92	
x 12",	1.00 EA SIWSL5A	0.21	874	200	5,610	0	6,684	6683.92
HD, self cont w/crank, sluice								
IL AA Ladder, steel, 20" wide, b			31.21	0.88	62.78	0.00	94.87	
olted	2.00 VLF SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage								
MIL AA Ladder, steel, 20" wide, b			18.36	0.52	29.20	0.00	48.07	
olted	17.00 VLF SIWSE4	10.63	312	9	496	0	817	48.07
to conc, w/o cage								
MIL AA Placing conc, slab on grad			10.81	3.50	0.00	0.00	14.31	
e,	5.27 CY CLABC20	23.13	57	18	0	0	75	14.31
over 6" thick, pumped								
MIL AA Placing conc, walls, 12" t			18.17	5.89	0.00	0.00	24.06	
hick,	13.97 CY CLABC20	13.75	254	82	0	0	336	24.06
pumped								
RSM AA Concrete ready mix, regula			0.00	0.00	79.32	0.00	79.32	
r	19.24 CY N/A	0.00	0	0	1,526	0	1,526	79.32
weight, 4000 psi								
MIL AA Reinforcing in place, slab			699.05	0.00	607.35	0.00	1306.40	
on	0.40 TON SIWRRODM4	0.29	276	0	240	0	517	1306.40
grade, #3 to #7								
MIL AA Reinforcing in place, slab			699.05	0.00	607.35	0.00	1306.40	
on	1.05 TON SIWRRODM4	0.29	732	0	636	0	1,368	1306.40
grade, #3 to #7								
L RSM CO Grout			10.81	3.50	70.39	0.00	84.69	
	0.32 CY CLABC20	23.13	3	1	23	0	27	84.69

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Plates, steel, 1/4" thick					0.00	0.00	1698.44	0.00	1698.44	
	0.15	TON	N/A	0.00	0	0	262	0	262	1698.44
MIL AA Forms in place, walls, int					4.97	0.00	1.43	0.00	6.41	
plywood, 8-16' high, 4 use	653.13	SF	ACARC2	49.38	3,248	0	936	0	4,183	6.41
MIL CA Forms in place, SOG, edge forms,					3.62	0.00	0.96	0.00	4.58	
wood, over 12", 4 use	54.63	SF	ACARC1	43.75	198	0	52	0	250	4.58
MIL CO Finishing walls, float fin ish,					0.95	0.00	0.03	0.00	0.99	
1/16" thick	267.19	SF	ACMACEFI1	37.50	255	0	9	0	264	0.99
MIL CO Finishing walls, break tie s &					0.53	0.00	0.06	0.00	0.59	
patch voids	267.19	SF	ACMACEFI1	67.50	141	0	15	0	157	0.59
TOTAL 12" Control Manhole	1.00	EA			6,412	313	9,931	0	16,657	16657

AA_11.02.01_ 10. 12" RCP Culvert (USER)

	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
B MIL AA Piping, drainage & sewage,					4.78	1.06	14.90	0.00	20.74	
12" dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.	130.00	LF		0.00	621	137	1,938	0	2,696	20.74
AF AA Piping, drainage & sewage,					0.00	0.00	2.75	0.00	2.75	
gasket, 12" dia	13.00	EA	N/A	0.00	0	0	36	0	36	2.75
RSM CO Lean Concrete ready mix, r egular					0.00	0.00	70.39	0.00	70.39	
weight, 2000 psi	5.60	CY	N/A	0.00	0	0	394	0	394	70.39
MIL CO Placing conc, footings, sp read,					30.76	9.96	0.00	0.00	40.72	
under 1 CY, pumped	5.60	CY	CLABC20	8.13	172	56	0	0	228	40.72
USR AA Place Select Granular Fill					4.33	2.28	9.62	0.00	16.23	
	88.47	CY	CODLQ	56.25	383	202	851	0	1,436	16.23
L RSM AA Compaction, riding, vibrat ing					0.21	0.10	0.00	0.00	0.32	
roller, 6" lifts, 4 passes	88.47	CY	COFCB10Y	237.50	19	9	0	0	28	0.32
TOTAL 12" RCP Culvert	130.00	LF			1,195	405	3,219	0	4,819	37.0

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.01_ 15. 12" Outlet Structure									
CIV AA Hydraulic structures, flap				297.04	68.14	2104.97	0.00	2470.14	
gates, aluminum, 12" dia	1.00 EA	SIWSL5A	0.63	297	68	2,105	0	2,470	2470.14
MIL AA Headwall, conc, CIP, 12" d				613.83	10.08	142.44	0.00	766.35	
ia	1.00 EA	ACARC14H	0.40	614	10	142	0	766	766.35
pipe, 30 deg skewed wingwall									
USR AA Bedding Material				0.65	0.31	23.80	0.00	24.76	
East Side Sand & Gravel-$9/Ton	3.57 CY	CODLP	360.00	2	1	85	0	88	24.76
Coolbaugh Sand & Gravel-$8.65/T									
American Asphalt-$12.15/Ton									
Use Average Of $9.93/Ton Multi-									
Plied By Conversion Factor Of									
1.82 Received From Geotechnical									
Design Branch >> $18.07/Cy									
TOTAL 12" Outlet Structure	1.00 EA			913	79	2,332	0	3,325	3324.78
AA_11.02.01_20 . Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	96.00 CY	CODEB12C	130.00	51	50	0	0	101	1.06
2 CY, medium matl. Say 10'									
deep x 2' wide x 130' long /									
27' = 96 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	10.00 CY	CODEB30	87.00	12	16	0	0	28	2.80
5 mile haul, soil. Say 96 cy -									
86 cy = 10 cy to be hauled									
offsite									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	29.00 SY	COFGB36C	525.00	9	11	270	0	290	10.00
deep, crushed 3/4" stone, large									
areas. Say 2' wide x 130' long									
/ 90' = 29 sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	86.00 CY	CODFB10N	50.00	87	62	0	0	148	1.72
loader, 40 - 60 HP, no. Say a									
total of 96 cy of excavated									
material so 96 cy - (1' x 2' x									
130') cy of stone = 86 cy of									
backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	86.00 CY	COFCB10Y	375.00	12	6	0	0	17	0.20
roller, 6" lifts, 2 passes									

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	8.60 CY	COFCB10A	25.00	17	3	0	0	20	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			188	147	270	0	605	605.21
TOTAL 12" Drainage Structure #1	130.00 LF			8,709	944	15,753	0	25,405	195.42
AA_11.02.02. 12" Drainage Structure #2									
AA_11.02.02_ 5. 12" Control Manhole (USER)									
CIV AA Hydraulic structures, 12"				873.64	200.41	5609.87	0.00	6683.92	
x 12",	1.00 EA	SIWSL5A	0.21	874	200	5,610	0	6,684	6683.92
HD, self cont w/crank, sluice									
MIL AA Ladder, steel, 20" wide, b				31.21	0.88	62.78	0.00	94.87	
olted	2.00 VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage									
MIL AA Ladder, steel, 20" wide, b				18.36	0.52	29.20	0.00	48.07	
olted	18.00 VLF	SIWSE4	10.63	330	9	526	0	865	48.07
to conc, w/o cage									
MIL AA Placing conc, slab on grad				10.81	3.50	0.00	0.00	14.31	
e,	5.55 CY	CLABC20	23.13	60	19	0	0	79	14.31
over 6" thick, pumped									
MIL AA Placing conc, walls, 12" t				18.17	5.89	0.00	0.00	24.06	
hick,	14.70 CY	CLABC20	13.75	267	87	0	0	354	24.06
pumped									
RSM AA Concrete ready mix, regula				0.00	0.00	79.32	0.00	79.32	
r	20.25 CY	N/A	0.00	0	0	1,606	0	1,606	79.32
weight, 4000 psi									
MIL AA Reinforcing in place, slab				699.05	0.00	607.35	0.00	1306.40	
on	0.42 TON	SIWRRODM4	0.29	291	0	253	0	544	1306.40
grade, #3 to #7									
MIL AA Reinforcing in place, slab				699.05	0.00	607.35	0.00	1306.40	
on	1.10 TON	SIWRRODM4	0.29	771	0	670	0	1,440	1306.40
grade, #3 to #7									
L RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	0.34 CY	CLABC20	23.13	4	1	24	0	29	84.69
MIL AA Plates, steel, 1/4" thick				0.00	0.00	1698.44	0.00	1698.44	
	0.16 TON	N/A	0.00	0	0	276	0	276	1698.44

\A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Forms in place, walls, int					4.97	0.00	1.43	0.00	6.41	
,	687.50	SF	ACARC2	49.38	3,419	0	985	0	4,404	6.41
plywood, 8-16' high, 4 use										
MIL CA Forms in place, SOG, edge					3.62	0.00	0.96	0.00	4.58	
forms,	57.50	SF	ACARC1	43.75	208	0	55	0	264	4.58
wood, over 12", 4 use										
MIL CO Finishing walls, float fin					0.95	0.00	0.03	0.00	0.99	
ish,	281.25	SF	ACMACEFI1	37.50	268	0	10	0	278	0.99
1/16" thick										
MIL CO Finishing walls, break tie					0.53	0.00	0.06	0.00	0.59	
s &	281.25	SF	ACMACEFI1	67.50	149	0	16	0	165	0.59
patch voids										
TOTAL 12" Control Manhole	1.00	EA			6,703	319	10,155	0	17,177	17177
AA_11.02.02_ 10. 12" RCP Culvert (USER)										
b MIL AA Piping, drainage & sewage,					4.78	1.06	14.90	0.00	20.74	
12"	50.00	LF		0.00	239	53	745	0	1,037	20.74
dia, RCP, class 5, no gaskets.										
MEANS Site Work 2003, page 83.										
AF AA Piping, drainage & sewage,					0.00	0.00	2.75	0.00	2.75	
gasket, 12" dia	5.00	EA	N/A	0.00	0	0	14	0	14	2.75
RSM CO Lean Concrete ready mix, r					0.00	0.00	70.39	0.00	70.39	
egular	5.88	CY	N/A	0.00	0	0	414	0	414	70.39
weight, 2000 psi										
MIL CO Placing conc, footings, sp					30.76	9.96	0.00	0.00	40.72	
read,	5.88	CY	CLABC20	8.13	181	59	0	0	239	40.72
under 1 CY, pumped										
USR AA Place Select Granular Fill					4.33	2.28	9.62	0.00	16.23	
	93.13	CY	CODLQ	56.25	403	213	896	0	1,512	16.23
L RSM AA Compaction, riding, vibrat					0.21	0.10	0.00	0.00	0.32	
ing	93.13	CY	COFCB10Y	237.50	20	10	0	0	29	0.32
roller, 6" lifts, 4 passes										
TOTAL 12" RCP Culvert	50.00	LF			842	334	2,069	0	3,245	64.90

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.02_ 15. 12" Outlet Structure										
CIV AA Hydraulic structures, flap					297.04	68.14	2104.97	0.00	2470.14	
gates, aluminum, 12" dia	1.00	EA	SIWSL5A	0.63	297	68	2,105	0	2,470	2470.14
MIL AA Headwall, conc, CIP, 12" d					613.83	10.08	142.44	0.00	766.35	
ia	1.00	EA	ACARC14H	0.40	614	10	142	0	766	766.35
pipe, 30 deg skewed wingwall										
USR AA Bedding Material					0.65	0.31	23.80	0.00	24.76	
East Side Sand & Gravel-$9/Ton	3.57	CY	CODLP	360.00	2	1	85	0	88	24.76
Coolbaugh Sand & Gravel-$8.65/T										
American Asphalt-$12.15/Ton										
Use Average Of $9.93/Ton Multi-										
Plied By Conversion Factor Of										
1.82 Received From Geotechnical										
Design Branch >> $18.07/Cy										
TOTAL 12" Outlet Structure	1.00	EA			913	79	2,332	0	3,325	3324.78
AA_11.02.02_20 . Excavation and Backfilling										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	96.00	CY	CODEB12C	130.00	51	50	0	0	101	1.06
2 CY, medium matl. Say 10'										
deep x 2' wide x 130' long /										
27' = 96 cy										
AF AA Hauling, w/loading, 12 CY					1.19	1.61	0.00	0.00	2.80	
truck,	10.00	CY	CODEB30	87.00	12	16	0	0	28	2.80
5 mile haul, soil. Say 96 cy -										
86 cy = 10 cy to be hauled										
offsite										
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12"	29.00	SY	COFGB36C	525.00	9	11	270	0	290	10.00
deep, crushed 3/4" stone, large										
areas. Say 2' wide x 130' long										
/ 90' = 29 sy										
MIL AA Backfill, trench, front-en					1.01	0.72	0.00	0.00	1.72	
d	86.00	CY	CODFB10N	50.00	87	62	0	0	148	1.72
loader, 40 - 60 HP, no. Say a										
total of 96 cy of excavated										
material so 96 cy - (1' x 2' x										
130') cy of stone = 86 cy of										
backfilling.										
RSM AA Compaction, riding, vibrat					0.13	0.07	0.00	0.00	0.20	
ing	86.00	CY	COFCB10Y	375.00	12	6	0	0	17	0.20
roller, 6" lifts, 2 passes										

A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Excavation and Backfilling	1.00	JOB			171	144	270	0	585	584.74
TOTAL 12" Drainage Structure #2	50.00	LF			8,629	876	14,827	0	24,331	486.63
AA_11.02.03. 24" Drainage Structure #1										
AA_11.02.03_ 5. 24" Control Manhole										
CIV AA Hydraulic structures, 24"					1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00	EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice										
MIL AA Ladder, steel, 20" wide, b					31.21	0.88	62.78	0.00	94.87	
olted	2.00	VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage										
MIL AA Ladder, steel, 20" wide, b					18.36	0.52	29.20	0.00	48.07	
olted	15.00	VLF	SIWSE4	10.63	275	8	438	0	721	48.07
to conc, w/o cage										
MIL AA Placing conc, slab on grad					10.81	3.50	0.00	0.00	14.31	
e,	4.19	CY	CLABC20	23.13	45	15	0	0	60	14.31
over 6" thick, pumped										
MIL AA Placing conc, walls, 12" t					18.17	5.89	0.00	0.00	24.06	
hick,	14.34	CY	CLABC20	13.75	261	84	0	0	345	24.06
pumped										
RSM AA Concrete ready mix, regula					0.00	0.00	79.32	0.00	79.32	
r	16.58	CY	N/A	0.00	0	0	1,315	0	1,315	79.32
weight, 4000 psi										
MIL AA Reinforcing in place, slab					699.05	0.00	607.35	0.00	1306.40	
on	0.31	TON	SIWRRODM4	0.29	220	0	191	0	411	1306.40
grade, #3 to #7										
MIL RE Reinforcing in place, wall					535.94	0.00	592.72	0.00	1128.66	
s, #3	1.24	TON	SIWRRODM4	0.38	667	0	737	0	1,404	1128.66
to #7										
L RSM CO Grout					10.81	3.50	70.39	0.00	84.69	
	0.43	CY	CLABC20	23.13	5	2	31	0	37	84.69
MIL AA Plates, steel, 1/4" thick					0.00	0.00	1698.44	0.00	1698.44	
	0.12	TON	N/A	0.00	0	0	208	0	208	1698.44
MIL AA Forms in place, walls, int					4.97	0.00	1.43	0.00	6.41	
,	833.00	SF	ACARC2	49.38	4,142	0	1,193	0	5,335	6.41
plywood, 8-16' high, 4 use										

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Forms in place, SOG, edge					3.62	0.00	0.90	0.00	4.53	
forms,	51.00	SF	ACARC1	43.75	185	0	46	0	231	4.53
wood, over 12", 4 use										
MIL CO Finishing walls, float fin					0.95	0.00	0.03	0.00	0.99	
ish,	416.00	SF	ACMACEFI1	37.50	396	0	14	0	411	0.99
1/16" thick										
MIL CO Finishing walls, break tie					0.53	0.00	0.06	0.00	0.59	
s &	416.00	SF	ACMACEFI1	67.50	220	0	24	0	244	0.59
patch voids										
TOTAL 24" Control Manhole	1.00	EA			7,716	394	11,745	0	19,855	19855
AA_11.02.03_ 10. 24" RCP Culvert										
3 MIL AA Piping, drainage & sewage,					5.90	1.31	30.62	0.00	37.83	
24"	830.00	LF		0.00	4,897	1,086	25,413	0	31,396	37.83
dia, RCP, class 5, no gaskets.										
MEANS Site Work 2003, page 83.										
AF AA Piping, drainage & sewage,					0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	83.00	EA	N/A	0.00	0	0	384	0	384	4.62
RSM CO Lean Concrete ready mix, r					0.00	0.00	70.39	0.00	70.39	
egular	9.44	CY	N/A	0.00	0	0	664	0	664	70.39
weight, 2000 psi										
MIL CO Placing conc, footings, sp					30.76	9.96	0.00	0.00	40.72	
read,	9.44	CY	CLABC20	8.13	290	94	0	0	384	40.72
under 1 CY, pumped										
USR AA Place Select Granular Fill					4.33	2.28	24.52	0.00	31.13	
	17.00	CY	CODLQ	56.25	74	39	417	0	529	31.13
L RSM AA Compaction, riding, vibrat					0.21	0.10	0.00	0.00	0.32	
ing	17.00	CY	COFCB10Y	237.50	4	2	0	0	5	0.32
roller, 6" lifts, 4 passes										
MIL CO Waterstop, PVC, dumbbell,					2.37	0.00	1.62	0.00	3.99	
6"	23.00	LF	ACARCARP1	18.13	55	0	37	0	92	3.99
wide, 3/8" thick										
TOTAL 24" RCP Culvert	830.00	LF			5,319	1,220	26,915	0	33,454	40.31

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.03_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
TOTAL 24" Outlet Structure	1.00 EA			1,599	105	2,968	0	4,673	4672.57
AA_11.02.03_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & c				74.52	11.30	656.27	0.00	742.08	
over,	2.00 EA	CODLB6	1.25	149	23	1,313	0	1,484	742.08
curb inlet type, 27" x 27"									
MIL AA CB or manholes, conc, prec				343.30	58.82	490.16	0.00	892.27	
ast,	2.00 EA	UOEHB22	0.38	687	118	980	0	1,785	892.27
4' ID, 5' deep									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	10.00 SY	ULABA2	150.00	6	1	15	0	22	2.21
lene									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	10.00 SY	COFGB36C	525.00	3	4	93	0	100	10.00
deep, crushed 3/4" stone, large									
areas									
TOTAL 24" Inlet Structure	2.00 EA			845	145	2,401	0	3,391	1695.43
AA_11.02.03_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	1889.00 CY	CODEB12C	130.00	1,006	987	0	0	1,994	1.06
2 CY, medium matl. Say 2(10'									
deep x 3' wide x 830' long /									
27') = 1889 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	94.00 CY	CODEB30	87.00	112	152	0	0	263	2.80
5 mile haul, soil. Say a total									
of 1,889 cy of excavated									
material minus 1,795 cy of									
backfilling material equals 94									
cy of material to be hauled									
offsite.									

_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12"	283.00	SY	COFGB36C	525.00	92	103	2,635	0	2,830	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 850' long / 9' = 283 sy										
MIL AA Backfill, trench, front-en					1.01	0.72	0.00	0.00	1.72	
d	1795.00	CY	CODFB10N	50.00	1,807	1,285	0	0	3,092	1.72
loader, 40 - 60 HP, no. Say a total of 1889 cy of excavated material minus (1' x 3' x 850' / 27') of stone = 1,795 cy of backfilling.										
RSM AA Compaction, riding, vibrat					0.13	0.07	0.00	0.00	0.20	
ing	1795.00	CY	COFCB10Y	375.00	241	118	0	0	359	0.20
roller, 6" lifts, 2 passes										
MIL AA Compaction, 1 ton roller,					2.01	0.37	0.00	0.00	2.38	
around	180.00	CY	COFCB10A	25.00	362	66	0	0	429	2.38
structures & trenches										
TOTAL Excavation and Backfilling	1.00	JOB			3,621	2,711	2,635	0	8,967	8967.30
TOTAL 24" Drainage Structure #1	830.00	LF			19,100	4,575	46,664	0	70,340	84.75
AA_11.02.04. 24" Drainage Structure #2										
AA_11.02.04_ 5. 24" Control Manhole										
CIV AA Hydraulic structures, 24"					1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00	EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice										
MIL AA Ladder, steel, 20" wide, b					31.21	0.88	62.78	0.00	94.87	
olted	2.00	VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage										
MIL AA Ladder, steel, 20" wide, b					18.36	0.52	29.20	0.00	48.07	
olted	15.00	VLF	SIWSE4	10.63	275	8	438	0	721	48.07
to conc, w/o cage										
MIL AA Placing conc, slab on grad					10.81	3.50	0.00	0.00	14.31	
e,	4.19	CY	CLABC20	23.13	45	15	0	0	60	14.31
over 6" thick, pumped										
MIL AA Placing conc, walls, 12" t					18.17	5.89	0.00	0.00	24.06	
hick,	14.34	CY	CLABC20	13.75	261	84	0	0	345	24.06
pumped										

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Concrete ready mix, regula r weight, 4000 psi	16.58	CY	N/A	0.00	0.00 0	0.00 0	79.32 1,315	0.00 0	79.32 1,315	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7	0.31	TON	SIWRRODM4	0.29	699.05 220	0.00 0	607.35 191	0.00 0	1306.40 411	1306.40
MIL RE Reinforcing in place, wall s, #3 to #7	1.24	TON	SIWRRODM4	0.38	535.94 667	0.00 0	592.72 737	0.00 0	1128.66 1,404	1128.66
L RSM CO Grout	0.43	CY	CLABC20	23.13	10.81 5	3.50 2	70.39 31	0.00 0	84.69 37	84.69
MIL AA Plates, steel, 1/4" thick	0.12	TON	N/A	0.00	0.00 0	0.00 0	1698.44 208	0.00 0	1698.44 208	1698.44
MIL AA Forms in place, walls, int plywood, 8-16' high, 4 use	833.00	SF	ACARC2	49.38	4.97 4,142	0.00 0	1.43 1,193	0.00 0	6.41 5,335	6.41
MIL AA Forms in place, SOG, edge forms, wood, over 12", 4 use	51.00	SF	ACARC1	43.75	3.62 185	0.00 0	0.90 46	0.00 0	4.53 231	4.53
MIL CO Finishing walls, float fin ish, 1/16" thick	416.00	SF	ACMACEFI1	37.50	0.95 396	0.00 0	0.03 14	0.00 0	0.99 411	0.99
MIL CO Finishing walls, break tie s & patch voids	416.00	SF	ACMACEFI1	67.50	0.53 220	0.00 0	0.06 24	0.00 0	0.59 244	0.59
TOTAL 24" Control Manhole	1.00	EA			7,716	394	11,745	0	19,855	19855
AA_11.02.04_ 10. 24" RCP Culvert										
B MIL AA Piping, drainage & sewage, 24" dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.	425.00	LF		0.00	5.90 2,508	1.31 556	30.62 13,013	0.00 0	37.83 16,076	37.83
AF AA Piping, drainage & sewage, gasket, 24" dia	43.00	EA	N/A	0.00	0.00 0	0.00 0	4.62 199	0.00 0	4.62 199	4.62
RSM CO Lean Concrete ready mix, r egular weight, 2000 psi	9.44	CY	N/A	0.00	0.00 0	0.00 0	70.39 664	0.00 0	70.39 664	70.39

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	9.44 CY	CLABC20	8.13	290	94	0	0	384	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	24.52	0.00	31.13	
	17.00 CY	CODLQ	56.25	74	39	417	0	529	31.13
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	17.00 CY	COFCB10Y	237.50	4	2	0	0	5	0.32
roller, 6" lifts, 4 passes									
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	23.00 LF	ACARCARP1	18.13	55	0	37	0	92	3.99
wide, 3/8" thick									
TOTAL 24" RCP Culvert	425.00 LF			2,930	691	14,330	0	17,950	42.24
AA_11.02.04_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
TOTAL 24" Outlet Structure	1.00 EA			1,599	105	2,968	0	4,673	4672.57
AA_11.02.04_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & c				74.52	11.30	656.27	0.00	742.08	
over,	2.00 EA	CODLB6	1.25	149	23	1,313	0	1,484	742.08
curb inlet type, 27" x 27"									
MIL AA CB or manholes, conc, prec				343.30	58.82	490.16	0.00	892.27	
ast,	2.00 EA	UOEHB22	0.38	687	118	980	0	1,785	892.27
4' ID, 5' deep									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	10.00 SY	ULABA2	150.00	6	1	15	0	22	2.21
lene									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	10.00 SY	COFGB36C	525.00	3	4	93	0	100	10.00
deep, crushed 3/4" stone, large									
areas									

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 24" Inlet Structure	2.00 EA			845	145	2,401	0	3,391	1695.43
AA_11.02.04_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	1889.00 CY	CODEB12C	130.00	1,006	987	0	0	1,994	1.06
2 CY, medium matl. Say 2(10' deep x 3' wide x 425' long / 27') = 944 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	94.00 CY	CODEB30	87.00	112	152	0	0	263	2.80
5 mile haul, soil. Say a total of 944 cy of excavated material minus 897 cy of backfilling material equals 47 cy of material to be hauled offsite.									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	283.00 SY	COFGB36C	525.00	92	103	2,635	0	2,830	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 425' long / 9' = 142 sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	897.00 CY	CODFB10N	50.00	903	642	0	0	1,545	1.72
loader, 40 - 60 HP, no. Say a total of 944 cy of excavated material minus (1' x 3' x 425' / 27') of stone = 897 cy of backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	897.00 CY	COFCB10Y	375.00	120	59	0	0	179	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	90.00 CY	COFCB10A	25.00	181	33	0	0	214	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			2,415	1,976	2,635	0	7,026	7026.49
TOTAL 24" Drainage Structure #2	425.00 LF			15,505	3,311	34,079	0	52,894	124.46

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.05. 36" Drainage Structure #1									
AA_11.02.05_ 5. 36" Control Manhole									
CIV AA Hydraulic structures, 84" x 84", HD, self cont w/crank, sluice				14851.90	3406.89	40159.49	0.00	58418.28	
	1.00 EA	SIWSL5A	0.01	14,852	3,407	40,159	0	58,418	58418
MIL AA Ladder, steel, 20" wide, bolted to conc, w/cage				31.21	0.88	62.78	0.00	94.87	
	2.00 VLF	SIWSE4	6.25	62	2	126	0	190	94.87
MIL AA Ladder, steel, 20" wide, bolted to conc, w/o cage				18.36	0.52	29.20	0.00	48.07	
	25.00 VLF	SIWSE4	10.63	459	13	730	0	1,202	48.07
MIL AA Placing conc, slab on grade, over 6" thick, pumped				10.81	3.50	0.00	0.00	14.31	
	7.00 CY	CLABC20	23.13	76	25	0	0	100	14.31
MIL AA Placing conc, walls, 12" thick, pumped				18.17	5.89	0.00	0.00	24.06	
	32.17 CY	CLABC20	13.75	585	189	0	0	774	24.06
RSM AA Concrete ready mix, regular weight, 4000 psi				0.00	0.00	79.32	0.00	79.32	
	38.08 CY	N/A	0.00	0	0	3,020	0	3,020	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7				699.05	0.00	607.35	0.00	1306.40	
	0.46 TON	SIWRRODM4	0.29	321	0	279	0	600	1306.40
MIL AA Reinforcing in place, walls, #3 to #7				535.94	0.00	607.35	0.00	1143.29	
	2.41 TON	SIWRRODM4	0.38	1,293	0	1,465	0	2,759	1143.29
L RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	0.59 CY	CLABC20	23.13	6	2	41	0	50	84.69
MIL SS Plates, steel, 1/4" thick				0.00	0.00	1848.64	0.00	1848.64	
	0.15 TON	N/A	0.00	0	0	276	0	276	1848.64
MIL CA Forms in place, walls, int, plywood, 8-16' high, 4 use				4.97	0.00	1.43	0.00	6.41	
	1734.00 SF	ACARC2	49.38	8,622	0	2,484	0	11,106	6.41
MIL CA Forms in place, SOG, edge forms, wood, over 12", 4 use				3.62	0.00	0.96	0.00	4.58	
	69.00 SF	ACARC1	43.75	250	0	66	0	316	4.58

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Finishing walls, float fin				0.95	0.00	0.03	0.00	0.99	
ish,	868.00 SF	ACMACEFI1	37.50	827	0	30	0	857	0.99
1/16" thick									
MIL CO Finishing walls, break tie				0.53	0.00	0.06	0.00	0.59	
s &	868.00 SF	ACMACEFI1	67.50	460	0	50	0	510	0.59
patch voids									
TOTAL 36" Control Manhole	1.00 EA			27,814	3,637	48,728	0	80,179	80179
AA_11.02.05_ 10. 36" RCP Culvert									
B MIL AA Piping, drainage & sewage,				21.00	9.92	60.66	0.00	91.58	
36"	130.00 LF		0.00	2,730	1,289	7,886	0	11,905	91.58
dia, RCP, class 5, no gaskets.									
MEANS Site Work 2003, page 83.									
AF AA Piping, drainage & sewage,				0.00	0.00	6.79	0.00	6.79	
gasket, 36" dia	13.00 EA	N/A	0.00	0	0	88	0	88	6.79
RSM CO Lean Concrete ready mix, r				0.00	0.00	70.39	0.00	70.39	
egular	29.00 CY	N/A	0.00	0	0	2,041	0	2,041	70.39
weight, 2000 psi									
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	29.00 CY	CLABC20	8.13	892	289	0	0	1,181	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	9.62	0.00	16.23	
	25.00 CY	CODLQ	56.25	108	57	241	0	406	16.23
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	25.00 CY	COFCB10Y	237.50	5	3	0	0	8	0.32
roller, 6" lifts, 4 passes									
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	64.00 LF	ACARCARP1	18.13	152	0	104	0	255	3.99
wide, 3/8" thick									
TOTAL 36" RCP Culvert	130.00 LF			3,887	1,638	10,359	0	15,885	122.19
AA_11.02.05_ 15. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	193.00 CY	CODEB12C	130.00	103	101	0	0	204	1.06
2 CY, medium matl. Say 10'									
deep x 4' wide x 130' long /									
27' = 193 cy									

_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	14.00 CY	CODEB30	87.00	17	23	0	0	39	2.80
5 mile haul, soil. Say a total of 193 cy - 179 cy = 14 cy									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	13.00 SY	COFGB36C	525.00	4	5	121	0	130	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 130' long / 9' = 43 sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	179.00 CY	CODFB10N	50.00	180	128	0	0	308	1.72
loader, 40 - 60 HP, no. Say a total of 193 cy of excavated material minus (1' x 3' x 130' / 27') of stone = 179 cy of backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	179.00 CY	COFCB10Y	375.00	24	12	0	0	36	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	18.00 CY	COFCB10A	25.00	36	7	0	0	43	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			364	275	121	0	760	759.97
AA_11.02.05_ 20. 36" Outlet Structure									
CIV AA Hydraulic structures, flap				530.43	121.67	3932.37	0.00	4584.47	
gates, aluminum, 36" dia	1.00 EA	SIWSL5A	0.35	530	122	3,932	0	4,584	4584.47
MIL AA Headwall, conc, CIP, 36" d				2157.59	35.44	508.75	0.00	2701.78	
ia	1.00 EA	ACARC14H	0.11	2,158	35	509	0	2,702	2701.78
pipe, 30 deg skewed wingwall									
USR AA Bedding Material				0.65	0.31	23.80	0.00	24.76	
East Side Sand & Gravel-$9/Ton	5.10 CY	CODLP	360.00	3	2	121	0	126	24.76
Coolbaugh Sand & Gravel-$8.65/T American Asphalt-$12.15/Ton Use Average Of $9.93/Ton Multi-Plied By Conversion Factor Of 1.82 Received From Geotechnical Design Branch >> $18.07/Cy									
TOTAL 36" Outlet Structure	1.00 EA			2,691	159	4,563	0	7,413	7412.53

A_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 36" Drainage Structure #1	130.00 LF		34,756	5,709	63,771	0	104,236	801.82
AA_11.02.06. 36" Drainage Structure #2								
AA_11.02.06_ 5. 36" Control Manhole								
CIV AA Hydraulic structures, 84" x 84", HD, self cont w/crank, sluice	1.00 EA SIWSL5A	0.01	14851.90 14,852	3406.89 3,407	40159.49 40,159	0.00 0	58418.28 58,418	58418
MIL AA Ladder, steel, 20" wide, b olted to conc, w/cage	2.00 VLF SIWSE4	6.25	31.21 62	0.88 2	62.78 126	0.00 0	94.87 190	94.87
MIL AA Ladder, steel, 20" wide, b olted to conc, w/o cage	22.00 VLF SIWSE4	10.63	18.36 404	0.52 11	29.20 642	0.00 0	48.07 1,058	48.07
MIL AA Placing conc, slab on grad e, over 6" thick, pumped	5.24 CY CLABC20	23.13	10.81 57	3.50 18	0.00 0	0.00 0	14.31 75	14.31
MIL AA Placing conc, walls, 12" t hick, pumped	28.56 CY CLABC20	13.75	18.17 519	5.89 168	0.00 0	0.00 0	24.06 687	24.06
RSM AA Concrete ready mix, regula r weight, 4000 psi	33.80 CY N/A	0.00	0.00 0	0.00 0	79.32 2,681	0.00 0	79.32 2,681	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7	0.41 TON SIWRRODM4	0.29	699.05 285	0.00 0	607.35 248	0.00 0	1306.40 533	1306.40
MIL AA Reinforcing in place, wall s, #3 to #7	2.14 TON SIWRRODM4	0.38	535.94 1,148	0.00 0	607.35 1,301	0.00 0	1143.29 2,449	1143.29
L RSM CO Grout	0.52 CY CLABC20	23.13	10.81 6	3.50 2	70.39 37	0.00 0	84.69 44	84.69
MIL SS Plates, steel, 1/4" thick	0.13 TON N/A	0.00	0.00 0	0.00 0	1848.64 245	0.00 0	1848.64 245	1848.64
MIL CA Forms in place, walls, int plywood, 8-16' high, 4 use	1539.00 SF ACARC2	49.38	4.97 7,653	0.00 0	1.43 2,205	0.00 0	6.41 9,857	6.41
MIL CA Forms in place, SOG, edge forms, wood, over 12", 4 use	61.00 SF ACARC1	43.75	3.62 221	0.00 0	0.96 58	0.00 0	4.58 280	4.58

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Finishing walls, float fin				0.95	0.00	0.03	0.00	0.99	
ish,	770.00 SF	ACMACEFI1	37.50	734	0	27	0	761	0.99
1/16" thick									
MIL CO Finishing walls, break tie				0.53	0.00	0.06	0.00	0.59	
s &	770.00 SF	ACMACEFI1	67.50	408	0	44	0	452	0.59
patch voids									
TOTAL 36" Control Manhole	1.00 EA			26,348	3,608	47,774	0	77,730	77730
AA_11.02.06_ 10. 36" RCP Culvert									
MIL AA Piping, drainage & sewage,				21.00	9.92	60.66	0.00	91.58	
36"	40.00 LF		0.00	840	397	2,426	0	3,663	91.58
dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.									
AF AA Piping, drainage & sewage,				0.00	0.00	6.79	0.00	6.79	
gasket, 36" dia	4.00 EA	N/A	0.00	0	0	27	0	27	6.79
RSM CO Lean Concrete ready mix, r				0.00	0.00	70.39	0.00	70.39	
egular	25.50 CY	N/A	0.00	0	0	1,795	0	1,795	70.39
weight, 2000 psi									
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	25.50 CY	CLABC20	8.13	784	254	0	0	1,038	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	9.62	0.00	16.23	
	22.44 CY	CODLQ	56.25	97	51	216	0	364	16.23
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	22.44 CY	COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes									
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	57.00 LF	ACARCARP1	18.13	135	0	92	0	227	3.99
wide, 3/8" thick									
TOTAL 36" RCP Culvert	40.00 LF			1,861	704	4,557	0	7,122	178.06
AA_11.02.06_ 15. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	59.00 CY	CODEB12C	130.00	31	31	0	0	62	1.06
2 CY, medium matl. Say 10' deep x 4' wide x 40' long / 27' = 59 cy									

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Hauling, w/loading, 12 CY					1.19	1.61	0.00	0.00	2.80	
truck, 5 mile haul, soil. Say a total of 59 cy - 55 cy = 4 cy	4.00	CY	CODEB30	87.00	5	6	0	0	11	2.80
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12" deep, crushed 3/4" stone, large areas. Say 3' wide x 40' long / 9' = 13 sy	13.00	SY	COFGB36C	525.00	4	5	121	0	130	10.00
MIL AA Backfill, trench, front-en					1.01	0.72	0.00	0.00	1.72	
d loader, 40 - 60 HP, no. Say a total of 59 cy of excavated material minus (1' x 3' x 40' / 27') of stone = 55 cy of backfilling.	55.00	CY	CODFB10N	50.00	55	39	0	0	95	1.72
RSM AA Compaction, riding, vibrat					0.13	0.07	0.00	0.00	0.20	
ing roller, 6" lifts, 2 passes	55.00	CY	COFCB10Y	375.00	7	4	0	0	11	0.20
MIL AA Compaction, 1 ton roller,					2.01	0.37	0.00	0.00	2.38	
around structures & trenches	5.50	CY	COFCB10A	25.00	11	2	0	0	13	2.38
TOTAL Excavation and Backfilling	1.00	JOB			114	87	121	0	322	322.34
AA_11.02.06_ 20. 36" Outlet Structure										
CIV AA Hydraulic structures, flap					530.43	121.67	3932.37	0.00	4584.47	
gates, aluminum, 36" dia	1.00	EA	SIWSL5A	0.35	530	122	3,932	0	4,584	4584.47
MIL AA Headwall, conc, CIP, 36" d					2157.59	35.44	508.75	0.00	2701.78	
ia pipe, 30 deg skewed wingwall	1.00	EA	ACARC14H	0.11	2,158	35	509	0	2,702	2701.78
USR AA Bedding Material					0.65	0.31	23.80	0.00	24.76	
East Side Sand & Gravel-$9/Ton Coolbaugh Sand & Gravel-$8.65/T American Asphalt-$12.15/Ton Use Average Of $9.93/Ton Multi- Plied By Conversion Factor Of 1.92 Received From Geotechnical Design Branch >> $18.07/Cy	5.10	CY	CODLP	360.00	3	2	121	0	126	24.76
TOTAL 36" Outlet Structure	1.00	EA			2,691	159	4,563	0	7,413	7412.53

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.06_ 25. 36" Inlet Structure										
MIL AA Catch basin, CI, frame & c					74.52	11.30	656.27	0.00	742.08	
over,	1.00	EA	CODLB6	1.25	75	11	656	0	742	742.08
curb inlet type, 27" x 27"										
MIL AA CB or manholes, conc, prec					343.30	58.82	490.16	0.00	892.27	
ast,	1.00	EA	UOEHB22	0.38	343	59	490	0	892	892.27
4' ID, 5' deep										
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	5.00	SY	ULABA2	150.00	3	1	7	0	11	2.21
lene										
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12"	5.00	SY	COFGB36C	525.00	2	2	47	0	50	10.00
deep, crushed 3/4" stone, large areas										
TOTAL 36" Inlet Structure	1.00	EA			423	72	1,200	0	1,695	1695.43
TOTAL 36" Drainage Structure #2	40.00	LF			31,437	4,631	58,214	0	94,282	2357.06
AA_11.02.07. 36" Drainage Structure #3										
AA_11.02.07_ 5. 36" Control Manhole										
CIV AA Hydraulic structures, 84"					14851.90	3406.89	40159.49	0.00	58418.28	
x 84",	1.00	EA	SIWSL5A	0.01	14,852	3,407	40,159	0	58,418	58418
HD, self cont w/crank, sluice										
MIL AA Ladder, steel, 20" wide, b					31.21	0.88	62.78	0.00	94.87	
olted	2.00	VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage										
MIL AA Ladder, steel, 20" wide, b					18.36	0.52	29.20	0.00	48.07	
olted	18.00	VLF	SIWSE4	10.63	330	9	526	0	865	48.07
to conc, w/o cage										
MIL AA Placing conc, slab on grad					10.81	3.50	0.00	0.00	14.31	
e,	4.37	CY	CLABC20	23.13	47	15	0	0	63	14.31
over 6" thick, pumped										
MIL AA Placing conc, walls, 12" t					18.17	5.89	0.00	0.00	24.06	
hick,	23.83	CY	CLABC20	13.75	433	140	0	0	573	24.06
pumped										
RSM AA Concrete ready mix, regula					0.00	0.00	79.32	0.00	79.32	
r	28.20	CY	N/A	0.00	0	0	2,237	0	2,237	79.32
weight, 4000 psi										

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Reinforcing in place, slab on grade, #3 to #7				699.05	0.00	607.35	0.00	1306.40	
	0.34 TON	SIWRRODM4	0.29	238	0	207	0	445	1306.40
MIL AA Reinforcing in place, wall s, #3 to #7				535.94	0.00	607.35	0.00	1143.29	
	1.79 TON	SIWRRODM4	0.38	958	0	1,085	0	2,043	1143.29
L RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	0.43 CY	CLABC20	23.13	5	2	31	0	37	84.69
MIL SS Plates, steel, 1/4" thick				0.00	0.00	1848.64	0.00	1848.64	
	0.11 TON	N/A	0.00	0	0	205	0	205	1848.64
MIL CA Forms in place, walls, int , plywood, 8-16' high, 4 use				4.97	0.00	1.43	0.00	6.41	
	1284.00 SF	ACARC2	49.38	6,385	0	1,840	0	8,224	6.41
MIL CA Forms in place, SOG, edge forms, wood, over 12", 4 use				3.62	0.00	0.96	0.00	4.58	
	51.00 SF	ACARC1	43.75	185	0	49	0	234	4.58
MIL CO Finishing walls, float fin ish, 1/16" thick				0.95	0.00	0.03	0.00	0.99	
	643.00 SF	ACMACEFI1	37.50	613	0	22	0	635	0.99
MIL CO Finishing walls, break tie s & patch voids				0.53	0.00	0.06	0.00	0.59	
	643.00 SF	ACMACEFI1	67.50	340	0	37	0	378	0.59
TOTAL 36" Control Manhole	1.00 EA			24,448	3,575	46,523	0	74,547	74547

AA_11.02.07_ 10. 36" RCP Culvert

	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
B MIL AA Piping, drainage & sewage, 36" dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.				21.00	9.92	60.66	0.00	91.58	
	600.00 LF		0.00	12,600	5,951	36,395	0	54,947	91.58
AF AA Piping, drainage & sewage, gasket, 36" dia				0.00	0.00	6.79	0.00	6.79	
	60.00 EA	N/A	0.00	0	0	408	0	408	6.79
RSM CO Lean Concrete ready mix, r egular weight, 2000 psi				0.00	0.00	70.39	0.00	70.39	
	21.28 CY	N/A	0.00	0	0	1,497	0	1,497	70.39
MIL CO Placing conc, footings, sp read, under 1 CY, pumped				30.76	9.96	0.00	0.00	40.72	
	21.28 CY	CLABC20	8.13	654	212	0	0	866	40.72

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR AA Place Select Granular Fill				4.33	2.28	9.62	0.00	16.23	
	18.72 CY	CODLQ	56.25	81	43	180	0	304	16.23
L RSM AA Compaction, riding, vibrating roller, 6" lifts, 4 passes				0.21	0.10	0.00	0.00	0.32	
	18.72 CY	COFCB10Y	237.50	4	2	0	0	6	0.32
MIL CO Waterstop, PVC, dumbbell, 6" wide, 3/8" thick				2.37	0.00	1.62	0.00	3.99	
	48.00 LF	ACARCARP1	18.13	114	0	78	0	191	3.99
TOTAL 36" RCP Culvert	600.00 LF			13,453	6,208	38,558	0	58,219	97.03
AA_11.02.07_ 15. Excavation and Backfilling									
MIL AA Excavate & load, hydr excavator, 2 CY, medium matl. Say 10' deep x 4' wide x 600' long / 27' = 889 cy				0.53	0.52	0.00	0.00	1.06	
	889.00 CY	CODEB12C	130.00	474	465	0	0	938	1.06
AF AA Hauling, w/loading, 12 CY truck, 5 mile haul, soil. Say a total of 889 cy - 822 cy = 67 cy				1.19	1.61	0.00	0.00	2.80	
	67.00 CY	CODEB30	87.00	80	108	0	0	188	2.80
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas. Say 3' wide x 600' long / 9' = 200 sy				0.33	0.36	9.31	0.00	10.00	
	200.00 SY	COFGB36C	525.00	65	73	1,863	0	2,000	10.00
MIL AA Backfill, trench, front-end loader, 40 - 60 HP, no. Say a total of 889cy of excavated material minus (1' x 3' x 600' / 27') of stone = 822cy of backfilling.				1.01	0.72	0.00	0.00	1.72	
	822.00 CY	CODFB10N	50.00	828	589	0	0	1,416	1.72
RSM AA Compaction, riding, vibrating roller, 6" lifts, 2 passes				0.13	0.07	0.00	0.00	0.20	
	822.00 CY	COFCB10Y	375.00	110	54	0	0	164	0.20
MIL AA Compaction, 1 ton roller, around structures & trenches				2.01	0.37	0.00	0.00	2.38	
	82.20 CY	COFCB10A	25.00	166	30	0	0	196	2.38

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Excavation and Backfilling	1.00 JOB			1,722	1,318	1,863	0	4,902	4902.48
AA_11.02.07_ 20. 36" Outlet Structure									
CIV AA Hydraulic structures, flap				530.43	121.67	3932.37	0.00	4584.47	
gates, aluminum, 36" dia	1.00 EA	SIWSL5A	0.35	530	122	3,932	0	4,584	4584.47
MIL AA Headwall, conc, CIP, 36" d				2157.59	35.44	508.75	0.00	2701.78	
ia	1.00 EA	ACARC14H	0.11	2,158	35	509	0	2,702	2701.78
pipe, 30 deg skewed wingwall									
USR AA Bedding Material				0.65	0.31	23.80	0.00	24.76	
East Side Sand & Gravel-$9/Ton	4.26 CY	CODLP	360.00	3	1	101	0	105	24.76
Coolbaugh Sand & Gravel-$8.65/T									
American Asphalt-$12.15/Ton									
Use Average Of $9.93/Ton Multi-									
Plied By Conversion Factor Of									
1.82 Received From Geotechnical									
Design Branch >> $18.07/Cy									
TOTAL 36" Outlet Structure	1.00 EA			2,691	158	4,542	0	7,392	7391.61
AA_11.02.07_ 25. 36" Inlet Structure									
MIL AA Catch basin, CI, frame & c				74.52	11.30	656.27	0.00	742.08	
over,	5.00 EA	CODLB6	1.25	373	56	3,281	0	3,710	742.08
curb inlet type, 27" x 27"									
MIL AA CB or manholes, conc, prec				343.30	58.82	490.16	0.00	892.27	
ast,	5.00 EA	UOEHB22	0.38	1,716	294	2,451	0	4,461	892.27
4' ID, 6' deep									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	25.00 SY	ULABA2	150.00	15	3	37	0	55	2.21
lene									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	25.00 SY	COFGB36C	525.00	8	9	233	0	250	10.00
deep, crushed 3/4" stone, large									
areas									
TOTAL 36" Inlet Structure	5.00 EA			2,113	362	6,002	0	8,477	1695.43
TOTAL 36" Drainage Structure #3	600.00 LF			44,427	11,622	97,488	0	153,537	255.89

A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.08. 84" Drainage Structure #1										
AA_11.02.08_ 5. 84" Control Manhole										
CIV AA Hydraulic structures, 84"					14851.90	3406.89	40159.49	0.00	58418.28	
x 84",	1.00	EA	SIWSL5A	0.01	14,852	3,407	40,159	0	58,418	58418
HD, self cont w/crank, sluice										
MIL AA Ladder, steel, 20" wide, b					31.21	0.88	62.78	0.00	94.87	
olted	2.00	VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage										
MIL AA Ladder, steel, 20" wide, b					18.36	0.52	29.20	0.00	48.07	
olted	25.00	VLF	SIWSE4	10.63	459	13	730	0	1,202	48.07
to conc, w/o cage										
MIL AA Placing conc, slab on grad					10.81	3.50	0.00	0.00	14.31	
e,	12.00	CY	CLABC20	23.13	130	42	0	0	172	14.31
over 6" thick, pumped										
MIL AA Placing conc, walls, 12" t					18.17	5.89	0.00	0.00	24.06	
hick,	65.00	CY	CLABC20	13.75	1,181	383	0	0	1,564	24.06
pumped										
RSM AA Concrete ready mix, regula					0.00	0.00	79.32	0.00	79.32	
r	77.00	CY	N/A	0.00	0	0	6,108	0	6,108	79.32
weight, 4000 psi										
MIL AA Reinforcing in place, slab					699.05	0.00	607.35	0.00	1306.40	
on	0.75	TON	SIWRRODM4	0.29	525	0	456	0	982	1306.40
grade, #3 to #7										
MIL AA Reinforcing in place, wall					535.94	0.00	607.35	0.00	1143.29	
s, #3	5.02	TON	SIWRRODM4	0.38	2,693	0	3,051	0	5,744	1143.29
to #7										
L RSM CO Grout					10.81	3.50	70.39	0.00	84.69	
	1.46	CY	CLABC20	23.13	16	5	102	0	123	84.69
MIL AA Plates, steel, 1/4" thick					0.00	0.00	1698.44	0.00	1698.44	
	0.31	TON	N/A	0.00	0	0	518	0	518	1698.44
MIL AA Forms in place, walls, int					4.97	0.00	1.43	0.00	6.41	
,	3226.00	SF	ACARC2	49.38	16,041	0	4,622	0	20,663	6.41
plywood, 8-16' high, 4 use										
MIL CA Forms in place, SOG, edge					3.62	0.00	0.96	0.00	4.58	
forms,	141.00	SF	ACARC1	43.75	511	0	135	0	646	4.58
wood, over 12", 4 use										

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Finishing walls, float fin ish, 1/16" thick	1338.00	SF	ACMACEFI1	37.50	0.95 1,275	0.00 0	0.03 46	0.00 0	0.99 1,322	0.99
MIL CO Finishing walls, break tie s & patch voids	1338.00	SF	ACMACEFI1	67.50	0.53 708	0.00 0	0.06 77	0.00 0	0.59 786	0.59
TOTAL 84" Control Manhole	1.00	EA			38,454	3,851	56,132	0	98,437	98437
AA_11.02.08_ 10. 84" RCP Culvert										
B AF AA Piping, drainage & sewage, RCP, class 5, 84" dia. MEANS FC 2003, page 83.	90.00	LF		0.00	47.00 4,230	39.24 3,532	284.23 25,581	0.00 0	370.47 33,342	370.47
M AF AA Piping, drainage & sewage, gasket, 72" dia	9.00	EA	N/A	0.00	0.00 0	0.00 0	22.82 205	0.00 0	22.82 205	22.82
USR AA Fine Drainage Gravel Drainage Fill East Side Sand & Gravel-$9/Ton Coolbaugh Sand & Gravel-$8.65/T American Asphalt-$12.15/Ton Use Average Of $9.93/Ton Multiplied By A Conversion Factor Of 1.82 Received From Geotechnical Design Branch. >> $18.07/Cy	35.22	CY	CODLQ	450.00	0.54 19	0.29 10	18.43 649	0.00 0	19.25 678	19.25
USR AA Place Select Granular Fill	359.24	CY	CODLQ	56.25	4.33 1,554	2.28 821	24.52 8,808	0.00 0	31.13 11,182	31.13
L RSM AA Compaction, riding, vibrat ing roller, 6" lifts, 4 passes	359.24	CY	COFCB10Y	237.50	0.21 76	0.10 37	0.00 0	0.00 0	0.32 113	0.32
MIL CO Waterstop, PVC, dumbbell, 6" wide, 3/8" thick	132.00	LF	ACARCARP1	18.13	2.37 313	0.00 0	1.62 214	0.00 0	3.99 527	3.99
RSM CO Lean Concrete ready mix, r egular weight, 2000 psi	75.14	CY	N/A	0.00	0.00 0	0.00 0	70.39 5,289	0.00 0	70.39 5,289	70.39
MIL CO Placing conc, footings, sp read, under 1 CY, pumped	75.14	CY	CLABC20	8.13	30.76 2,311	9.96 749	0.00 0	0.00 0	40.72 3,059	40.72

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 84" RCP Culvert	90.00 LF			8,503	5,148	40,745	0	54,396	604.40
AA_11.02.08_ 15. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	267.00 CY	CODEB12C	130.00	142	140	0	0	282	1.06
2 CY, medium matl. Say 10' deep x 8' wide x 90' long / 27' = 267 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	27.00 CY	CODEB30	87.00	32	44	0	0	76	2.80
5 mile haul, soil. Say a total of 267 cy - 240 cy = 27 cy									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	80.00 SY	COFGB36C	525.00	26	29	745	0	800	10.00
deep, crushed 3/4" stone, large areas. Say 8' wide x 90' long / 9' = 80 sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	240.00 CY	CODFB10N	50.00	242	172	0	0	413	1.72
loader, 40 - 60 HP, no. Say a total of 267 cy of excavated material minus (1' x 8' x 90' / 27') of stone = 240 cy of backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	240.00 CY	COFCB10Y	375.00	32	16	0	0	48	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, water, wagon,				0.14	0.20	0.23	0.00	0.57	
6000	240.00 CY	COFWB59	250.00	33	48	55	0	136	0.57
gal, 3 mile haul									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	24.00 CY	COFCB10A	25.00	48	9	0	0	57	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			555	456	800	0	1,812	1812.03

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.02.08_ 20. 84" Outlet Structure									
B CIV AA Hydraulic structures, flap				5142.63	1179.67	23155.69	0.00	29477.99	
gates, aluminum, 84" dia	1.00 EA	SIWSL5A	0.04	5,143	1,180	23,156	0	29,478	29478
B MIL AA Headwall, conc, CIP, 84" d				6995.27	114.90	3837.79	0.00	10947.95	
ia	1.00 EA	ACARC14H	0.04	6,995	115	3,838	0	10,948	10948
pipe, 30 deg skewed wingwall									
TOTAL 84" Outlet Structure	1.00 EA			12,138	1,295	26,993	0	40,426	40426
TOTAL 84" Drainage Structure #1	90.00 LF			59,650	10,750	124,671	0	195,071	2167.45
AA_11.02.09. 84" Drainage Structure #2									
AA_11.02.09_ 5. 84" Control Manhole									
CIV AA Hydraulic structures, 84"				14851.90	3406.89	40159.49	0.00	58418.28	
x 84",	1.00 EA	SIWSL5A	0.01	14,852	3,407	40,159	0	58,418	58418
HD, self cont w/crank, sluice									
MIL AA Ladder, steel, 20" wide, b				31.21	0.88	62.78	0.00	94.87	
olted	2.00 VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage									
MIL AA Ladder, steel, 20" wide, b				18.36	0.52	29.20	0.00	48.07	
olted	23.00 VLF	SIWSE4	10.63	422	12	672	0	1,106	48.07
to conc, w/o cage									
MIL AA Placing conc, slab on grad				10.81	3.50	0.00	0.00	14.31	
e,	11.13 CY	CLABC20	23.13	120	39	0	0	159	14.31
over 6" thick, pumped									
MIL AA Placing conc, walls, 12" t				18.17	5.89	0.00	0.00	24.06	
hick,	60.18 CY	CLABC20	13.75	1,094	354	0	0	1,448	24.06
pumped									
RSM AA Concrete ready mix, regula				0.00	0.00	79.32	0.00	79.32	
r	71.31 CY	N/A	0.00	0	0	5,656	0	5,656	79.32
weight, 4000 psi									
MIL AA Reinforcing in place, slab				699.05	0.00	607.35	0.00	1306.40	
on	0.70 TON	SIWRRODM4	0.29	487	0	423	0	909	1306.40
grade, #3 to #7									
MIL AA Reinforcing in place, wall				535.94	0.00	607.35	0.00	1143.29	
s, #3	4.65 TON	SIWRRODM4	0.38	2,493	0	2,825	0	5,319	1143.29
to #7									

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	1.35 CY	CLABC20	23.13	15	5	95	0	114	84.69
MIL AA Plates, steel, 1/4" thick				0.00	0.00	1698.44	0.00	1698.44	
	0.28 TON	N/A	0.00	0	0	480	0	480	1698.44
MIL AA Forms in place, walls, int ,				4.97	0.00	1.43	0.00	6.41	
plywood, 8-16' high, 4 use	2987.00 SF	ACARC2	49.38	14,853	0	4,279	0	19,132	6.41
MIL CA Forms in place, SOG, edge forms,				3.62	0.00	0.96	0.00	4.58	
wood, over 12", 4 use	130.00 SF	ACARC1	43.75	471	0	125	0	596	4.58
MIL CO Finishing walls, float fin ish,				0.95	0.00	0.03	0.00	0.99	
1/16" thick	1239.00 SF	ACMACEFI1	37.50	1,181	0	43	0	1,224	0.99
MIL CO Finishing walls, break tie s &				0.53	0.00	0.06	0.00	0.59	
patch voids	1239.00 SF	ACMACEFI1	67.50	656	0	72	0	728	0.59
TOTAL 84" Control Manhole	1.00 EA			36,706	3,818	54,954	0	95,478	95478
AA_11.02.09_ 10. 84" RCP Culvert									
B AF AA Piping, drainage & sewage, RCP,				47.00	39.24	284.23	0.00	370.47	
class 5, 84" dia. MEANS FC 2003, page 83.	80.00 LF		0.00	3,760	3,139	22,738	0	29,637	370.47
M AF AA Piping, drainage & sewage,				0.00	0.00	22.82	0.00	22.82	
gasket, 72" dia	8.00 EA	N/A	0.00	0	0	183	0	183	22.82
USR AA Fine Drainage Gravel				0.54	0.29	18.43	0.00	19.25	
Drainage Fill East Side Sand & Gravel-$9/Ton Coolbaugh Sand & Gravel-$8.65/T American Asphalt-$12.15/Ton Use Average Of $9.93/Ton Multiplied By A Conversion Factor Of 1.82 Received From Geotechnical Design Branch. >> $18.07/Cy	32.61 CY	CODLQ	450.00	18	9	601	0	628	19.25
USR AA Place Select Granular Fill				4.33	2.28	24.52	0.00	31.13	
	333.00 CY	CODLQ	56.25	1,440	761	8,164	0	10,365	31.1

A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L RSM AA Compaction, riding, vibrating roller, 6" lifts, 4 passes	333.00	CY	COFCB10Y	237.50	0.21 71	0.10 35	0.00 0	0.00 0	0.32 105	0.32
MIL CO Waterstop, PVC, dumbbell, 6" wide, 3/8" thick	122.00	LF	ACARCARP1	18.13	2.37 289	0.00 0	1.62 197	0.00 0	3.99 487	3.99
RSM CO Lean Concrete ready mix, regular weight, 2000 psi	70.00	CY	N/A	0.00	0.00 0	0.00 0	70.39 4,927	0.00 0	70.39 4,927	70.39
MIL CO Placing conc, footings, spread, under 1 CY, pumped	70.00	CY	CLABC20	8.13	30.76 2,153	9.96 697	0.00 0	0.00 0	40.72 2,850	40.72
TOTAL 84" RCP Culvert	80.00	LF			7,731	4,641	36,811	0	49,183	614.78
AA_11.02.09_ 15. 84" Outlet Structure Precast headwall with flapgate										
B CIV AA Hydraulic structures, flap gates, aluminum, 84" dia	1.00	EA	SIWSL5A	0.04	5142.63 5,143	1179.67 1,180	23155.69 23,156	0.00 0	29477.99 29,478	29478
B MIL AA Headwall, conc, CIP, 84" dia pipe, 30 deg skewed wingwall	1.00	EA	ACARC14H	0.04	6995.27 6,995	114.90 115	3837.79 3,838	0.00 0	10947.95 10,948	10948
CIV AA Geotextile fabric, 120 mil thick, non-woven polypropylene	15.00	SY	ULABA2	150.00	0.62 9	0.11 2	1.49 22	0.00 0	2.21 33	2.21
MIL AA Base course, crushed 3/4" stone, compacted, 12"D, large areas	15.00	SY	COFGB36C	525.00	0.33 5	0.36 5	9.31 140	0.00 0	10.00 150	10.00
TOTAL 84" Outlet Structure	1.00	EA			12,152	1,302	27,156	0	40,609	40609
AA_11.02.09_ 20. 84" Inlet Structure Inlet structure with trashrack										
USR AA Allowance for a trash rack	1.00	LS		0.00	0.00 0	0.00 0	0.00 0	6500.00 6,500	6500.00 6,500	6500.00
USR AA CIP Inlet Structure, 84" Pipe 30 Degree Skewed Wingwall	1.00	EA		0.00	442.80 443	234.03 234	4094.18 4,094	0.00 0	4771.02 4,771	4771.02

_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene	15.00	SY	ULABA2	150.00	9	2	22	0	33	2.21
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12" deep, crushed 3/4" stone, large areas	15.00	SY	COFGB36C	525.00	5	5	140	0	150	10.00
CIV AA Forms in place, SOG, trenc					7.05	0.00	1.01	0.00	8.05	
h forms in floor, wood, 3 use	120.00	SF	ACARC1	22.50	846	0	121	0	966	8.05
MIL AA Forms in place, ret wall,					5.24	0.00	0.80	0.00	6.03	
battered, to 8' high, 3 us e, job blt plywood	30.00	SF	ACARC2	46.88	157	0	24	0	181	6.03
MIL AA Reinforcing in place, slab					699.05	0.00	607.35	0.00	1306.40	
on grade, #3 to #7	0.40	TON	SIWRRODM4	0.29	280	0	243	0	523	1306.40
RSM AA Concrete ready mix, regula					0.00	0.00	74.81	0.00	74.81	
r weight, 3000 psi	7.00	CY	N/A	0.00	0	0	524	0	524	74.81
MIL AA Placing conc, slab on grad					8.96	0.39	0.00	0.00	9.35	
e, over 6" thick, direct chute	6.00	CY	ULABC6	20.63	54	2	0	0	56	9.35
MIL AA Placing conc, walls, 12" t					18.17	5.89	0.00	0.00	24.06	
hick, pumped	2.00	CY	CLABC20	13.75	36	12	0	0	48	24.06
TOTAL 84" Inlet Structure	1.00	EA			1,829	255	5,167	6,500	13,752	13752
AA_11.02.09_ 25. Excavation and Backfilling										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator, 2 CY, medium matl. Say 10' deep x 8' wide x 80' long / 27' = 237 cy	237.00	CY	CODEB12C	130.00	126	124	0	0	250	1.06
AF AA Hauling, w/loading, 12 CY					1.19	1.61	0.00	0.00	2.80	
truck, 5 mile haul, soil. Say a total of 237 cy - 231 cy = 24 cy	24.00	CY	CODEB30	87.00	29	39	0	0	67	2.80

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas. Say 8' wide x 80' long / 9' = 71	71.00 SY	COFGB36C	525.00	0.33 23	0.36 26	9.31 661	0.00 0	10.00 710	10.00
MIL AA Backfill, trench, front-end loader, 40 - 60 HP, no. Say a total of 237 cy of excavated material minus (1' x 8' x 80' / 27') of stone = 213 cy of backfilling.	213.00 CY	CODFB10N	50.00	1.01 214	0.72 153	0.00 0	0.00 0	1.72 367	1.72
RSM AA Compaction, riding, vibrating roller, 6" lifts, 2 passes	213.00 CY	COFCB10Y	375.00	0.13 29	0.07 14	0.00 0	0.00 0	0.20 43	0.20
MIL AA Compaction, 1 ton roller, around structures & trenches	21.30 CY	COFCB10A	25.00	2.01 43	0.37 8	0.00 0	0.00 0	2.38 51	2.38
TOTAL Excavation and Backfilling	1.00 JOB			464	363	661	0	1,488	1487.74
TOTAL 84" Drainage Structure #2	80.00 LF			58,882	10,379	124,749	6,500	200,510	2506.37
TOTAL Drainage	1.00 EA			281,094	52,797	580,216	6,500	920,606	920606
AA_11.03. Care & Diversion of Water									
AA_11.03. 5. Dewatering									
B MIL AA Dewatering, drainage piping	100.00 LF	CODLB6	40.00	2.33 233	0.35 35	1.16 116	0.00 0	3.84 384	3.84
AF AA Water pump, portable, 2" discharge, 6000 GPH, gasoline	2.00 EA	MPLUQ1	1.38	54.57 109	0.00 0	908.14 1,816	0.00 0	962.72 1,925	962.72
B MIL AA Crew to maintain the pumps during dewatering	14.00 DAY	COFWG	0.13	397.91 5,571	56.35 789	0.00 0	0.00 0	454.26 6,360	454.26
B AF AA Allowance for relocating dewatering basin 2003 , page 76.	1.00 LS		0.00	0.00 0	0.00 0	0.00 0	1500.00 1,500	1500.00 1,500	1500.00

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MAP AA Allowance for the removal				0.00	0.00	0.00	675.00	675.00	
of the	1.00 LS		0.00	0	0	0	675	675	675.00
dewatering basin after construction									
TOTAL Dewatering	60.00 LF			5,913	824	1,932	2,175	10,844	180.73
TOTAL Care & Diversion of Water	1.00 EA			5,913	824	1,932	2,175	10,844	10844
AA_11.99. Associated General Items									
AA_11.99.01. Construct Levee									
AA_11.99.01_ 5. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	44.00 EA	CODTB10M	18.75	118	213	0	0	331	7.52
HP dozer, trees to 12" dia									
AF AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	44.00 EA	CODTB10M	12.50	177	319	0	0	496	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	21.00 ACR	CODTB11A	1.00	1,368	1,276	0	0	2,644	125.91
rake, medium brush									
M MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	504.00 CY	COEIB17	11.00	5,826	2,587	5,823	0	14,237	28.25
mi haul to dump. Say 24 cubic yards of debris per acre.									
TOTAL Clearing and Grubbing	101561 SY			7,489	4,395	5,823	0	17,708	0.17
AA_11.99.01_ 10. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6"	13841 CY	CODTB10B	108.13	6,443	7,780	0	0	14,223	1.03
deep, 200 HP dozer, remove/pile on site									
MIL AA Loam or topsoil, frtn load				2.01	1.07	0.00	0.00	3.08	
er,	13841 CY	CODFB10S	25.00	27,869	14,803	0	0	42,672	3.08
1.5 CY, spread from pile to									
TOTAL Top Soil	13841 CY			34,312	22,583	0	0	56,895	4.11

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.01_ 15. Excavation (USER)										
MIL AA Excavate & load, hydr excavator,					0.53	0.52	0.00	0.00	1.06	
2 CY, medium matl. Total excavation includes the levee, and the toe drain.	34895	CY	CODEB12C	130.00	18,592	18,238	0	0	36,830	1.06
MIL AA Hauling, hwy haulers, 16.5 CY, 6					0.97	1.31	0.00	0.00	2.28	
mi round trip @ 40 MPH (2.1 cyc/hr)	40129	CY	CTDHB34C	35.00	38,998	52,445	0	0	91,443	2.28
TOTAL Excavation	34895	CY			57,590	70,683	0	0	128,273	3.68
AA_11.99.01_ 20. Geotextile (USER)										
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropylene	17928	SY	ULABA2	150.00	11,028	1,944	26,721	0	39,693	2.21
TOTAL Geotextile	17928	SY			11,028	1,944	26,721	0	39,693	2.21
AA_11.99.01_ 25. Cutoff Trench Selectfill Materia (USER)										
MIL AA Excavate & load, wheeled loader,					0.37	0.35	0.00	0.00	0.72	
3 CY, medium matl. Swell factor 15%.	1117.70	CY	CODFB10T	137.50	409	393	0	0	802	0.72
MIL AA Hauling, hwy haulers, 12 CY,					0.85	1.07	0.00	0.00	1.92	
stockpile onsite, 1 mi round trip @ 20 MPH (4.2 cyc/hr)	1117.70	CY	COEIB34B	40.00	950	1,198	0	0	2,149	1.92
MIL AA Soil stbln, w/scarifying &					7.86	3.87	35.25	0.00	46.98	
cmpct, 10% by volume, lime	1117.70	CY	COFCB70A	25.00	8,781	4,329	39,400	0	52,511	46.98
AF AA Compaction, steel wheel tandem					0.24	0.21	0.00	0.00	0.45	
roller, 5 ton	1117.70	CY	COFCB10E	212.50	265	237	0	0	502	0.45
MIL AA Compaction, water, truck, 3000					0.29	0.23	0.23	0.00	0.76	
gal, 3 mile haul	1117.70	CY	COKBB45	236.00	329	260	258	0	848	0.76
TOTAL Cutoff Trench Selectfill M	972.00	CY			10,735	6,418	39,659	0	56,812	58.45

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.01_ 30. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader, 3 CY, medium matl. Swell factor 15%.	71619 CY	CODFB10T	137.50	0.37 26,220	0.35 25,199	0.00 0	0.00 0	0.72 51,419	0.72
MIL AA Hauling, hwy haulers, 16.5 CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)	71619 CY	CTDHB34C	35.00	0.97 69,599	1.31 93,599	5.60 401,328	0.00 0	7.88 564,526	7.88
USR AA Placement of Fill Spread/Compact Roadwy Embankment 8"(20cm) Lift w/300 HP Tractor	71619 CY	CODTP	2000.00	0.15 10,929	0.15 10,976	0.00 0	0.00 0	0.31 21,905	0.31
TOTAL Random Fill	62277 CY			106,747	129,774	401,328	0	637,850	10.24
AA_11.99.01_ 35. 18" Riprap (USER)									
USR AA 6" Bedding Stone The cost includes 6" riprap randomly dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 9,855 sy / 3' = 3,285 cy x 0.5' thick = 1,643 cy.	1643.00 CY	CODLP	558.10	0.42 689	0.20 330	32.82 53,931	0.00 0	33.45 54,950	33.45
MIL AA Class II Rip-rap, random pieces, 25 - 500 # pieces, dumped from truck. Say 9,855 sy / 3' = 3,285 cy	3285.00 CY	COETB3B	32.00	4.05 13,320	1.83 6,013	22.15 72,760	0.00 0	28.03 92,093	28.03
B RSM AA Rip-rap, random, machine placed for slope protection	3285.00 CY	UOEHB12G	32.00	2.16 7,110	1.22 4,005	0.00 0	0.00 0	3.38 11,115	3.38
L MIL AA Delivery stones to placement site from stockpile, front-end loader, 40 - 60 HP	3285.00 CY	CODFB10N	32.00	1.57 5,167	1.12 3,675	0.00 0	0.00 0	2.69 8,842	2.69
TOTAL 18" Riprap	9855.00 SY			26,287	14,023	126,691	0	167,000	16.95

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.01_ 45. Select Fill (USER)									
MIL AA Excavate & load, wheeled loader, 3 CY, medium matl. Swell factor 15%.				0.37	0.35	0.00	0.00	0.72	
	225147 CY	CODFB10T	137.50	82,426	79,218	0	0	161,645	0.72
M MIL AA Hauling, hwy haulers, 16.5 CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)				0.97	1.31	6.93	0.00	9.21	
	225147 CY	CTDHB34C	35.00	218,798	294,247	1,560,809	0	2,073,854	9.21
USR AA Placement of Fill Spread/Compact Roadwy Embankment 8"(20cm) Lift w/300 HP Tractor				0.15	0.15	0.00	0.00	0.31	
	225147 CY	CODTP	2000.00	34,357	34,505	0	0	68,862	0.31
TOTAL Select Fill	195780 CY			335,582	407,970	1,560,809	0	2,304,361	11.77
AA_11.99.01_ 50. Drainage Material/Toe Drain (USER) Assumed cost for the excavation and goetextile for the toe drain is cover under tasks "excavation", and "geotextile", see above.									
B USR AA Placement of D50 = 3/4" stone - A unit price of $25 per cubic yard delivered to site.				4.41	1.35	28.89	0.00	34.65	
	15775 CY	CODEH	15.00	69,557	21,308	455,661	0	546,525	34.65
TOTAL Drainage Material/Toe Drai	15775 CY			69,557	21,308	455,661	0	546,525	34.65
AA_11.99.01_ 55. Seeding (USER)									
MIL AA Seeding, athletic field mix, mechanical seeding, 450#/acre.				144.41	73.62	634.89	0.00	852.93	
	17.20 ACR	COELB66	0.24	2,484	1,267	10,922	0	14,673	852.93
RSM AA Seeding, apply fertilizer, 800 lb/acre. Say 12 acres x 800 lb / 2,000 lb = 5 tons.				67.87	34.60	381.28	0.00	483.76	
	7.17 TON	COELB66	0.50	487	248	2,733	0	3,468	483.76
TOTAL Seeding	83046 SY			2,971	1,515	13,655	0	18,141	0.22
TOTAL Construct Levee	9700.00 LF			662,297	680,613	2,630,347	0	3,973,257	409.61

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.02. Construct 16' MSE Wall									
AA_11.99.02_ 5. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	13.00 EA	CODTB10M	18.75	35	63	0	0	98	7.52
HP dozer, trees to 12" dia									
AF AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	13.00 EA	CODTB10M	12.50	52	94	0	0	147	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	1.80 ACR	CODTB11A	1.00	117	109	0	0	227	125.91
rake, medium brush									
M MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	43.20 CY	COEIB17	11.00	499	222	499	0	1,220	28.25
mi haul to dump. Say 24 cubic									
yards of debris per acre.									
TOTAL Clearing and Grubbing	8750.00 SY			704	488	499	0	1,691	0.19
AA_11.99.02_ 10. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6"	347.00 CY	CODTB10B	108.13	162	195	0	0	357	1.03
deep, 200 HP dozer, remove/pile									
on site									
MIL AA Loam or topsoil, frtn load				2.01	1.07	0.00	0.00	3.08	
er,	347.00 CY	CODFB10S	25.00	699	371	0	0	1,070	3.08
1.5 CY, spread from pile to									
TOTAL Top Soil	347.00 CY			860	566	0	0	1,426	4.11
AA_11.99.02_ 15. Excavation (USER)									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	1250.00 CY	CODEB12C	130.00	666	653	0	0	1,319	1.06
2 CY, medium matl.									
MIL AA Hauling, hwy haulers, 16.5				0.97	1.31	0.00	0.00	2.28	
CY, 6	1437.38 CY	CTDHB34C	35.00	1,397	1,879	0	0	3,275	2.28
mi round trip @ 40 MPH (2.1									
cyc/hr)									
TOTAL Excavation	1250.00 CY			2,063	2,532	0	0	4,595	3.68

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.02_ 20. Geotextile (USER)										
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene	667.00	SY	ULABA2	150.00	410	72	994	0	1,477	2.21
TOTAL Geotextile	667.00	SY			410	72	994	0	1,477	2.21
AA_11.99.02_ 30. 24" Riprap (USER)										
USR AA 6" Bedding Stone The cost					0.42	0.20	32.82	0.00	33.45	
includes 6" riprap randoml y dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 2,083 sy / 3' = 694 cy x 0.5' thick = 347 cy.	347.00	CY	CODLP	558.10	146	70	11,390	0	11,605	33.45
MIL AA Class II Rip-rap, random p					4.05	1.83	22.15	0.00	28.03	
ieces, 25 - 500 # pieces, dumped from truck. Say 2,083 sy / 3' = 694 cy.	694.00	CY	COETB3B	32.00	2,814	1,270	15,371	0	19,456	28.03
B RSM AA Rip-rap, random, machine p					2.16	1.22	0.00	0.00	3.38	
laced for slope protection	694.00	CY	UOEHB12G	32.00	1,502	846	0	0	2,348	3.38
L MIL AA Delivery stones to placem					1.57	1.12	0.00	0.00	2.69	
ent site from stockpile, front-end loader, 40 - 60 HP	694.00	CY	CODFB10N	32.00	1,092	776	0	0	1,868	2.69
TOTAL 24" Riprap	2083.00	SY			5,553	2,962	26,762	0	35,278	16.94
AA_11.99.02_ 35. Drainage Material (USER) Cost for the excavation and goetextile for the toe drain is cover under tasks "excavation", and "geotextile", see above.										
B USR AA Placement of D50 = 3/4" st					4.41	1.35	28.89	0.00	34.65	
one - A unit price of $25 per cubic yard delivered to site.	389.00	CY	CODEH	15.00	1,715	525	11,236	0	13,477	34.65
TOTAL Drainage Material	389.00	CY			1,715	525	11,236	0	13,477	34.65

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.02_ 40. MSE Wall Facing (USER)									
USR AA MSE segmental block units				5.98	0.07	5.36	0.00	11.41	
	24003 SF		0.00	143,538	1,570	128,681	0	273,789	11.41
TOTAL MSE Wall Facing	2667.00 SY			143,538	1,570	128,681	0	273,789	102.66
AA_11.99.02_ 45. MSE Wall Geogrid (USER)									
USR AA Geogrid Material cost are				2.87	0.00	7.28	0.00	10.15	
from	17333 SY		0.00	49,746	0	126,167	0	175,913	10.15
Fleetwood Block (610) 944-8385, as taken from the Olyphant LFP project dated 21 May 01.									
TOTAL MSE Wall Geogrid	17333 SY			49,746	0	126,167	0	175,913	10.15
AA_11.99.02_ 50. MSE Wall Fill (USER)									
M RSM AA Structural Fill, borrow, f				0.79	0.98	13.34	0.00	15.11	
or	5333.00 CY	CODTB15	150.00	4,208	5,210	71,168	0	80,587	15.11
M MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	8900.00 CY	CODFB10N	50.00	8,960	6,373	0	0	15,332	1.72
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	8900.00 CY	COFCB10A	25.00	17,920	3,269	0	0	21,189	2.38
structures & trenches									
MIL AA Compaction, water, wagon,				0.14	0.20	0.23	0.00	0.57	
6000	8900.00 CY	COFWB59	250.00	1,210	1,771	2,057	0	5,038	0.57
gal, 3 mile haul									
TOTAL MSE Wall Fill	5333.00 CY			32,298	16,623	73,225	0	122,147	22.90
AA_11.99.02_ 55. Seeding (USER)									
MIL AA Seeding, athletic field mi				7.61	0.00	7.11	0.00	14.72	
x, by	20.77 CSY	ALABCLAB1	3.89	158	0	148	0	306	14.72
hand, 50#/MSY									
AF AA Seeding, apply fertilizer,				0.91	0.46	2.31	0.00	3.68	
35#/MSF	19.04 MSF	COELB66	37.50	17	9	44	0	70	3.68
MIL AA Loam or topsoil, top dress				0.05	0.00	0.00	0.00	0.05	
by	18747 SF	ALABCLAB1	600.00	924	0	0	0	924	0.05
hand									

\A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Seeding	2083.00 SY			1,100	9	192	0	1,300	0.62
AA_11.99.02_ 60. Concrete Leveling Pad (USER) Concrete leveling pad for the MSE wall facing.									
MIL AA Excavate trench, mdm soil, 4'-6' D, 1/2 CY excavator	56.00 CY	CODEB12E	91.50	0.76 42	0.25 14	0.00 0	0.00 0	1.01 57	1.01
RSM AA Concrete ready mix, regula r weight, 3500 psi.	56.00 CY	N/A	0.00	0.00 0	0.00 0	76.27 4,271	0.00 0	76.27 4,271	76.27
MIL AA Placing conc, footings, sh allow, continuous, direct chute	56.00 CY	ULABC6	15.00	12.32 690	0.54 30	0.00 0	0.00 0	12.86 720	12.86
TOTAL Concrete Leveling Pad	56.00 CY			732	44	4,271	0	5,047	90.13
AA_11.99.02_ 65. Railing (USER)									
MIL AA Railing, pipe, steel, 2 ra il, on stairs, primed, 2" dia	1500.00 LF	SIWSE4	20.00	9.75 14,631	0.27 411	13.00 19,497	0.00 0	23.03 34,540	23.03
TOTAL Railing	1500.00 LF			14,631	411	19,497	0	34,540	23.03
AA_11.99.02_ 70. Piping (USER)									
MIL AA Piping, drainage & sewage, SDR 35,4" dia,PVC,no exc/bkfill,10' L,B&S	750.00 LF	USKCSKWK2	50.00	1.49 1,118	0.00 0	0.97 728	0.00 0	2.46 1,846	2.46
MIL AA Piping, drainage & sewage, PVC, no exc/bkfill, plug, 4". Say 4' on center so, 750' / 4' = 188 each	188.00 EA	USKCSKWK2	9.38	7.95 1,494	0.00 0	1.92 361	0.00 0	9.87 1,855	9.87
MIL AA Piping, drainage & sewage, 4", PVC, no exc/bkfill, coupling	75.00 EA	USKCSKWK2	4.63	16.11 1,208	0.00 0	1.13 85	0.00 0	17.24 1,293	17.24
TOTAL Piping	750.00 LF			3,820	0	1,173	0	4,994	6.66

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Construct 16' MSE Wall	750.00	LF			257,171	25,804	392,698	0	675,673	900.90
AA_11.99.03. H-Piles										
AA_11.99.03_ 5. Steel H-Pile Mob/demob										
USR AA Mob/demob of Equipment					0.00	0.00	0.00	50000.00	50000.00	
	1.00	LS		0.00	0	0	0	50,000	50,000	50000
TOTAL Steel H-Pile Mob/demob	1.00	EA			0	0	0	50,000	50,000	50000
AA_11.99.03_ 10. Steel H-Pile Lengths										
MIL AA Pile, steel, pipe, heavy d					127.23	13.71	207.31	0.00	348.25	
uty	195.00	EA	SIWWE14	0.40	24,810	2,673	40,426	0	67,909	348.25
points, 14" dia										
MIL AA Pile, steel, pipe, splices					107.44	11.57	107.49	0.00	226.50	
, not	195.00	EA	SIWWE14	0.47	20,950	2,257	20,960	0	44,167	226.50
in leads 14" dia										
MIL AA Pile, steel, "H" sections,					6.43	3.12	29.66	0.00	39.21	
50'	9750.00	VLF	CPIDB19A	63.75	62,680	30,418	289,176	0	382,274	39.21
long, HP14 x 102. 195 each x										
50' = 9,750 VLF.										
USR PI Sheet Piling Cutoffs					26.36	0.55	11.80	0.00	38.72	
	195.00	LF	SIWWA	2.38	5,141	108	2,300	0	7,550	38.72
L MIL AA Haul scrape piles offsite,					127.16	56.47	0.00	0.00	183.62	
loading & trucking,machine	4.00	HR	COEIB17	1.00	509	226	0	0	734	183.62
loading truck.										
TOTAL Steel H-Pile Lengths	9750.00	VLF			114,090	35,682	352,863	0	502,635	51.55
AA_11.99.03_ 15. Pre-Drill Pilot Holes										
Drill each pilot hole to a depth of 40' deep, per Chuck Freey, CENAB-EN-GW, 13 Aug 03.										
L MIL AA Borings, auger holes in ea					200.00	54.50	0.00	0.00	254.50	
rth	195.00	EA		0.00	39,000	10,628	0	0	49,628	254.50
2003, page 44.										
MIL AA Borings, drilling in rock					19.61	29.22	0.00	0.00	48.83	
	1950.00	LF	CLADB56	3.24	38,242	56,971	0	0	95,213	48.83
TOTAL Pre-Drill Pilot Holes	7800.00	LF			77,242	67,598	0	0	144,841	18.57

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.03_ 20. Grout for Pre-Drill Pilot Holes									
RSM AA Concrete ready mix, regula				0.00	0.00	79.32	0.00	79.32	
r	840.00 CY	N/A	0.00	0	0	66,627	0	66,627	79.32
weight, 4000 psi									
L MIL AA Placing conc, pumped aroun				8.70	2.82	0.00	0.00	11.52	
d	840.00 CY	CLABC20	28.72	7,308	2,367	0	0	9,675	11.52
pre-drilled H-pile holes.									
TOTAL Grout for Pre-Drill Pilot	22659 CF			7,308	2,367	66,627	0	76,302	3.37
AA_11.99.03_ 25. Steel H-Piles Withdrawn One test H-pile driven to 38' then extracted.									
B MIL PI Pile, steel, "H" sections,				90.45	32.47	0.00	0.00	122.92	
50'	38.00 VLF	CPIDB40	4.53	3,437	1,234	0	0	4,671	122.92
long, HP14 x 102									
TOTAL Steel H-Piles Withdrawn	1.00 EA			3,437	1,234	0	0	4,671	4670.99
AA_11.99.03_ 30. Concrete Panel H-Pile Wall									
M MIL AA Post and Concrete Panel Wa				0.00	0.00	0.00	876.65	876.65	
lls,	539.00 CY	N/A	0.00	0	0	0	472,514	472,514	876.65
cost provided Pittsburgh District (the Saw Mill Flood Protection project), Aug 03. Say (1,618 sy x 9') x 1' / 27' = 539 cy.									
TOTAL Concrete Panel H-Pile Wall	1618.00 SY			0	0	0	472,514	472,514	292.04
AA_11.99.03_ 35. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	8.00 EA	CODTB10M	18.75	21	39	0	0	60	7.52
HP dozer, trees to 12" dia									
AF AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	8.00 EA	CODTB10M	12.50	32	58	0	0	90	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	0.40 ACR	CODTB11A	1.00	26	24	0	0	50	125.91
rake, medium brush									

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	23.00 CY	COEIB17	11.00	266	118	266	0	650	28.25
mi haul to dump									
TOTAL Clearing and Grubbing	1942.00 SY			346	239	266	0	851	0.44
AA_11.99.03_ 40. Random Fill Materail (USER)									
MIL AA Excavate & load, wheeled l				0.37	0.35	0.00	0.00	0.72	
oader,	495.22 CY	CODFB10T	137.50	181	174	0	0	356	0.72
3 CY, medium matl. Swell factor 15%.									
4 MIL AA Hauling of reinforcing fil				0.97	1.31	5.60	0.00	7.88	
l	495.22 CY	CTDHB34C	35.00	481	647	2,775	0	3,904	7.88
material, hwy haulers, 16.5 CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)									
USR AA Placement of Fill				0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Emba	495.22 CY	CODTP	2000.00	76	76	0	0	151	0.31
nkment 8"(20cm) Lift w/300 HP Tractor									
MIL AA Compaction, water, wagon,				0.17	0.25	0.23	0.00	0.65	
6000	495.22 CY	COFWB59	200.00	84	123	114	0	322	0.65
gal, 6 mile haul									
TOTAL Random Fill Materail	431.00 CY			822	1,021	2,889	0	4,732	10.98
AA_11.99.03_ 45. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6"	431.00 CY	CODTB10B	108.13	201	242	0	0	443	1.03
deep, 200 HP dozer, remove/pile on site									
MIL AA Loam or topsoil, frtn load				2.01	1.07	0.00	0.00	3.08	
er,	431.00 CY	CODFB10S	25.00	868	461	0	0	1,329	3.08
1.5 CY, spread from pile to									
TOTAL Top Soil	431.00 CY			1,068	703	0	0	1,772	4.11

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.03_ 50. Excavation (USER)										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	431.00	CY	CODEB12C	130.00	230	225	0	0	455	1.06
2 CY, medium matl. Swell factor 15%.										
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	0.00	0.00	2.28	
CY, 6	495.78	CY	CTDHB34C	35.00	482	648	0	0	1,130	2.28
mi round trip @ 40 MPH (2.1 cyc/hr)										
TOTAL Excavation	431.00	CY			711	873	0	0	1,585	3.68
AA_11.99.03_ 55. 24" Riprap (USER)										
MIL AA Class II Rip-rap, random p					4.05	1.83	22.15	0.00	28.03	
ieces,	1294.00	CY	COETB3B	32.00	5,247	2,369	28,661	0	36,277	28.03
25 - 500 # pieces, dumped from truck. Say 3,883 sy / 3' = 1,294 cy										
B RSM AA Rip-rap, random, machine p					2.16	1.22	0.00	0.00	3.38	
laced	1294.00	CY	UOEHB12G	32.00	2,801	1,578	0	0	4,378	3.38
for slope protection										
L MIL AA Delivery stones to placem					1.57	1.12	0.00	0.00	2.69	
ent	1294.00	CY	CODFB10N	32.00	2,035	1,448	0	0	3,483	2.69
site from stockpile, front-end loader, 40 - 60 HP										
TOTAL 24" Riprap	3883.00	SY			10,083	5,394	28,661	0	44,138	11.37
AA_11.99.03_ 60. Seeding (USER)										
MIL AA Seeding, athletic field mi					7.61	0.00	7.11	0.00	14.72	
x, by	25.89	CSY	ALABCLAB1	3.89	197	0	184	0	381	14.72
hand, 50#/MSY										
AF AA Seeding, apply fertilizer,					0.91	0.46	2.31	0.00	3.68	
35#/MSF	23.30	MSF	COELB66	37.50	21	11	54	0	86	3.68
MIL AA Loam or topsoil, top dress					0.05	0.00	0.00	0.00	0.05	
by	23301	SF	ALABCLAB1	600.00	1,149	0	0	0	1,149	0.05
hand										
TOTAL Seeding	2589.00	SY			1,367	11	238	0	1,615	0.62

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.03_ 65. Traffic Control Full closure of the road during construction.										
', CIV AA Signs, placement and remov					385.46	56.02	0.00	0.00	441.48	
al of	20.00	EA	CLABB80	0.33	7,709	1,120	0	0	8,830	441.48
signs, including supports, 21 SF to 40 SF										
AF AA Sign, hi-intensity					0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00	SF	N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.										
MIL AA Flagmen, Laborers,					29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	120.00	HR	B-LABORER	1.00	3,553	0	0	0	3,553	29.60
M MIL AA Provide 28" High Traffic C					29.60	0.00	20.97	0.00	50.57	
ones.	200.00	EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &										
CIV AA Barricades, 10' sections,					3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00	LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00	JOB			17,431	1,158	7,078	1,250	26,917	26917
TOTAL H-Piles	1155.00	LF			233,907	116,280	458,622	523,764	1,332,573	1153.74
AA_11.99.04. Stop Log Closure at Route 11 52' wide by 12.5' high. This structure was revised on 4 Aug 03 to 52' x 11.9' but I left the quantities as is for now.										
AA_11.99.04_ 5. Concrete										
AA_11.99.04_ 5_ 25. Footing										
MIL AA Forms in place, footing,					2.88	0.00	1.53	0.00	4.41	
continuous wall, plywood,	2703.00	SF	ACARC1	55.00	7,792	0	4,122	0	11,914	4.41
2 use. Say 1,802 x a factor of 1.5 = 2,703 sf										
RSM AA Reinforcing in place, foot					765.63	0.00	607.35	0.00	1372.97	
ings,	10.00	TON	SIWBRODM4	0.26	7,656	0	6,073	0	13,730	1372.97
#4 to #7. Say 6.7 tons x 1.5 = 10 tons										

A_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Concrete ready mix, regula			0.00	0.00	74.81	0.00	74.81	
r	201.00 CY N/A	0.00	0	0	15,037	0	15,037	74.81
weight, 3000 psi. Say 134 x 1.5 = 201 cy								
MIL AA Placing conc, footings, sp			26.87	1.17	0.00	0.00	28.05	
read,	201.00 CY ULABC6	6.88	5,402	236	0	0	5,638	28.05
under 1 CY, direct chute								
MIL AA Curing, sprayed membrane c			4.99	0.00	4.07	0.00	9.05	
uring	27.00 CSF ALABCLAB2	11.88	135	0	110	0	244	9.05
compound.								
TOTAL Footing	1.00 EA		20,985	236	25,343	0	46,563	46563
AA_11.99.04_ 5_ 30. Wall								
CIV AA Forms in place, ret wall,			6.66	0.00	1.21	0.00	7.87	
battered, 8'-16', 2 use, j	1062.00 SF ACARC2	36.88	7,071	0	1,288	0	8,359	7.87
ob blt. Say 708 sf x a factor of 1.5 = 1,062 sf								
MIL AA Reinforcing in place, wall			535.94	0.00	607.35	0.00	1143.29	
s, #3	1.50 TON SIWRRODM4	0.38	804	0	911	0	1,715	1143.29
to #7. Say 1 ton x 1.5 = 1.5 tons								
RSM AA Concrete ready mix, regula			0.00	0.00	74.81	0.00	74.81	
r	30.00 CY N/A	0.00	0	0	2,244	0	2,244	74.81
weight, 3000 psi. Say 20 cy x 1.5 = 30 cy								
MIL AA Placing conc, walls, 8" th			19.99	6.48	0.00	0.00	26.47	
ick,	30.00 CY CLABC20	12.50	600	194	0	0	794	26.47
pumped								
MIL AA Curing, sprayed membrane c			4.99	0.00	4.07	0.00	9.05	
uring	10.60 CSF ALABCLAB2	11.88	53	0	43	0	96	9.05
compound. Say 0.7 csf x 1.5 = 1.1 csf								
TOTAL Wall	1.00 EA		8,527	194	4,487	0	13,208	13208

A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.04_ 5_ 35. Sill										
MIL AA Site dml, bituminous drive					1.99	1.16	0.00	0.00	3.15	
ways.	347.00	SY	CLADB38	80.00	691	403	0	0	1,094	3.15
Say (40' x 52' / 9' = 231 sy) x a factor of 1.5 = 347 sy										
AF AA Hauling, w/loading, 12 CY					1.73	2.34	0.00	0.00	4.06	
truck,	60.00	CY	CODEB30	60.00	104	140	0	0	244	4.06
5 mile haul, rock. Say 40' long x 52' wide x 0.5' thick / 27' = 40 cy x 1.5 = 60										
MIL AA Excavate trench, mdm soil,					0.76	0.25	0.00	0.00	1.01	
4'-6'	606.00	CY	CODEB12E	91.50	459	153	0	0	612	1.01
D, 1/2 CY excavator. (Say 10,400 cf x 5% / 27' = 404 cy.) time a factor of 1.5 = 606 cy.										
AF AA Hauling, w/loading, 12 CY					1.19	1.61	0.00	0.00	2.80	
truck,	606.00	CY	CODEB30	87.00	721	977	0	0	1,698	2.80
5 mile haul, soil										
MIL AA Forms in place, walls, bul					7.41	0.00	2.89	0.00	10.30	
khead	276.00	LF	ACARC2	33.13	2,046	0	797	0	2,843	10.30
forms, 2 piece, w/keyway, 1 use. Say 40' + 40' + 52' + 52' = 184 lf x a factor of 1.5 = 276 lf										
MIL AA Reinforcing in place, wall					535.94	0.00	607.35	0.00	1143.29	
s, #3	30.00	TON	STWRRODM4	0.38	16,078	0	18,220	0	34,299	1143.29
to #7. Say 606 cy x 100 lb / 2,000 lb = 30 tons										
RSM AA Concrete ready mix, regula					0.00	0.00	76.27	0.00	76.27	
r	606.00	CY	N/A	0.00	0	0	46,218	0	46,218	76.27
weight, 3500 psi										
MIL AA Placing conc, foundation m					4.22	0.18	0.00	0.00	4.41	
ats,	606.00	CY	ULABC6	43.75	2,559	112	0	0	2,671	4.41
over 20 CY, direct chute										
MIL AA Curing, sprayed membrane c					4.99	0.00	4.07	0.00	9.05	
uring	32.00	CSF	ALABCLAB2	11.88	160	0	130	0	290	9.05
compound. Say 40' x 52' / 100' = 21 csf time a factor of 1.5 = 32 csf.										

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Waterstop, rubber, center				2.55	0.00	11.22	0.00	13.77	
bulb	4140.00 LF	ACARCARP1	16.88	10,545	0	46,446	0	56,991	13.77
split, 3/8" thick, 9" wide. (Say 52' wide / 0.75' = 69' x 40' long = 2,760 lf) times a factor 1.5 = 4,140 lf									
B MIL AA Allowance for repairing				1322.25	255.84	924.32	0.00	2502.41	
bituminous roadway after construction of the sill.	1.00 LS	COKBB91A	0.05	1,322	256	924	0	2,502	2502.41
TOTAL Sill	1.00 EA			34,684	2,041	112,737	0	149,462	149462
TOTAL Concrete	1.00 EA			64,196	2,471	142,567	0	209,234	209234
AA_11.99.04_ 10. Aluminum									
MIL AA Aluminum, structural shape				1.88	0.82	2.66	0.00	5.36	
s, 1" to 10" members, 1 to 5 tons	6940.00 LB	SIWSE2	166.25	13,060	5,718	18,442	0	37,221	5.36
TOTAL Aluminum	1.00 EA			13,060	5,718	18,442	0	37,221	37221
AA_11.99.04_ 15. Structural Steel									
MIL AA Structural steel members,				481.84	118.19	1443.67	0.00	2043.70	
comb sections, channel/angle, 0-30 PLF	2.30 TON	SIWSE21	0.75	1,108	272	3,320	0	4,701	2043.70
MIL AA Structural steel projects,				667.36	292.18	1627.67	0.00	2587.21	
column base plates, heavy, > 150 lb, each	16.50 TON	SIWSE2	0.47	11,011	4,821	26,857	0	42,689	2587.21
TOTAL Structural Steel	1.00 EA			12,120	5,093	30,177	0	47,389	47389
AA_11.99.04_ 25. Traffic Control — Partial closure of the road during construction.									
L CIV AA Signs, placement and remov				385.46	56.02	0.00	0.00	441.48	
al of signs, including supports, 21 SF to 40 SF	20.00 EA	CLABB80	0.33	7,709	1,120	0	0	8,830	441.48

_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Sign, hi-intensity				0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.	25.00 SF	N/A	0.00	0	0	404	1,250	1,654	66.15
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	360.00 HR	B-LABORER	1.00	10,658	0	0	0	10,658	29.60
M MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones. Means 2000 Site Work &	50.00 EA	ALABCLAB2	2.00	1,480	0	1,049	0	2,529	50.57
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF	CODL86	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB			20,095	1,158	3,932	1,250	26,436	26436
TOTAL Stop Log Closure at Route	1.00 JOB			109,472	14,440	195,118	1,250	320,280	320280

AA_11.99.05. RR Gated Closure at Sta 81+00
24' wide x 11.2' high

AA_11.99.05_ 5. Clearing

MIL AA Loam or topsoil, 200' haul				1.02	1.23	0.00	0.00	2.25	
, 4" deep, 200 HP dozer, remove/pile on site	33.00 CY	CODTB10B	49.38	34	41	0	0	74	2.25
MIL AA Hauling, hwy haulers, 12 C				1.27	1.60	0.00	0.00	2.86	
Y, 6 mi round trip @ 40 MPH (2.1 cyc/hr)	38.00 CY	COEIB34B	26.88	48	61	0	0	109	2.86
TOTAL Clearing	1.00 EA			82	101	0	0	183	183.00

AA_11.99.05_ 10. Stripping

MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6" deep, 200 HP dozer, remove/pile on site	50.00 CY	CODTB10B	108.13	23	28	0	0	51	1.03

ıA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	50.00	CY	CODFB10S	25.00	101	53	·0	0	154	3.08
1.5 CY, spread from pile to finish grade										
TOTAL Stripping	1.00	EA			124	82	0	0	206	205.53
AA_11.99.05_ 15. Excavation										
L USR AA Excavate and Load					3.03	1.02	0.00	0.00	4.05	
2-1/2CY Wh Ldr,Med Matl 75	1458.00	CY	CODLS	72.50	4,417	1,488	0	0	5,905	4.05
CY/Hr (57M3)										
MIL AA Hauling, hwy haulers, 12 C					1.27	1.60	0.00	0.00	2.86	
Y, 6	1677.00	CY	COEIB34B	26.88	2,122	2,676	0	0	4,799	2.86
mi round trip @ 40 MPH (2.1 cyc/hr)										
'OTAL Excavation	1.00	EA			6,540	4,164	0	0	10,704	10704
AA_11.99.05_ 21. Permanent Shoring										
AA_11.99.05_ 21_ 5. Steel H-Pile Mob/demob										
USR AA Mob/demob of Equipment					0.00	0.00	0.00	30000.00	30000.00	
	1.00	LS		0.00	0	0	0	30,000	30,000	30000
TOTAL Steel H-Pile Mob/demob	1.00	EA			0	0	0	30,000	30,000	30000
AA_11.99.05_ 21_ 10. Steel H-Pile Lengths										
MIL AA Pile, steel, pipe, heavy d					127.23	13.71	207.31	0.00	348.25	
uty	20.00	EA	SIWWE14	0.40	2,545	274	4,146	0	6,965	348.25
points, 14" dia										
MIL AA Pile, steel, pipe, splices					107.44	11.57	107.49	0.00	226.50	
, not	20.00	EA	SIWWE14	0.47	2,149	231	2,150	0	4,530	226.50
in leads 14" dia										
MIL AA Pile, steel, "H" sections,					6.43	3.12	29.66	0.00	39.21	
40'	800.00	VLF	CPIDB19A	63.75	5,143	2,496	23,727	0	31,366	39.21
long, HP14 x 102. 20 each x 40' = 800 VLF.										
USR PI Sheet Piling Cutoffs					26.36	0.55	11.80	0.00	38.72	
	20.00	LF	SIWWA	2.38	527	11	236	0	774	38.72

A_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L MIL AA Haul scrape piles offsite,					127.16	56.47	0.00	0.00	183.62	
loading & trucking,machine loading truck.	8.00	HR	COEIB17	1.00	1,017	452	0	0	1,469	183.62
TOTAL Steel H-Pile Lengths	1750.00	VLF			11,381	3,464	30,259	0	45,104	25.77
AA_11.99.05_ 21_ 15. Pre-Drill Pilot Holes Drill each pilot hole to a depth of 40' deep, per Chuck Frey, CENAB-EN-GW, 13 Aug 03.										
L MIL AA Borings, auger holes in ea					200.00	54.50	0.00	0.00	254.50	
rth 2003, page 44.	20.00	EA		0.00	4,000	1,090	0	0	5,090	254.50
MIL AA Borings, drilling in rock					19.61	29.22	0.00	0.00	48.83	
	400.00	LF	CLADB56	3.24	7,845	11,686	0	0	19,531	48.83
TOTAL Pre-Drill Pilot Holes	7800.00	LF			11,845	12,776	0	0	24,621	3.16
AA_11.99.05_ 21_20 . Grout for Pre-Drill Pilot Holes										
RSM AA Concrete ready mix, regula					0.00	0.00	79.32	0.00	79.32	
r weight, 4000 psi	80.00	CY	N/A	0.00	0	0	6,345	0	6,345	79.32
L MIL AA Placing conc, pumped aroun					8.70	2.82	0.00	0.00	11.52	
d pre-drilled H-pile holes.	80.00	CY	CLABC20	28.72	696	225	0	0	921	11.52
TOTAL Grout for Pre-Drill Pilot	22659	CF			696	225	6,345	0	7,267	0.32
AA_11.99.05_ 21_30 . Wailer Beams										
MIL AA Two 15' Wailer Beams, Pile					6.43	3.12	29.66	0.00	39.21	
, steel, "H" sections, 50' long, HP14 x 102. Say 2 x 15' = 30'	1.00	VLF	CPIDB19A	63.75	6	3	30	0	39	39.21
MIL AA Two 20' Bottom Wailer Beam					6.43	3.12	29.66	0.00	39.21	
s, Pile, steel, "H" sections, 50' long, HP14 x 102. Say 2 x 20'	1.00	VLF	CPIDB19A	63.75	6	3	30	0	39	39.21
USR PI Sheet Piling Cutoffs					26.36	0.55	11.80	0.00	38.72	
	10.00	LF	SIWWA	2.38	264	6	118	0	387	38.72

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR AA Crew to assemble Structure			463.54	110.69	0.00	0.00	574.22	
	40.00 HRS SIWSE7	1.00	18,541	4,427	0	0	22,969	574.22
TOTAL Wailer Beams	1.00 JOB		18,818	4,439	177	0	23,435	23435
AA_11.99.05_ 21_35 . Steel Lagging								
MIL AA Plates, steel, 1/2" thick.			0.00	0.00	1132.29	0.00	1132.29	
Say a ½" one-foot square steel plate weighs 20.5 pounds so, 20.5# x 1,350 sf / 2,000# = 13.8 tons.	13.80 TON N/A	0.00	0	0	15,626	0	15,626	1132.29
USR AA Crew to assemble lagging			463.54	110.69	0.00	0.00	574.22	
	40.00 HRS SIWSE7	1.00	18,541	4,427	0	0	22,969	574.22
TOTAL Steel Lagging	1350.00 SF		18,541	4,427	15,626	0	38,595	28.59
TOTAL Permanent Shoring	1.00 JOB		61,281	25,333	52,408	30,000	169,021	169021
AA_11.99.05_ 25. Structural Fill Material								
L USR AA Excavate & Load Offstie So			2.44	0.82	0.00	0.00	3.26	
urce Exc & Ld,2-1/2CY Wh Ldr, Lt Matl 90 CY/Hr (69M3). Assume material from commerical source offsite.	1276.00 CY CODLS	90.00	3,114	1,049	0	0	4,163	3.26
M MIL AA Hauling, hwy haulers, 12 C			1.27	1.60	6.93	0.00	9.79	
Y, 6 mi round trip @ 40 MPH (2.1 cyc/hr)	1467.00 CY COEIB34B	26.88	1,857	2,341	10,170	0	14,368	9.79
MIL AA Backfill, trench, front-en			1.01	0.72	0.00	0.00	1.72	
d loader, 40 - 60 HP, no compaction	1467.00 CY CODFB10N	50.00	1,477	1,050	0	0	2,527	1.72
MIL AA Compaction, structural/tre			2.13	0.13	0.00	0.00	2.26	
nch, by hand w/air tamp, 6" lift	1467.00 CY ULABB9	70.00	3,123	196	0	0	3,319	2.26
MIL AA Compaction, water, truck,			0.29	0.23	0.23	0.00	0.76	
3000 gal, 3 mile haul	1467.00 CY COKBB45	236.00	432	341	339	0	1,112	0.76

A_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Structural Fill Material	1.00 EA			10,003	4,978	10,509	0	25,490	25490
AA_11.99.05_ 30. Concrete/Rebar									
MIL AA Forms in place, footing,				3.38	0.00	2.77	0.00	6.16	
continuous wall, plywood, 1 use	2640.00 SF	ACARC1	46.88	8,930	0	7,321	0	16,250	6.16
CIV AA Forms in place, ret wall,				8.18	0.00	2.22	0.00	10.40	
battered, 8'-16', 1 use, j ob blt plywood	61.00 SF	ACARC2	30.00	499	0	135	0	635	10.40
MIL AA Placing conc, foundation m				6.66	2.59	0.00	0.00	9.26	
ats, over 20 CY, w/crane & bucket	361.00 CY	ULABC7	37.50	2,406	936	0	0	3,341	9.26
RSM AA Concrete ready mix, regula				0.00	0.00	74.81	0.00	74.81	
r weight, 3000 psi	361.00 CY	N/A	0.00	0	0	27,007	0	27,007	74.81
TOTAL Concrete/Rebar	1.00 EA			11,834	936	34,463	0	47,233	47233

AA_11.99.05_ 35. Metals

All metals for this item are for the gate structures. Excluded are all reinforcing steel in the concrete abutment and sill.

Each gate leaf shall be fully assembled in the shop, complete with anchorage plates for the diagonals. Diagonals will be attached and adjusted in the field.

	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR SS Field Welding for Steel It				4.54	0.08	9.71	0.00	14.32	
ems	1200.00 LF	SIWSC	41.50	5,442	100	11,646	0	17,189	14.32
MIL AA Structural steel projects,				667.36	292.18	1627.67	0.00	2587.21	
column base plates, heavy, > 150 lb, each	25.30 TON	SIWSE2	0.47	16,884	7,392	41,180	0	65,456	2587.21
USR SS Railroad Work, 115# Rail				31.46	4.51	16.87	0.00	52.84	
In Place, Compl, ARA-A and ARAE	200.00 LF	UOEHD	5.29	6,291	903	3,374	0	10,568	52.84
MIL AA Structural steel members,				481.84	118.19	1443.67	0.00	2043.70	
comb sections, channel/angle, 0-30 PLF	4.00 TON	SIWSE21	0.75	1,927	473	5,775	0	8,175	2043.70

\A_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Metals	1.00 EA		30,545	8,868	61,975	0	101,388	101388
AA_11.99.05_ 40. Traffic Control Full closure of the road during construction.								
L CIV AA Signs, placement and remov			385.46	56.02	0.00	0.00	441.48	
al of	20.00 EA CLABB80	0.33	7,709	1,120	0	0	8,830	441.48
signs, including supports, 21 SF to 40 SF								
AF AA Sign, hi-intensity			0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00 SF N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.								
TL AA Flagmen, Laborers,			29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	120.00 HR B-LABORER	1.00	3,553	0	0	0	3,553	29.60
M MIL AA Provide 28" High Traffic C			29.60	0.00	20.97	0.00	50.57	
ones.	200.00 EA ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &								
CIV AA Barricades, 10' sections,			3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB		17,431	1,158	7,078	1,250	26,917	26917
TOTAL RR Gated Closure at Sta 81	1.00 JOB		137,840	45,620	166,432	31,250	381,142	381142
AA_11.99.07. South Cross Over Ramp Vehicular Cross Over Ramp for the Fair Ground South Ramp								
AA_11.99.07_ 5. Bituninous Side Walk (USER)								
MIL AA Base, prepare & roll sub-b			0.06	0.05	0.00	0.00	0.11	
ase,	8460.00 SF COFGB32A	1687.51	505	392	0	0	897	0.11
small areas to 2500 SY								
MIL AA Sidewalks, no base, asphal			2.22	0.55	5.12	0.00	7.88	
tic	940.00 SY COFCB37	82.50	2,085	514	4,811	0	7,410	7.88
conc, 2.5" thick								

.11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Asphaltic conc pavement,			5.29	2.51	32.93	0.00	40.72	
highway, wearing course, 1 ".	206.42 TON COKCB25B	71.88	1,091	518	6,797	0	8,407	40.72
Say 3954 Lbs/CY								
TOTAL Bituminous Side Walk	8460.00 SF		3,681	1,423	11,609	0	16,713	1.98
AA_11.99.07_ 10. Paved Roadway (USER)								
MIL AA Base course, bituminous			0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course ,	137.05 CY COFGB36E	175.00	134	163	4,263	0	4,560	33.27
3.5" layer od bituminous								
MIL AA Base course, crushed 3/4"			0.30	0.33	6.99	0.00	7.62	
stone,	1409.86 SY COFGB36C	575.00	420	467	9,855	0	10,742	7.62
compacteed, 8"D, large areas								
MIL AA Base, prepare & roll sub-b			0.06	0.05	0.00	0.00	0.11	
ase,	12690 SF COFGB32A	1687.51	758	588	0	0	1,345	0.11
small areas to 2500 SY								
MIL AA Asphaltic conc pavement,			3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	234.77 TON COKCB25	106.25	761	300	7,006	0	8,068	34.37
MIL AA Asphaltic conc pavement,			3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	387.05 TON COKCB25B	100.00	1,471	698	12,745	0	14,914	38.53
Say 3954 Lbs/CY so, 3,954 lb x 300 / 2,000 lb = 593 tons.								
TOTAL Paved Roadway	12690 SF		3,543	2,216	33,869	0	39,629	3.12
AA_11.99.07_ 15. Clearing and Grubbing (USER)								
AF AA Clear & grub, clear site w			2.68	4.83	0.00	0.00	7.52	
/335	1.00 EA CODTB10M	18.75	3	5	0	0	8	7.52
HP dozer, trees to 12" dia								
AF AA Clear & grub, clear site w			4.03	7.25	0.00	0.00	11.28	
/335	1.00 EA CODTB10M	12.50	4	7	0	0	11	11.28
HP dozer, light trees to 24" dia								
AF AA Clearing, brush w/dozer &			65.14	60.77	0.00	0.00	125.91	
brush	0.45 ACR CODTB11A	1.00	29	27	0	0	57	125.91
rake, medium brush								

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
M MIL AA Clearing, machine load spoils, 2 mi haul to dump				11.56	5.13	11.55	0.00	28.25	
	10.12 CY	COEIB17	11.00	117	52	117	0	286	28.25
TOTAL Clearing and Grubbing	2150.00 SY			153	91	117	0	361	0.17
AA_11.99.07_ 20. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul, 6" deep, 200 HP dozer, remove/pile on site				0.47	0.56	0.00	0.00	1.03	
	358.00 CY	CODTB10B	108.13	167	201	0	0	368	1.03
MIL AA Loam or topsoil, frtn loader, 1.5 CY, spread from pile to				2.01	1.07	0.00	0.00	3.08	
	358.00 CY	CODFB10S	25.00	721	383	0	0	1,104	3.08
TOTAL Top Soil	358.00 CY			887	584	0	0	1,472	4.11
AA_11.99.07_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader, 3 CY, medium matl. Swell factor 15%.				0.37	0.35	0.00	0.00	0.72	
	14030 CY	CODFB10T	137.50	5,136	4,936	0	0	10,073	0.72
M MIL AA Hauling, hwy haulers, 16.5 CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)				0.97	1.31	5.60	0.00	7.88	
	14030 CY	CTDHB34C	35.00	13,634	18,336	78,620	0	110,590	7.88
USR AA Placement of Fill Spread/Compact Roadwy Embankment 8"(20cm) Lift w/300 HP Tractor				0.15	0.15	0.00	0.00	0.31	
	14030 CY	CODTP	2000.00	2,141	2,150	0	0	4,291	0.31
TOTAL Random Fill	12200 CY			20,912	25,423	78,620	0	124,954	10.24
AA_11.99.07_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mix, mechanical seeding, 450#/acre.				144.41	73.62	634.89	0.00	852.93	
	0.44 ACR	COELB66	0.24	64	33	281	0	378	852.93
RSM AA Seeding, apply fertilizer, 800 lb/acre. Say 0.7 acres x 800 lb / 2,000 lb = 0.28 ton.				67.87	34.60	381.28	0.00	483.76	
	0.19 TON	COELB66	0.50	13	7	72	0	92	483.76

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Seeding	2150.00 SY			77	39	353	0	469	0.22
TOTAL South Cross Over Ramp	1.00 JOB			29,253	29,777	124,568	0	183,598	183598
AA_11.99.09. Erosion and Sediment Control									
AA_11.99.09_ 5. Silt Fencing									
MIL AA Erosion control, w/7.5' po				1.35	0.00	0.77	0.00	2.13	
sts,	15000 LF	ALABCLAB2	43.75	20,300	0	11,612	0	31,911	2.13
silt fence, 3' high, polypropylene									
MIL AA Remove silt fence after				1.35	0.00	0.00	0.00	1.35	
construction	15000 LF	ALABCLAB2	43.75	20,300	0	0	0	20,300	1.35
TOTAL Silt Fencing	15000 LF			40,599	0	11,612	0	52,211	3.48
AA_11.99.09_ 10. Temporary Seeding and Mulching									
MIL AA Seeding, athletic field mi				144.41	73.62	634.89	0.00	852.93	
x,	42.00 ACR	COELB66	0.24	6,065	3,092	26,665	0	35,823	852.93
mechanical seeding, 450#/acre.									
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	16.80 TON	COELB66	0.50	1,140	581	6,406	0	8,127	483.76
lb/acre. Say 42 acres x 800 lb / 2,000 lb = 16.8 ton.									
B MIL AA Mulch, oak straw, tractor				0.75	0.70	38.71	0.00	40.15	
spreader, MEANS FC 2003, p	1830.00 MSF		0.00	1,373	1,277	70,832	0	73,481	40.15
age 123									
TOTAL Temporary Seeding and Mulc	42.00 ACR			8,578	4,950	103,903	0	117,431	2795.98
AA_11.99.09_ 15. Stablized Construction Entrances									
B USR AA Placement of D50 = 3/4" st				4.41	1.35	28.89	0.00	34.65	
one -	195.00 CY	CODEH	15.00	860	263	5,633	0	6,756	34.65
A unit price of $25 per cubic yard delivered to site was used (dumped stone)									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	1170.00 SY	ULABA2	150.00	720	127	1,744	0	2,590	2.21
lene									

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Stablized Construction Ent	5.00 EA			1,579	390	7,376	0	9,346	1869.24
AA_11.99.09_ 20. Temporary Roads									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	5.00 EA	CODTB10M	18.75	13	24	0	0	38	7.52
HP dozer, trees to 12" dia									
AF AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	5.00 EA	CODTB10M	12.50	20	36	0	0	56	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	3.00 ACR	CODTB11A	1.00	195	182	0	0	378	125.91
rake, medium brush									
M MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	65.00 CY	COEIB17	11.00	751	334	751	0	1,836	28.25
mi haul to dump									
MIL AA Fine grade, for roadway, b				383.17	194.47	0.00	0.00	577.65	
ase or	7.00 MSY	COFGB11L	0.17	2,682	1,361	0	0	4,044	577.65
leveling course. Say 5(15' x 800' / 9') / 1000 = 7 MSY									
MIL AA Base course, crushed 3/4"				0.27	0.30	3.11	0.00	3.68	
stone,	6667.00 SY	COFGB36C	637.50	1,791	1,991	20,721	0	24,503	3.68
compacted, 4"D, large areas. 5(15' x 800' / 9') = 6,667 sy									
MIL AA Base, prepare & roll sub-b				0.54	0.42	0.00	0.00	0.95	
ase,	6667.00 SY	COFGB32A	187.50	3,580	2,783	0	0	6,362	0.95
small areas to 2500 SY									
MIL AA Surface treatment, tack co				0.70	0.55	1.57	0.00	2.82	
at,	600.00 CSF	COKBB45	100.00	417	329	943	0	1,689	2.82
bituminous, 0.1 gal/SY. 5(15' x 800') / 100' = 600 csy									
MIL AA Excavate & load, hydr exca				0.69	0.56	0.00	0.00	1.25	
vator,	2222.00 CY	CODEB12B	100.00	1,539	1,235	0	0	2,774	1.25
1.5 CY, medium matl. Remove roads after construction so, 5(1' x 15' x 800' / 27') = 2,222 cy									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	2222.00 CY	COEIB17	15.00	18,836	8,365	0	27,775	54,976	24.74
loading & trucking,machine loading truck. Price includes									

_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
tipping fees.									
TOTAL Temporary Roads	5.00 EA			29,825	16,640	22,415	27,775	96,656	19331
TOTAL Erosion and Sediment Contr	1.00 JOB			80,582	21,981	145,306	27,775	275,644	275644
AA_11.99.10. Staging and Storage Areas									
AF AA Fencing, 11 ga, chain link				6.32	0.00	3.79	0.00	10.11	
, 6'	1200.00 LF	ALABCLAB2	9.38	7,579	0	4,548	0	12,126	10.11
high. Say each area is 100' wide x 100' long = 10,000 sf so, 3 (100 + 100 + 100 + 100) = 1,200 lf									
MIL AA Site dml, chain link fence				1.53	0.00	0.00	0.00	1.53	
	1200.00 LF	ALABCLAB2	38.75	1,834	0	0	0	1,834	1.53
remove & salvage for reuse									
MIL AA Base course, crushed 3/4"				0.33	0.36	9.31	0.00	10.00	
stone,	3333.00 SY	COFGB36C	525.00	1,087	1,209	31,039	0	33,335	10.00
compacted, 12"D, large areas. Say 3(100' x 100' / 9') = 3,333 sy									
MIL AA Excavate & load, hydr exca				0.69	0.56	0.00	0.00	1.25	
vator,	370.00 CY	CODEB12B	100.00	256	206	0	0	462	1.25
1.5 CY, medium matl. Demo after construction.									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	370.00 CY	COEIB17	15.00	3,137	1,393	0	4,625	9,154	24.74
loading & trucking,machine loading truck. Stockpile onsite for backfill/usage later.									
MIL AA Seeding, athletic field mi				144.41	73.62	634.89	0.00	852.93	
x,	0.69 ACR	COELB66	0.24	100	51	438	0	589	852.93
mechanical seeding, 450#/acre. 3 x 0.23 = 0.69 acre									
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	0.28 TON	COELB66	0.50	19	10	105	0	134	483.76
lb/acre. Say 3(0.69 acre x 800 lb / 2,000 lb) = 0.276 ton.									
B MIL AA Mulch, oak straw, tractor				0.75	0.70	38.71	0.00	40.15	
spreader, MEANS FC 2003, p	30.00 MSF		0.00	23	21	1,161	0	1,205	40.15
age 123. 3(100' x 100' / 1,000) =									

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
30 msf									
TOTAL Staging and Storage Areas	3.00 EA			14,033	2,889	37,291	4,625	58,838	19613
AA_11.99.12. Addition Traffic Control									
L CIV AA Signs, placement and removal of				385.46	56.02	0.00	0.00	441.48	
signs, including supports, 21 SF to 40 SF	50.00 EA	CLABB80	0.33	19,273	2,801	0	0	22,074	441.48
AF AA Sign, hi-intensity				0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, buy. Say each sign is 25 sf so, 50 signs times 25 sf = 1,250 sf. Say $50 for a set post per sign.	100.00 SF	N/A	0.00	0	0	1,615	5,000	6,615	66.15
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	960.00 HR	B-LABORER	1.00	28,420	0	0	0	28,420	29.60
M MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones. Means 2000 Site Work &	800.00 EA	ALABCLAB2	2.00	23,684	0	16,776	0	40,460	50.57
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	320.00 LF	CODLB6	30.00	994	151	9,920	0	11,064	34.58
TOTAL Addition Traffic Control	4.00 EA			72,370	2,952	28,311	5,000	108,634	27158
AA_11.99.13. Temp Security Fence @ Fair Groun Temporary Security Fence at the Fair Grounds									
AF AA Fencing, 11 ga, chain link				6.32	0.00	3.79	0.00	10.11	
, 6' high	7000.00 LF	ALABCLAB2	9.38	44,209	0	26,528	0	70,737	10.11
MIL AA Site dml, chain link fence				1.53	0.00	0.00	0.00	1.53	
, remove & salvage for reuse	7000.00 LF	ALABCLAB2	38.75	10,696	0	0	0	10,696	1.53
TOTAL Temp Security Fence @ Fair	7000.00 LF			54,905	0	26,528	0	81,433	11.63

_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.14. Water Treatment Plant										
USR AA Flodproofing the treatment					0.00	0.00	0.00	1000000	1000000.00	
plant	1.00	LS		0.00	0	0	0	1,000,000	1,000,000	1000000
USR AA Improvements to the bring					0.00	0.00	0.00	250000.00	250000.00	
reservoir	1.00	LS		0.00	0	0	0	250,000	250,000	250000
TOTAL Water Treatment Plant	1.00	JOB			0	0	0	1,250,000	1,250,000	1250000
AA_11.99.15. Electrical Substation										
AA_11.99.15_ 4. 12" CMU Wall										
AA_11.99.15_ 4_ 5. Foundation										
RSM AA Saw cutting, asphalt, up t					0.51	0.16	0.28	0.00	0.95	
o 3" deep	650.00	LF	COELB89	131.25	332	103	180	0	615	0.95
MIL AA Site dml, bituminous drive					1.99	1.16	0.00	0.00	3.15	
ways	100.00	SY	CLADB38	80.00	199	116	0	0	315	3.15
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	0.00	12.24	
ul, loading & trucking,machine loading truck	20.00	CY	COEIB17	15.00	170	75	0	0	245	12.24
MIL AA Excavate trench, medium so					0.87	0.75	0.00	0.00	1.62	
il, 4'-6' D, 1 CY gradall. Say 4' wide x 300' long x 4' deep / 27' = 178 cy	180.00	CY	COFGB12K	80.00	156	136	0	0	291	1.62
MIL AA Hauling, hwy haulers, 12 C					1.27	1.60	0.00	0.00	2.86	
Y, 6 mi round trip @ 40 MPH (2.1 cyc/hr)	180.00	CY	COEIB34B	26.88	228	287	0	0	515	2.86
MIL AA Forms in place, footing, s					3.16	0.00	0.84	0.00	4.01	
pread, plywood, 3 use. Say 2' wide x 300' long = 600 sf	600.00	SF	ACARC1	50.13	1,898	0	506	0	2,404	4.01
MIL AA Forms in place, footing,					2.70	0.00	1.11	0.00	3.81	
continuous wall, plywood, 3 use. Say 300' long 3.5' high =	1050.00	SF	ACARC1	58.75	2,834	0	1,165	0	3,998	3.81

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
1,050 sf										
RSM AA Reinforcing in place, foot					765.63	0.00	607.35	0.00	1372.97	
ings,	3.25	TON	SIWRRODM4	0.26	2,488	0	1,974	0	4,462	1372.97
#4 to #7. Say 100 pounds/cy of concrete so, 65 cy x 100 pd / 2,000 pd = 3.25 tons										
RSM AA Concrete ready mix, regula					0.00	0.00	79.32	0.00	79.32	
r	65.00	CY	N/A	0.00	0	0	5,156	0	5,156	79.32
weight, 4000 psi.										
MIL AA Placing conc, footings, sh					12.32	0.54	0.00	0.00	12.86	
allow,	25.00	CY	ULABC6	15.00	308	13	0	0	321	12.86
continuous, direct chute. Say 2' wide x 300' long x 1' thick / 27' = 22 cy										
MIL AA Placing conc, walls, 12" t					14.78	0.65	0.00	0.00	15.43	
hick,	40.00	CY	ULABC6	12.50	591	26	0	0	617	15.43
direct chute. Say 1' wide x 300' long x 3.5' high / 27' = 39 cy										
TOTAL Foundation	1.00	JOB			9,203	757	8,981	0	18,940	18940
AA_11.99.15_ 4_ 10. CMU Wall										
MIL AA CMU, ptn, 12" x 8" x 16",					4.78	0.00	4.69	0.00	9.47	
ltwt,	1200.00	SF	AMABD9	41.25	5,733	0	5,629	0	11,362	9.47
solid, no scaf/reinf. Say 300' long x 4' high = 1,200 sf										
B MIL AA Reinforcement for CMU, fdn					1.50	0.00	1.55	0.00	3.05	
wall,	1200.00	SF	AMABD9	131.37	1,800	0	1,858	0	3,658	3.05
12" x 8" x 16"										
TOTAL CMU Wall	1.00	JOB			7,533	0	7,487	0	15,020	15020
AA_11.99.15_ 4_ 15. Painting										
MIL AA Ext. painting, CMU,					0.91	0.00	0.44	0.00	1.35	
epoxy/waterstop, 2 coats	1200.00	SF	APTRPORD1	45.00	1,096	0	527	0	1,623	1.35
M MIL AA Ext. painting, CMU,					0.91	0.00	2.31	0.00	3.22	
anti-graffiti, 2 coats	1200.00	SF	APTRPORD1	45.00	1,096	0	2,773	0	3,869	3.22
TOTAL Painting	1.00	JOB			2,192	0	3,300	0	5,492	5491.74

_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 12" CMU Wall	300.00	LF			18,927	757	19,767	0	39,452	131.51
AA_11.99.15_ 10. Security Fence Relocation (USER)										
MIL AA Site dml, chain link, remo					10.65	1.61	0.00	0.00	12.26	
ve &	100.00	LF	CODLB6	8.75	1,065	161	0	0	1,226	12.26
reset, 8' to 10' high										
TOTAL Security Fence Relocation	100.00	LF			1,065	161	0	0	1,226	12.26
AA_11.99.15_ 15. Sandbag Closure										
USR AA Sandbags Closure. Say 10					0.00	0.00	0.00	5.00	5.00	
sandbag per one-foot high	600.00	EA		0.00	0	0	0	3,000	3,000	5.00
of										
protection. Say two feet high										
of protection is 40 sandbags										
times 15' wide is 600 sandbags.										
USR AA Install sandbags, one even					9.15	0.71	0.00	0.00	9.85	
t	600.00	EA	CLABB14	20.00	5,489	424	0	0	5,912	9.85
TOTAL Sandbag Closure	1.00	JOB			5,489	424	0	3,000	8,912	8912.40
TOTAL Electrical Substation	1.00	JOB			25,481	1,342	19,767	3,000	49,590	49590
AA_11.99.17. Structures										
AA_11.99.17_ 4. Demo Residential Frame Structure										
AA_11.99.17_ 4_ 5. Demo Residential Structures										
AF AA Building dml, two family,					0.00	0.00	0.00	6375.00	6375.00	
two	13.00	EA	N/A	0.00	0	0	0	82,875	82,875	6375.00
story house, wood, maximum.										
2003 MEANS Site Work, page 36.										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	624.00	CY	COEIB17	15.00	5,290	2,349	0	7,800	15,439	24.74
loading & trucking,machine										
loading truck. Say each										
structure is four 12-cy truck										
load so, 13(4 x 12) = 624 cy.										
Price includes dumping fees.										
TOTAL Demo Residential Structure	13.00	EA			5,290	2,349	0	90,675	98,314	7562.60

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.17_ 4_ 10. Demo Basements										
L MIL AA Building dml, foundations					1.31	0.00	0.00	0.00	1.31	
walls	14560	SF		0.00	19,074	0	0	0	19,074	1.31
(12" block), conc, plain. MEANS Site Work 2003, page 37. Say each structure is 30' x 40' x 8' so, 2(8' x 30') + 2(8' x 40') = 1,120 sf x 13 structures = 14,560 sf										
USR AA Demo 4" thick concrete sla					1.97	0.80	0.00	0.00	2.77	
b,	14560	SF	CODFB5	111.49	28,744	11,635	0	0	40,379	2.77
reinforced wire mesh, 2003										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	191.00	CY	COEIB17	15.00	1,619	719	0	2,388	4,726	24.74
loading & trucking,machine loading truck. Say the slab is 13(30' x 40' x0.33' / 27') = 191 cy. Price includes dumping fees.										
TOTAL Demo Basements	13.00	EA			49,437	12,354	0	2,388	64,178	4936.78
AA_11.99.17_ 4_ 15. Demo Concrete Driveways										
MIL AA Site dml, bituminous drive					1.99	1.16	0.00	0.00	3.15	
ways.	433.00	SY	CLADB38	80.00	862	503	0	0	1,365	3.15
Say 13(12' x 25' / 9') = 433 sy										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	144.00	CY	COEIB17	15.00	1,221	542	0	1,800	3,563	24.74
loading & trucking,machine loading truck. Say 13(12' x 25' x 1' /27') = 144 cy. Price includes dumping fees.										
TOTAL Demo Concrete Driveways	13.00	EA			2,083	1,045	0	1,800	4,928	379.07
AA_11.99.17_ 4_ 20. Demo Remove/Cap Utilities										
USR AA Allowance to remove and/or					0.00	0.00	0.00	1500.00	1500.00	
cap	13.00	EA		0.00	0	0	0	19,500	19,500	1500.00
utilities after demo of homes										
TOTAL Demo Remove/Cap Utilities	13.00	EA			0	0	0	19,500	19,500	1500.00

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.17_ 4_ 25. Demo Oil Tanks									
USR AA Allowance to remove of oil tanks after demo of homes				0.00	0.00	0.00	1200.00	1200.00	
	13.00 EA		0.00	0	0	0	15,600	15,600	1200.00
TOTAL Demo Oil Tanks	13.00 EA			0	0	0	15,600	15,600	1200.00
AA_11.99.17_ 4_ 30. Grade and Restore Lots									
RSM AA Fill, borrow, for embankments, load, 1 mile haul, spread w/dozer. Say 13(30' x 40' x 8' / 27') = 4,622 cy				0.79	0.98	7.91	0.00	9.68	
	4622.00 CY	CODTB15	150.00	3,647	4,516	36,581	0	44,744	9.68
L AF AA Fill, spread borrow w/dozer				0.55	0.66	0.00	0.00	1.21	
	4622.00 CY	CODTB10B	91.52	2,542	3,069	0	0	5,611	1.21
AF AA Seeding, apply fertilizer, 1# nitrogen/MSF, spray from truck				0.97	1.42	3.05	0.00	5.44	
	283.14 MSF	COFWB59	35.00	275	402	864	0	1,541	5.44
MIL AA Seeding, athletic field mix, mechanical seeding, 450#/acre. Say each lot is 1/2 acre.				144.41	73.62	634.89	0.00	852.93	
	6.50 ACR	COELB66	0.24	939	479	4,127	0	5,544	852.93
TOTAL Grade and Restore Lots	13.00 EA			7,403	8,466	41,571	0	57,440	4418.46
TOTAL Demo Residential Frame Str	13.00 EA			64,213	24,213	41,571	129,963	259,960	19997
AA_11.99.17_ 10. Demo Garages									
AA_11.99.17_ 10_ 5. Demo Garages									
AF AA Allowance for the demolition of Garages				0.00	0.00	0.00	1262.50	1262.50	
	10.00 EA	N/A	0.00	0	0	0	12,625	12,625	1262.50
MIL AA Rubbish handling, 2 mile haul, loading & trucking, machine loading truck. Say each garage is one 12-cy truck load so, 10 x 12 = 120 cy. Price includes dumping fees.				8.48	3.76	0.00	12.50	24.74	
	120.00 CY	COEIB17	15.00	1,017	452	0	1,500	2,969	24.74

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Demo Garages	10.00	EA			1,017	452	0	14,125	15,594	1559.40
AA_11.99.17_ 10_ 10. Demo Concrete Driveways										
MIL AA Site dml, bituminous drive					1.99	1.16	0.00	0.00	3.15	
ways.	694.00	SY	CLADB38	80.00	1,382	806	0	0	2,188	3.15
Say 10(25' x 25' / 9') = 694 sy										
MIL AA Rubbish handling,2 mile ha					8.48	3.76	0.00	12.50	24.74	
ul,	19.00	CY	COEIB17	15.00	161	72	0	238	470	24.74
loading & trucking,machine loading truck. Say 10(25' x 25' x 1' /27') = 232 cy or 232 cy / 12 cy = 19 truckloads of debris.										
TOTAL Demo Concrete Driveways	10.00	EA			1,543	878	0	238	2,658	265.80
AA_11.99.17_ 10_ 15. Demo Remove/Cap Utilities										
USR AA Allowance to remove and/or					0.00	0.00	0.00	625.00	625.00	
cap	10.00	EA		0.00	0	0	0	6,250	6,250	625.00
utilities after demo of garage										
TOTAL Demo Remove/Cap Utilities	10.00	EA			0	0	0	6,250	6,250	625.00
AA_11.99.17_ 10_ 25. Grade and Restore Lots										
M RSM AA Fill, borrow, for embankme					0.79	0.98	7.91	0.00	9.68	
nts,	140.00	CY	CODTB15	150.00	110	137	1,108	0	1,355	9.68
load, 1 mile haul, spread w/dozer. Say 10(25' x 25' x 1' / 27') = 232 cy										
L AF AA Fill, spread borrow w/doze					0.55	0.66	0.00	0.00	1.21	
r	232.00	CY	CODTB10B	91.52	128	154	0	0	282	1.21
AF AA Seeding, apply fertilizer,					0.97	1.42	3.05	0.00	5.44	
1#	6.25	MSF	COFWB59	35.00	6	9	19	0	34	5.44
nitrogen/MSF, spray from truck										
MIL AA Seeding, athletic field mi					144.41	73.62	634.89	0.00	852.93	
x,	0.14	ACR	COELB66	0.24	20	10	89	0	119	852.93
mechanical seeding, 450#/acre.										

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Grade and Restore Lots	10.00	EA			264	310	1,216	0	1,790	179.04
TOTAL Demo Garages	10.00	EA			2,825	1,639	1,216	20,613	26,292	2629.24
TOTAL Structures	1.00	JOB			67,037	25,853	42,787	150,575	286,252	286252
AA_11.99.32. Non-hazardous Waste (Landfill)										
AA_11.99.32_ 01. Mob, Demob & Preparatory Work										
AA_11.99.32_ 01_ 01. Mob, Demob Construction Equip										
GEN AA Mob/Demob of Equipment. For simplicity the cost reflected in the column OTHER was divided between the hazardous and non-hazardous tasks for this project.					0.00	55.59	0.00	1100.00	1155.59	
	1.00	LS	H25Z3185	1.00	0	56	0	1,100	1,156	1155.59
TOTAL Mob, Demob Construction Eq	1.00	JOB			0	56	0	1,100	1,156	1155.59
AA_11.99.32_ 01_ 02. Mob, Demob of Personnel										
USR AA Mob/demob of Personnel. For simplicity this task was divided between the hazardous and non-hazardous tasks for this project.					2500.00	0.00	0.00	0.00	2500.00	
	1.00	LS		0.00	2,500	0	0	0	2,500	2500.00
TOTAL Mob, Demob of Personnel	1.00	JOB			2,500	0	0	0	2,500	2500.00
AA_11.99.32_ 01_ 97. Other										
USR AA Health and Safety Plan					0.00	0.00	0.00	4500.00	4500.00	
	1.00	LS		0.00	0	0	0	4,500	4,500	4500.00
TOTAL Other	1.00	JOB			0	0	0	4,500	4,500	4500.00
TOTAL Mob, Demob & Preparatory W	1.00	EA			2,500	56	0	5,600	8,156	8155.59

AA_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_11.99.32_ 06. Collection & Disposal of Wastes										
AA_11.99.32_ 06_ 01. Collection of Solids/Sludges/Gas										
L MIL AA Excavate trench, mdm soil,					0.43	0.34	0.00	0.00	0.77	
6'-10' D, 1.5 CY excavator . The productivity rate for this task was reduced by 30% because the personnel will be wearing Level C personal protective equipment (PPE) during excavation. and handling of the contaminated material.	13606	CY	CODEB12B	161.70	5,827	4,678	0	0	10,505	0.77
L MIL AA Hauling, hwy haulers, 16.5					1.70	2.29	0.00	0.00	3.99	
CY, 80 mi round trip @ 40 MPH	13608	CY	CTDHB34C	20.00	23,142	31,123	0	0	54,265	3.99
MIL AA Load truck from stockpile,					0.85	0.60	0.00	0.00	1.45	
track loader, 1-1/2 CY	13608	CY	CODFB10N	59.38	11,537	8,204	0	0	19,741	1.45
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene for stockpile and truck liner	682.00	SY	ULABA2	150.00	419	74	1,016	0	1,510	2.21
HTW AA Petroleum contaminated soi					1.55	0.14	0.74	0.00	2.43	
l, sandbags for stockpile	375.00	EA	ULABI	60.00	583	53	277	0	913	2.43
RAD AA Site Safety & Health Offic					62.44	0.00	0.00	0.00	62.44	
er Monitoring during excavation. Say 13,608 cy / [(162 + 5 + 59) / 3] cy/hr = 181 hours. Excavation is 162 cy/hr, hauling is 5 cy/hr, and loading is 59 cy/hr for an average of 75 cy/hr.	181.00	HR	FH-HEALTO	1.00	11,302	0	0	0	11,302	62.44
TOTAL Collection of Solids/Sludg	13608	CY			52,811	44,132	1,294	0	98,236	7.22
AA_11.99.32_ 06_ 02. Air Monitoring										
M HTW AA Air Monitoring during exca					0.00	0.00	0.00	1000.00	1000.00	
vation rent/mo	10.00	DAY	N/A	0.00	0	0	0	10,000	10,000	1000.00

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Air Monitoring	10.00	DAY			0	0	0	10,000	10,000	1000.00
AA_11.99.32_ 06_ 03. Sampling (USER)										
L AFH AA Sampling. One sample for					2.77	0.73	0.00	200.00	203.50	
every 1,000 cy of material so, 13,608 cy or 14,000 cy of material will require 14 samples.	14.00	EA	HLABR	40.00	39	10	0	2,800	2,849	203.50
RAD AA Industrial Hygiene Technic					31.43	0.00	0.00	0.00	31.43	
ian. Assume approximately 8 hours for every 5 samples collected. Say 15 samples / 5 x 8 hours = 24 hours.	24.00	HR	FH-HYGTEH	1.00	754	0	0	0	754	31.43
TOTAL Sampling	10.00	EA			793	10	0	2,800	3,603	360.34
AA_11.99.32_ 06_ 04. Disposal of Waste (Off-Site) The non-hazardous waste would be disposed at the RCRA Subtitle D disposal facility 40 miles one.										
L AFH AA Disposal Fees for non-haza					0.00	0.00	0.00	40.00	40.00	
rdous waste at a RCRA Subtiltle D Fac	13608	CY	N/A	0.00	0	0	0	544,320	544,320	40.00
TOTAL Disposal of Waste (Off-Sit	13608	CY			0	0	0	544,320	544,320	40.00
AA_11.99.32_ 06_ 07. Contain/Restore Contamin G.Water Containment or Restoration of Contaminated Ground Water										
EP AA PUMP,SUBM, 4"D, 860 GPM/40					0.00	4.05	0.00	0.00	4.05	
'HD, E	126.00	HR	P55GR003	1.00	0	511	0	0	511	4.05
USR AA Vacuum Truck. Say a 6,000					0.00	0.00	0.00	350.00	350.00	
gallon vaccuum truck is $3 50 per day, there will be 6,000 gallons of contaminated groundwater per day for 10 days. Every third day or 18,000 gallon of contaminated groundwater is vacuumed from the storage tank so, (6,000 gal x 10 days) / (18,000 gal) = 3.3	10.00	DAY	N/A	0.00	0	0	0	3,500	3,500	350.00

AA_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
days x 3 trucks = 10 days.								
B MIL AA Pumping Crew to dewater th			99.48	14.09	0.00	0.00	113.56	
e	10.00 DAY COFWG	0.50	995	141	0	0	1,136	113.56
excavation area								
USR AA Disposal of Contaminated			0.00	0.00	0.00	2.00	2.00	
groundwater	60000 GAL	0.00	0	0	0	120,000	120,000	2.00
B MIL AA Dewatering, drainage pipin			2.33	0.35	1.16	0.00	3.84	
g	600.00 LF CODLB6	40.00	1,397	212	693	0	2,302	3.84
leading to storage tank								
M MIL AA Tanks, no pipe/pumps, 21,0			0.00	0.00	40.44	33.57	74.01	
00	10.00 DAY N/A	0.00	0	0	404	336	740	74.01
gal, steel, gnd lvl, no fdn. Cost includes the rental, delivery, setup, and removal after excavation.								
TOTAL Contain/Restore Contamin G	60000 GAL		2,392	863	1,098	123,836	128,189	2.14
TOTAL Collection & Disposal of W	13608 CY		55,996	45,005	2,391	680,956	784,348	57.64
TOTAL Non-hazardous Waste (Landf	1360.00 CY		58,496	45,061	2,391	686,556	792,504	582.72
TOTAL Associated General Items	1.00 EA		1,802,844	1,012,611	4,270,168	2,683,795	9,769,417	9769417
TOTAL LEVEES AND FLOODWALLS	1.00 EA		2,099,850	1,070,047	4,859,826	2,692,470	10,722,193	10722193

18. CULTURAL RESOURCE PRESERVATIO	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_18. CULTURAL RESOURCE PRESERVATION									
TOTAL Cultural Resources	1.00 EA			200,000	0	0	0	200,000	200000
TOTAL CULTURAL RESOURCE PRESERVA	1.00 EA			200,000	0	0	0	200,000	200000

A_30. ENGINEERING AND DESIGN	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_30. ENGINEERING AND DESIGN								
AA_30.08. Plans and Specifications								
AA_30.08.25. All Other								
AA_30.08.25_ AA. Engineering Division								
USR 30 Design Management			92669.00	0.00	0.00	0.00	92669.00	
	1.00 LS	0.00	92,669	0	0	0	92,669	92669
USR 30 Sister District Review			5000.00	0.00	0.00	0.00	5000.00	
	1.00 LS	0.00	5,000	0	0	0	5,000	5000.00
USR 30 Civil Section. See Utilit			231448.00	0.00	0.00	0.00	231448.00	
y and	1.00 LS	0.00	231,448	0	0	0	231,448	231448
Real Estate Surveying for the remaining $89,500.								
USR 30 Geotech			395456.00	0.00	0.00	0.00	395456.00	
	1.00 LS	0.00	395,456	0	0	0	395,456	395456
USR 30 Structural Section			97100.00	0.00	0.00	0.00	97100.00	
	1.00 LS	0.00	97,100	0	0	0	97,100	97100
USR 30 H&H Section			167600.00	0.00	0.00	0.00	167600.00	
	1.00 LS	0.00	167,600	0	0	0	167,600	167600
USR 30 HTRW Branch			99000.00	0.00	0.00	0.00	99000.00	
	1.00 LS	0.00	99,000	0	0	0	99,000	99000
USR 30 Automation			68532.00	0.00	0.00	0.00	68532.00	
	1.00 LS	0.00	68,532	0	0	0	68,532	68532
USR 30 Cost Engineering Branch			22600.00	0.00	0.00	0.00	22600.00	
	1.00 LS	0.00	22,600	0	0	0	22,600	22600
USR 30 Mech/Electrical Section			70266.00	0.00	0.00	0.00	70266.00	
	1.00 LS	0.00	70,266	0	0	0	70,266	70266
USR 30 CAETS			5000.00	0.00	0.00	0.00	5000.00	
	1.00 LS	0.00	5,000	0	0	0	5,000	5000.00
USR 30 Contract Award			37500.00	0.00	0.00	0.00	37500.00	
	1.00 LS	0.00	37,500	0	0	0	37,500	37500
TOTAL Engineering Division	1.00 EA		1,292,171	0	0	0	1,292,171	1292171

30. ENGINEERING AND DESIGN	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_30.08.25_ BB. Planning Division								
USR 30 Environmental			40000.00	0.00	0.00	0.00	40000.00	
	1.00 LS	0.00	40,000	0	0	0	40,000	40000
USR 30 TMS/Contract - USFWS,			16000.00	0.00	0.00	0.00	16000.00	
Coordination Report	1.00 LS	0.00	16,000	0	0	0	16,000	16000
USR 30 Economics			20000.00	0.00	0.00	0.00	20000.00	
	1.00 LS	0.00	20,000	0	0	0	20,000	20000
USR 30 Study Management			72000.00	0.00	0.00	0.00	72000.00	
	1.00 LS	0.00	72,000	0	0	0	72,000	72000
TOTAL Planning Division	1.00 EA		148,000	0	0	0	148,000	148000
AA_30.08.25_ CC. PPMD								
USR 30 PPMD			210000.00	0.00	0.00	0.00	210000.00	
	1.00 LS	0.00	210,000	0	0	0	210,000	210000
TOTAL PPMD	1.00 EA		210,000	0	0	0	210,000	210000
AA_30.08.25_ DD. Utility and Real Estate Surveyin								
TOTAL Survey Requirements By A/E	1.00 EA		0	0	0	89,500	89,500	89500
TOTAL Utility and Real Estate Su	1.00 EA		0	0	0	89,500	89,500	89500
AA_30.08.25_ EE. Real Estate Division								
USR 30 Real Estate Division			50918.00	0.00	0.00	0.00	50918.00	
	1.00 LS	0.00	50,918	0	0	0	50,918	50918
TOTAL Real Estate Division	1.00 EA		50,918	0	0	0	50,918	50918
TOTAL All Other	1.00 EA		1,701,089	0	0	89,500	1,790,589	1790589
TOTAL Plans and Specifications	1.00 JOB		1,701,089	0	0	89,500	1,790,589	1790589

AA_30. ENGINEERING AND DESIGN	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_30.10. Engineering During Construction								
AA_30.10.09. All Other EDC								
AA_30.10.09_ AA. Engineering Division								
USR 30 Design Management			80007.00	0.00	0.00	0.00	80007.00	
	1.00 LS	0.00	80,007	0	0	0	80,007	80007
USR 30 Civil Section			20686.00	0.00	0.00	0.00	20686.00	
	1.00 LS	0.00	20,686	0	0	0	20,686	20686
USR 30 Geotech			143863.00	0.00	0.00	0.00	143863.00	
	1.00 LS	0.00	143,863	0	0	0	143,863	143863
USR 30 Structural Section			20790.00	0.00	0.00	0.00	20790.00	
	1.00 LS	0.00	20,790	0	0	0	20,790	20790
USR 30 H&H Section			81600.00	0.00	0.00	0.00	81600.00	
	1.00 LS	0.00	81,600	0	0	0	81,600	81600
SR 30 HTRW Branch			54000.00	0.00	0.00	0.00	54000.00	
	1.00 LS	0.00	54,000	0	0	0	54,000	54000
USR 30 O&M Manual			100000.00	0.00	0.00	0.00	100000.00	
	1.00 LS	0.00	100,000	0	0	0	100,000	100000
USR 30 Automation			26489.00	0.00	0.00	0.00	26489.00	
	1.00 LS	0.00	26,489	0	0	0	26,489	26489
USR 30 Cost Engineering Branch			7400.00	0.00	0.00	0.00	7400.00	
	1.00 LS	0.00	7,400	0	0	0	7,400	7400.00
USR 30 Mech/Electrical Section			11440.00	0.00	0.00	0.00	11440.00	
	1.00 LS	0.00	11,440	0	0	0	11,440	11440
USR 30 CAETS (Shop Drawings)			10000.00	0.00	0.00	0.00	10000.00	
	1.00 LS	0.00	10,000	0	0	0	10,000	10000
TOTAL Engineering Division	1.00 EA		556,275	0	0	0	556,275	556275
AA_30.10.09_ BB. Planning Division								
USR 30 Planning Division			0.00	0.00	0.00	0.00	0.00	
	1.00 LS	0.00	0	0	0	0	0	0.00
TOTAL Planning Division	1.00 EA		0	0	0	0	0	0.00

30. ENGINEERING AND DESIGN	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_30.10.09_ CC. PPMD									
USR 30 PPMD				141271.00	0.00	0.00	0.00	141271.00	
	1.00 LS		0.00	141,271	0	0	0	141,271	141271
TOTAL PPMD	1.00 EA			141,271	0	0	0	141,271	141271
AA_30.10.09_ EE. Real Estate Division									
USR 30 Real Estate Division				0.00	0.00	0.00	0.00	0.00	
	1.00 LS		0.00	0	0	0	0	0	0.00
TOTAL Real Estate Division	1.00 EA			0	0	0	0	0	0.00
TOTAL All Other EDC	1.00 EA			697,546	0	0	0	697,546	697546
TOTAL Engineering During Constru	1.00 JOB			697,546	0	0	0	697,546	697546
AA_30.11. Value Engineering									
USR 30 Value Engineering Study				100000.00	0.00	0.00	0.00	100000.00	
	1.00 LS		0.00	100,000	0	0	0	100,000	100000
TOTAL Value Engineering	1.00 JOB			100,000	0	0	0	100,000	100000
TOTAL ENGINEERING AND DESIGN	1.00 EA			2,498,635	0	0	89,500	2,588,135	2588135

AA_31. CONSTRUCTION MANAGEMENT	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AA_31. CONSTRUCTION MANAGEMENT The cost for this task was provided by CENAB-COF-HA, and it included escalation for the various years of effort.								
AA_31.AA. Construction Management FY 06								
USR 31 SIOH			490139.00	0.00	0.00	0.00	490139.00	
	1.00 LS	0.00	490,139	0	0	0	490,139	490139
TOTAL Construction Management FY			490,139	0	0	0	490,139	
AA_31.BB. Construction Management FY 07								
USR 31 SIOH			953587.00	0.00	0.00	0.00	953587.00	
	1.00 LS	0.00	953,587	0	0	0	953,587	953587
TOTAL Construction Management FY			953,587	0	0	0	953,587	
AA_31.CC. Construction Management FY 08								
USR 31 SIOH			971045.00	0.00	0.00	0.00	971045.00	
	1.00 LS	0.00	971,045	0	0	0	971,045	971045
TOTAL Construction Management FY			971,045	0	0	0	971,045	
AA_31.DD. Construction Management FY 09								
USR 31 SIOH			219067.00	0.00	0.00	0.00	219067.00	
	1.00 LS	0.00	219,067	0	0	0	219,067	219067
TOTAL Construction Management FY			219,067	0	0	0	219,067	
TOTAL CONSTRUCTION MANAGEMENT	1.00 EA		2,633,838	0	0	0	2,633,838	2633838
TOTAL Bloomsburg LFP Project	1.00 EA		7,735,183	1,172,129	5,255,339	7,428,876	21,591,528	21591528

B_01. LANDS AND DAMAGES	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB. Fernville LFP Project									
BB_01. LANDS AND DAMAGES									
BB_01.02. ACQUISITIONS									
BB_01.02.02. By Non-Federal Sponsor (NFS)									
USR 01 Survey & Legals				0.00	0.00	0.00	27000.00	27000.00	
	1.00 LS		0.00	0	0	0	27,000	27,000	27000
USR 01 Title Evidence				0.00	0.00	0.00	32700.00	32700.00	
	1.00 LS		0.00	0	0	0	32,700	32,700	32700
USR 01 Negotiations				0.00	0.00	0.00	42000.00	42000.00	
	1.00 LS		0.00	0	0	0	42,000	42,000	42000
TOTAL By Non-Federal Sponsor (NF	1.00 EA			0	0	0	101,700	101,700	101700
BB_01.02.04. Review of NFS									
USR 01 Survey & Legals				0.00	0.00	0.00	10800.00	10800.00	
	1.00 LS		0.00	0	0	0	10,800	10,800	10800
USR 01 Title Evidence				0.00	0.00	0.00	10800.00	10800.00	
	1.00 LS		0.00	0	0	0	10,800	10,800	10800
USR 01 Negotiations				0.00	0.00	0.00	8000.00	8000.00	
	1.00 LS		0.00	0	0	0	8,000	8,000	8000.00
TOTAL Review of NFS	1.00 EA			0	0	0	29,600	29,600	29600
TOTAL ACQUISITIONS	1.00 EA			0	0	0	131,300	131,300	131300
BB_01.03. CONDEMNATIONS									
BB_01.03.02. By Non-Federal Sponsor (NFS)									
USR 01 Base				0.00	0.00	0.00	12000.00	12000.00	
	1.00 LS		0.00	0	0	0	12,000	12,000	12000
TOTAL By Non-Federal Sponsor (NF	1.00 EA			0	0	0	12,000	12,000	12000
BB_01.03.03. By Government on Behalf of NFS									
USR 01 Base				0.00	0.00	0.00	10000.00	10000.00	
	1.00 LS		0.00	0	0	0	10,000	10,000	10000

BB_01. LANDS AND DAMAGES	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL By Government on Behalf of	1.00 EA			0	0	0	10,000	10,000	10000
BB_01.03.04. Review of NFS									
USR 01 Base				0.00	0.00	0.00	2000.00	2000.00	
	1.00 LS		0.00	0	0	0	2,000	2,000	2000.00
TOTAL Review of NFS	1.00 EA			0	0	0	2,000	2,000	2000.00
TOTAL CONDEMNATIONS	1.00 EA			0	0	0	24,000	24,000	24000
BB_01.05. APPRAISALS									
BB_01.05.02. By Non-Federal Sponsor (NFS)									
USR 01 Base				0.00	0.00	0.00	43000.00	43000.00	
	1.00 LS		0.00	0	0	0	43,000	43,000	43000
TOTAL By Non-Federal Sponsor (NF	120.01 EA			0	0	0	43,000	43,000	358.29
BB_01.05.04. Review of NFS									
USR 01 Base				0.00	0.00	0.00	35800.00	35800.00	
	1.00 LS		0.00	0	0	0	35,800	35,800	35800
TOTAL Review of NFS	120.00 EA			0	0	0	35,800	35,800	298.33
TOTAL APPRAISALS	1.00 EA			0	0	0	78,800	78,800	78800
BB_01.06. PL 91-646 ASSISSTANCE									
BB_01.06.02. By Non-Federal Sponsor (NFS)									
USR 01 Base				0.00	0.00	0.00	74000.00	74000.00	
	1.00 LS		0.00	0	0	0	74,000	74,000	74000
TOTAL By Non-Federal Sponsor (NF	1.00 EA			0	0	0	74,000	74,000	74000
BB_01.06.04. Review of NFS									
USR 01 Base				0.00	0.00	0.00	7400.00	7400.00	
	1.00 LS		0.00	0	0	0	7,400	7,400	7400.00
TOTAL Review of NFS	1.00 EA			0	0	0	7,400	7,400	7400.00

_01. LANDS AND DAMAGES	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL PL 91-646 ASSISSTANCE	1.00 EA		0	0	0	81,400	81,400	81400
BB_01.15. REAL ESTATE PAYMENTS								
BB_01.15.01. Land Payments								
BB_01.15.01_ 02. By Non-Federal Sponsor (NFS)								
USR 01 Base			0.00	0.00	0.00	1223929	1223929.00	
	1.00 LS	0.00	0	0	0	1,223,929	1,223,929	1223929
TOTAL By Non-Federal Sponsor (NF			0	0	0	1,223,929	1,223,929	
BB_01.15.01_ 04. Review of NFS								
USR 01 Base			0.00	0.00	0.00	10800.00	10800.00	
	1.00 LS	0.00	0	0	0	10,800	10,800	10800
TOTAL Review of NFS			0	0	0	10,800	10,800	
TOTAL Land Payments	1.00 EA		0	0	0	1,234,729	1,234,729	1234729
BB_01.15.02. PL 91-646 Assistance Payments								
BB_01.15.02_ 02. By Non-Federal Sponsor (NFS)								
USR 01 Base			0.00	0.00	0.00	462250.00	462250.00	
	1.00 LS	0.00	0	0	0	462,250	462,250	462250
TOTAL By Non-Federal Sponsor (NF			0	0	0	462,250	462,250	
BB_01.15.02_ 04. Review of NFS								
USR 01 Base			0.00	0.00	0.00	7400.00	7400.00	
	1.00 LS	0.00	0	0	0	7,400	7,400	7400.00
TOTAL Review of NFS			0	0	0	7,400	7,400	
TOTAL PL 91-646 Assistance Payme	1.00 EA		0	0	0	469,650	469,650	469650
TOTAL REAL ESTATE PAYMENTS	1.00 EA		0	0	0	1,704,379	1,704,379	1704379
TOTAL LANDS AND DAMAGES	1.00 EA		0	0	0	2,019,879	2,019,879	2019879

BB_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02. RELOCATIONS										
BB_02.01. Roads, Construction Activities										
BB_02.01. 5. Mob, Demob and Preparatory Work										
BB_02.01. 5_ 01. Road Relocation at Drinker St										
BB_02.01. 5_ 01_ 2. Mob and Demob (USER)										
USR AA Allowance for the the mob					0.00	0.00	0.00	6000.00	6000.00	
and	1.00	LS		0.00	0	0	0	6,000	6,000	6000.00
demob cost for reolcation effort										
TOTAL Mob and Demob	1.00	JOB			0	0	0	6,000	6,000	6000.00
BB_02.01. 5_ 01_ 15. Clearing and Grubbing (USER)										
AF AA Clear & grub, clear site w					2.68	4.83	0.00	0.00	7.52	
/335	1.00	EA	CODTB10M	18.75	3	5	0	0	8	7.52
HP dozer, trees to 12" dia										
AF AA Clear & grub, clear site w					4.03	7.25	0.00	0.00	11.28	
/335	1.00	EA	CODTB10M	12.50	4	7	0	0	11	11.28
HP dozer, light trees to 24" dia										
AF AA Clearing, brush w/dozer &					65.14	60.77	0.00	0.00	125.91	
brush	0.28	ACR	CODTB11A	1.00	18	17	0	0	36	125.91
rake, medium brush										
M MIL AA Clearing, machine load spo					11.56	5.13	11.55	0.00	28.25	
ils, 2	6.00	CY	COEIB17	11.00	69	31	69	0	169	28.25
mi haul to dump										
TOTAL Clearing and Grubbing	1350.00	SY			94	60	69	0	224	0.17
BB_02.01. 5_ 01_ 20. Top Soil (USER)										
MIL AA Loam or topsoil, 200' haul					0.47	0.56	0.00	0.00	1.03	
, 6"	225.00	CY	CODTB10B	108.13	105	126	0	0	231	1.03
deep, 200 HP dozer, remove/pile										
on site										
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	225.00	CY	CODFB10S	25.00	453	241	0	0	694	3.08
1.5 CY, spread from pile to										
TOTAL Top Soil	225.00	CY			558	367	0	0	925	4.11

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Road Relocation at Drinker	1.00 JOB			652	427	69	6,000	7,149	7148.79
BB_02.01. 5_ 02. Relocate Hemlock Street Road Relocation at Fair Ground 2									
BB_02.01. 5_ 02_ 2. Mob and Demob (USER)									
USR AA Allowance for the the mob				0.00	0.00	0.00	7000.00	7000.00	
and	1.00 LS		0.00	0	0	0	7,000	7,000	7000.00
demob cost for reolcation effort									
TOTAL Mob and Demob	1.00 JOB			0	0	0	7,000	7,000	7000.00
BB_02.01. 5_ 02_ 15. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	2.00 EA	CODTB10M	18.75	5	10	0	0	15	7.52
HP dozer, trees to 12" dia									
AF AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	2.00 EA	CODTB10M	12.50	8	14	0	0	23	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	0.83 ACR	CODTB11A	1.00	54	51	0	0	105	125.91
rake, medium brush									
M MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	19.00 CY	COEIB17	11.00	220	98	220	0	537	28.25
mi haul to dump									
TOTAL Clearing and Grubbing	3981.00 SY			287	172	220	0	679	0.17
BB_02.01. 5_ 02_ 20. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6"	225.00 CY	CODTB10B	108.13	105	126	0	0	231	1.03
deep, 200 HP dozer, remove/pile on site									
MIL AA Loam or topsoil, frtn load				2.01	1.07	0.00	0.00	3.08	
er,	225.00 CY	CODFB10S	25.00	453	241	0	0	694	3.08
1.5 CY, spread from pile to									
TOTAL Top Soil	225.00 CY			558	367	0	0	925	4.11

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Relocate Hemlock Street	1.00 JOB			845	540	220	7,000	8,604	8604.20
BB_02.01. 5_ 03. Relocate Blooms Street Road Relocation at Fair Ground 2									
BB_02.01. 5_ 03_ 2. Mob and Demob (USER)									
USR AA Allowance for the the mob				0.00	0.00	0.00	10000.00	10000.00	
and	1.00 LS		0.00	0	0	0	10,000	10,000	10000
demob cost for reolcation effort									
TOTAL Mob and Demob	1.00 JOB			0	0	0	10,000	10,000	10000
BB_02.01. 5_ 03_ 15. Clearing and Grubbing (USER)									
AF AA Clear & grub, clear site w				2.68	4.83	0.00	0.00	7.52	
/335	2.00 EA	CODTB10M	18.75	5	10	0	0	15	7.52
HP dozer, trees to 12" dia									
\F AA Clear & grub, clear site w				4.03	7.25	0.00	0.00	11.28	
/335	2.00 EA	CODTB10M	12.50	8	14	0	0	23	11.28
HP dozer, light trees to 24" dia									
AF AA Clearing, brush w/dozer &				65.14	60.77	0.00	0.00	125.91	
brush	0.83 ACR	CODTB11A	1.00	54	51	0	0	105	125.91
rake, medium brush									
M MIL AA Clearing, machine load spo				11.56	5.13	11.55	0.00	28.25	
ils, 2	19.00 CY	COEIB17	11.00	220	98	220	0	537	28.25
mi haul to dump									
TOTAL Clearing and Grubbing	3981.00 SY			287	172	220	0	679	0.17
BB_02.01. 5_ 03_ 20. Top Soil (USER)									
MIL AA Loam or topsoil, 200' haul				0.47	0.56	0.00	0.00	1.03	
, 6"	4.00 CY	CODTB10B	108.13	2	2	0	0	4	1.03
deep, 200 HP dozer, remove/pile on site									
MIL AA Loam or topsoil, frtn load				2.01	1.07	0.00	0.00	3.08	
er,	4.00 CY	CODFB10S	25.00	8	4	0	0	12	3.08
1.5 CY, spread from pile to									
TOTAL Top Soil	4.00 CY			10	7	0	0	16	4.11

3_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Relocate Blooms Street	1.00 JOB			297	179	220	10,000	10,696	10696
TOTAL Mob, Demob and Preparatory	1.00 JOB			1,795	1,146	508	23,000	26,449	26449
BB_02.01.30. Traffic Control									
BB_02.01.30_ 01. Road Relocation at Drinker St									
BB_02.01.30_ 01_ 5. Traffic Control (USER) Sinple - Close road during construction									
L CIV AA Signs, placement and remov				385.46	56.02	0.00	0.00	441.48	
al of	20.00 EA	CLABB80	0.33	7,709	1,120	0	0	8,830	441.48
signs, including supports, 21 SF to 40 SF									
AF AA Sign, hi-intensity				0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	25.00 SF	N/A	0.00	0	0	404	1,250	1,654	66.15
uy. Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.									
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	120.00 HR	B-LABORER	1.00	3,553	0	0	0	3,553	29.60
M MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones.	200.00 EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &									
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB			17,431	1,158	7,078	1,250	26,917	26917
TOTAL Road Relocation at Drinker	1.00 JOB			17,431	1,158	7,078	1,250	26,917	26917
BB_02.01.30_ 02. Relocate Hemlock Street Road Relocation at Fair Ground 2									
BB_02.01.30_ 02_ 5. Traffic Control (USER) Complex									
L CIV AA Signs, placement and remov				385.46	56.02	0.00	0.00	441.48	
al of	75.00 EA	CLABB80	0.33	28,910	4,202	0	0	33,111	441.48
signs, including supports, 21 SF to 40 SF									

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Sign, hi-intensity				0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b uy.	25.00 SF	N/A	0.00	0	0	404	1,250	1,654	66.15
Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.									
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	480.00 HR	B-LABORER	1.00	14,210	0	0	0	14,210	29.60
M MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones.	200.00 EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &									
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB			49,289	4,239	7,078	1,250	61,856	61856
TOTAL Relocate Hemlock Street	1.00 JOB			49,289	4,239	7,078	1,250	61,856	61856
BB_02.01.30_ 03. Relocate Blooms Street Road Relocation at Fair Ground 2									
BB_02.01.30_ 03_ 5. Traffic Control (USER) Complex									
L CIV AA Signs, placement and remov				385.46	56.02	0.00	0.00	441.48	
al of	75.00 EA	CLABB80	0.33	28,910	4,202	0	0	33,111	441.48
signs, including supports, 21 SF to 40 SF									
AF AA Sign, hi-intensity				0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b uy.	25.00 SF	N/A	0.00	0	0	404	1,250	1,654	66.15
Say each sign is 25 sf so, 20 signs times 25 sf = 500 sf. Say $25 per post times 50 posts equals $1,250 / 25 sf = $50 per sign for a pair of posts.									
MIL AA Flagmen, Laborers,				29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	480.00 HR	B-LABORER	1.00	14,210	0	0	0	14,210	29.60
MIL AA Provide 28" High Traffic C				29.60	0.00	20.97	0.00	50.57	
ones.	200.00 EA	ALABCLAB2	2.00	5,921	0	4,194	0	10,115	50.57
Means 2000 Site Work &									

B_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
CIV AA Barricades, 10' sections,				3.10	0.47	31.00	0.00	34.58	
precast barrier walls	80.00 LF	CODLB6	30.00	248	38	2,480	0	2,766	34.58
TOTAL Traffic Control	1.00 JOB			49,289	4,239	7,078	1,250	61,856	61856
TOTAL Relocate Blooms Street	1.00 JOB			49,289	4,239	7,078	1,250	61,856	61856
TOTAL Traffic Control	1.00 JOB			116,009	9,637	21,234	3,750	150,629	150629
BB_02.01.35. Construct Roadbed to Subgrade									
BB_02.01.35_ 01. Road Relocation at Drinker St									
BB_02.01.35_ 01_ 10. Construct Roadbed (USER) Say 24' wide x 488' long = 11,712 sf									
MIL AA Base course, bituminous				0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course	217.00 CY	COFGB36E	175.00	212	259	6,749	0	7,220	33.27
MIL AA Base course, crushed 3/4"				0.27	0.30	4.66	0.00	5.23	
stone,	1301.00 SY	COFGB36C	625.00	356	396	6,058	0	6,811	5.23
compacted, 6"D, large areas									
MIL AA Base, prepare & roll sub-b				0.06	0.05	0.00	0.00	0.11	
ase,	11712 SF	COFGB32A	1687.51	699	543	0	0	1,242	0.11
small areas to 2500 SY									
TOTAL Construct Roadbed	11712 SF			1,268	1,198	12,807	0	15,273	1.30
TOTAL Road Relocation at Drinker	1.00 JOB			1,268	1,198	12,807	0	15,273	15273
BB_02.01.35_ 02. Relocate Hemlock Street Road Relocation at Fair Ground 2									
BB_02.01.35_ 02_ 10. Construct Roadbed (USER) Say 24' wide x 169' long = 4,056 sf									
MIL AA Base course, bituminous				0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course	75.04 CY	COFGB36E	175.00	73	89	2,334	0	2,497	33.27
MIL AA Base course, crushed 3/4"				0.27	0.30	4.66	0.00	5.23	
stone,	451.00 SY	COFGB36C	625.00	124	137	2,100	0	2,361	5.23
compacted, 6"D, large areas									
MIL AA Base, prepare & roll sub-b				0.06	0.05	0.00	0.00	0.11	
ase,	4056.00 SF	COFGB32A	1687.51	242	188	0	0	430	0.11
small areas to 2500 SY									

BB_02. RELOCATIONS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Construct Roadbed	4056.00	SF			439	415	4,434	0	5,288	1.30
TOTAL Relocate Hemlock Street	1.00	JOB			439	415	4,434	0	5,288	5287.72
BB_02.01.35_ 03. Relocate Blooms Street Road Relocation at Fair Ground 2										
BB_02.01.35_ 03_ 10. Construct Roadbed (USER) Say 24' wide x 169' long = 4,056 sf										
MIL AA Base course, bituminous					0.98	1.19	31.10	0.00	33.27	
stabilized, subbase course	75.04	CY	COFGB36E	175.00	73	89	2,334	0	2,497	33.27
MIL AA Base course, crushed 3/4"					0.27	0.30	4.66	0.00	5.23	
stone,	451.00	SY	COFGB36C	625.00	124	137	2,100	0	2,361	5.23
compacted, 6"D, large areas										
MIL AA Base, prepare & roll sub-b					0.06	0.05	0.00	0.00	0.11	
ase,	4056.00	SF	COFGB32A	1687.51	242	188	0	0	430	0.11
small areas to 2500 SY										
TOTAL Construct Roadbed	4056.00	SF			439	415	4,434	0	5,288	1.30
TOTAL Relocate Blooms Street	1.00	JOB			439	415	4,434	0	5,288	5287.72
TOTAL Construct Roadbed to Subgr	1.00	JOB			2,146	2,027	21,675	0	25,848	25848
BB_02.01.55. Road Surfacing										
BB_02.01.55_ 01. Road Relocation at Drinker St										
BB_02.01.55_ 01_ 10. Surface Roadway (USER) Say 24' wide x 488' long = 11,712 sf										
MIL AA Asphaltic conc pavement,					3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4"	217.00	TON	COKCB25	106.25	703	278	6,476	0	7,457	34.37
thick										
MIL AA Asphaltic conc pavement,					3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3	306.00	TON	COKCB25B	100.00	1,163	552	10,076	0	11,791	38.53
".										
Say 3954 Lbs/CY										
TOTAL Surface Roadway	11712	SF			1,866	829	16,552	0	19,248	1.64

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Road Relocation at Drinker	1.00 JOB			1,866	829	16,552	0	19,248	19248
BB_02.01.55_ 02. Relocate Hemlock Street Road Relocation at Fair Ground 2									
BB_02.01.55_ 02_ 10. Surface Roadway (USER) Say 24' wide x 169' long = 4,056 sf									
MIL AA Asphaltic conc pavement,				3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	75.00 TON	COKCB25	106.25	243	96	2,238	0	2,577	34.37
MIL AA Asphaltic conc pavement,				3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	106.00 TON	COKCB25B	100.00	403	191	3,490	0	4,084	38.53
Say 3954 Lbs/CY									
TOTAL Surface Roadway	4056.00 SF			646	287	5,729	0	6,662	1.64
TOTAL Relocate Hemlock Street	1.00 JOB			646	287	5,729	0	6,662	6661.77
BB_02.01.55_ 03. Relocate Blooms Street Road Relocation at Fair Ground 2									
BB_02.01.55_ 03_ 10. Surface Roadway (USER) Say 24' wide x 169' long = 4,056 sf									
MIL AA Asphaltic conc pavement,				3.24	1.28	29.84	0.00	34.37	
highway, binder course, 4" thick	75.00 TON	COKCB25	106.25	243	96	2,238	0	2,577	34.37
MIL AA Asphaltic conc pavement,				3.80	1.80	32.93	0.00	38.53	
highway, wearing course, 3 ".	106.00 TON	COKCB25B	100.00	403	191	3,490	0	4,084	38.53
Say 3954 Lbs/CY									
TOTAL Surface Roadway	4056.00 SF			646	287	5,729	0	6,662	1.64
TOTAL Relocate Blooms Street	1.00 JOB			646	287	5,729	0	6,662	6661.77
TOTAL Road Surfacing	1.00 JOB			3,158	1,404	28,010	0	32,572	32572

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02.01.60. Associated General Items									
BB_02.01.60_ 01. Road Relocation at Drinker St									
BB_02.01.60_ 01_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader, 3 CY, medium matl. Swell factor 15% .				0.37	0.35	0.00	0.00	0.72	
	5274.00 CY	CODFB10T	137.50	1,931	1,856	0	0	3,786	0.72
M MIL AA Hauling, hwy haulers, 16.5 CY, 6 mi round trip @ 40 MPH (2.1 cyc/hr)				0.97	1.31	5.60	0.00	7.88	
	5274.00 CY	CTDHB34C	35.00	5,125	6,893	29,554	0	41,572	7.88
USR AA Placement of Fill Spread/Compact Roadwy Embankment 8"(20cm) Lift w/300 HP Tractor				0.15	0.15	0.00	0.00	0.31	
	5274.00 CY	CODTP	2000.00	805	808	0	0	1,613	0.31
TOTAL Random Fill	4586.00 CY			7,861	9,557	29,554	0	46,971	10.24
BB_02.01.60_ 01_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mix, mechanical seeding, 450#/acre.				144.41	73.62	634.89	0.00	852.93	
	0.28 ACR	COELB66	0.24	40	20	175	0	235	852.93
RSM AA Seeding, apply fertilizer, 800 lb/acre.				67.87	34.60	381.28	0.00	483.76	
	0.11 TON	COELB66	0.50	8	4	42	0	53	483.76
TOTAL Seeding	1350.00 SY			47	24	217	0	289	0.21
TOTAL Road Relocation at Drinker	1.00 JOB			7,908	9,581	29,771	0	47,260	47260
BB_02.01.60_ 02. Relocate Hemlock Street Road Relocation at Fair Ground 2									
BB_02.01.60_ 02_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader, 3 CY, medium matl. Swell factor 15%.				0.37	0.35	0.00	0.00	0.72	
	460.00 CY	CODFB10T	137.50	168	162	0	0	330	0.72

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
M MIL AA Hauling, hwy haulers, 16.5				0.97	1.31	5.60	0.00	7.88	
CY, 6	460.00 CY	CTDHB34C	35.00	447	601	2,578	0	3,626	7.88
mi round trip @ 40 MPH (2.1 cyc/hr)									
USR AA Placement of Fill				0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Embankment	460.00 CY	CODTP	2000.00	70	70	0	0	141	0.31
8"(20cm) Lift w/300 HP Tractor									
TOTAL Random Fill	400.00 CY			686	834	2,578	0	4,097	10.24
BB_02.01.60_ 02_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mix,				144.41	73.62	634.89	0.00	852.93	
	0.09 ACR	COELB66	0.24	13	7	58	0	78	852.93
mechanical seeding, 450#/acre.									
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	0.04 TON	COELB66	0.50	2	1	14	0	18	483.76
lb/acre.									
TOTAL Seeding	450.00 SY			16	8	72	0	96	0.21
TOTAL Relocate Hemlock Street	1.00 JOB			701	842	2,650	0	4,193	4193.13
BB_02.01.60_ 03. Relocate Blooms Street Road Relocation at Fair Ground 2									
BB_02.01.60_ 03_ 25. Random Fill (USER)									
MIL AA Excavate & load, wheeled loader,				0.37	0.35	0.00	0.00	0.72	
	1526.05 CY	CODFB10T	137.50	559	537	0	0	1,096	0.72
3 CY, medium matl. Swell factor 15%.									
M MIL AA Hauling, hwy haulers, 16.5				0.97	1.31	5.60	0.00	7.88	
CY, 6	1526.05 CY	CTDHB34C	35.00	1,483	1,994	8,552	0	12,029	7.88
mi round trip @ 40 MPH (2.1 cyc/hr)									
USR AA Placement of Fill				0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Embankment	1526.05 CY	CODTP	2000.00	233	234	0	0	467	0.31
8"(20cm) Lift w/300 HP Tractor									
TOTAL Random Fill	1327.00 CY			2,275	2,765	8,552	0	13,591	10.24

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02.01.60_ 03_ 30. Seeding (USER)									
MIL AA Seeding, athletic field mi x, mechanical seeding, 450#/acre.	0.01 ACR	COELB66	0.24	144.41 1	73.62 0	634.89 3	0.00 0	852.93 4	852.93
RSM AA Seeding, apply fertilizer, 800 lb/acre.	0.00 TON	COELB66	0.50	67.87 0	34.60 0	381.28 1	0.00 0	483.76 1	483.76
TOTAL Seeding	25.00 SY			1	0	4	0	5	0.21
BB_02.01.60_ 03_ 35. 18" Riprap (USER)									
USR AA 6" Bedding Stone The cost includes 6" riprap randoml y dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 25 sy / 3' = 8 cy x 0.5' thick = 4 cy.	4.00 CY	CODLP	558.10	0.42 2	0.20 1	32.82 131	0.00 0	33.45 134	33.45
MIL AA Class II Rip-rap, random p ieces, 25 - 500 # pieces, dumped from truck. Say 24,890 sy / 3' = 8,297 cy	8.00 CY	COETB3B	32.00	4.05 32	1.83 15	22.15 177	0.00 0	28.03 224	28.03
B RSM AA Rip-rap, random, machine p laced for slope protection	8.00 CY	UOEHB12G	32.00	2.16 17	1.22 10	0.00 0	0.00 0	3.38 27	3.38
L MIL AA Delivery stones to placem ent site from stockpile, front-end loader, 40 - 60 HP	8.00 CY	CODFB10N	32.00	1.57 13	1.12 9	0.00 0	0.00 0	2.69 22	2.69
TOTAL 18" Riprap	25.00 SY			64	34	308	0	407	16.27
TOTAL Relocate Blooms Street	1.00 JOB			2,339	2,800	8,864	0	14,003	14003
TOTAL Associated General Items	1.00 JOB			10,949	13,222	41,285	0	65,457	65457

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02.01.90. Permanent Access Roads & Parking									
BB_02.01.90_ 02. Concrete Sill									
BB_02.01.90_ 02_ 5. Concstract Concrete Sill (USER)									
USR AA Allowance for the construc				20000.00	4905.00	12131.70	0.00	37036.70	
tion	1.00 LS		0.00	20,000	4,905	12,132	0	37,037	37037
of a concrete sill at Sta 1+25									
TOTAL Concstract Concrete Sill	35.00 LF			20,000	4,905	12,132	0	37,037	1058.19
TOTAL Concrete Sill	35.00 LF			20,000	4,905	12,132	0	37,037	1058.19
TOTAL Permanent Access Roads & P	1.00 EA			20,000	4,905	12,132	0	37,037	37037
TOTAL Roads, Construction Activi	1.00 EA			154,057	32,340	124,844	26,750	337,991	337991
BB_02.03. Cemetery, Utilities, & Structure									
BB_02.03. 5. Mob, Demob & Preparatory Work									
USR AA Mob, Demob & Prep Work for				8134.86	2426.70	0.00	21000.00	31561.56	
	1.00 LS	UTDHA	0.02	8,135	2,427	0	21,000	31,562	31562
TOTAL Mob, Demob & Preparatory W	1.00 JOB			8,135	2,427	0	21,000	31,562	31562
BB_02.03.10. Utilities									
The costs for the bid items reflected under this task are based on cost data provided by James Hawk, CENAB-EN-M, 28 Aug 03									
BB_02.03.10_ 5. OH Utility Relocation (Complex) (USER)									
USR EL Demolition of overhead uti				0.00	0.00	0.00	65.00	65.00	
lity	500.00 LF		0.00	0	0	0	32,500	32,500	65.00
USR EL Installation of overhead u				0.00	0.00	0.00	65.00	65.00	
tility	500.00 LF		0.00	0	0	0	32,500	32,500	65.00
USR EL Installation of utility po				0.00	0.00	0.00	3200.00	3200.00	
les.	10.00 EA		0.00	0	0	0	32,000	32,000	3200.00
USR EL Installation of undergroun				0.00	0.00	0.00	850.00	850.00	
d	50.00 LF		0.00	0	0	0	42,500	42,500	850.00

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL New Easement Work				0.00	0.00	0.00	350.00	350.00	
	8.00 HR		0.00	0	0	0	2,800	2,800	350.00
USR EL Transformer ($5,000), pad				0.00	0.00	0.00	5900.00	5900.00	
	0.50 EA		0.00	0	0	0	2,950	2,950	5900.00
TOTAL OH Utility Relocation (Com	500.00 LF			0	0	0	145,250	145,250	290.50
BB_02.03.10_ 10. OH Utility Relocation (Major) (USER)									
USR EL Demolition of overhead uti lity				0.00	0.00	0.00	70.00	70.00	
	900.00 LF		0.00	0	0	0	63,000	63,000	70.00
USR EL Installation of overhead u tility				0.00	0.00	0.00	70.00	70.00	
	900.00 LF		0.00	0	0	0	63,000	63,000	70.00
USR EL Installation of utility po les.				0.00	0.00	0.00	2700.00	2700.00	
	22.50 EA		0.00	0	0	0	60,750	60,750	2700.00
USR EL Installation of undergroun d				0.00	0.00	0.00	850.00	850.00	
	90.00 LF		0.00	0	0	0	76,500	76,500	850.00
USR EL New Easement Work				0.00	0.00	0.00	350.00	350.00	
	14.04 HR		0.00	0	0	0	4,914	4,914	350.00
USR EL Transformer ($5,000), pad				0.00	0.00	0.00	5900.00	5900.00	
	0.50 EA		0.00	0	0	0	2,950	2,950	5900.00
TOTAL OH Utility Relocation (Maj	900.00 LF			0	0	0	271,114	271,114	301.24
BB_02.03.10_ 15. OH Utility Relocation (Minor) (USER)									
USR EL Demolition of overhead uti lity				0.00	0.00	0.00	75.00	75.00	
	1600.00 LF		0.00	0	0	0	120,000	120,000	75.00
USR EL Installation of overhead u tility				0.00	0.00	0.00	75.00	75.00	
	1600.00 LF		0.00	0	0	0	120,000	120,000	75.00
USR EL Installation of utility po les.				0.00	0.00	0.00	2200.00	2200.00	
	48.48 EA		0.00	0	0	0	106,656	106,656	2200.00

02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
USR EL Installation of undergroun d	160.00 LF		0.00	0.00 0	0.00 0	0.00 0	850.00 136,000	850.00 136,000	850.00
USR EL New Easement Work	20.00 HR		0.00	0.00 0	0.00 0	0.00 0	350.00 7,000	350.00 7,000	350.00
TOTAL OH Utility Relocation (Min	1600.00 LF			0	0	0	489,656	489,656	306.04
BB_02.03.10_ 20. Water Line Relocation (USER)									
USR EL Relocation of 12" water li ne	150.00 LF		0.00	0.00 0	0.00 0	0.00 0	75.00 11,250	75.00 11,250	75.00
USR EL Road Crossing	2.00 EA		0.00	0.00 0	0.00 0	0.00 0	6500.00 12,968	6500.00 12,968	6500.00
USR EL Real Estate cost associate d with	20.00 HR		0.00	0.00 0	0.00 0	0.00 0	320.00 6,398	320.00 6,398	320.00
USR EL Connection Charges	0.50 LS		0.00	0.00 0	0.00 0	0.00 0	3800.00 1,900	3800.00 1,900	3800.00
B MIL AA Piping, water dist,5'D,8", fire hydrant,2 way,no exc/bkfl, breakable	1.50 EA		0.00	1000.00 1,500	0.00 0	2888.50 4,333	0.00 0	3888.50 5,833	3888.50
TOTAL Water Line Relocation	150.00 LF			1,500	0	4,333	32,516	38,349	255.66
BB_02.03.10_ 25. Sewer Line Relocation (USER)									
USR EL Relocation of 12" sewer li nes	150.00 LF		0.00	0.00 0	0.00 0	0.00 0	93.00 13,950	93.00 13,950	93.00
USR EL Road Crossing	2.00 EA		0.00	0.00 0	0.00 0	0.00 0	6500.00 12,968	6500.00 12,968	6500.00
USR EL Real Estate cost associate d with	20.00 HR		0.00	0.00 0	0.00 0	0.00 0	320.00 6,398	320.00 6,398	320.00
USR EL Connection Charges	0.50 LS		0.00	0.00 0	0.00 0	0.00 0	4500.00 2,250	4500.00 2,250	4500.00

BB_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Sewer Line Relocation	150.00 LF		0	0	0	35,566	35,566	237.11
BB_02.03.10_ 30. Gas Line Relocation (USER)								
USR EL Relocation of 12" Gas line			0.00	0.00	0.00	200.00	200.00	
s	150.00 LF	0.00	0	0	0	30,000	30,000	200.00
USR EL Relocation and Easement			0.00	0.00	0.00	300.00	300.00	
	20.00 HR	0.00	0	0	0	5,999	5,999	300.00
USR EL Road Crossing			0.00	0.00	0.00	4500.00	4500.00	
	1.50 EA	0.00	0	0	0	6,750	6,750	4500.00
TOTAL Gas Line Relocation	150.00 LF		0	0	0	42,749	42,749	284.99
BB_02.03.10_ 35. Under Ground Cable Relocation (USER)								
USR EL Allowance for the relocati			126.85	39.47	0.00	0.00	166.32	
on of	150.00 LF	0.00	19,028	5,920	0	0	24,948	166.32
TOTAL Under Ground Cable Relocat	150.00 LF		19,028	5,920	0	0	24,948	166.32
TOTAL Utilities	1.00 JOB		20,528	5,920	4,333	1,016,850	1,047,631	1047631
BB_02.03.30. Structures								
BB_02.03.30_ 5. Demo Residential Frame Structure								
BB_02.03.30_ 5_ 5. Demo Residential Structures								
AF AA Building dml, two family,			0.00	0.00	0.00	6375.00	6375.00	
two	1.00 EA N/A	0.00	0	0	0	6,375	6,375	6375.00
story house, wood, maximum. 2003 MEANS Site Work, page 36.								
MIL AA Rubbish handling,2 mile ha			8.48	3.76	0.00	12.50	24.74	
ul,	48.00 CY COEIB17	15.00	407	181	0	600	1,188	24.74
loading & trucking,machine loading truck. Say each structure is four 12-cy truck load so, 4 x 12 = 48 cy. Price includes dumping fees.								
TOTAL Demo Residential Structure	1.00 EA		407	181	0	6,975	7,563	7562.60

B_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02.03.30_ 5_ 10. Demo Basements									
L MIL AA Building dml, foundations,				1.31	0.00	0.00	0.00	1.31	
conc,	1120.00 SF		0.00	1,467	0	0	0	1,467	1.31
plain. Say each structure is 2(8' x 30') + 2(8' x 40') = 1,120 sf									
USR AA Demo 4" thick concrete sla				1.97	0.80	0.00	0.00	2.77	
b,	1200.00 SF	CODFB5	111.49	2,369	959	0	0	3,328	2.77
reinforced wire mesh, 2003 MEANS Site Work, page 36. Say 30' x 40' = 1,200 sf									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	15.00 CY	COEIB17	15.00	127	56	0	188	371	24.74
loading & trucking,machine loading truck. Say the slab is 30' x 40' x 0.33' / 27' = 15 cy. Price includes dumping fees.									
TOTAL Demo Basements	1.00 EA			3,963	1,015	0	188	5,166	5166.26
BB_02.03.30_ 5_ 15. Demo Concrete Driveways									
MIL AA Site dml, bituminous drive				1.99	1.16	0.00	0.00	3.15	
ways.	33.00 SY	CLADB38	80.00	66	38	0	0	104	3.15
Say 12' x 25' / 9' = 33 sy									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	44.00 CY	COEIB17	15.00	373	166	0	550	1,089	24.74
loading & trucking,machine loading truck. Say 30' x 40' x 1' /27' = 44 cy of debris. Price includes dumping fees.									
TOTAL Demo Concrete Driveways	1.00 EA			439	204	0	550	1,193	1192.67
BB_02.03.30_ 5_ 20. Demo Remove/Cap Utilities									
USR AA Allowance to remove and/or				0.00	0.00	0.00	1500.00	1500.00	
cap	1.00 EA		0.00	0	0	0	1,500	1,500	1500.00
utilities after demo of homes									
TOTAL Demo Remove/Cap Utilities	1.00 EA			0	0	0	1,500	1,500	1500.00

BB_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_02.03.30_ 5_ 25. Demo Oil Tanks								
USR AA Allowance to remove of oil			0.00	0.00	0.00	1200.00	1200.00	
tanks after demo of homes	1.00 EA	0.00	0	0	0	1,200	1,200	1200.00
TOTAL Demo Oil Tanks	1.00 EA		0	0	0	1,200	1,200	1200.00
BB_02.03.30_ 5_ 30. Grade and Restore Lots								
M RSM AA Fill, borrow, for embankme			0.79	0.98	7.91	0.00	9.68	
nts, load, 1 mile haul, spread w/dozer. Say 50' x 50' x 6' / 27' = 556 cy	556.00 CY CODTB15	150.00	439	543	4,400	0	5,382	9.68
L AF AA Fill, spread borrow w/doze			0.55	0.66	0.00	0.00	1.21	
r	556.00 CY CODTB10B	91.52	306	369	0	0	675	1.21
AF AA Seeding, apply fertilizer,			0.97	1.42	3.05	0.00	5.44	
1# nitrogen/MSF, spray from truck	43.56 MSF COFWB59	35.00	42	62	133	0	237	5.44
MIL AA Seeding, athletic field mi			144.41	73.62	634.89	0.00	852.93	
x, mechanical seeding, 450#/acre. Say each lot is 1/2 acre.	1.00 ACR COELB66	0.24	144	.74	635	0	853	852.93
TOTAL Grade and Restore Lots	1.00 EA		931	1,048	5,168	0	7,147	7147.43
TOTAL Demo Residential Frame Str	1.00 EA		5,740	2,448	5,168	10,413	23,769	23769
BB_02.03.30_ 10. Demo Garages								
BB_02.03.30_ 10_ 5. Demo Garages								
AF AA Allowance for the demoliti			0.00	0.00	0.00	1262.50	1262.50	
on of Garages	5.00 EA N/A	0.00	0	0	0	6,313	6,313	1262.50
MIL AA Rubbish handling,2 mile ha			8.48	3.76	0.00	12.50	24.74	
ul, loading & trucking,machine loading truck. Say each garage is one 12-cy truck load so, 5 x 12 = 60 cy. Price includes dumping fees.	60.00 CY COEIB17	15.00	509	226	0	750	1,484	24.74

3_02. RELOCATIONS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Demo Garages	5.00 EA		509	226	0	7,063	7,797	1559.40
BB_02.03.30_ 10_ 10. Demo Concrete Driveways								
MIL AA Site dml, bituminous drive			1.99	1.16	0.00	0.00	3.15	
ways.	350.00 SY CLADB38	80.00	697	407	0	0	1,103	3.15
Say 5(25' x 25' / 9') = 350 sy								
MIL AA Rubbish handling, 2 mile ha			8.48	3.76	0.00	12.50	24.74	
ul,	120.00 CY COEIB17	15.00	1,017	452	0	1,500	2,969	24.74
loading & trucking, machine loading truck. Say 5(25' x 25' x 1' /27') = 120 cy. Price includes dumping fees.								
TOTAL Demo Concrete Driveways	5.00 EA		1,714	858	0	1,500	4,072	814.48
BB_02.03.30_ 10_ 15. Demo Remove/Cap Utilities								
USR AA Allowance to remove and/or			0.00	0.00	0.00	625.00	625.00	
cap	5.00 EA	0.00	0	0	0	3,125	3,125	625.00
utilities after demo of garage								
TOTAL Demo Remove/Cap Utilities	5.00 EA		0	0	0	3,125	3,125	625.00
BB_02.03.30_ 10_ 25. Grade and Restore Lots								
M RSM AA Fill, borrow, for embankme			0.79	0.98	7.91	0.00	9.68	
nts,	120.00 CY CODTB15	150.00	95	117	950	0	1,162	9.68
load, 1 mile haul, spread w/dozer. Say 5(25' x 25' x 1' / 27') = 120 cy								
L AF AA Fill, spread borrow w/doze			0.55	0.66	0.00	0.00	1.21	
r	120.00 CY CODTB10B	91.52	66	80	0	0	146	1.21
AF AA Seeding, apply fertilizer,			0.97	1.42	3.05	0.00	5.44	
1#	43.56 MSF COFWB59	35.00	42	62	133	0	237	5.44
nitrogen/MSF, spray from truck								
MIL AA Seeding, athletic field mi			144.41	73.62	634.89	0.00	852.93	
x,	1.00 ACR COELB66	0.24	144	74	635	0	853	852.93
mechanical seeding, 450#/acre.								
TOTAL Grade and Restore Lots	5.00 EA		347	332	1,718	0	2,397	479.48

BB_02. RELOCATIONS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Demo Garages	5.00 EA			2,570	1,417	1,718	11,688	17,392	3478.36
TOTAL Structures	1.00 JOB			8,311	3,865	6,886	22,100	41,161	41161
TOTAL Cemetery, Utilities, & Str	1.00 EA			36,973	12,212	11,218	1,059,950	1,120,353	1120353
TOTAL RELOCATIONS	1.00 EA			191,030	44,552	136,062	1,086,700	1,458,344	1458344

B_06. FISH AND WILDLIFE FACILITIES	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_06. FISH AND WILDLIFE FACILITIES									
BB_06.03. Wildlife Facilities & Sanctuary									
BB_06.03.73. Habitat and Feeding Facilities									
BB_06.03.73_ 01. Fishing Creek Mitigation									
USR AA Mitigation for Fishing Cre				0.00	0.00	0.00	750000.00	750000.00	
ek,	1.00 LS		0.00	0	0	0	750,000	750,000	750000
per Bill Abadie, CENAB-PL-P, 28									
Aug 03 during the team meeting									
TOTAL Fishing Creek Mitigation	1.00 EA			0	0	0	750,000	750,000	750000
TOTAL Habitat and Feeding Facili	1.00 EA			0	0	0	750,000	750,000	750000
TOTAL Wildlife Facilities & Sanc	1.00 EA			0	0	0	750,000	750,000	750000
TOTAL FISH AND WILDLIFE FACILITI	1.00 EA			0	0	0	750,000	750,000	750000

BB_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11. LEVEES AND FLOODWALLS										
BB_11.01. Mob, Demob & Preparatory Work										
BB_11.01.01. Mob, Demob & Preparatory Work										
USR AA Allowance for mob, demob, & preparatory work					6000.00	1635.00	2888.50	0.00	10523.50	
	1.00	LS		0.00	6,000	1,635	2,889	0	10,524	10524
TOTAL Mob, Demob & Preparatory W	1.00	EA			6,000	1,635	2,889	0	10,524	10524
TOTAL Mob, Demob & Preparatory W	1.00	EA			6,000	1,635	2,889	0	10,524	10524
BB_11.02. Drainage										
BB_11.02.01. 24" Drainage Structure #1										
BB_11.02.01_ 5. 24" Control Manhole										
CIV AA Hydraulic structures, 24" x 24", HD, self cont w/crank, sluice					1237.66	283.91	7421.13	0.00	8942.70	
	1.00	EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
MIL AA Ladder, steel, 20" wide, b olted to conc, w/cage					31.21	0.88	62.78	0.00	94.87	
	2.00	VLF	SIWSE4	6.25	62	2	126	0	190	94.87
MIL AA Ladder, steel, 20" wide, b olted to conc, w/o cage					18.36	0.52	29.20	0.00	48.07	
	23.00	VLF	SIWSE4	10.63	422	12	672	0	1,106	48.07
MIL AA Placing conc, slab on grad e, over 6" thick, pumped					10.81	3.50	0.00	0.00	14.31	
	5.47	CY	CLABC20	23.13	59	19	0	0	78	14.31
MIL AA Placing conc, walls, 12" t hick, pumped					18.17	5.89	0.00	0.00	24.06	
	29.80	CY	CLABC20	13.75	542	175	0	0	717	24.06
RSM AA Concrete ready mix, regula r weight, 4000 psi					0.00	0.00	79.32	0.00	79.32	
	35.30	CY	N/A	0.00	0	0	2,800	0	2,800	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7					699.05	0.00	607.35	0.00	1306.40	
	0.43	TON	SIWRRODM4	0.29	301	0	261	0	562	1306.40
MIL RE Reinforcing in place, wall s, #3 to #7					535.94	0.00	592.72	0.00	1128.66	
	2.23	TON	SIWRRODM4	0.38	1,195	0	1,322	0	2,517	1128.66

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L RSM CO Grout					10.81	3.50	70.39	0.00	84.69	
	0.54	CY	CLABC20	23.13	6	2	38	0	46	84.69
MIL AA Plates, steel, 1/4" thick					0.00	0.00	1698.44	0.00	1698.44	
	0.14	TON	N/A	0.00	0	0	234	0	234	1698.44
MIL AA Forms in place, walls, int					4.97	0.00	1.43	0.00	6.41	
,	1606.00	SF	ACARC2	49.38	7,986	0	2,301	0	10,287	6.41
plywood, 8-16' high, 4 use										
MIL AA Forms in place, SOG, edge					3.62	0.00	0.90	0.00	4.53	
forms,	64.00	SF	ACARC1	43.75	232	0	58	0	290	4.53
wood, over 12", 4 use										
MIL CO Finishing walls, float fin					0.95	0.00	0.03	0.00	0.99	
ish,	803.00	SF	ACMACEFI1	37.50	765	0	28	0	793	0.99
1/16" thick										
MIL CO Finishing walls, break tie					0.53	0.00	0.06	0.00	0.59	
s &	803.00	SF	ACMACEFI1	67.50	425	0	46	0	472	0.59
patch voids										
TOTAL 24" Control Manhole	1.00	EA			13,233	494	15,307	0	29,033	29033
BB_11.02.01_ 10. 24" RCP Culvert										
B MIL AA Piping, drainage & sewage,					5.90	1.31	30.62	0.00	37.83	
24"	110.00	LF		0.00	649	144	3,368	0	4,161	37.83
dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.										
AF AA Piping, drainage & sewage,					0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	11.00	EA	N/A	0.00	0	0	51	0	51	4.62
RSM CO Lean Concrete ready mix, r					0.00	0.00	70.39	0.00	70.39	
egular	27.00	CY	N/A	0.00	0	0	1,900	0	1,900	70.39
weight, 2000 psi										
MIL CO Placing conc, footings, sp					30.76	9.96	0.00	0.00	40.72	
read,	27.00	CY	CLABC20	8.13	830	269	0	0	1,099	40.72
under 1 CY, pumped										
USR AA Place Select Granular Fill					4.33	2.28	24.52	0.00	31.13	
	23.00	CY	CODLQ	56.25	99	53	564	0	716	31.13
L RSM AA Compaction, riding, vibrat					0.21	0.10	0.00	0.00	0.32	
ing	23.00	CY	COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes										

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	60.00 LF	ACARCARP1	18.13	142	0	97	0	239	3.99
wide, 3/8" thick									
TOTAL 24" RCP Culvert	110.00 LF			1,726	468	5,980	0	8,174	74.31
BB_11.02.01_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
MIL AA Rip-rap, random pieces, 10				4.05	1.83	19.36	0.00	25.25	
- 100	11.00 CY	COETB3B	32.00	45	20	213	0	278	25.25
# pieces, dumped from truck									
TOTAL 24" Outlet Structure	1.00 EA			1,644	125	3,181	0	4,950	4950.32
BB_11.02.01_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & c				74.52	11.30	656.27	0.00	742.08	
over,	1.00 EA	CODLB6	1.25	75	11	656	0	742	742.08
curb inlet type, 27" x 27"									
MIL AA CB or manholes, conc, prec				343.30	58.82	490.16	0.00	892.27	
ast,	1.00 EA	UOEHB22	0.38	343	59	490	0	892	892.27
4' ID, 5' deep									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	5.00 SY	ULABA2	150.00	3	1	7	0	11	2.21
lene									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	5.00 SY	COFGB36C	525.00	2	2	47	0	50	10.00
deep, crushed 3/4" stone, large									
areas									
TOTAL 24" Inlet Structure	1.00 EA			423	72	1,200	0	1,695	1695.43

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.02.01_ 25. Excavation and Backfilling										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	122.00	CY	CODEB12C	130.00	65	64	0	0	129	1.06
2 CY, medium matl. Say 10' deep x 3' wide x 110' long / 27' = 122 cy										
AF AA Hauling, w/loading, 12 CY					1.19	1.61	0.00	0.00	2.80	
truck,	94.00	CY	CODEB30	87.00	112	152	0	0	263	2.80
5 mile haul, soil. Say a total of 122 cy of excavated material minus 110 cy of backfilling material equals 12 cy of material to be hauled offsite.										
MIL AA Base course, compacted to					0.33	0.36	9.31	0.00	10.00	
12"	283.00	SY	COFGB36C	525.00	92	103	2,635	0	2,830	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 110' long / 9' = 37sy										
MIL AA Backfill, trench, front-en					1.01	0.72	0.00	0.00	1.72	
d	110.00	CY	CODFB10N	50.00	111	79	0	0	189	1.72
loader, 40 - 60 HP, no. Say a total of 122 cy of excavated material minus (1' x 3' x 110' / 27') of stone = 110 cy of backfilling.										
RSM AA Compaction, riding, vibrat					0.13	0.07	0.00	0.00	0.20	
ing	110.00	CY	COFCB10Y	375.00	15	7	0	0	22	0.20
roller, 6" lifts, 2 passes										
MIL AA Compaction, 1 ton roller,					2.01	0.37	0.00	0.00	2.38	
around	11.00	CY	COFCB10A	25.00	22	4	0	0	26	2.38
structures & trenches										
TOTAL Excavation and Backfilling	1.00	JOB			417	408	2,635	0	3,460	3460.29
TOTAL 24" Drainage Structure #1	110.00	LF			17,442	1,568	28,304	0	47,313	430.12
BB_11.02.02. 24" Drainage Structure #2										
BB_11.02.02_ 5. 24" Control Manhole										
CIV AA Hydraulic structures, 24"					1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00	EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice										

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Ladder, steel, 20" wide, b olted to conc, w/cage				31.21	0.88	62.78	0.00	94.87	
	2.00 VLF	SIWSE4	6.25	62	2	126	0	190	94.87
MIL AA Ladder, steel, 20" wide, b olted to conc, w/o cage				18.36	0.52	29.20	0.00	48.07	
	23.00 VLF	SIWSE4	10.63	422	12	672	0	1,106	48.07
MIL AA Placing conc, slab on grad e, over 6" thick, pumped				10.81	3.50	0.00	0.00	14.31	
	5.47 CY	CLABC20	23.13	59	19	0	0	78	14.31
MIL AA Placing conc, walls, 12" t hick, pumped				18.17	5.89	0.00	0.00	24.06	
	29.80 CY	CLABC20	13.75	542	175	0	0	717	24.06
RSM AA Concrete ready mix, regula r weight, 4000 psi				0.00	0.00	79.32	0.00	79.32	
	35.30 CY	N/A	0.00	0	0	2,800	0	2,800	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7				699.05	0.00	607.35	0.00	1306.40	
	0.43 TON	SIWRRODM4	0.29	301	0	261	0	562	1306.40
MIL RE Reinforcing in place, wall s, #3 to #7				535.94	0.00	592.72	0.00	1128.66	
	2.23 TON	SIWRRODM4	0.38	1,195	0	1,322	0	2,517	1128.66
L RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	0.54 CY	CLABC20	23.13	6	2	38	0	46	84.69
MIL AA Plates, steel, 1/4" thick				0.00	0.00	1698.44	0.00	1698.44	
	0.14 TON	N/A	0.00	0	0	234	0	234	1698.44
MIL AA Forms in place, walls, int , plywood, 8-16' high, 4 use				4.97	0.00	1.43	0.00	6.41	
	1606.00 SF	ACARC2	49.38	7,986	0	2,301	0	10,287	6.41
MIL AA Forms in place, SOG, edge forms, wood, over 12", 4 use				3.62	0.00	0.90	0.00	4.53	
	64.00 SF	ACARC1	43.75	232	0	58	0	290	4.53
MIL CO Finishing walls, float fin ish, 1/16" thick				0.95	0.00	0.03	0.00	0.99	
	803.00 SF	ACMACEFI1	37.50	765	0	28	0	793	0.99
MIL CO Finishing walls, break tie s & patch voids				0.53	0.00	0.06	0.00	0.59	
	803.00 SF	ACMACEFI1	67.50	425	0	46	0	472	0.59

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 24" Control Manhole	1.00 EA			13,233	494	15,307	0	29,033	29033
BB_11.02.02_ 10. 24" RCP Culvert									
3 MIL AA Piping, drainage & sewage,				5.90	1.31	30.62	0.00	37.83	
24"	110.00 LF		0.00	649	144	3,368	0	4,161	37.83
dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.									
AF AA Piping, drainage & sewage,				0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	11.00 EA	N/A	0.00	0	0	51	0	51	4.62
RSM CO Lean Concrete ready mix, r				0.00	0.00	70.39	0.00	70.39	
egular	27.00 CY	N/A	0.00	0	0	1,900	0	1,900	70.39
weight, 2000 psi									
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	27.00 CY	CLABC20	8.13	830	269	0	0	1,099	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	24.52	0.00	31.13	
	23.00 CY	CODLQ	56.25	99	53	564	0	716	31.13
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	23.00 CY	COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes									
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	60.00 LF	ACARCARP1	18.13	142	0	97	0	239	3.99
wide, 3/8" thick									
TOTAL 24" RCP Culvert	110.00 LF			1,726	468	5,980	0	8,174	74.31
BB_11.02.02_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
MIL AA Rip-rap, random pieces, 10				4.05	1.83	19.36	0.00	25.25	
- 100	10.00 CY	COETB3B	32.00	41	18	194	0	252	25.25
# pieces, dumped from truck									
TOTAL 24" Outlet Structure	1.00 EA			1,640	124	3,162	0	4,925	4925.07

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.02.02_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & c over, curb inlet type, 27" x 27"	1.00 EA	CODLB6	1.25	74.52 75	11.30 11	656.27 656	0.00 0	742.08 742	742.08
MIL AA CB or manholes, conc, prec ast, 4' ID, 5' deep	1.00 EA	UOEHB22	0.38	343.30 343	58.82 59	490.16 490	0.00 0	892.27 892	892.27
CIV AA Geotextile fabric, 120 mil thick, non-woven polypropy lene	5.00 SY	ULABA2	150.00	0.62 3	0.11 1	1.49 7	0.00 0	2.21 11	2.21
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas	5.00 SY	COFGB36C	525.00	0.33 2	0.36 2	9.31 47	0.00 0	10.00 50	10.00
TOTAL 24" Inlet Structure	1.00 EA			423	72	1,200	0	1,695	1695.43
BB_11.02.02_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca vator, 2 CY, medium matl. Say 10' deep x 3' wide x 110' long / 27' = 122 cy	122.00 CY	CODEB12C	130.00	0.53 65	0.52 64	0.00 0	0.00 0	1.06 129	1.06
AF AA Hauling, w/loading, 12 CY truck, 5 mile haul, soil. Say a total of 122 cy of excavated material minus 110 cy of backfilling material equals 12 cy of material to be hauled offsite.	94.00 CY	CODEB30	87.00	1.19 112	1.61 152	0.00 0	0.00 0	2.80 263	2.80
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas. Say 3' wide x 110' long / 9' = 37sy	283.00 SY	COFGB36C	525.00	0.33 92	0.36 103	9.31 2,635	0.00 0	10.00 2,830	10.00
MIL AA Backfill, trench, front-en d loader, 40 - 60 HP, no. Say a total of 122 cy of excavated material minus (1' x 3' x 110' / 27') of stone = 110 cy of backfilling.	110.00 CY	CODFB10N	50.00	1.01 111	0.72 79	0.00 0	0.00 0	1.72 189	1.72

11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Compaction, riding, vibrat			0.13	0.07	0.00	0.00	0.20	
ing	110.00 CY COFCB10Y	375.00	15	7	0	0	22	0.20
roller, 6" lifts, 2 passes								
MIL AA Compaction, 1 ton roller,			2.01	0.37	0.00	0.00	2.38	
around	11.00 CY COFCB10A	25.00	22	4	0	0	26	2.38
structures & trenches								
TOTAL Excavation and Backfilling	1.00 JOB		417	408	2,635	0	3,460	3460.29
TOTAL 24" Drainage Structure #2	110.00 LF		17,438	1,566	28,285	0	47,288	429.89
BB_11.02.03. 24" Drainage Structure #3								
BB_11.02.03_ 5. 24" Control Manhole								
CIV AA Hydraulic structures, 24"			1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00 EA SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice								
MIL AA Ladder, steel, 20" wide, b			31.21	0.88	62.78	0.00	94.87	
olted	2.00 VLF SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage								
MIL AA Ladder, steel, 20" wide, b			18.36	0.52	29.20	0.00	48.07	
olted	22.00 VLF SIWSE4	10.63	404	11	642	0	1,058	48.07
to conc, w/o cage								
MIL AA Placing conc, slab on grad			10.81	3.50	0.00	0.00	14.31	
e,	514.00 CY CLABC20	23.13	5,555	1,799	0	0	7,354	14.31
over 6" thick, pumped								
MIL AA Placing conc, walls, 12" t			18.17	5.89	0.00	0.00	24.06	
hick,	28.00 CY CLABC20	13.75	509	165	0	0	674	24.06
pumped								
RSM AA Concrete ready mix, regula			0.00	0.00	79.32	0.00	79.32	
r	33.14 CY N/A	0.00	0	0	2,629	0	2,629	79.32
weight, 4000 psi								
MIL AA Reinforcing in place, slab			699.05	0.00	607.35	0.00	1306.40	
on	0.40 TON SIWRRODM4	0.29	280	0	243	0	523	1306.40
grade, #3 to #7								
MIL RE Reinforcing in place, wall			535.94	0.00	592.72	0.00	1128.66	
s, #3	2.10 TON SIWRRODM4	0.38	1,125	0	1,245	0	2,370	1128.66
to #7								

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L RSM CO Grout			10.81	3.50	70.39	0.00	84.69	
	0.51 CY CLABC20	23.13	6	2	36	0	43	84.69
MIL AA Plates, steel, 1/4" thick			0.00	0.00	1698.44	0.00	1698.44	
	0.13 TON N/A	0.00	0	0	221	0	221	1698.44
MIL AA Forms in place, walls, int			4.97	0.00	1.43	0.00	6.41	
,	1509.00 SF ACARC2	49.38	7,503	0	2,162	0	9,665	6.41
plywood, 8-16' high, 4 use								
MIL AA Forms in place, SOG, edge			3.62	0.00	0.90	0.00	4.53	
forms,	60.00 SF ACARC1	43.75	217	0	54	0	272	4.53
wood, over 12", 4 use								
MIL CO Finishing walls, float fin			0.95	0.00	0.03	0.00	0.99	
ish,	755.00 SF ACMACEFI1	37.50	720	0	26	0	746	0.99
1/16" thick								
MIL CO Finishing walls, break tie			0.53	0.00	0.06	0.00	0.59	
s &	755.00 SF ACMACEFI1	67.50	400	0	44	0	443	0.59
patch voids								
TOTAL 24" Control Manhole	1.00 EA		18,018	2,263	14,848	0	35,129	35129
BB_11.02.03_ 10. 24" RCP Culvert								
B MIL AA Piping, drainage & sewage,			5.90	1.31	30.62	0.00	37.83	
24"	60.00 LF	0.00	354	78	1,837	0	2,270	37.83
dia, RCP, class 5, no gaskets.								
MEANS Site Work 2003, page 83.								
AF AA Piping, drainage & sewage,			0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	6.00 EA N/A	0.00	0	0	28	0	28	4.62
RSM CO Lean Concrete ready mix, r			0.00	0.00	70.39	0.00	70.39	
egular	25.00 CY N/A	0.00	0	0	1,760	0	1,760	70.39
weight, 2000 psi								
MIL CO Placing conc, footings, sp			30.76	9.96	0.00	0.00	40.72	
read,	25.00 CY CLABC20	8.13	769	249	0	0	1,018	40.72
under 1 CY, pumped								
USR AA Place Select Granular Fill			4.33	2.28	24.52	0.00	31.13	
	22.00 CY CODLQ	56.25	95	50	539	0	685	31.13
RSM AA Compaction, riding, vibrat			0.21	0.10	0.00	0.00	0.32	
ing	22.00 CY COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes								

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Waterstop, PVC, dumbbell, 6" wide, 3/8" thick	56.00 LF	ACARCARP1	18.13	2.37 133	0.00 0	1.62 91	0.00 0	3.99 223	3.99
TOTAL 24" RCP Culvert	60.00 LF			1,356	380	4,254	0	5,990	99.83
BB_11.02.03_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371.30 371	85.17 85	2640.17 2,640	0.00 0	3096.64 3,097	3096.64
MIL AA Headwall, conc, CIP, 24" dia pipe, 30 deg skewed wingwall	1.00 EA	ACARC14H	0.20	1227.67 1,228	20.17 20	328.10 328	0.00 0	1575.93 1,576	1575.93
MIL AA Rip-rap, random pieces, 10 - 100 # pieces, dumped from truck	10.00 CY	COETB3B	32.00	4.05 41	1.83 18	19.36 194	0.00 0	25.25 252	25.25
TOTAL 24" Outlet Structure	1.00 EA			1,640	124	3,162	0	4,925	4925.07
BB_11.02.03_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & cover, curb inlet type, 27" x 27"	1.00 EA	CODLB6	1.25	74.52 75	11.30 11	656.27 656	0.00 0	742.08 742	742.08
MIL AA CB or manholes, conc, precast, 4' ID, 5' deep	1.00 EA	UOEHB22	0.38	343.30 343	58.82 59	490.16 490	0.00 0	892.27 892	892.27
CIV AA Geotextile fabric, 120 mil thick, non-woven polypropylene	5.00 SY	ULABA2	150.00	0.62 3	0.11 1	1.49 7	0.00 0	2.21 11	2.21
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas	5.00 SY	COFGB36C	525.00	0.33 2	0.36 2	9.31 47	0.00 0	10.00 50	10.00
TOTAL 24" Inlet Structure	1.00 EA			423	72	1,200	0	1,695	1695.43

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.02.03_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	67.00 CY	CODEB12C	130.00	36	35	0	0	71	1.06
2 CY, medium matl. Say 10' deep x 3' wide x 60' long / 27' = 67 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	7.00 CY	CODEB30	87.00	8	11	0	0	20	2.80
5 mile haul, soil. Say a total of 67 cy of excavated material minus 60 cy of backfilling material equals 7 cy of material to be hauled offsite.									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	20.00 SY	COFGB36C	525.00	7	7	186	0	200	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 60' long / 9' = 20 sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	60.00 CY	CODFB10N	50.00	60	43	0	0	103	1.72
loader, 40 - 60 HP, no. Say a total of 67 cy of excavated material minus (1' x 3' x 60' / 27') of stone = 60 cy of backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	60.00 CY	COFCB10Y	375.00	8	4	0	0	12	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	6.00 CY	COFCB10A	25.00	12	2	0	0	14	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			131	103	186	0	420	420.01
TOTAL 24" Drainage Structure #3	60.00 LF			21,567	2,942	23,651	0	48,159	802.66
BB_11.02.04. 24" Drainage Structure #4									
BB_11.02.04_ 5. 24" Control Manhole									
CIV AA Hydraulic structures, 24"				1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00 EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice									

B_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Ladder, steel, 20" wide, b olted to conc, w/cage	2.00	VLF	SIWSE4	6.25	31.21 62	0.88 2	62.78 126	0.00 0	94.87 190	94.87
MIL AA Ladder, steel, 20" wide, b olted to conc, w/o cage	23.00	VLF	SIWSE4	10.63	18.36 422	0.52 12	29.20 672	0.00 0	48.07 1,106	48.07
MIL AA Placing conc, slab on grad e, over 6" thick, pumped	5.47	CY	CLABC20	23.13	10.81 59	3.50 19	0.00 0	0.00 0	14.31 78	14.31
MIL AA Placing conc, walls, 12" t hick, pumped	29.80	CY	CLABC20	13.75	18.17 542	5.89 175	0.00 0	0.00 0	24.06 717	24.06
RSM AA Concrete ready mix, regula r weight, 4000 psi	35.30	CY	N/A	0.00	0.00 0	0.00 0	79.32 2,800	0.00 0	79.32 2,800	79.32
MIL AA Reinforcing in place, slab on grade, #3 to #7	0.43	TON	SIWRRODM4	0.29	699.05 301	0.00 0	607.35 261	0.00 0	1306.40 562	1306.40
MIL RE Reinforcing in place, wall s, #3 to #7	2.23	TON	SIWRRODM4	0.38	535.94 1,195	0.00 0	592.72 1,322	0.00 0	1128.66 2,517	1128.66
L RSM CO Grout	0.54	CY	CLABC20	23.13	10.81 6	3.50 2	70.39 38	0.00 0	84.69 46	84.69
MIL AA Plates, steel, 1/4" thick	0.14	TON	N/A	0.00	0.00 0	0.00 0	1698.44 234	0.00 0	1698.44 234	1698.44
MIL AA Forms in place, walls, int , plywood, 8-16' high, 4 use	1606.00	SF	ACARC2	49.38	4.97 7,986	0.00 0	1.43 2,301	0.00 0	6.41 10,287	6.41
MIL AA Forms in place, SOG, edge forms, wood, over 12", 4 use	64.00	SF	ACARC1	43.75	3.62 232	0.00 0	0.90 58	0.00 0	4.53 290	4.53
MIL CO Finishing walls, float fin ish, 1/16" thick	803.00	SF	ACMACEFI1	37.50	0.95 765	0.00 0	0.03 28	0.00 0	0.99 793	0.99
MIL CO Finishing walls, break tie s & patch voids	803.00	SF	ACMACEFI1	67.50	0.53 425	0.00 0	0.06 46	0.00 0	0.59 472	0.59

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL 24" Control Manhole	1.00 EA			13,233	494	15,307	0	29,033	29033
BB_11.02.04_ 10. 24" RCP Culvert									
B MIL AA Piping, drainage & sewage,				5.90	1.31	30.62	0.00	37.83	
24"	100.00 LF		0.00	590	131	3,062	0	3,783	37.83
dia, RCP, class 5, no gaskets. MEANS Site Work 2003, page 83.									
AF AA Piping, drainage & sewage,				0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	10.00 EA	N/A	0.00	0	0	46	0	46	4.62
RSM CO Lean Concrete ready mix, r				0.00	0.00	70.39	0.00	70.39	
egular	27.00 CY	N/A	0.00	0	0	1,900	0	1,900	70.39
weight, 2000 psi									
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	27.00 CY	CLABC20	8.13	830	269	0	0	1,099	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	24.52	0.00	31.13	
	23.00 CY	CODLQ	56.25	99	53	564	0	716	31.13
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	23.00 CY	COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes									
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	60.00 LF	ACARCARP1	18.13	142	0	97	0	239	3.99
wide, 3/8" thick									
TOTAL 24" RCP Culvert	100.00 LF			1,667	455	5,669	0	7,791	77.91
BB_11.02.04_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
MIL AA Rip-rap, random pieces, 10				4.05	1.83	19.36	0.00	25.25	
- 100	11.00 CY	COETB3B	32.00	45	20	213	0	278	25.25
# pieces, dumped from truck									
TOTAL 24" Outlet Structure	1.00 EA			1,644	125	3,181	0	4,950	4950.32

3_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.02.04_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & cover, curb inlet type, 27" x 27"	1.00 EA	CODLB6	1.25	74.52 75	11.30 11	656.27 656	0.00 0	742.08 742	742.08
MIL AA CB or manholes, conc, precast, 4' ID, 5' deep	1.00 EA	UOEHB22	0.38	343.30 343	58.82 59	490.16 490	0.00 0	892.27 892	892.27
CIV AA Geotextile fabric, 120 mil thick, non-woven polypropylene	5.00 SY	ULABA2	150.00	0.62 3	0.11 1	1.49 7	0.00 0	2.21 11	2.21
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas	5.00 SY	COFGB36C	525.00	0.33 2	0.36 2	9.31 47	0.00 0	10.00 50	10.00
TOTAL 24" Inlet Structure	1.00 EA			423	72	1,200	0	1,695	1695.43
BB_11.02.04_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr excavator, 2 CY, medium matl. Say 10' deep x 3' wide x 100' long / 27' = 111 cy	111.00 CY	CODEB12C	130.00	0.53 59	0.52 58	0.00 0	0.00 0	1.06 117	1.06
AF AA Hauling, w/loading, 12 CY truck, 5 mile haul, soil. Say a total of 122 cy of excavated material minus 110 cy of backfilling material equals 12 cy of material to be hauled offsite.	94.00 CY	CODEB30	87.00	1.19 112	1.61 152	0.00 0	0.00 0	2.80 263	2.80
MIL AA Base course, compacted to 12" deep, crushed 3/4" stone, large areas. Say 3' wide x 110' long / 9' = 37sy	283.00 SY	COFGB36C	525.00	0.33 92	0.36 103	9.31 2,635	0.00 0	10.00 2,830	10.00
MIL AA Backfill, trench, front-end loader, 40 - 60 HP, no. Say a total of 122 cy of excavated material minus (1' x 3' x 110' / 27') of stone = 110 cy of backfilling.	110.00 CY	CODFB10N	50.00	1.01 111	0.72 79	0.00 0	0.00 0	1.72 189	1.72

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	1795.00 CY	COFCB10Y	375.00	241	118	0	0	359	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	179.50 CY	COFCB10A	25.00	361	66	0	0	427	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			976	575	2,635	0	4,187	4186.73
TOTAL 24" Drainage Structure #4	100.00 LF			17,942	1,722	27,993	0	47,657	476.57
BB_11.02.05. 24" Drainage Structure #5									
BB_11.02.05_ 5. 24" Control Manhole									
CIV AA Hydraulic structures, 24"				1237.66	283.91	7421.13	0.00	8942.70	
x 24",	1.00 EA	SIWSL5A	0.15	1,238	284	7,421	0	8,943	8942.70
HD, self cont w/crank, sluice									
MIL AA Ladder, steel, 20" wide, b				31.21	0.88	62.78	0.00	94.87	
olted	2.00 VLF	SIWSE4	6.25	62	2	126	0	190	94.87
to conc, w/cage									
MIL AA Ladder, steel, 20" wide, b				18.36	0.52	29.20	0.00	48.07	
olted	23.00 VLF	SIWSE4	10.63	422	12	672	0	1,106	48.07
to conc, w/o cage									
MIL AA Placing conc, slab on grad				10.81	3.50	0.00	0.00	14.31	
e,	5.47 CY	CLABC20	23.13	59	19	0	0	78	14.31
over 6" thick, pumped									
MIL AA Placing conc, walls, 12" t				18.17	5.89	0.00	0.00	24.06	
hick,	29.80 CY	CLABC20	13.75	542	175	0	0	717	24.06
pumped									
RSM AA Concrete ready mix, regula				0.00	0.00	79.32	0.00	79.32	
r	35.30 CY	N/A	0.00	0	0	2,800	0	2,800	79.32
weight, 4000 psi									
MIL AA Reinforcing in place, slab				699.05	0.00	607.35	0.00	1306.40	
on	0.43 TON	SIWRRODM4	0.29	301	0	261	0	562	1306.40
grade, #3 to #7									
MIL RE Reinforcing in place, wall				535.94	0.00	592.72	0.00	1128.66	
s, #3	2.23 TON	SIWRRODM4	0.38	1,195	0	1,322	0	2,517	1128.66
to #7									

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
RSM CO Grout				10.81	3.50	70.39	0.00	84.69	
	0.54 CY	CLABC20	23.13	6	2	38	0	46	84.69
MIL AA Plates, steel, 1/4" thick				0.00	0.00	1698.44	0.00	1698.44	
	0.14 TON	N/A	0.00	0	0	234	0	234	1698.44
MIL AA Forms in place, walls, int				4.97	0.00	1.43	0.00	6.41	
,	1606.00 SF	ACARC2	49.38	7,986	0	2,301	0	10,287	6.41
plywood, 8-16' high, 4 use									
MIL AA Forms in place, SOG, edge				3.62	0.00	0.90	0.00	4.53	
forms,	64.00 SF	ACARC1	43.75	232	0	58	0	290	4.53
wood, over 12", 4 use									
MIL CO Finishing walls, float fin				0.95	0.00	0.03	0.00	0.99	
ish,	803.00 SF	ACMACEFI1	37.50	765	0	28	0	793	0.99
1/16" thick									
MIL CO Finishing walls, break tie				0.53	0.00	0.06	0.00	0.59	
s &	803.00 SF	ACMACEFI1	67.50	425	0	46	0	472	0.59
patch voids									
TOTAL 24" Control Manhole	1.00 EA			13,233	494	15,307	0	29,033	29033
BB_11.02.05_ 10. 24" RCP Culvert									
B MIL AA Piping, drainage & sewage,				5.90	1.31	30.62	0.00	37.83	
24"	110.00 LF		0.00	649	144	3,368	0	4,161	37.83
dia, RCP, class 5, no gaskets.									
MEANS Site Work 2003, page 83.									
AF AA Piping, drainage & sewage,				0.00	0.00	4.62	0.00	4.62	
gasket, 24" dia	11.00 EA	N/A	0.00	0	0	51	0	51	4.62
RSM CO Lean Concrete ready mix, r				0.00	0.00	70.39	0.00	70.39	
egular	27.00 CY	N/A	0.00	0	0	1,900	0	1,900	70.39
weight, 2000 psi									
MIL CO Placing conc, footings, sp				30.76	9.96	0.00	0.00	40.72	
read,	27.00 CY	CLABC20	8.13	830	269	0	0	1,099	40.72
under 1 CY, pumped									
USR AA Place Select Granular Fill				4.33	2.28	24.52	0.00	31.13	
	23.00 CY	CODLQ	56.25	99	53	564	0	716	31.13
L RSM AA Compaction, riding, vibrat				0.21	0.10	0.00	0.00	0.32	
ing	23.00 CY	COFCB10Y	237.50	5	2	0	0	7	0.32
roller, 6" lifts, 4 passes									

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL CO Waterstop, PVC, dumbbell,				2.37	0.00	1.62	0.00	3.99	
6"	60.00 LF	ACARCARP1	18.13	142	0	97	0	239	3.99
wide, 3/8" thick									
TOTAL 24" RCP Culvert	110.00 LF			1,726	468	5,980	0	8,174	74.31
BB_11.02.05_ 15. 24" Outlet Structure									
CIV AA Hydraulic structures, flap				371.30	85.17	2640.17	0.00	3096.64	
gates, aluminum, 24" dia	1.00 EA	SIWSL5A	0.50	371	85	2,640	0	3,097	3096.64
MIL AA Headwall, conc, CIP, 24" d				1227.67	20.17	328.10	0.00	1575.93	
ia	1.00 EA	ACARC14H	0.20	1,228	20	328	0	1,576	1575.93
pipe, 30 deg skewed wingwall									
MIL AA Rip-rap, random pieces, 10				4.05	1.83	19.36	0.00	25.25	
- 100	11.00 CY	COETB3B	32.00	45	20	213	0	278	25.25
# pieces, dumped from truck									
TOTAL 24" Outlet Structure	1.00 EA			1,644	125	3,181	0	4,950	4950.32
BB_11.02.05_ 20. 24" Inlet Structure									
MIL AA Catch basin, CI, frame & c				74.52	11.30	656.27	0.00	742.08	
over,	1.00 EA	CODLB6	1.25	75	11	656	0	742	742.08
curb inlet type, 27" x 27"									
MIL AA CB or manholes, conc, prec				343.30	58.82	490.16	0.00	892.27	
ast,	1.00 EA	UOEHB22	0.38	343	59	490	0	892	892.27
4' ID, 6' deep									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	5.00 SY	ULABA2	150.00	3	1	7	0	11	2.21
lene									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	5.00 SY	COFGB36C	525.00	2	2	47	0	50	10.00
deep, crushed 3/4" stone, large									
areas									
TOTAL 24" Inlet Structure	1.00 EA			423	72	1,200	0	1,695	1695.43

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.02.05_ 25. Excavation and Backfilling									
MIL AA Excavate & load, hydr exca				0.53	0.52	0.00	0.00	1.06	
vator,	122.00 CY	CODEB12C	130.00	65	64	0	0	129	1.06
2 CY, medium matl. Say 10' deep x 3' wide x 110' long / 27' = 122 cy									
AF AA Hauling, w/loading, 12 CY				1.19	1.61	0.00	0.00	2.80	
truck,	94.00 CY	CODEB30	87.00	112	152	0	0	263	2.80
5 mile haul, soil. Say a total of 122 cy of excavated material minus 110 cy of backfilling material equals 12 cy of material to be hauled offsite.									
MIL AA Base course, compacted to				0.33	0.36	9.31	0.00	10.00	
12"	283.00 SY	COFGB36C	525.00	92	103	2,635	0	2,830	10.00
deep, crushed 3/4" stone, large areas. Say 3' wide x 110' long / 9' = 37sy									
MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	110.00 CY	CODFB10N	50.00	111	79	0	0	189	1.72
loader, 40 - 60 HP, no. Say a total of 122 cy of excavated material minus (1' x 3' x 110' / 27') of stone = 110 cy of backfilling.									
RSM AA Compaction, riding, vibrat				0.13	0.07	0.00	0.00	0.20	
ing	110.00 CY	COFCB10Y	375.00	15	7	0	0	22	0.20
roller, 6" lifts, 2 passes									
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	11.00 CY	COFCB10A	25.00	22	4	0	0	26	2.38
structures & trenches									
TOTAL Excavation and Backfilling	1.00 JOB			417	408	2,635	0	3,460	3460.29
TOTAL 24" Drainage Structure #5	110.00 LF			17,442	1,568	28,304	0	47,313	430.12
TOTAL Drainage	1.00 EA			91,831	9,365	136,536	0	237,732	237732

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.03. Care & Diversion of Water								
BB_11.03. 5. Dewatering								
B MIL AA Dewatering, drainage pipin			2.33	0.35	1.16	0.00	3.84	
g	100.00 LF CODLB6	40.00	233	35	116	0	384	3.84
AF AA Water pump, portable, 2"			54.57	0.00	908.14	0.00	962.72	
discharge, 6000 GPH, gasol ine	2.00 EA MPLUQ1	1.38	109	0	1,816	0	1,925	962.72
B MIL AA Crew to maintain the pumps			397.91	56.35	0.00	0.00	454.26	
during dewatering	14.00 DAY COFWG	0.13	5,571	789	0	0	6,360	454.26
B AF AA Allowance for relocating			0.00	0.00	0.00	1500.00	1500.00	
dewatering basin 2003 , page 76.	1.00 LS	0.00	0	0	0	1,500	1,500	1500.00
L MAP AA Allowance for the removal			0.00	0.00	0.00	675.00	675.00	
of the dewatering basin after construction	1.00 LS	0.00	0	0	0	675	675	675.00
TOTAL Dewatering	60.00 LF		5,913	824	1,932	2,175	10,844	180.73
TOTAL Care & Diversion of Water	1.00 EA		5,913	824	1,932	2,175	10,844	10844
BB_11.99. Associated General Items								
BB_11.99.01. Construct Levee								
BB_11.99.01_ 5. Clearing and Grubbing (USER)								
AF AA Clear & grub, clear site w			2.68	4.83	0.00	0.00	7.52	
/335 HP dozer, trees to 12" dia	16.00 EA CODTB10M	18.75	43	77	0	0	120	7.52
AF AA Clear & grub, clear site w			4.03	7.25	0.00	0.00	11.28	
/335 HP dozer, light trees to 24" dia	16.00 EA CODTB10M	12.50	64	116	0	0	180	11.28
AF AA Clearing, brush w/dozer &			65.14	60.77	0.00	0.00	125.91	
brush rake, medium brush	8.00 ACR CODTB11A	1.00	521	486	0	0	1,007	125.91
MIL AA Clearing, machine load spo			11.56	5.13	11.55	0.00	28.25	
ils, 2 mi haul to dump. Say 24 cubic yards of debris per acre	192.00 CY COEIB17	11.00	2,219	986	2,218	0	5,423	28.25

B_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Clearing and Grubbing	37721	SY			2,848	1,665	2,218	0	6,731	0.18
BB_11.99.01_ 10. Top Soil (USER)										
MIL AA Loam or topsoil, 200' haul					0.47	0.56	0.00	0.00	1.03	
, 6"	3772.00	CY	CODTB10B	108.13	1,756	2,120	0	0	3,876	1.03
deep, 200 HP dozer, remove/pile on site										
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	3772.00	CY	CODFB10S	25.00	7,595	4,034	0	0	11,629	3.08
1.5 CY, spread from pile to										
TOTAL Top Soil	3772.00	CY			9,351	6,154	0	0	15,505	4.11
BB_11.99.01_ 15. Excavation (USER)										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	12898	CY	CODEB12C	130.00	6,872	6,741	0	0	13,613	1.06
2 CY, medium matl. Total excavation includes the levee, and the toe drain.										
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	0.00	0.00	2.28	
CY, 6	14833	CY	CTDHB34C	35.00	14,415	19,385	0	0	33,800	2.28
mi round trip @ 40 MPH (2.1 cyc/hr)										
TOTAL Excavation	12898	CY			21,287	26,127	0	0	47,413	3.68
BB_11.99.01_ 20. Geotextile (USER)										
CIV AA Geotextile fabric, 120 mil					0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy	14510	SY	ULABA2	150.00	8,925	1,574	21,627	0	32,125	2.21
lene										
TOTAL Geotextile	14510	SY			8,925	1,574	21,627	0	32,125	2.21
BB_11.99.01_ 25. Random Fill (USER)										
MIL AA Excavate & load, wheeled l					0.37	0.35	0.00	0.00	0.72	
oader,	29256	CY	CODFB10T	137.50	10,711	10,294	0	0	21,004	0.72
3 CY, medium matl. Swell factor 15%.										

BB_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
M MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	5.60	0.00	7.88	
CY, 6	29256	CY	CTDHB34C	35.00	28,431	38,235	163,942	0	230,607	7.88
mi round trip @ 40 MPH (2.1 cyc/hr)										
USR AA Placement of Fill					0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Embankment	29256	CY	CODTP	2000.00	4,464	4,484	0	0	8,948	0.31
8"(20cm) Lift w/300 HP Tractor										
TOTAL Random Fill	25440	CY			43,606	53,012	163,942	0	260,560	10.24
BB_11.99.01_ 30. Select Fill (USER)										
MIL AA Excavate & load, wheeled loader,	94096	CY	CODFB10T	137.50	0.37	0.35	0.00	0.00	0.72	
3 CY, medium matl. Swell factor 15%.					34,449	33,108	0	0	67,557	0.72
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	6.93	0.00	9.21	
CY, 6	94096	CY	CTDHB34C	35.00	91,443	122,976	652,314	0	866,733	9.21
mi round trip @ 40 MPH (2.1 cyc/hr)										
USR AA Placement of Fill					0.15	0.15	0.00	0.00	0.31	
Spread/Compact Roadwy Embankment	94096	CY	CODTP	2000.00	14,359	14,421	0	0	28,780	0.31
8"(20cm) Lift w/300 HP Tractor										
TOTAL Select Fill	81823	CY			140,251	170,504	652,314	0	963,069	11.77
BB_11.99.01_ 35. Drainage Material/Toe Drain (USER)										
Assumed cost for the excavation and geotextile for the toe drain is cover under tasks "excavation", and "geotextile", see above.										
B USR AA Placement of D50 = 3/4" stone -					4.41	1.35	28.89	0.00	34.65	
A unit price of $25 per cubic yard delivered to site.	4837.00	CY	CODEH	15.00	21,328	6,533	139,717	0	167,578	34.65
TOTAL Drainage Material/Toe Drai	4837.00	CY			21,328	6,533	139,717	0	167,578	34.65

11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.01_ 40. Seeding (USER)									
MIL AA Seeding, athletic field mi				144.41	73.62	634.89	0.00	852.93	
x,	4.69 ACR	COELB66	0.24	677	345	2,976	0	3,998	852.93
mechanical seeding, 450#/acre.									
RSM AA Seeding, apply fertilizer,				67.87	34.60	381.28	0.00	483.76	
800	1.88 TON	COELB66	0.50	127	65	715	0	907	483.76
lb/acre. Say 14.6 acres x 800 lb / 2,000 lb = 5.84 tons.									
TOTAL Seeding	22635 SY			804	410	3,691	0	4,905	0.22
BB_11.99.01_ 45. 18" Riprap (USER)									
USR AA 6" Bedding Stone The cost				0.42	0.20	32.82	0.00	33.45	
includes 6" riprap randoml	2878.00 CY	CODLP	558.10	1,208	578	94,470	0	96,255	33.45
y dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 17,268 sy / 3' = 5,756 cy x 0.5' thick = 2,878 cy.									
MIL AA Class II Rip-rap, random p				4.05	1.83	22.15	0.00	28.03	
ieces,	5756.00 CY	COETB3B	32.00	23,340	10,537	127,490	0	161,366	28.03
25 - 500 # pieces, dumped from truck. Say 17,268 sy / 3' = 5,756 cy									
B RSM AA Rip-rap, random, machine p				2.16	1.22	0.00	0.00	3.38	
laced	5756.00 CY	UOEHB12G	32.00	12,458	7,018	0	0	19,475	3.38
for slope protection									
L MIL AA Delivery stones to placem				1.57	1.12	0.00	0.00	2.69	
ent	5756.00 CY	CODFB10N	32.00	9,054	6,439	0	0	15,493	2.69
site from stockpile, front-end loader, 40 - 60 HP									
TOTAL 18" Riprap	17268 SY			46,060	24,571	221,960	0	292,590	16.94
BB_11.99.01_ 50. 24" Riprap (USER)									
USR AA 6" Bedding Stone The cost				0.42	0.20	32.82	0.00	33.45	
includes 6" riprap randoml	757.00 CY	CODLP	558.10	318	152	24,848	0	25,318	33.45
y dumped from truck and placed. Assumed material cost from the									

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
Jun 93 Wyoming Valley Project at $28.41/cy. Say 4,539 sy / 3' = 1,513 cy x 0.5' thicK = 757 cy.									
MIL AA Class II Rip-rap, random p				4.05	1.83	22.15	0.00	28.03	
ieces,	1513.00 CY	COETB3B	32.00	6,135	2,770	33,511	0	42,416	28.03
25 - 500 # pieces, dumped from truck. Say 4,539 sy / 3' = 1,513 cy									
B RSM AA Rip-rap, random, machine p				2.16	1.22	0.00	0.00	3.38	
laced	1513.00 CY	UOEHB12G	32.00	3,275	1,845	0	0	5,119	3.38
for slope protection									
L MIL AA Delivery stones to placem				1.57	1.12	0.00	0.00	2.69	
ent	1513.00 CY	CODFB10N	32.00	2,380	1,693	0	0	4,072	2.69
site from stockpile, front-end loader, 40 - 60 HP									
TOTAL 24" Riprap	4539.00 SY			12,107	6,459	58,360	0	76,926	16.95
BB_11.99.01_ 55. Cutoff Trench Selectfill Materia (USER)									
MIL AA Excavate & load, wheeled l				0.37	0.35	0.00	0.00	0.72	
oader,	666.00 CY	CODFB10T	137.50	244	234	0	0	478	0.72
3 CY, medium matl. Swell factor 15%.									
MIL AA Hauling, hwy haulers, 12 C				0.85	1.07	0.00	0.00	1.92	
Y,	666.00 CY	COEIB34B	40.00	566	714	0	0	1,280	1.92
stockpile onsite, 1 mi round trip @ 20 MPH (4.2									
MIL AA Soil stbln, w/scarifying &				7.86	3.87	35.25	0.00	46.98	
cmpct, 10% by volume, lime	666.00 CY	COFCB70A	25.00	5,233	2,579	23,477	0	31,289	46.98
MIL AA Compaction, water, wagon,				0.17	0.25	0.23	0.00	0.65	
6000	666.00 CY	COFWB59	200.00	113	166	154	0	433	0.65
gal, 6 mile haul									
AF AA Compaction, steel wheel ta				0.24	0.21	0.00	0.00	0.45	
ndem	666.00 CY	COFCB10E	212.50	158	141	0	0	299	0.45
roller, 5 ton									
TOTAL Cutoff Trench Selectfill M	579.00 CY			6,314	3,835	23,631	0	33,780	58.34
TOTAL Construct Levee	4390.00 LF			312,880	300,844	1,287,460	0	1,901,184	433.07

B_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.02. Construct 17' MSE Wall										
BB_11.99.02_ 5. Clearing and Grubbing (USER)										
AF AA Clear & grub, clear site w					2.68	4.83	0.00	0.00	7.52	
/335	2.00	EA	CODTB10M	18.75	5	10	0	0	15	7.52
HP dozer, trees to 12" dia										
AF AA Clear & grub, clear site w					4.03	7.25	0.00	0.00	11.28	
/335	2.00	EA	CODTB10M	12.50	8	14	0	0	23	11.28
HP dozer, light trees to 24" dia										
AF AA Clearing, brush w/dozer &					65.14	60.77	0.00	0.00	125.91	
brush	0.21	ACR	CODTB11A	1.00	13	13	0	0	26	125.91
rake, medium brush										
M MIL AA Clearing, machine load spo					11.56	5.13	11.55	0.00	28.25	
ils, 2	5.00	CY	COEIB17	11.00	58	26	58	0	141	28.25
mi haul to dump. Say 24 cubic										
yards of debris per acre										
TOTAL Clearing and Grubbing	996.00	SY			85	62	58	0	205	0.21
BB_11.99.02_ 10. Top Soil (USER)										
MIL AA Loam or topsoil, 200' haul					0.47	0.56	0.00	0.00	1.03	
, 6"	145.00	CY	CODTB10B	108.13	67	82	0	0	149	1.03
deep, 200 HP dozer, remove/pile										
on site										
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	145.00	CY	CODFB10S	25.00	292	155	0	0	447	3.08
1.5 CY, spread from pile to										
TOTAL Top Soil	145.00	CY			359	237	0	0	596	4.11
BB_11.99.02_ 15. Excavation (USER)										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	2074.00	CY	CODEB12C	130.00	1,105	1,084	0	0	2,189	1.06
2 CY, medium matl.										
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	0.00	0.00	2.28	
CY, 6	2384.89	CY	CTDHB34C	35.00	2,318	3,117	0	0	5,434	2.28
mi round trip @ 40 MPH (2.1										
cyc/hr)										
TOTAL Excavation	2074.00	CY			3,423	4,201	0	0	7,623	3.68

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.02_ 20. Geotextile (USER)									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene	622.00 SY	ULABA2	150.00	383	67	927	0	1,377	2.21
TOTAL Geotextile	622.00 SY			383	67	927	0	1,377	2.21
BB_11.99.02_ 28. 24" Riprap (USER)									
USR AA 6" Bedding Stone The cost				0.42	0.20	32.82	0.00	33.45	
includes 6" riprap randoml y dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 1,244 sy / 3' = 415 cy x 0.5' thich = 208 cy.	208.00 CY	CODLP	558.10	87	42	6,828	0	6,957	33.45
MIL AA Class II Rip-rap, random p				4.05	1.83	22.15	0.00	28.03	
ieces, 25 - 500 # pieces, dumped from truck. Say 1,244 sy / 3' = 415 cy	415.00 CY	COETB3B	32.00	1,683	760	9,192	0	11,634	28.03
B RSM AA Rip-rap, random, machine p				2.16	1.22	0.00	0.00	3.38	
laced for slope protection	415.00 CY	UOEHB12G	32.00	898	506	0	0	1,404	3.38
L MIL AA Delivery stones to placem				1.57	1.12	0.00	0.00	2.69	
ent site from stockpile, front-end loader, 40 - 60 HP	415.00 CY	CODFB10N	32.00	653	464	0	0	1,117	2.69
TOTAL 24" Riprap	1244.00 SY			3,321	1,772	16,019	0	21,112	16.97
BB_11.99.02_ 30. Drainage Material (USER) Cost for the excavation and goetextile for the toe drain is cover under tasks "excavation", and "geotextile", see above.									
B USR AA Placement of D50 = 3/4" st				4.41	1.35	28.89	0.00	34.65	
one - A unit price of $25 per cubic yard delivered to site.	415.00 CY	CODEH	15.00	1,830	561	11,987	0	14,378	34.65
TOTAL Drainage Material	415.00 CY			1,830	561	11,987	0	14,378	34.65

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.02_ 35. MSE Wall Facing (USER)									
USR AA MSE segmental block units				5.98	0.07	5.36	0.00	11.41	
	19040 SF		0.00	113,859	1,245	102,075	0	217,179	11.41
TOTAL MSE Wall Facing	2116.00 SY			113,859	1,245	102,075	0	217,179	102.64
BB_11.99.02_ 40. MSE Wall Geogrid (USER)									
USR AA Geogrid Material cost are				2.87	0.00	7.28	0.00	10.15	
from	13751 SY		0.00	39,465	0	100,094	0	139,559	10.15
Fleetwood Block (610) 944-8385, as taken from the Olyphant LFP project dated 21 May 01.									
TOTAL MSE Wall Geogrid	13751 SY			39,465	0	100,094	0	139,559	10.15
BB_11.99.02_ 42. MSE Wall Fill (USER)									
M RSM AA Structural Fill, borrow, f				0.79	0.98	13.34	0.00	15.11	
or	4231.00 CY	CODTB15	150.00	3,339	4,134	56,462	0	63,934	15.11
M MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	4231.00 CY	CODFB10N	50.00	4,259	3,029	0	0	7,289	1.72
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	4231.00 CY	COFCB10A	25.00	8,519	1,554	0	0	10,073	2.38
structures & trenches									
MIL AA Compaction, water, wagon,				0.14	0.20	0.23	0.00	0.57	
6000	4231.00 CY	COFWB59	250.00	575	842	978	0	2,395	0.57
gal, 3 mile haul									
TOTAL MSE Wall Fill	4231.00 CY			16,693	9,559	57,440	0	83,692	19.78
BB_11.99.02_ 45. Seeding (USER)									
MIL AA Seeding, athletic field mi				7.61	0.00	7.11	0.00	14.72	
x, by	9.00 CSY	ALABCLAB1	3.89	69	0	64	0	132	14.72
hand, 50#/MSY									
AF AA Seeding, apply fertilizer,				0.91	0.46	2.31	0.00	3.68	
35#/MSF	8.00 MSF	COELB66	37.50	7	4	18	0	29	3.68
MIL AA Loam or topsoil, top dress				0.05	0.00	0.00	0.00	0.05	
by	7839.00 SF	ALABCLAB1	600.00	386	0	0	0	386	0.05
hand									

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Seeding	871.00 SY			462	4	82	0	548	0.63
BB_11.99.02_ 50. Concrete Leveling Pad (USER) Concrete leveling pad for the MSE wall facing.									
MIL AA Excavate trench, mdm soil,				0.76	0.25	0.00	0.00	1.01	
4'-6'	41.00 CY	CODEB12E	91.50	31	10	0	0	41	1.01
D, 1/2 CY excavator.									
RSM AA Concrete ready mix, regula				0.00	0.00	76.27	0.00	76.27	
r	41.00 CY	N/A	0.00	0	0	3,127	0	3,127	76.27
weight, 3500 psi.									
MIL AA Placing conc, footings, sh				12.32	0.54	0.00	0.00	12.86	
allow,	41.00 CY	ULABC6	15.00	505	22	0	0	527	12.86
continuous, direct chute									
TOTAL Concrete Leveling Pad	5169.00 SF			536	32	3,127	0	3,695	0.71
BB_11.99.02_ 55. Railing (USER)									
MIL AA Railing, pipe, steel, 2 ra				9.75	0.27	13.00	0.00	23.03	
il, on	1120.00 LF	SIWSE4	20.00	10,924	307	14,558	0	25,790	23.03
stairs, primed, 2" dia									
TOTAL Railing	1120.00 LF			10,924	307	14,558	0	25,790	23.03
BB_11.99.02_ 60. Piping (USER)									
MIL AA Piping, drainage & sewage,				1.49	0.00	0.97	0.00	2.46	
SDR	560.00 LF	USKCSKWK2	50.00	835	0	544	0	1,378	2.46
35,4" dia,PVC,no exc/bkfill,10' L,B&S									
MIL AA Piping, drainage & sewage,				7.95	0.00	1.92	0.00	9.87	
PVC,	140.00 EA	USKCSKWK2	9.38	1,113	0	269	0	1,381	9.87
no exc/bkfill, plug, 4". Say 4' on center.									
MIL AA Piping, drainage & sewage,				16.11	0.00	1.13	0.00	17.24	
4",	56.00 EA	USKCSKWK2	4.63	902	0	63	0	966	17.24
PVC, no exc/bkfill, coupling									
TOTAL Piping	560.00 LF			2,849	0	875	0	3,725	6.65

11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Construct 17' MSE Wall	560.00	LF			194,190	18,047	307,243	0	519,479	927.64
BB_11.99.03. Construct 19' MSE Wall										
BB_11.99.03_ 5. Clearing and Grubbing (USER)										
AF AA Clear & grub, clear site w					2.68	4.83	0.00	0.00	7.52	
/335	1.00	EA	CODTB10M	18.75	3	5	0	0	8	7.52
HP dozer, trees to 12" dia										
AF AA Clear & grub, clear site w					4.03	7.25	0.00	0.00	11.28	
/335	1.00	EA	CODTB10M	12.50	4	7	0	0	11	11.28
HP dozer, light trees to 24" dia										
AF AA Clearing, brush w/dozer &					65.14	60.77	0.00	0.00	125.91	
brush	0.06	ACR	CODTB11A	1.00	4	4	0	0	8	125.91
rake, medium brush										
M MIL AA Clearing, machine load spo					11.56	5.13	11.55	0.00	28.25	
ils, 2	2.00	CY	COEIB17	11.00	23	10	23	0	56	28.25
mi haul to dump. Say 24 cubic yards of debris per acre										
TOTAL Clearing and Grubbing	300.00	SY			34	26	23	0	83	0.28
BB_11.99.03_ 10. Top Soil (USER)										
MIL AA Loam or topsoil, 200' haul					0.47	0.56	0.00	0.00	1.03	
, 6"	44.00	CY	CODTB10B	108.13	20	25	0	0	45	1.03
deep, 200 HP dozer, remove/pile on site										
MIL AA Loam or topsoil, frtn load					2.01	1.07	0.00	0.00	3.08	
er,	44.00	CY	CODFB10S	25.00	89	47	0	0	136	3.08
1.5 CY, spread from pile to										
TOTAL Top Soil	44.00	CY			109	72	0	0	181	4.11
BB_11.99.03_ 15. Excavation (USER)										
MIL AA Excavate & load, hydr exca					0.53	0.52	0.00	0.00	1.06	
vator,	556.00	CY	CODEB12C	130.00	296	291	0	0	587	1.06
2 CY, medium matl.										
MIL AA Hauling, hwy haulers, 16.5					0.97	1.31	0.00	0.00	2.28	
CY, 6	639.34	CY	CTDHB34C	35.00	621	836	0	0	1,457	2.28
mi round trip @ 40 MPH (2.1 cyc/hr)										

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Excavation	556.00 CY			918	1,126	0	0	2,044	3.68
BB_11.99.03_ 20. Geotextile (USER)									
CIV AA Geotextile fabric, 120 mil				0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene	167.00 SY	ULABA2	150.00	103	18	249	0	370	2.21
TOTAL Geotextile	167.00 SY			103	18	249	0	370	2.21
BB_11.99.03_ 28. 24" Riprap (USER)									
USR AA 6" Bedding Stone The cost				0.42	0.20	32.82	0.00	33.45	
includes 6" riprap randoml y dumped from truck and placed. Assumed material cost from the Jun 93 Wyoming Valley Project at $28.41/cy. Say 500 sy / 3' = 167 cy x 0.5' thich = 84 cy.	84.00 CY	CODLP	558.10	35	17	2,757	0	2,809	33.45
MIL AA Class II Rip-rap, random p				4.05	1.83	22.15	0.00	28.03	
ieces, 25 - 500 # pieces, dumped from truck. Say 500 sy / 3' = 167 cy	167.00 CY	COETB3B	32.00	677	306	3,699	0	4,682	28.03
B RSM AA Rip-rap, random, machine p				2.16	1.22	0.00	0.00	3.38	
laced for slope protection	167.00 CY	UOEHB12G	32.00	361	204	0	0	565	3.38
L MIL AA Delivery stones to placem				1.57	1.12	0.00	0.00	2.69	
ent site from stockpile, front-end loader, 40 - 60 HP	167.00 CY	CODFB10N	32.00	263	187	0	0	450	2.69
TOTAL 24" Riprap	500.00 SY			1,337	713	6,456	0	8,506	17.01
BB_11.99.03_ 30. Drainage Material (USER) Cost for the excavation and goetextile for the toe drain is cover under tasks "excavation", and "geotextile", see above.									
B USR AA Placement of D50 = 3/4" st				4.41	1.35	28.89	0.00	34.65	
one - A unit price of $25 per cubic yard delivered to site.	111.00 CY	CODEH	15.00	489	150	3,206	0	3,846	34.65

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Drainage Material	111.00 CY			489	150	3,206	0	3,846	34.65
BB_11.99.03_ 35. MSE Wall Facing (USER)									
USR AA MSE segmental block units				5.98	0.07	5.36	0.00	11.41	
	5700.00 SF		0.00	34,086	373	30,558	0	65,017	11.41
TOTAL MSE Wall Facing	633.33 SY			34,086	373	30,558	0	65,017	102.66
BB_11.99.03_ 40. MSE Wall Geogrid (USER)									
USR AA Geogrid Material cost are				2.87	0.00	7.28	0.00	10.15	
from	4750.00 SY		0.00	13,633	0	34,575	0	48,208	10.15
Fleetwood Block (610) 944-8385, as taken from the Olyphant LFP project dated 21 May 01.									
TOTAL MSE Wall Geogrid	4750.00 SY			13,633	0	34,575	0	48,208	10.15
BB_11.99.03_ 42. MSE Wall Fill (USER)									
M RSM AA Structural Fill, borrow, f				0.79	0.98	13.34	0.00	15.11	
or	1478.00 CY	CODTB15	150.00	1,166	1,444	19,724	0	22,334	15.11
M MIL AA Backfill, trench, front-en				1.01	0.72	0.00	0.00	1.72	
d	1478.00 CY	CODFB10N	50.00	1,488	1,058	0	0	2,546	1.72
MIL AA Compaction, 1 ton roller,				2.01	0.37	0.00	0.00	2.38	
around	1478.00 CY	COFCB10A	25.00	2,976	543	0	0	3,519	2.38
structures & trenches									
MIL AA Compaction, water, wagon,				0.14	0.20	0.23	0.00	0.57	
6000	1478.00 CY	COFWB59	250.00	201	294	342	0	837	0.57
gal, 3 mile haul									
TOTAL MSE Wall Fill	1478.00 CY			5,831	3,339	20,065	0	29,236	19.78
BB_11.99.03_ 45. Seeding (USER)									
MIL AA Seeding, athletic field mi				7.61	0.00	7.11	0.00	14.72	
x, by	2.75 CSY	ALABCLAB1	3.89	21	0	20	0	40	14.72
hand, 50#/MSY									

3B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Seeding, apply fertilizer,				0.91	0.46	2.31	0.00	3.68	
35#/MSF	2.45 MSF	COELB66	37.50	2	1	6	0	9	3.68
MIL AA Loam or topsoil, top dress				0.05	0.00	0.00	0.00	0.05	
by	2403.00 SF	ALABCLAB1	600.00	118	0	0	0	118	0.05
hand									
TOTAL Seeding	267.00 SY			142	1	25	0	168	0.63
BB_11.99.03_ 50. Concrete Leveling Pad (USER)									
Concrete leveling pad for the MSE wall facing.									
MIL AA Excavate trench, mdm soil,				0.76	0.25	0.00	0.00	1.01	
4'-6'	11.00 CY	CODEB12E	91.50	8	3	0	0	11	1.01
D, 1/2 CY excavator. Say 3'									
wide x 141' long x 0.7' thick /									
27' = 11 cy									
RSM AA Concrete ready mix, regula				0.00	0.00	76.27	0.00	76.27	
r	11.00 CY	N/A	0.00	0	0	839	0	839	76.27
weight, 3500 psi. Say 3' wide									
x 141' long x 0.7' thick / 27'									
= 11 cy									
MIL AA Placing conc, footings, sh				12.32	0.54	0.00	0.00	12.86	
allow,	11.00 CY	ULABC6	15.00	135	6	0	0	141	12.86
continuous, direct chute									
TOTAL Concrete Leveling Pad	423.00 SF			144	9	839	0	991	2.34
BB_11.99.03_ 55. Railing (USER)									
MIL AA Railing, pipe, steel, 2 ra				9.75	0.27	13.00	0.00	23.03	
il, on	300.00 LF	SIWSE4	20.00	2,926	82	3,899	0	6,908	23.03
stairs, primed, 2" dia									
TOTAL Railing	300.00 LF			2,926	82	3,899	0	6,908	23.03
BB_11.99.03_ 60. Piping (USER)									
MIL AA Piping, drainage & sewage,				1.49	0.00	0.97	0.00	2.46	
SDR	150.00 LF	USKCSKWK2	50.00	224	0	146	0	369	2.46
35,4" dia,PVC,no exc/bkfill,10'									
L,B&S									

B_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Piping, drainage & sewage,			7.95	0.00	1.92	0.00	9.87	
PVC,	38.00 EA USKCSKWK2	9.38	302	0	73	0	375	9.87
no exc/bkfill, plug, 4". Say								
4' on center.								
MIL AA Piping, drainage & sewage,			16.11	0.00	1.13	0.00	17.24	
4",	15.00 EA USKCSKWK2	4.63	242	0	17	0	259	17.24
PVC, no exc/bkfill, coupling								
TOTAL Piping	150.00 LF		767	0	235	0	1,003	6.68
TOTAL Construct 19' MSE Wall	150.00 LF		60,518	5,909	100,132	0	166,559	1110.39
BB_11.99.04. Bloom Street Stoplog Closure 24' wide by 5' high								
BB_11.99.04_ 5. Concrete								
BB_11.99.04_ 5_ 5. Footing								
MIL AA Forms in place, footing,			2.88	0.00	1.53	0.00	4.41	
continuous wall, plywood,	288.00 SF ACARC1	55.00	830	0	439	0	1,269	4.41
2								
use.								
RSM AA Reinforcing in place, foot			765.63	0.00	607.35	0.00	1372.97	
ings,	3.00 TON SIWRRODM4	0.26	2,297	0	1,822	0	4,119	1372.97
#4 to #7. Say 100 pd per cubic								
yard of concrete								
RSM AA Concrete ready mix, regula			0.00	0.00	74.81	0.00	74.81	
r	62.00 CY N/A	0.00	0	0	4,638	0	4,638	74.81
weight, 3000 psi.								
MIL AA Placing conc, footings, sp			26.87	1.17	0.00	0.00	28.05	
read,	62.00 CY ULABC6	6.88	1,666	73	0	0	1,739	28.05
under 1 CY, direct chute								
MIL AA Curing, sprayed membrane c			4.99	0.00	4.07	0.00	9.05	
uring	2.88 CSF ALABCLAB2	11.88	14	0	12	0	26	9.05
compound.								
TOTAL Footing	1.00 EA		4,808	73	6,911	0	11,792	11792

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.04_ 5_ 10. Wall								
CIV AA Forms in place, ret wall, battered, 8'-16', 2 use, job blt.	110.00 SF ACARC2	36.88	6.66 732	0.00 0	1.21 133	0.00 0	7.87 866	7.87
MIL AA Reinforcing in place, walls, #3 to #7. Say 100 pd per cubic yard of concrete	3.00 TON SIWRRODM4	0.38	535.94 1,608	0.00 0	607.35 1,822	0.00 0	1143.29 3,430	1143.29
RSM AA Concrete ready mix, regular weight, 3000 psi.	59.00 CY N/A	0.00	0.00 0	0.00 0	74.81 4,414	0.00 0	74.81 4,414	74.81
MIL AA Placing conc, walls, 8" thick, pumped	59.00 CY CLABC20	12.50	19.99 1,180	6.48 382	0.00 0	0.00 0	26.47 1,562	26.47
MIL AA Curing, sprayed membrane curing compound. Say 0.7 csf x 1.5 = 1.1 csf	1.10 CSF ALABCLAB2	11.88	4.99 5	0.00 0	4.07 4	0.00 0	9.05 10	9.05
TOTAL Wall	1.00 EA		3,525	382	6,374	0	10,281	10281
BB_11.99.04_ 5_ 15. Sill								
MIL AA Site dml, bituminous driveways. Say (40' x 24' / 9' = 107sy) x a factor of 1.05 = 112 sy	112.00 SY CLADB38	80.00	1.99 223	1.16 130	0.00 0	0.00 0	3.15 353	3.15
AF AA Hauling, w/loading, 12 CY truck, 5 mile haul, rock. Say 40' long x 24' wide x 0.5' thick / 27' = 18 cy x 1.05 = 19 cy	19.00 CY CODEB30	60.00	1.73 33	2.34 44	0.00 0	0.00 0	4.06 77	4.06
MIL AA Excavate trench, mdm soil, 4'-6' D, 1/2 CY excavator. (Say 3,840 cf / 27' = 142 cy.) time a factor of 1.05 = 150 cy.	150.00 CY CODEB12E	91.50	0.76 114	0.25 38	0.00 0	0.00 0	1.01 151	1.01

40' x 24' x 4' = 3,840 cf

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF AA Hauling, w/loading, 12 CY truck, 5 mile haul, soil	150.00 CY	CODEB30	87.00	1.19 179	1.61 242	0.00 0	0.00 0	2.80 420	2.80
MIL AA Forms in place, walls, bul khead forms, 2 piece, w/keyway, 1 use. Say 40' + 40' + 24' + 24' = 128 lf x a factor of 1.05 = 135 lf	135.00 LF	ACARC2	33.13	7.41 1,001	0.00 0	2.89 390	0.00 0	10.30 1,391	10.30
MIL AA Reinforcing in place, wall s, #3 to #7. Say 150 cy x 100 lb / 2,000 lb = 7.5 tons	7.50 TON	SIWRRODM4	0.38	535.94 4,020	0.00 0	607.35 4,555	0.00 0	1143.29 8,575	1143.29
RSM AA Concrete ready mix, regula r weight, 3500 psi	150.00 CY	N/A	0.00	0.00 0	0.00 0	76.27 11,440	0.00 0	76.27 11,440	76.27
MIL AA Placing conc, foundation m ats, over 20 CY, direct chute	150.00 CY	ULABC6	43.75	4.22 633	0.18 28	0.00 0	0.00 0	4.41 661	4.41
MIL AA Curing, sprayed membrane c uring compound. Say 40' x 24' / 100' = 9.6 csf time a factor of 1.05 = 10 csf.	10.00 CSF	ALABCLAB2	11.88	4.99 50	0.00 0	4.07 41	0.00 0	9.05 91	9.05
MIL AA Waterstop, rubber, center bulb split, 3/8" thick, 9" wide. (Say 24' wide / 0.75' = 32' x 40' long = 1,280 lf) times a factor 1.05 = 1,344 lf	1344.00 LF	ACARCARP1	16.88	2.55 3,423	0.00 0	11.22 15,078	0.00 0	13.77 18,502	13.77
B MIL AA Allowance for repairing bituminous roadway after construction of the sill.	1.00 LS	COKBB91A	0.15	440.75 441	85.28 85	308.49 308	0.00 0	834.52 835	834.52
TOTAL Sill	1.00 EA			10,115	567	31,813	0	42,495	42495
TOTAL Concrete	1.00 EA			18,448	1,022	45,098	0	64,568	64568

BB_11. LEVEES AND FLOODWALLS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_11.99.04_ 10. Aluminum										
MIL AA Aluminum, structural shape					2.38	1.04	2.89	0.00	6.32	
s, 1"	1490.00	LB	SIWSE2	131.25	3,552	1,555	4,304	0	9,410	6.32
to 10" members, under 1 ton										
TOTAL Aluminum	1.00	EA			3,552	1,555	4,304	0	9,410	9410.49
BB_11.99.04_ 15. Structural Steel										
MIL AA Structural steel projects,					667.36	292.18	1627.67	0.00	2587.21	
column base plates, heavy,	9.70	TON	SIWSE2	0.47	6,473	2,834	15,788	0	25,096	2587.21
> 150										
lb, each										
TOTAL Structural Steel	1.00	EA			6,473	2,834	15,788	0	25,096	25096
TOTAL Bloom Street Stoplog Closu	1.00	JOB			28,473	5,411	65,190	0	99,074	99074
BB_11.99.06. Erosion and Sediment Control										
BB_11.99.06_ 5. Silt Fencing (USER)										
MIL AA Erosion control, w/7.5' po					1.35	0.00	0.77	0.00	2.13	
sts,	6000.00	LF	ALABCLAB2	43.75	8,120	0	4,645	0	12,765	2.13
silt fence, 3' high,										
polypropylene										
M MIL AA Remove silt fence after					1.35	0.00	0.00	0.00	1.35	
construction	6000.00	LF	ALABCLAB2	43.75	8,120	0	0	0	8,120	1.35
TOTAL Silt Fencing	6000.00	LF			16,240	0	4,645	0	20,884	3.48
BB_11.99.06_ 10. Temporary Seeding and Mulching (USER)										
MIL AA Seeding, athletic field mi					144.41	73.62	634.89	0.00	852.93	
x,	10.00	ACR	COELB66	0.24	1,444	736	6,349	0	8,529	852.93
mechanical seeding, 450#/acre.										
RSM AA Seeding, apply fertilizer,					67.87	34.60	381.28	0.00	483.76	
800	4.00	TON	COELB66	0.50	271	138	1,525	0	1,935	483.76
lb/acre. Say 42 acres x 800 lb										
/ 2,000 lb = 16.8 ton.										
MIL AA Mulch, oak straw, tractor					0.75	0.70	38.71	0.00	40.15	
spreader, MEANS FC 2003, p	435.71	MSF		0.00	327	304	16,865	0	17,495	40.15
age										
123										

BB_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Temporary Seeding and Mulc	10.00 ACR		2,042	1,179	24,739	0	27,960	2795.98
BB_11.99.06_ 15. Stablized Construction Entrances								
B USR AA Placement of D50 = 3/4" st			4.41	1.35	28.89	0.00	34.65	
one -	195.00 CY CODEH	15.00	860	263	5,633	0	6,756	34.65
A unit price of $25 per cubic yard delivered to site was used (dumped stone)								
CIV AA Geotextile fabric, 120 mil			0.62	0.11	1.49	0.00	2.21	
thick, non-woven polypropy lene	1170.00 SY ULABA2	150.00	720	127	1,744	0	2,590	2.21
TOTAL Stablized Construction Ent	5.00 EA		1,579	390	7,376	0	9,346	1869.24
BB_11.99.06_ 20. Temporary Roads								
AF AA Clear & grub, clear site w			2.68	4.83	0.00	0.00	7.52	
/335	5.00 EA CODTB10M	18.75	13	24	0	0	38	7.52
HP dozer, trees to 12" dia								
AF AA Clear & grub, clear site w			4.03	7.25	0.00	0.00	11.28	
/335	5.00 EA CODTB10M	12.50	20	36	0	0	56	11.28
HP dozer, light trees to 24" dia								
AF AA Clearing, brush w/dozer &			65.14	60.77	0.00	0.00	125.91	
brush	3.00 ACR CODTB11A	1.00	195	182	0	0	378	125.91
rake, medium brush								
M MIL AA Clearing, machine load spo			11.56	5.13	11.55	0.00	28.25	
ils, 2	65.00 CY COEIB17	11.00	751	334	751	0	1,836	28.25
mi haul to dump								
MIL AA Fine grade, for roadway, b			383.17	194.47	0.00	0.00	577.65	
ase or	7.00 MSY COFGB11L	0.17	2,682	1,361	0	0	4,044	577.65
leveling course. Say 5(15' x 800' / 9') / 1000 = 7 MSY								
MIL AA Base course, crushed 3/4"			0.27	0.30	3.11	0.00	3.68	
stone,	6667.00 SY COFGB36C	637.50	1,791	1,991	20,721	0	24,503	3.68
compacted, 4"D, large areas. 5(15' x 800' / 9') = 6,667 sy								
MIL AA Base, prepare & roll sub-b			0.54	0.42	0.00	0.00	0.95	
ase,	6667.00 SY COFGB32A	187.50	3,580	2,783	0	0	6,362	0.9
small areas to 2500 SY								

3B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL AA Surface treatment, tack co				0.70	0.55	1.57	0.00	2.82	
at,	600.00 CSF	COKBB45	100.00	417	329	943	0	1,689	2.82
bituminous, 0.1 gal/SY. 5(15' x 800') / 100' = 600 csy									
MIL AA Excavate & load, hydr exca				0.69	0.56	0.00	0.00	1.25	
vator,	2222.00 CY	CODEB12B	100.00	1,539	1,235	0	0	2,774	1.25
1.5 CY, medium matl. Remove roads after construction so, 5(1' x 15' x 800' / 27') = 2,222 cy									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	2222.00 CY	COEIB17	15.00	18,836	8,365	0	27,775	54,976	24.74
loading & trucking,machine loading truck. Price includes tipping fees.									
TOTAL Temporary Roads	5.00 EA			29,825	16,640	22,415	27,775	96,656	19331
TOTAL Erosion and Sediment Contr	1.00 JOB			49,687	18,209	59,175	27,775	154,846	154846
BB_11.99.07. Staging and Storage Areas									
AF AA Fencing, 11 ga, chain link				6.32	0.00	3.79	0.00	10.11	
, 6'	1200.00 LF	ALABCLAB2	9.38	7,579	0	4,548	0	12,126	10.11
high. Say each area is 100' wide x 100' long = 10,000 sf so, 3 (100 + 100 + 100 + 100) = 1,200 lf									
MIL AA Site dml, chain link fence				1.53	0.00	0.00	0.00	1.53	
,	1200.00 LF	ALABCLAB2	38.75	1,834	0	0	0	1,834	1.53
remove & salvage for reuse									
MIL AA Base course, crushed 3/4"				0.33	0.36	9.31	0.00	10.00	
stone,	3333.00 SY	COFGB36C	525.00	1,087	1,209	31,039	0	33,335	10.00
compacted, 12"D, large areas. Say 3(100' x 100' / 9') = 3,333 sy									
MIL AA Excavate & load, hydr exca				0.69	0.56	0.00	0.00	1.25	
vator,	370.00 CY	CODEB12B	100.00	256	206	0	0	462	1.25
1.5 CY, medium matl. Demo after construction.									
MIL AA Rubbish handling,2 mile ha				8.48	3.76	0.00	12.50	24.74	
ul,	370.00 CY	COEIB17	15.00	3,137	1,393	0	4,625	9,154	24.74
loading & trucking,machine loading truck. Stockpile onsite									

B_11. LEVEES AND FLOODWALLS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
for backfill/usage later.								
MIL AA Seeding, athletic field mi			144.41	73.62	634.89	0.00	852.93	
x,	0.69 ACR COELB66	0.24	100	51	438	0	589	852.93
mechanical seeding, 450#/acre.								
3 x 0.23 = 0.69 acre								
RSM AA Seeding, apply fertilizer,			67.87	34.60	381.28	0.00	483.76	
800	0.28 TON COELB66	0.50	19	10	105	0	134	483.76
lb/acre. Say 3(0.69 acre x 800								
lb / 2,000 lb) = 0.276 ton.								
B MIL AA Mulch, oak straw, tractor			0.75	0.70	38.71	0.00	40.15	
spreader, MEANS FC 2003, p	30.00 MSF	0.00	23	21	1,161	0	1,205	40.15
age								
123. 3(100' x 100' / 1,000) =								
30 msf								
TOTAL Staging and Storage Areas	3.00 EA		14,033	2,889	37,291	4,625	58,838	19613
BB_11.99.08. Addition Traffic Control								
L CIV AA Signs, placement and remov			385.46	56.02	0.00	0.00	441.48	
al of	50.00 EA CLABB80	0.33	19,273	2,801	0	0	22,074	441.48
signs, including supports, 21								
SF to 40 SF								
AF AA Sign, hi-intensity			0.00	0.00	16.15	50.00	66.15	
reflectorized, no posts, b	100.00 SF N/A	0.00	0	0	1,615	5,000	6,615	66.15
uy.								
Say each sign is 25 sf so, 50								
signs times 25 sf = 1,250 sf.								
Say $50 for a set post per								
sign.								
MIL AA Flagmen, Laborers,			29.60	0.00	0.00	0.00	29.60	
(Semi-Skilled)	960.00 HR B-LABORER	1.00	28,420	0	0	0	28,420	29.60
M MIL AA Provide 28" High Traffic C			29.60	0.00	20.97	0.00	50.57	
ones.	800.00 EA ALABCLAB2	2.00	23,684	0	16,776	0	40,460	50.57
Means 2000 Site Work &								
CIV AA Barricades, 10' sections,			3.10	0.47	31.00	0.00	34.58	
precast barrier walls	320.00 LF CODLB6	30.00	994	151	9,920	0	11,064	34.58
TOTAL Addition Traffic Control	4.00 EA		72,370	2,952	28,311	5,000	108,634	27158
TOTAL Associated General Items	1.00 EA		732,151	354,261	1,884,802	37,400	3,008,614	3008614

B_11. LEVEES AND FLOODWALLS	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL LEVEES AND FLOODWALLS	1.00 EA			835,894	366,085	2,026,158	39,575	3,267,713	3267713

BB_18. CULTURAL RESOURCE PRESERVATIO	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
BB_18. CULTURAL RESOURCE PRESERVATION									
TOTAL Cultural Resources	1.00 EA			200,000	0	0	0	200,000	200000
TOTAL CULTURAL RESOURCE PRESERVA	1.00 EA			200,000	0	0	0	200,000	200000
TOTAL Fernville LFP Project	1.00 EA			1,226,924	410,637	2,162,221	3,896,154	7,695,936	7695936
TOTAL Bloomsburg/Fernville LFP P	55.00 EA			8,962,107	1,582,767	7,417,559	11325030	29,287,464	532499

** PROJECT SETTINGS **

ESTIMATE TYPE : A-Crews with Auto Reprice

SALES TAX : 6.0%

DATE OF ESCALATION SCHEDULE : 03/31/03

PROJECT DIRECT COST COLUMNS

Col Type	L	E	M	U	X
Rep Width	10	10	10	10	0
Title	LABOR	EQUIPMNT	MATERIAL	OTHER	(Unused)

PROJECT INDIRECT COST COLUMNS

Col Type	O	U	P	B	X
Rep Width	10	10	10	10	0
Title	FIELD OH	HOME OFC	PROFIT	BOND	(Unused)

PROJECT OWNER COST COLUMNS

Col Type	C	E	X	X	X
Rep Width	12	12	0	0	0
Title	CONTINGN	ESCALATN	(Unused)	(Unused)	(Unused)

PROJECT BREAKDOWN

PROJECT ID	Length	Trail Sep	Level Title	2nd View Order
Level 1 ID :	2	_	Contract	0
Level 2 ID :	2	.	Feature	0
Level 3 ID :	2	.	Sub Feat	0
Level 4 ID :	2	_	Element	0
Level 5 ID :	3	_	Level 5	0
Level 6 ID :	3	N	Level 6	0

Owner Cost Level : 2

** PROJECT SETTINGS **

2ND VIEW COLUMNS

Quantity Column Width : 10

Col Type	X	X	X	X	X
Rep Width	0	0	0	0	0
Title	(Unused)	(Unused)	(Unused)	(Unused)	(Unused)
Shadow	X	X	X	X	X

DETAIL REPORT FORMATTING

PAGE OPTIONS
Page Break Levels : 2
Table of Contents Levels : 6

0 1 2 3 4 5 6 7

ROW OPTIONS
Print Titles at Levels : Y Y Y Y Y Y
Print Totals at Levels : Y Y Y Y Y Y
Print Notes at Levels : Y Y Y Y Y Y Y Y
Print Unit Cost Row : Y
Print Page Footer : N
Show Cost Codes : Y

COLUMNS OPTIONS
Print Crew Id : Y
Crew Output : Y
Unit Cost : Y

UPB TITLES
No. of Levels to Print : 0
Bracket Titles With : y y
Include titles Notes : Y

** PROJECT SETTINGS **

OTHER REPORT FORMATTING

COLUMN TITLES FOR SUMMARY REPORTS

Column 1 FIELD OH : Field Office Overhead
Column 2 HOME OFC : Home Office Expense
Column 3 PROFIT : Profit
Column 4 BOND : Contractor's Bond
Column 5 (Unused) : (Unused)

Column 1 CONTINGN : Contingency
Column 2 ESCALATN : Escalated to midpoint of construction
Column 3 (Unused) :
Column 4 (Unused) :
Column 5 (Unused) :

STANDARD COLUMN WIDTHS		SUMMARY FEATURES	
Quantity Columns	8	Round Totals Column	N-None
Total cost Columns	12	Contingency Notes	No
Unit Cost Columns	8	Show Project Totals	Yes

SPECIAL REPORT FORMATTING OPTIONS

First Alternate ID : (None)
Show Markup at Level : 0
Display Indirect/Owner Markup as : A - Unit Costs Only
CSI Sort at Level : (None)

** PROJECT SETTINGS **

REPORT SELECTION

Project Settings : Y Profit Guidelines : N
Contractor Settings : N
Link Listing : N Measurement Units : Original

	REPORT FORMAT TYPE			FOR LEVEL (S)
	Direct	Indirect	Owner	0 1 2 3 4 5 6
Detail :	Y			
Project :	N	N	Y	Y Y N N Y N
Contractor :	N	N		N N N N N N N
Division :	N	N	N	N N N N N N N
System :	N	N	N	N N N N N N N
2nd View :	N			
Crew :	N			N N N N N N N
Labor :	N			
Equipment :	N			
Prime Labor Cost Level :	N			

** OWNER, OVERTIME, AND ADJUSTMENTS SETTINGS **

			AMOUNT	PERCENT	ESCALATN DATE BEGIN	ESCALATN DATE END	ESCALATN INDEX BEGIN	ESCALATN INDEX END

Project Information Record

ADJUSTMENTS (1)	Unit Price Ident	LABOR	EQUIPMNT	MATERIAL	OTHER (Unused)
	Default		.09	.09	

			AMOUNT	PERCENT
AA_01 LANDS AND DAMAGES				
	Contingency	P		21.00
	Escalated to midpoint of construction	P		8.70
AA_02 RELOCATIONS				
	Contingency	P		20.00
	Escalated to midpoint of construction	P		13.90
AA_06 FISH AND WILDLIFE FACILITIES				
	Contingency	P		25.00
	Escalated to midpoint of construction	P		13.90
AA_11 LEVEES AND FLOODWALLS				
	Contingency	P		20.00
	Escalated to midpoint of construction	P		13.90
AA_18 CULTURAL RESOURCE PRESERVATION				
	Contingency	P		25.00
	Escalated to midpoint of construction	P		13.90
AA_30 ENGINEERING AND DESIGN				
	Contingency	P		15.00
	Escalated to midpoint of construction	P		15.40
AA_31 CONSTRUCTION MANAGEMENT				
	Contingency	P		10.00
	Escalated to midpoint of construction	P		11.00
BB_01 LANDS AND DAMAGES				
	Contingency	P		21.00
	Escalated to midpoint of construction	P		8.70
BB_02 RELOCATIONS				
	Contingency	P		20.00
	Escalated to midpoint of construction	P		13.90
BB_06 FISH AND WILDLIFE FACILITIES				
	Contingency	P		25.00
	Escalated to midpoint of construction	P		13.90
BB_11 LEVEES AND FLOODWALLS				
	Contingency	P		25.00
	Escalated to midpoint of construction	P		13.90
BB_18 CULTURAL RESOURCE PRESERVATION				
	Contingency	P		25.00
	Escalated to midpoint of construction	P		13.90

Date Prepared: 4/16/2004

TOTAL PROJECT COST SUMMARIES
ALL CONTRACT SITES
THIS ESTIMATE IS BASED ON THE FEASIBILITY PLANS, DATED NOVEMBER 2003

PROJECT: BLOOMSBURG/FERNVILLE LFP PROJECT
LOCATION: COLUMBIA COUNTY PENNSYLVANIA

PREPARED BY: CENAB-EN-C, CEDRIC BLAND
P.O.C.: DAVID ROBERTS, ACTING C, ESTIMATING & SPEC SECTION

ACCOUNT NUMBER	ITEM DESCRIPTION	CURRENT MCACES ESTIMATE 16 APR 04 EFFECTIVE PRICING LEVEL 1 FEB 04				AUTHORIZ./BUDGET YEAR: EFFECTIVE PRICING LEVEL:			FULLY FUNDED ESTIMATE		
		COST ($)	CNTG ($)	CNTG %	TOTAL ($)	COST ($)	CNTG ($)	TOTAL ($)	COST ($)	CNTG ($)	FULL ($)
02	RELOCATIONS	$4,623	$924	20.0%	$5,547	$4,623	$924	$5,547	$5,265	$1,053	$6,318
06	FISH AND WILDLIFE FACILITIES	$1,322	$330	25.0%	$1,652	$1,322	$330	$1,652	$1,505	$377	$1,882
11	LEVEES AND FLOODWALLS	$17,610	$3,728	21.2%	$21,337	$17,610	$3,728	$21,337	$20,058	$4,245	$24,303
18	CULTURAL RESOURCE PRESERVATION	$400	$100	25.0%	$500	$400	$100	$500	$456	$114	$570
	TOTAL CONSTRUCTION COST	**$23,954**	**$5,082**	**21.2%**	**$29,036**	**$23,954**	**$5,082**	**$29,036**	**$27,284**	**$5,789**	**$33,073**
01	LANDS AND DAMAGES	$4,953	$1,040	21.0%	$5,993	$4,953	$1,040	$5,993	$5,384	$1,131	$6,515
30	PLANNING, ENGINEERING AND DESIGN	$2,588	$388	15.0%	$2,976	$2,588	$388	$2,976	$2,987	$448	$3,435
31	CONSTRUCTION MANAGEMENT	$2,634	$263	10.0%	$2,897	$2,634	$263	$2,897	$2,924	$292	$3,216
	TOTAL PROJECT COSTS	**$34,130**	**$6,774**	**19.8%**	**$40,904**	**$34,130**	**$6,774**	**$40,904**	**$38,579**	**$7,660**	**$46,239**

TOTAL PROJECT COST ***$46,239***

NOTES:

(1) THE FULLY FUNDED ESTIMATE IS BASED ON A CONTRACT AWARD MAR 09 AND A CONSTRUCTION DURATION OF 1,095 CALENDAR DAYS, AND A MIDPOINT OF CONSTRUCTION AT SEP 010.

(2) ESCALATION FACTORS ARE BASED ON THE FY04 CIVIL WORKS ESCALATION TABLE FACTORS, EC 11-2-184, DTD 31 MAR 03.

DISTRICT APPROVED:

__________ Acting C, ESTIMATING & SPEC SECTION
__________ CHIEF, REAL ESTATE DIVISION
__________ CHIEF, CONSTRUCTION DIVISION
__________ CHIEF, PLANNING DIVISION
__________ CHIEF, CIVIL PROGRAMS BRANCH
__________ CHIEF, ENGINEERING DIVISION
__________ PROJECT MANAGER
__________ DDE (PM)

DIVISION APPROVED:

CHIEF, COST ENGINEERING __________
DIRECTOR REAL-ESTATE __________
CHIEF, PROGRAMS MANAGEMENT __________
DIRECTOR OF PPMD __________

APPROVED DATE: __________

Date Prepared: 4/16/2004

TOTAL PROJECT COST SUMMARIES
BLOOMSBURG LOCAL FLOOD PROTECTION
THIS ESTIMATE IS BASED ON THE FEASIBILITY PLANS, DATED NOVEMBER 2003

)MSBURG/FERNVILLE LFP PROJECT
)OMSBURG, PENNSYLVANIA

PREPARED BY: CENAB-EN-C, CEDRIC BLAND
P.O.C.: DAVID ROBERTS, ACTING C, ESTIMATING & SPEC SECTION

ITEM DESCRIPTION	CURRENT MCACES ESTIMATE 16 APR 04 EFFECTIVE PRICING LEVEL 1 FEB 04				AUTHORIZ./BUDGET YEAR: EFFECTIVE PRICING LEVEL:			FULLY FUNDED ESTIMATE		
	COST ($)	CNTG ($)	CNTG %	TOTAL ($)	COST ($)	CNTG ($)	TOTAL ($)	COST ($)	CNTG ($)	FULL ($)
OCATIONS	$2,787	$557	20.0%	$3,344	$2,787	$557	$3,344	$3,174	$635	$3,809
[AND WILDLIFE FACILITIES	$378	$94	25.0%	$472	$378	$94	$472	$430	$108	$538
EES AND FLOODWALLS	$13,497	$2,699	20.0%	$16,196	$13,497	$2,699	$16,196	$15,373	$3,074	$18,447
TURAL RESOURCE PRESERVATION	$200	$50	25.0%	$250	$200	$50	$250	$228	$57	$285
'AL CONSTRUCTION COST	**$16,862**	**$3,400**	**20.2%**	**$20,262**	**$16,861**	**$3,401**	**$20,262**	**$19,205**	**$3,874**	**$23,079**
DS AND DAMAGES	$2,933	$616	21.0%	$3,549	$2,933	$616	$3,549	$3,188	$670	$3,858
NNING, ENGINEERING AND DESIGN	$2,588	$388	15.0%	$2,976	$2,588	$388	$2,976	$2,987	$448	$3,435
STRUCTION MANAGEMENT (3)	$2,634	$263	10.0%	$2,897	$2,634	$263	$2,897	$2,924	$292	$3,216
AL ENVIRONMENTAL RESTORATION	**$25,017**	**$4,669**	**18.7%**	**$29,685**	**$25,017**	**$4,669**	**$29,685**	**$28,304**	**$5,284**	**$33,588**

:S:
IE FULLY FUNDED ESTIMATE IS BASED ON A CONTRACT AWARD OF MAR 09 AND A
TRUCTION DURATION OF 1,095 CALENDAR DAYS FOR A MIDPOINT OF CONSTRUCTION AT SEP 10.
CALATION FACTORS ARE BASED ON THE FY04 CIVIL WORKS ESCALATION TABLE FACTORS, EC 11-2-184, DTD 31 MAR 03.

Date Prepared: 4/16/2004

TOTAL PROJECT COST SUMMARIES
FERNVILLE LOCAL FLOOD PROTECTION
THIS ESTIMATE IS BASED ON THE FEASIBILITY PLANS, DATED NOVEMBER 2003

ERNVILLE LFP PROJECT
:NNSYLVANIA

PREPARED BY: CENAB-EN-C, CEDRIC BLAND
P.O.C.: DAVID ROBERTS, ACTING C, ESTIMATING & SPEC SECTION

	CURRENT MCACES ESTIMATE 16 APR 04 EFFECTIVE PRICING LEVEL 1 FEB 04				AUTHORIZ./BUDGET YEAR: EFFECTIVE PRICING LEVEL:			FULLY FUNDED ESTIMATE		
EM DESCRIPTION	COST ($)	CNTG ($)	CNTG %	TOTAL ($)	COST ($)	CNTG ($)	TOTAL ($)	COST ($)	CNTG ($)	FULL ($)
	$1,836	$367	20.0%	$2,203	$1,836	$367	$2,203	$2,091	$418	$2,509
)LIFE FACILITIES	$944	$236	25.0%	$1,180	$944	$236	$1,180	$1,075	$269	$1,344
.OODWALLS	$4,113	$1,028	25.0%	$5,141	$4,113	$1,028	$5,141	$4,685	$1,171	$5,856
;OURCE PRESERVATION	$200	$50	25.0%	$250	$200	$50	$250	$228	$57	$285
RUCTION COST	**$7,093**	**$1,681**	**23.7%**	**$8,774**	**$7,093**	**$1,681**	**$8,774**	**$8,079**	**$1,915**	**$9,994**
.MAGES	$2,020	$424	21.0%	$2,444	$2,020	$424	$2,444	$2,196	$461	$2,657
)NMENTAL RESTORATION	**$9,113**	**$2,106**	**23.1%**	**$11,219**	**$9,113**	**$2,106**	**$11,219**	**$10,275**	**$2,376**	**$12,651**

DED ESTIMATE IS BASED ON A CONTRACT AWARD OF MAR 09 AND A
JRATION OF 1,095 CALENDAR DAYS FOR A MIDPOINT OF CONSTRUCTION AT SEP 10.
.CTORS ARE BASED ON THE FY04 CIVIL WORKS ESCALATION TABLE FACTORS, EC 11-2-184, DTD 31 MAR 03.

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

ENGINEERING APPENDIX

Attachment G – Operation and Maintenance

May 2004

Part 208 - FLOOD CONTROL REGULATIONS

§ 208.10 Local flood protection works; maintenance and operation of structures and facilities.

(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of the Army, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the Department of the Army or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The Department of the Army will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in

carrying out their obligations under this part.

(b) *Levees*—(1) *Maintenance*. The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation*. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of leave exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls*—(1) *Maintenance*. Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation*. Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance*. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation*. Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance*. Closure structures for traffic openings shall be inspected by the Superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order;

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways*—(1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities*—(1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor.

(Sec. 3, 49 Stat. 1571, as amended; 33 U.S.C. 701c)

[9 FR 9999, Aug. 17, 1944; 9 FR 10203, Aug. 22, 1944]

OPERATION AND MAINTENANCE COSTS
For the Bloomsburg (side) LFP Project

The following assumptions were made in the development of the O&M costs for the Bloomsburg Local Flood Protection Project at an Agnes level of protection.

A. Levees The general maintenance would include mowing every two week for six months of the year. In addition miscellaneous maintenance items could include fertilization, vegetation removal, checking profiles, filling holes, etc. The estimated yearly cost **$43,600**.

B. Closure Structures The general maintenance would include items such as inspecting the structure for settling, overall condition of the concrete abutments, repairing and monitoring cracks, cleaning and painting of metal parts, lubricating moving parts, testing the gate alignment, etc.. The estimated yearly cost **$9,500**.

C. Drainage Structures The general maintenance would include items such as testing the gate seats, lubrication, removal of debris, cleaning and painting all metal parts, overall condition of concrete surfaces, repairing and monitoring cracks, etc.. The estimated yearly cost **$16,500**.

D. Slope Protection The general maintenance would include items such as removal of vegetation, checking profiles, replacing materials, etc.. The estimated yearly cost **$33,700**.

E. Floodwalls The general maintenance would include items such as eliminating encroachments, removal of debris, removal of graffiti, removing vegetation roots which would endanger the wall, checking the overall condition of concrete surfaces, repairing and monitoring cracks, etc.. The estimated yearly cost **$9,000**.

F. Flood Warning System The general maintenance would be preformed on the river gage and radio equipment. The estimated yearly cost **$10,500**.

G. Periodic Inspection This item is to cover the cost for the Corps of Engineers annual inspection. The estimated yearly cost **$9,800**.

The total estimated Operation and Maintenance Costs for the **Bloomsburg** Local Flood Protection Project are **$132,600**. Major repair and or replacement costs are not included in the above figures. The features of this project are considered to be durable items, and if properly maintained, will not require replacement during the life of the project.

O & M COSTS FOR BLOOMSBURG LFP

LAWN MOWING:
1,948,300 SF
Assume 90% mowed by tractors 1,753,470 SF
Assume 10% mowed by hand 194,830 SF
Cost for tractor mowed areas = 3 days x $576.60/day = $1,729.80
(MEANS Site Work, page 191, 3 gang reel: Say 930 msf per day so, (1,753,470 sf / 1,000) / 930 msf = 2 days.
Cost for hand mowed areas = 3 days x $308.10/day = $924.30
(MEANS Site Work, page 191, power mower, 18″ - 22″: Say 65 msf per day so, (194,830 sf / 1,000) / 65 msf = 3 days.
Total cost for each mowing = $2,654.00
Assume levee is mowed every 2 weeks for six months of the year.
Total mowing O & M = 13 times x $2,654/each time = **$34,503/Year**.

MISCELLANEOUS LEVEE CARE (Fertilization, Vegetation Removal, Filling Holes, etc.)

Assume 4 man-days per month $16/hr x 32 MH x 12 months = **$6,144**/year.
(MEANS Site Work, page 190, Tractor towed spreader 8′: Say 500 msf per day so, (1,948,300 sf / 1,000) / 500 msf = 4 days.
Assume material costs of **$3,000**/year.

FLOODWALLS

Assume inspection once per month
12 months x 24 MH x $26/MH = **$7,488**/year
Assume material costs of **$1,500**/year

CLOSURE STRUCTURES

Assume 20 Man-days/closure/year
20 x 8 x $26/MH x 2 EA = **$8,320**/year
Assume material costs of **$1,200**/year

DRAINAGE STRUCTURES

Assume 8 man-days/drainage structure/year
8 x 8 x $26/MH x 9 EA = **$14,976**/year
Assume material costs of **$1,500**/year

SLOPE PROTECTION

Assume 18 man-weeks/year
18 x 40 x $26/MH = **$18,720**
Assume material costs of **$15,000**/year

PERIODIC INSPECTIONS

Assume 30 man-days/year
30 x 8 x $41/MH = **$9,840**/year

FLOOD WARNING SYSTEM

River Gage Equipment @ **$900**/year
USGS Maintenance of Gage Rating @ **$8,000**/year
Radio Telemetry Equipment 4 @ $400 EA = **$1,600**/year

OPERATION AND MAINTENANCE COSTS
For the Fernville (side) LFP Project

The following assumptions were made in the development of the O&M costs for the Fernville Local Flood Protection Project at an Agnes level of protection.

A. Levees The general maintenance would include mowing every two week for six months of the year. In addition miscellaneous maintenance items could include fertilization, vegetation removal, checking profiles, filling holes, etc. The estimated yearly cost **$16,500**.

B. Closure Structures The general maintenance would include items such as inspecting the structure for settling, overall condition of the concrete abutments, repairing and monitoring cracks, cleaning and painting of metal parts, lubricating moving parts, testing the gate alignment, etc.. The estimated yearly cost **$8,700**.

C. Drainage Structures The general maintenance would include items such as testing the gate seats, lubrication, removal of debris, cleaning and painting all metal parts, overall condition of concrete surfaces, repairing and monitoring cracks, etc.. The estimated yearly cost **$8,800**.

D. Slope Protection The general maintenance would include items such as removal of vegetation, checking profiles, replacing materials, etc.. The estimated yearly cost **$5,500**.

E. Floodwalls The general maintenance would include items such as eliminating encroachments, removal of debris, removal of graffiti, removing vegetation roots which would endanger the wall, checking the overall condition of concrete surfaces, repairing and monitoring cracks, etc.. The estimated yearly cost **$3,000**.

F. Flood Warning System The general maintenance would be preformed on the river gage and radio equipment. The estimated yearly cost **$5,000**.

G. Periodic Inspection This item is to cover the cost for the Corps of Engineers annual inspection. The estimated yearly cost **$5,200**.

The total estimated Operation and Maintenance Costs for the **Fernville** Local Flood Protection Project are **$52,700**. Major repair and or replacement costs are not included in the above figures. The features of this project are considered to be durable items, and if properly maintained, will not require replacement during the life of the project.

O & M COSTS FOR Fernville LFP

LAWN MOWING:
837,950 SF
Assume 90% mowed by tractors 754,155 SF
Assume 10% mowed by hand 83,795 SF
Cost for tractor mowed areas = 1 day x $576.60/day = $576.60
(MEANS Site Work, page 191, 3 gang reel: Say 930 msf per day so, (754,155 sf / 1,000) / 930 msf = 1 day.
Cost for hand mowed areas = 1.3 days x $308.10/day = $400.53
(MEANS Site Work, page 191, power mower, 18" - 22": Say 65 msf per day so, (83,795 sf / 1,000) / 65 msf = 1.3 days.
Total cost for each mowing = $977.00
Assume levee is mowed every 2 weeks for six months of the year.
Total mowing O & M = 13 times x $977/each time = **$12,701/Year.**
MISCELLANEOUS LEVEE CARE (Fertilization, Vegetation Removal, Filling Holes, etc.)

Assume 1.7 man-days per month $16/hr x 13.6 MH x 12 months = **$2,611**/year.
(MEANS Site Work, page 190, Tractor towed spreader 8': Say 500 msf per day so, (837,950 sf / 1,000) / 500 msf = 1.7 days.
Assume material costs of **$1,200**/year.

FLOODWALLS

Assume inspection once per month
12 months x 8 MH x $26/MH = **$2,496**/year
Assume material costs of **$500**/year

CLOSURE STRUCTURES

Assume 20 Man-days/closure/year
20 x 8 x $26/MH x 2 EA = **$8,320**/year
Assume material costs of **$400**/year

DRAINAGE STRUCTURES

Assume 8 man-days/drainage structure/year
8 x 8 x $26/MH x 5 EA = **$8,320**/year
Assume material costs of **$480**/year

SLOPE PROTECTION

Assume 3 man-weeks/year
3 x 40 x $26/MH = **$3,120**
Assume material costs of **$2,400**/year

PERIODIC INSPECTIONS

Assume 15 man-days/year
15 x 8 x $41/MH = **$4,920**/year

FLOOD WARNING SYSTEM

River Gage Equipment @ **$400**/year
USGS Maintenance of Gage Rating @ **$4,000**/year
Radio Telemetry Equipment 2 @ $400 EA = **$800**/year

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

PLANNING APPENDIX

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

PLANNING APPENDIX

Attachment A – Economics

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Integrated Feasibility Report & Environmental Impact Statement

ECONOMIC ANALYSIS APPENDIX

August 2005

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ECONOMIC ANALYSIS APPENDIX

1. INTRODUCTION

This appendix provides the results of the economic analysis of existing flood damages, evaluation of alternatives, and flood damage reduction benefits for Bloomsburg (Columbia County), Pennsylvania (conducted as an element of the Bloomsburg, PA Flood Damage Reduction Feasibility Study). The economic analysis is consistent with Federal water resources policies and practices, including *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G, 1983), the Corps *Planning Guidance Notebook* (ER-1105-2-100, 22 April 2000), and *Procedures for Implementing NEPA* (ER 200-2-2, 4 March 1988). The Bloomsburg, PA Flood Damage Reduction Feasibility Study is being conducted under the Corps of Engineers General Investigations program.

The purpose of this appendix is to evaluate the plan alternatives against economic constraints for U.S. Army Corps of Engineers (Corps) participation in flood damage reduction projects. The economic constraints are:

- the need for flood damage reduction features to be efficient (*i.e.*, average annual NED benefits exceed average annual costs); and
- the requirement to select the flood damage reduction plan that maximizes net excess NED benefits (*i.e.*, the NED plan).

Contributions to NED include increases in the net value of the national output of goods and services expressed in monetary units. Direct benefits (e.g., prevented damages, reduction of emergency services costs) that accrue in the planning area from implementation of a flood damage reduction project are contributions to NED. Direct costs (e.g., construction costs, real estate acquisition costs, operations and maintenance costs) of project implementation are deductions from NED. A positive difference of project benefits minus project costs becomes a net contribution to NED. Similarly, if the result of project benefits divided by project costs exceeds 1.0, the project is said to have a positive benefit-to-cost ratio (BCR).

The Federal objective of water resources development is to identify a plan that maximizes net contributions to NED consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. This plan is referred to as the NED plan, and becomes the basis for Federal cost-sharing in any project for flood damage reduction.

1.1 Water Resources Problem

The primary water resources problem along the Susquehanna River at Bloomsburg is recurrent flooding. Flood damages are attributable to overbank flooding from the Susquehanna River and to flooding along Fishing Creek, which is exacerbated by backwater flooding from the Susquehanna River. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. In addition, floods have disrupted major transportation systems, requiring closure of roads, railroads, and the municipal airport. Extensive portions of the Bloomsburg study area are within the 500-year floodplain of the

Susquehanna River and Fishing Creek. The 500-year floodplain includes approximately 525 residential structures, and 75 businesses and local government buildings.

2. SOCIAL AND ECONOMIC SETTING

The Town of Bloomsburg is located in Columbia County within the Middle Susquehanna River subbasin. In the upper part of the subbasin, the Susquehanna flows southeast through high, flat-topped plateaus separated by steep-sided valleys. Midway, the Susquehanna River joins the Lackawanna River before turning and flowing southwest towards Bloomsburg. The terrain in the southern portion of the subbasin consists of northeast-southwest trending ridges and valleys.

The Susquehanna River forms the town's southern boundary and is the most prominent drainage feature, draining an area of 10,576 square miles. Fishing Creek forms the northern and western boundary of the town and drains an area of 385 square miles at its mouth.

The Town of Bloomsburg is a rural and moderate density community characterized by attractive single-family residential neighborhoods, tree-lined streets and limited agricultural and industrial land use on the outskirts of town. Bloomsburg is the Columbia County seat and is the only incorporated town in Pennsylvania. The town has a land area of 4.4 square miles and approximately 4,400 housing units. The 2000 population density was 2,812.5 persons per square mile, a slight decrease from the 1990 population density of 2,827.0 persons per square mile.

2.1 Population & Demographics

Census 2000 population data for Pennsylvania, Columbia County, and Bloomsburg are shown in Table 1. Table 2 summarizes data from the Pennsylvania State Data Center regarding population projections through 2020 for the study area.

The age distribution of Pennsylvania, Columbia County, and Bloomsburg are shown in Table 3. The table shows a high proportion of persons in the 18 to 24-year old category, which would be expected in a town with a moderately sized university.

The median household incomes for the study area communities are presented in Table 4. As indicated in this table, Bloomsburg has a significantly lower median household income ($24,868) than either Columbia County or Pennsylvania.

Employment by economic sector for Bloomsburg is summarized in Table 5. The sectors with the largest shares of employment in the Town are Education, Health, Social Services (34.3 percent); Arts, Entertainment and Recreation (16.5 percent), and Retail Trade (13.1 percent). Bloomsburg University, Bloomsburg Hospital, and Magee Rieter Automotive Systems represent some of the larger employers in their respective categories.

Bloomsburg is well served by a variety of transportation facilities. Interstates 80 and 81 are located north and east of Bloomsburg, respectively, providing access to the rest of Pennsylvania and other metropolitan areas on the Eastern Seaboard. The City of Philadelphia is approximately 135 miles from Bloomsburg/Fernville via Interstate 476. Scheduled passenger and cargo airlines serve the nearby Wilkes-Barre/Scranton International Airport, which is jointly operated by Luzerne and Lackawanna Counties. Also, the Bloomsburg Municipal Airport offers daily incoming and outgoing flights on small aircraft.

The Susquehanna Economic Development Association Council of Government Joint Rail Authority (JRA) is a Pennsylvania Municipal Authority that owns a 200-mile regional rail system in Central Pennsylvania. The JRA serves the counties of Centre, Clinton, Columbia, Lycoming, Montour, Northumberland and Union Counties through the Nittany & Bald Eagle Railroad, North Shore Railroad, Shamokin Valley Railroad, Lycoming Valley Railroad, White Deer & Reading Railroad and the Juniata Valley Railroad.

Table 1
Populations of Study Area Jurisdictions 1980, 1990, 2000

	1980 Population	1990 Population	% Change 1980-1990	2000 Population	% Change 1990-2000
Commonwealth of Pennsylvania	11,864,720	11,881,643	0.1%	12,281,054	3.4%
Columbia County	61,967	63,202	2.0%	64,151	1.5%
Town of Bloomsburg	11,717	12,439	6.2%	12,375	-0.5%

Source: U.S. Bureau of the Census.

Table 2
Population Forecasts for Study Area Jurisdictions 1995 – 2020

	2000	2005	2010	2015	2020
Commonwealth of Pennsylvania*	12,281,054	12,328,348	12,407,523	12,490,248	12,569,017
Columbia County*	64,151	61,880	61,280	60,615	59,798
Town of Bloomsburg**	12,375	12,243	12,125	11,993	11,831

* Sources: Pennsylvania State Data Center
** 2005-2025 Forecasts Estimated Using County Growth Rates

Table 3
Age Distribution of Study Area Populations 2000

Age Distribution	Under 18	18-24	25-44	45-64	65 and Over	Median Age
Commonwealth of Pennsylvania	2,922,221	1,094,449	3,508,562	2,836,657	1,919,165	38
Columbia County	13,352	9,162	16,644	14,791	10,202	37.5
Town of Bloomsburg	1,520	5,629	2,302	1,567	1,357	22.4

Source: U.S. Bureau of the Census.

Table 4
Median Household Income of Study Area Jurisdiction
1999

Commonwealth of Pennsylvania	$40,106
Columbia County	$34,094
Town of Bloomsburg	$24,868

Source: U.S. Bureau of the Census

Table 5
Employment by Sector (2000), Bloomsburg

	Employees	Percent
Agriculture, Forestry, Fishing/Hunting, Mining	16	0.3
Construction	197	3.6
Manufacturing	696	12.7
Wholesale Trade	105	1.9
Retail Trade	722	13.1
Transportation	64	1.2
Information	160	2.9
Finance, Insurance, and Real Estate	136	2.5
Professional, Scientific, Mgmt	205	3.7
Education, Health, Social Services	1,888	34.3
Arts, Entertainment, Recreation, Accommodation, Food Service	910	16.5
Other Services (except Public Administration)	246	4.5
Public Administration	155	2.8
Total	5,500	100.0

2.2 Land Use

Land use in Columbia County is primarily forest. Of the 311,040 acres of land in Columbia County, forests cover 164,300 acres. Crops cover another 22 percent. Most of the developed or urban land is found along the floodplain corridor of the Susquehanna River. Eighty-five percent of the forestland is privately owned, while 12 percent is public land. Another 3 percent is owned by the forest industry. Future development in the study area is based on development of approved projects not yet built. It is not anticipated that any radically different land use concepts would dramatically change the character of the community.

2.3 Parks and Recreation

Several State, local, and private park facilities are located near the study area. The following provides a list of the most prominent sites and short descriptions of the facilities available.

Bloomsburg Town Park is a community park located along the banks of the Susquehanna River in Bloomsburg. The park complex provides facilities for swimming, tennis, basketball, softball, baseball, picnicking, and a children's park.

Susquehanna Riverlands Park, located approximately 20 miles north of Bloomsburg on Route 11, includes 1,200 acres along the west and east banks of the Susquehanna River. The park offers facilities for hiking, boating, fishing, and wildlife observation. A 700-foot bluff at the park provides a view of the entire valley.

Briar Creek Lake Park is a located between Orangeville and Berwick that offers fishing and recreational opportunities. The park includes a 50-acre lake and a picnic area. Fish species found in the lake include trout, bass, muskellunge, pan fish, pickerel and walleye.

Ricketts Glen State Park is located 30 miles north of Bloomsburg on Route 487. The park offers fishing, boating, swimming, family or group camping, cabins, winter sports, bridle trails, hiking, environmental education, hunting and the waterfalls of the Glens Natural Area.

The Bloomsburg Fairgrounds is a 248-acre facility located within Bloomsburg's town limits, and includes a grandstand with an 8,000 person seating capacity, 78,000 square feet of exhibition buildings, an indoor arena, a covered band shell, a half-mile race track, and other large outdoor event amenities. The Bloomsburg Fair begins the third Saturday after Labor Day and draws over 650,000 people (2003 estimate) from all along the Eastern Seaboard. The Fairgrounds also attracts many trade shows and conventions throughout the year. A partial listing of additional events from 2003 includes the Early Bird Sports Expo, the Central Susquehanna Builders Show, Antiques at Bloomsburg, the 14th Annual International Harvester Roundup, and the Four-Wheel & Off Road Jamboree.

3. ECONOMIC ANALYSIS METHODOLOGY

Flood damages under future with- and without-project conditions were estimated through: (1) an inventory of floodplain development, (2) direct interviews with major industry representatives, (3) estimation of depreciated structure replacement costs and content damages, (4) preparation of generalized stage-damage functions, and (5) combination stage/frequency relationships and stage/damage relationships into frequency/damage relationships.

3.1 Flood Damage Surveys

A structure inventory was compiled by conducting field surveys of structures in the 500-year floodplain during February and March of 2002. There are approximately 600 total structures within the 500-year floodplain, including 2 municipal and 75 non-residential (commercial and industrial) structures. Each structure was assigned a unique structure identification number. First floor and low opening elevations (measured from known benchmarks using a survey transit) and street addresses were recorded for all structures. Structure information required to compute depreciated replacement values was collected for residential structures based on Means Real Estate Valuation Guide. Data collected included the following categories: structure type, style, construction material, quality, condition, effective age, finished floor area, and other exterior characteristics. Content values were estimated in accordance with guidance provided in Corps economic guidance memoranda EGM 01-03 and 04-01[1]. Interviews were held (2002-2003) with owners/operators of non-residential floodplain properties, including municipal and major industrial facilities.

Actual damage information from the 1972 flood was obtained from the Town and published sources, and was used to calibrate depth-damage functions. Public emergency costs were calculated as a percentage of total damages based on local damage reports provided in *Tropical Storm Agnes June 1972 Post Flood Report*, Baltimore District, USACE, Nov 1974.

3.2 Depth-Damage Relationships

Depth-damage functions from Economic Guidance Memorandum 01-03 – *Generic Depth-Damage Relationships for Residential Structures without Basements* and Economic Guidance Memorandum 04-01 – *Generic Depth-Damage Relationships for Residential Structures with Basements* were applied to the inventory of residential floodplain properties in order to develop depth-damage relationships. Current HEC-RAS output (discharge frequency water surface elevations) was combined with the depth-damage data in order to calculate average annual damages under existing conditions.

A risk-based spreadsheet model (Microsoft Excel ® running statistical modeling software) was used to estimate flood damages to non-residential and residential structures and contents. Structure specific information (identification number, structure type, value, first floor elevation, zero damage level, and reach designation) was included in a structure inventory database for input to the model. Residential structures were classified as one of five types: one-story with a basement, one-story without a basement, split-level, two-story with a basement, and two-story without a basement (see Tables 6 and 7). The model used depth-percent damage curves corresponding to the structure type to relate flood depth to percent damage for residential and selected non-residential structures and their contents. Each structure was referenced to two cross sections which were used to determine the water surface elevations for the storm frequency events of 2-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year return intervals.

[1] This methodology differs from those used in past economic analyses of flood damage reduction projects conducted in the Wyoming Valley. While prior analyses used a content-to-structure ratio of 0.72, this analysis uses new depth-damage relationship curves developed by the Corps. The new depth-damage curves (full set available in October 2003) model content damages as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of contents valuations. Corps policy states that use of the new damage curves eliminates the need to establish content-to-structure ratios through surveys.

Table 6
Depth-Damage Functions of
One Story and Split Level Residential Structures (pct damage)

Depth of First Floor Flooding	One Story				Split Level	
	With Basement		Without Basement		With Basement	
	Structure	Contents	Structure	Contents	Structure	Contents
-4	5.20	5.70	0.00	0.00	4.70	3.80
-3	9.00	8.00	0.00	0.00	7.20	5.40
-2	13.80	10.50	0.00	0.00	10.40	7.30
-1	19.40	13.20	2.50	2.40	14.20	9.40
0	25.50	16.00	13.40	8.10	18.50	11.60
1	32.00	18.90	23.30	13.30	23.20	13.80
2	38.70	21.80	32.10	17.90	28.20	16.10
3	45.50	24.70	40.10	22.00	33.40	18.20
4	52.50	27.40	47.10	25.70	38.60	20.20
5	58.60	30.00	53.20	28.80	43.80	22.10
6	64.50	32.40	58.60	31.50	48.80	23.60
7	69.80	34.50	63.20	33.80	53.50	24.90
8	74.20	36.30	67.20	35.70	57.80	25.80
9	77.70	37.70	70.50	37.20	61.60	26.30

Table 7
Depth-Damage Functions of
Two Story Residential Structures (pct damage)

Depth of First Floor Flooding	Two Story			
	With Basement		Without Basement	
	Structure	Contents	Structure	Contents
-4	4.71	5.20	0.00	0.00
-3	7.20	6.80	0.00	0.00
-2	10.20	8.40	0.00	0.00
-1	13.90	10.10	3.00	2.40
0	17.90	11.90	9.30	8.10
1	22.30	13.80	15.20	13.30
2	27.00	15.70	20.90	17.90
3	31.90	17.70	26.30	22.00
4	36.90	19.80	31.40	25.70
5	41.90	22.00	36.20	28.80
6	46.90	24.30	40.70	31.50
7	51.80	26.70	44.90	33.80
8	56.40	29.10	48.80	35.70
9	60.80	31.70	52.40	37.20

3.3 Risk and Uncertainty – Structural Flood Damages

Planning guidance requires that risk and uncertainty be incorporated into flood damage reduction studies. Statistical modeling software and Microsoft Excel were used to incorporate uncertainty from damage input variables into the analysis. The evaluation process uses Monte Carlo Simulation to compute the expected value of damages while incorporating the variability associated with each input variable.

Some of the important uncertainties specific to this particular analysis include:

- Hydrologic and Hydraulic uncertainty factors include hydrologic data record lengths that are often short or do not exist, precipitation-runoff computational methods that are not precisely known, and imprecise knowledge of the effectiveness of flow regulation. Additional uncertainty arises from the use of simplified models to describe complex hydraulic phenomena, including the lack of detailed geometric data, misalignments of hydraulic structures, material variability, and errors in estimating slope and roughness factors. Water surface elevations were allowed to vary based on the standard deviations for specific return events taken directly from the hydrologic and hydraulic analyses conducted as part of this feasibility study.
- Economic uncertainty factors include land uses, depth/damage relationships, structure/content values, structure locations, first floor elevations, floodwater velocity, the amount of debris and mud, flood duration, and warning time and response of floodplain inhabitants. Variability in depth-damage curves was incorporated into the model by using standard deviations for specific damage percents taken directly from depth-damage functions provided in Corps economic guidance memoranda EGM 01-03 and EGM 04-01. Additional variability in first floor survey error (5 percent), and depreciated replacement values (estimated as a percent of the range shown in Means Cost Estimating Guides) were captured in the damage model.

Under the Monte Carlo approach, multiple iterations selected input values from the full range of possible values for each variable identified as a source of uncertainty. Expected values and standard deviations for each key input variable were used to develop distributions from which sample variables were randomly selected in the calculation of flood damages.

In normal distributions, 68 percent of the sampled values of a particular variable are within one standard deviation on either side of the mean, 95 percent within two standard deviations from the mean, and 99.7 percent within three standard deviations from the mean. With each iteration of the model a value is randomly selected from the key hydraulic and economic variable distributions and used in the calculation of structure and contents flood damages for that particular iteration. The sum of all flood damage calculations divided by the number of iterations yields the expected value of flood damages for the model run. Ten thousand iterations were run for each study area reach to ensure that the full range of possible outcomes was represented in the analysis.

Restrictions were imposed on the model in the computation of benefits for alternative flood damage reduction plans. For a levee/floodwall alternative designed to provide 100-year level flood protection plus a risk-based margin of safety, design height elevation had to exceed a sampled[2] water surface elevation in order for benefits to be claimed for the alternative. Benefits would be overstated if this restriction had not been imposed.

The discussion below is a simplified example of the restriction. A levee that provides a 100-year level of protection with a risk-based margin of safety at (hypothetical) station No. 12000 is designed to an elevation of 490.0 feet NGVD. The hydraulic analysis shows that the 100-year water surface elevation at this station is normally distributed, has an expected value of 487.0 feet NGVD, and a standard deviation of 1.5 feet.

In normal distributions, 68 percent of the sampled values of a particular variable are within one standard deviation on either side of the mean (expected value), 95 percent within two standard deviations from the mean, and 99.7 percent within three standard deviations from the mean. For the levee considered in this example, it would be expected (with all other variables held constant) that the 100-year level of protection would be overtopped five percent of the time when all of the possible water surface elevations[3] of a 100-year event are evaluated. Obviously, benefits should not accrue to the alternative when the sampled water surface elevation (10,000 iterations, or samplings, were run for each model used in the economic analysis) exceeds the design elevation of the alternative. For these iterations, damages prevented by the alternative are equal to zero.

The model restrictions are not limited to the return interval for which a design elevation is set. Consider the example provided above for the analysis of 50-year water surface elevations at the hypothetical cross section with an expected value of 486.5 feet and a standard deviation of 1.8 feet. It would be expected that the levee would be overtopped by a 50-year event (again, frequency is determined by hydrologic analyses), about 0.3 percent of the time. Because the models are run for 10,000 iterations, about 30 of the runs (0.3 percent of 10,000) for the 50-year event would accrue benefits equal to zero for the 100-year levee.

This type of model restriction ensured that alternative project benefits were not overstated.

4. WITHOUT PROJECT CONDITIONS DAMAGES

the hydraulic model was used to develop the water surface profiles for 28 Susquehanna River, and 51 Fishing Creek HEC-RAS river stations for all design storm events, using discharge values determined by the flood frequency analysis and HEC-FFA model. Water surface elevations for eight modeled design storm events (also known as return intervals) at 18 sample river stations along Fishing Creek are provided in Table 8. Water surface elevations for eight modeled design storm events at 18 sample river stations along the Susquehanna River are shown in Table 9. Locations of select river stations for Fishing Creek and the Susquehanna River can be found in the main report of the integrated Feasibility Report and Environmental Impact Statement as Figures 3-8 and 3-9, respectively.

[2] A sampled water surface elevation for any return interval refers to a water surface elevation that is randomly sampled from the distribution of possible water surface elevations for any return interval.
[3] Frequencies are determined by hydrologic (rainfall and streamflow) investigations.

Table 8
Water Surface Elevations for Modeled Storm Events
Fishing Creek: Without-Project Conditions

	Water Surface Elevation (Units = Feet NGVD)							
River Station	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	200-Yr	500-Yr
15996	480.6	483.2	485.1	487.5	489.7	491.8	493.9	496.3
14222	478.2	481.3	483.2	485.6	487.7	489.6	491.6	493.6
13531	476.8	479.9	481.8	484.0	485.8	487.5	489.5	491.3
12804	475.2	478.7	480.7	482.9	484.7	486.4	488.5	490.0
12366	474.6	478.2	480.2	482.3	483.9	485.5	488.1	489.8
11844	474.0	477.5	479.3	481.0	482.0	482.6	485.3	487.7
11811	474.0	477.5	479.4	481.0	482.0	482.7	485.4	487.8
10921	473.1	476.5	478.3	479.6	480.0	483.1	486.0	488.5
10246	472.9	476.3	478.1	479.4	479.7	483.0	485.9	488.4
9849	472.7	476.1	477.8	479.0	479.7	482.9	485.8	488.3
9439	472.6	476.0	477.8	478.9	479.8	482.9	485.8	488.3
8447	472.3	475.7	477.4	478.4	479.8	482.9	485.8	488.3
8443	471.9	475.2	476.9	478.7	479.8	482.9	485.8	488.3
7843	471.6	474.7	476.0	478.7	479.8	482.9	485.8	488.3
6468	470.8	473.6	475.3	478.6	479.6	482.8	485.7	488.2
4439	469.7	472.1	473.8	476.1	479.3	482.6	485.6	488.1
958	469.2	471.2	472.7	474.5	476.6	478.7	480.9	484.0
0	469.2	471.2	472.7	474.5	476.6	478.8	480.9	484.0

Table 9
Water Surface Elevations for Modeled Storm Events
Susquehanna River: Without-Project Conditions

	Water Surface Elevation (Units = Feet NGVD)							
River Station	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	200-Yr	500-Yr
27280	473.1	475.8	477.6	479.7	481.6	483.3	485.2	487.9
19450	471.5	473.9	475.6	477.6	479.5	481.3	483.3	486.2
17910	471.0	473.4	475.0	476.9	478.8	480.8	482.9	485.8
16407	470.7	473.0	474.5	476.4	478.3	480.3	482.3	485.1
15213	470.4	472.6	474.1	475.9	477.9	479.8	481.9	484.8
14020	470.1	472.3	473.7	475.6	477.6	479.6	481.7	484.6
12827	469.8	471.9	473.4	475.2	477.3	479.3	481.4	484.4
11634	469.6	471.6	473.0	474.9	477.0	479.1	481.2	484.3
10441	469.3	471.3	472.7	474.6	476.7	478.9	481.0	484.1
9241	469.1	471.0	472.4	474.2	476.3	478.4	480.6	483.6
8430	468.8	470.6	471.9	473.6	475.6	477.7	479.8	482.8
7380	468.6	470.3	471.5	473.2	475.2	477.2	479.3	482.3
6880	468.5	470.2	471.4	473.0	475.0	477.0	479.1	482.1
5672	468.2	469.7	470.8	472.3	474.3	476.3	478.4	481.2
3650	467.8	469.2	470.2	471.6	473.6	475.6	477.6	480.3
1628	467.3	468.4	469.2	470.2	472.2	474.1	476.2	478.8
306	467.0	468.0	468.7	469.6	471.6	473.6	475.6	478.3
135	467.0	467.9	468.6	469.5	471.4	473.4	475.4	478.1

4.1.1 Principal Flood Damage Reaches

Based on the patterns of past flooding, the topography of the study area, and the distribution of floodprone properties, the study area was divided into four damage reaches. Figure 3-9 (provided in the Feasibility Report and Environmental Impact Statement) shows an aerial photograph of the general study area with the locations of the reaches identified. These reaches were used to evaluate the costs of structural and nonstructural flood damage reduction measures and to estimate the benefits of the alternative plans, based on the corresponding reduction in flood damages.

The study reaches are described in Sections 4.1.1.1 through 4.1.1.4. With- and without-project future conditions for the flood-prone reaches assume a stable level of development. Because floodplain regulations restrict new construction in areas that are subject to damage by a 100-year flood event, it was assumed that development of new residential, commercial, and industrial uses in the floodplain is unlikely.

4.1.1.1 Bloomsburg Fishing Creek Damage Reach

Flooding in this reach causes inundation of residential and commercial structures, and roadways. The flood pathway for all damageable property in this reach is via direct inundation by Susquehanna River floodwaters flowing upstream through Fishing Creek and by floodwaters flowing from the Fishing Creek watershed. This damage reach is bounded by Fishing Creek to the north and west, West 5th Street to the south, and Railroad Street to the east. The 500-year floodplain of this reach contains about 250 residential structures (duplex homes are counted as one structure), the north end of the Fairgrounds, and about 20 commercial structures. Flooding begins for a small number of structures in this reach at roughly a 5-year event on Fishing Creek. Most structures begin to incur damages between the 10- and 25-year events.

Tables 10 and 11 show the damages and numbers of structures damaged for each of the eight return intervals. Average annual damages to residential structures and contents equal $1,175,000 through the 1 percent chance exceedance event (100-year return interval) and $1,386,000 through the 0.2 percent chance exceedance event (500-year return interval). Average annual damages to nonresidential property amounts to $50,000 and $62,000 for the 1 percent chance exceedance event and 0.2 percent chance exceedance events, respectively.

Table 10
Damages to Residential Structures and Contents
Without Project Conditions Bloomsburg Fishing Creek Reach

Recurrence Frequency	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0.0				
			79.00%	408	323	323
20%	23	817				
			10.00%	2,174	217	540
10%	80	3,531				
			6.00%	5,434	326	866
4%	146	7,336				
			2.00%	8,423	168	1,034
2%	165	9,510				
			1.00%	14,039	140	1,175
1%	221	18,569				
			0.50%	23,136	116	1,290
0.50%	232	27,703				
			0.30%	31,614	95	1,385
0.20%	243	35,526				

Table 11
Damages to Non-Residential Property
Without Project Conditions Bloomsburg Fishing Creek Reach

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0.0				
			79.00%	10	8	8
20%	1	21				
			10.00%	90	9	17
10%	4	160				
			6.00%	272	16	34
4%	10	383				
			2.00%	446	9	42
2%	11	508				
			1.00%	771	8	50
1%	17	1,034				
			0.50%	1,264	6	56
0.50%	19	1,494				
			0.30%	1,704	5	62
0.20%	19	1,914				

4.1.1.2 Fernville Fishing Creek Damage Reach

Fernville is located on the right descending bank of Fishing Creek directly across from Bloomsburg, and includes approximately 75 residential structures in the 500-year floodplain. Fernville was included as a damage reach because it was anticipated that any line of protection constructed for the Bloomsburg side of Fishing Creek (left bank) would raise water surface elevations on the Fernville side of Fishing Creek (right bank). Flooding under existing conditions begins at the 5 year event with damages of $78,700. Table 12 provides information on damage amounts and the numbers of structures damaged at the eight return intervals. Average annual damages for this reach are $116,000 through the 1 percent chance exceedance event and $147,000 through the 0.2 percent chance exceedance event.

Table 12
Damages to Residential Structures and Contents
Without Project Conditions Fernville Fishing Creek

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0				
			79.00%	39	31	31
20%	4	79				
			10.00%	198	20	51
10%	13	318				
			6.00%	509	31	82
4%	23	700				
			2.00%	890	18	99
2%	31	1,080				
			1.00%	1,642	16	116
1%	46	2,205				
			0.50%	3,178	16	132
0.50%	63	4,151				
			0.30%	5,027	15	147
0.20%	72	5,904				

4.1.1.3 Susquehanna River Lower (West Bloomsburg) Damage Reach

Structures in this damage reach are inundated by the Susquehanna River. This reach is bounded by West 5th Street to the north, the Susquehanna River to the south, Market Street to the east, and Fishing Creek to the west. The reach includes a small number of flood-prone residential structures, Bloomsburg Middle and High Schools (the schools are not in the 100-year floodplain), Bloomsburg's wastewater treatment plant, and the major industrial facilities of Magee Rieter Automotive Systems and Bernardi Italian Foods.

Structures in this damage reach are inundated by the Susquehanna River, with total damages of $77,000 beginning at the 5-year event. Economic damages occur in this reach at this low level because emergency procedures are implemented at Magee and Bernardi in an effort to minimize losses in the event of continued rising floodwaters. Damages and numbers of structures damaged under the eight return intervals are shown in Tables 13 and 14. Average annual damages to residential structures and contents are $114,000 through the 1 percent chance exceedance event and $219,000 through the 0.2 percent chance exceedance event. Average annual damages to non-residential property equal $1,549,000 and $2,079,000 through the 1 percent chance exceedance event and the 0.2 percent chance exceedance event, respectively.

Table 13
Damages to Residential Structures and Contents
Without Project Conditions Lower Susquehanna (West Bloomsburg) Reach

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0				
			79.00%	29	23	23
20%	2	58				
			10.00%	93	9	32
10%	4	129				
			6.00%	364	22	54
4%	13	599				
			2.00%	1,365	27	81
2%	34	2,132				
			1.00%	3,302	33	114
1%	54	4,472				
			0.50%	6,144	31	145
0.50%	77	7,816				
			0.30%	10,996	33	178
0.20%	120	14,175				

Table 14
Damages to Non-Residential Property
Without Project Conditions Lower Susquehanna (West Bloomsburg)

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0				
			79.00%	15	4	4
20%	2	30				
			10.00%	204	20	25
10%	3	379				
			6.00%	7,114	427	452
4%	3	13,848				
			2.00%	28,140	563	1,014
2%	4	42,431				
			1.00%	53,419	534	1,549
1%	5	64,407				
			0.50%	64,407	322	1,871
0.50%	9	64,407				
			0.30%	69,587	209	2,079
0.20%	13	74,767				

4.1.1.4 Susquehanna River Upper (East Bloomsburg) Reach

This reach is bounded by Market Street to the west, the Bloomsburg Town limits to the east, the Susquehanna River to the south, and East 8th Street to the north. The reach includes about 135 residential and commercial structures, the Bloomsburg Airport and Kawneer Architectural Products. Significant damages begin to occur in this reach at the 50-year event, with inundation of about 60 residential and commercial structures.

Damages begin for residential structures at the 10 percent chance exceedance (10-year reoccurrence interval) flood event, impacting two low-lying residential structures. Damages to nonresidential property begin at the 25-year event as Kawneer implements emergency procedures in anticipation of rising floodwaters (however, no physical damages occur at this frequency). Table 15 shows the numbers of residential structures damaged and the total damages to residential structures and contents for each of the eight return intervals, and this information is shown for nonresidential property on Table 16. Residential average annual damages are $88,000 through the 1 percent chance exceedance event and $130,000 through the 0.2 percent chance exceedance event. Nonresidential damages amount to $288,000 and $367,000 through the 1 percent chance exceedance event and the 0.2 percent chance exceedance event, respectively.

Table 15
Damages to Residential Structures and Contents
Without Project Conditions Upper Susquehanna (East Bloomsburg)

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0				
			79.00%	0	0	0
20%	0	0				
			10.00%	76	8	8
10%	2	152				
			6.00%	469	28	36
4%	16	786				
			2.00%	1,315	26	62
2%	32	1,844				
			1.00%	2,548	25	88
1%	44	3,253				
			0.50%	4,209	21	109
0.50%	58	5,165				
			0.30%	7,188	22	130
0.20%	93	9,211				

Table 16
Damages to Non-Residential Property
Without Project Conditions Upper Susquehanna (East Bloomsburg)

Recurrence Interval	Structures Damaged	Damages ($1,000)	Frequency Interval	Interval Average Damages	Average Annual Damages	Avg Ann Damages Summation
99%	0	0				
99%	0	0				
99%	0	0				
			95.00%	256	243	243
4%	1	512.0				
			2.00%	1,087	22	265
2%	25	1,661.9				
			1.00%	2,257	23	288
1%	38	2,851.2				
			0.50%	7,872	39	327
0.50%	39	12,893.4				
			0.30%	13,369	40	367
0.20%	44	13,844.6				

5. COSTS AND BENEFITS OF ALTERNATIVES

Alternative plans were developed incorporating one or more of the flood damage reduction measures to create various flood damage reduction alternative plans. Components of the alternative plans are outlined below.

Alternative 1: No Action.

Alternative 2: Fringe Alignment
East Bloomsburg Extension
Hydraulic Mitigation Acquisition

Alternative 3: Fringe Alignment
East Bloomsburg Extension
Hydraulic Mitigation Levee/Floodwall System

Alternative 4: Fringe Alignment
Hydraulic Mitigation Levee/Floodwall System

Alternative 5: Fringe Alignment
Hydraulic Mitigation Acquisition

Alternative 6: Interior Alignment
East Bloomsburg Extension
Hydraulic Mitigation Acquisition

Alternative 7: Interior Alignment
East Bloomsburg Extension
Hydraulic Mitigation Levee/Floodwall System

Alternative 8: Interior Alignment
Hydraulic Mitigation Levee/Floodwall System

Alternative 9: Interior Alignment
Hydraulic Mitigation Acquisition

5.1 Alternative Plan Benefits

Corps procedures calculate benefits based on the difference between the expected annual damages with and without alternative flood protection plans. The implicit assumption incorporated into this procedure is that the reduction in flood damages is directly translatable into increased net income to floodplain land uses. Benefits from flood damage reduction alternatives focus on inundation reduction benefits that would result from reduced physical damages to structures and contents, transportation and infrastructure, electric utilities, and a reduction in administrative costs of the National Flood Insurance Program.

Without-project average annual flood damages and with-project average annual residual flood damages are shown in Table 17. Average annual damages under without-project conditions equal $4,601,000 (March 2004 price levels). Average annual residual damages[4] range from $998,000 (Alternative 6) to $1,567,000 (Alternative 4). The percent reduction in average annual damages provided by the alternatives ranges from 66 percent (Alternatives 4 and 8) to 78 percent (Alternatives 2, 6, and 7).

Average annual benefits of the alternatives, which are equal to the difference between residual damages under each alternative and damages under the without project condition are shown in Table 18.

[4] Average annual residual damages are average annual damages that remain after a project has been constructed. For example, the average annual residual damages of the No Action alternative are equal to existing conditions average annual damages because no project would be constructed to reduce existing conditions damages. Similarly, if a particular project is constructed to provide a 100-year level of protection and floods of a greater magnitude could be expected (e.g., a 500-year flood), residual average annual damages would never equal zero because the project would not provide protection for floods greater than the 100-year flood.

Table 17
Average Annual Damages Remaining with 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $000)

Damage Category / Reach	Alternative Plans								
	1	2	3	4	5	6	7	8	9
RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	1,386	211	211	211	211	193	193	193	193
West Bloomsburg Susquehanna	219	104	104	217	217	104	104	217	217
East Bloomsburg Susquehanna	130	43	43	130	130	43	43	130	130
Fernville Fishing Creek	147	0	31	31	0	0	31	31	0
NON-RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	62	11	11	11	11	11	11	11	11
West Bloomsburg Susquehanna	2,079	531	531	531	531	531	531	531	531
East Bloomsburg Susquehanna	367	79	79	367	367	79	79	367	367
CLEAN-UP, INFRASTRUCTURE & NFIP COSTS									
Trans & Infrastructure Damages	121	26	28	41	40	27	27	41	40
Additional Debris Removal Costs	29	6	7	10	10	6	7	10	10
Electric Utilities Damages	14	3	3	5	5	3	3	5	5
FIS Administrative Costs	49	0	0	13	13	0	0	13	13
Total Damages	4,601	1,016	1,048	1,567	1,535	998	1,030	1,549	1,517
PERCENT DAMAGE REDUCTION									
Residential	0%	81%	79%	69%	70%	82%	80%	70%	71%
Non-Residential	0%	75%	75%	64%	64%	75%	75%	64%	64%
Total Damage Reduction	0%	78%	77%	66%	67%	78%	78%	66%	67%

Table 18
Average Annual Benefits of 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $000)

Damage Category / Reach	Alternative Plans								
	1	2	3	4	5	6	7	8	9
RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	0	1,175	1,175	1,175	1,175	1,193	1,193	1,193	1,193
West Bloomsburg Susquehanna	0	114	114	1	1	114	114	1	1
East Bloomsburg Susquehanna	0	88	88	0	0	88	88	0	0
Fernville Fishing Creek	0	147	116	116	147	147	116	116	147
NON-RESIDENTIAL STRUCTURES & CONTENTS									
Bloomsburg Fishing Creek	0	50	50	50	50	50	50	50	50
West Bloomsburg Susquehanna	0	1,549	1,549	1,549	1,549	1,549	1,549	1,549	1,549
East Bloomsburg Susquehanna	0	288	288	0	0	288	288	0	0
CLEAN-UP, INFRASTRUCTURE & NFIP SAVINGS									
Trans & Infrastructure Damages	0	94	93	80	81	95	94	80	81
Additional Debris Removal Costs	0	23	22	19	19	23	22	19	19
Electric Utilities Damages	0	11	11	9	9	11	11	9	9
FIS Administrative Costs	0	49	49	36	36	49	49	36	36
Total Benefits	0	3,586	3,553	3,034	3,067	3,604	3,572	3,053	3,085

5.2 Alternative Plan Costs

Preliminary cost estimates used to screen alternative plans were prepared using February 2003 price levels, but have been adjusted to March 2004 price levels for presentation in this report. Cost estimates for flood damage reduction alternatives were based on calculated quantities and unit prices. Operations and maintenance (O&M) costs were estimated based on the anticipated conditions over a 50-year project life. Preliminary costs of the alternative plans, which include construction costs, real estate acquisition, engineering and design, environmental mitigation, and interest during construction are shown in Table 19. Average annual costs were calculated based on the Federal discount rate of 5.375 percent and an analysis period of 50 years. Interest during construction was calculated assuming a 36-month construction period for all alternatives, though it is likely that construction of the East Bloomsburg Extension Levee would take longer than 36 months.

Annualized costs of the alternatives range from $1,907,000 (Alternative 4) to $3,651,000 (Alternative 6). Alternatives 5 and 9 have similar annualized costs of $2,399,000 and $2,443,000, respectively.

Table 19
Preliminary Costs of 100-Year Level of Protection
(March 2004 price levels, 50-year period of analysis, $000)

	Alternative Plans							
	2	3	4	5	6	7	8	9
Construction Cost, LERRD, PED	57,069	47,455	28,817	38,432	57,888	48,375	29,737	39,250
Interest During Construction	1,852	1,469	892	660	1,178	1,389	812	601
Annual O&M Costs	227	279	184	133	227	279	184	133
Annualized Cost	3,643	3,116	1,907	2,399	3,651	3,165	1,955	2,443

5.3 Comparison of Preliminary Alternatives Costs and Benefits

A comparison of the costs, benefits, residual damages, benefit-to-cost ratios, and net benefits of the alternatives is shown in Table 3-10. Based on the results of the preliminary analysis, the Net Economic Development (NED) Plan is Alternative 4 (Fringe Alignment and Structural Mitigation for Fernville), as this alternative provides the highest benefit-to-cost ratio of 1.59 and the highest net benefits of $1,128,000. Alternatives 3, 5, 7, 8, and 9 also are economically justified, with benefit-to-cost ratios of 1.14, 1.28, 1.13, 1.56, and 1.26, respectively. Alternatives 2 and 6 are not economically justified, and are eliminated from further consideration.

Table 20
Preliminary Economic Evaluation of Alternative Plans
(March 2004 price levels, 50-year period of analysis, $000)

	Alternative Plans							
	2	3	4	5	6	7	8	9
Annualized Cost	3,643	3,116	1,907	2,399	3,651	3,165	1,955	2,443
Total Annual Benefits	3,586	3,553	3,034	3,067	3,604	3,572	3,053	3,085
Total Remaining Damages	1,016	1,048	1,567	1,535	998	1,030	1,549	1,517
Benefit-to-Cost Ratio	0.98	1.14	1.59	1.28	0.99	1.13	1.56	1.26
Net Benefits	(57)	438	1,128	667	(48)	407	1,097	641

5.3.1.1 Separable Elements

The Interior Alignment and the Fringe Alignment each could be constructed as an individual flood damage reduction project. Each alignment provides a single line-of-protection with no separable elements. Alternatives that include the Interior Alignment or the Fringe Alignment as stand-alone project features are Alternatives 4 and 5 (Fringe Alignment), and Alternatives 8 and 9 (Interior Alignment)[5].

Each separable element represented in a justified plan (i.e., one for which total NED benefits exceed total costs) must be incrementally justified. Incremental justification requires that segment-specific dollar benefits must equal or exceed separable costs for that segment. The incremental justification test ensures that each segment, or element, of an economically justified plan adds to rather that subtracts from total net benefits produced by that plan.

Alternative 3 is an economically justified plan, with the sole difference between Alternatives 3 and 4 is being Alternative 3 includes the East Bloomsburg Extension Levee as a second added element to the Fringe Alignment. This same difference can be observed between Alternatives 7 and 8, where the East Bloomsburg Extension Levee is a second added element to the Interior Alignment.

Construction of the East Bloomsburg Extension Levee would contribute an additional $18.6 million to construction costs and an additional $577 thousand in interest during construction costs. These additional $19.2 million in first costs translate to annualized first costs of approximately $1.17 million, and when an additional $95 thousand in annual O&M costs are added, the total average annual cost of the second added element would equal $1.21 million.

Average annual benefits that can be attributed to the East Bloomsburg Extension Levee are equal to $519 thousand, which results in a benefit-to-cost ratio for the East Bloomsburg Extension Levee of 0.43 to one. Therefore, the East Bloomsburg Extension Levee is not economically justified as a second added element, and Alternatives 3 and 7 were eliminated from further consideration.

5.4 Selected Plan Optimization

During the initial screening process, the preliminary NED plan (Alternative 4) was designed to provide 100-year level of protection to all structures in the Bloomsburg Fishing Creek and Fernville Fishing Creek reaches, and most structures in the Susquehanna River Lower (Western) reach. The plan would consist of the Fringe Alignment levee/floodwall system, a hydraulic mitigation levee/floodwall system for the right descending bank of Fishing Creek through Fernville, and limited hydraulic mitigation acquisition for properties in Montour and Hemlock Townships downstream of Fernville.

Optimization of the NED plan level of protection ensures that the final NED plan recommends Federal cost-sharing investment in the most cost-effective flood protection alternative for the Town of Bloomsburg. Costs and benefits of four different levels of protection for the NED plan were analyzed:

1. 50-year level of protection from Fishing Creek and the Susquehanna River;
2. 100-year level of protection from Fishing Creek and the Susquehanna River;
3. 500-year level of protection from Fishing Creek and the Susquehanna River; and

[5] The method of mitigation for increased flooding on the right bank of Fishing Creek differs between Alternatives 4 and 5, and Alternatives 8 and 9. Mitigation is not a separable element, and is not subject to economic justification constraints regarding separable elements.

4. Agnes-level (440-year) protection from the Susquehanna River and 100-year level of protection from Fishing Creek.[6]

Costs for the levee/floodwall system at the four alternative levels of protection are shown in Table 21. Average annual costs were calculated based on the Federal discount rate of 5.375 percent and an analysis period of 50 years. Interest during construction was calculated assuming a 36-month construction period.

Table 21
Costs of Alternative Levels of Protection – NED Plan
(March 2004 price levels, 50-year period of analysis, $000)

	Level of Protection			
Cost Item	**50-Year**	**100-Year**	**500-Year**	**440-Year on Susquehanna / 100-Year on Fishing Creek**
Construction Cost, LERRD, PED	23,897	28,817	34,504	28,973
Interest During Construction	740	892	1,068	897
Annualized First Cost	1,428	1,723	2,062	1,732
Annual O&M Cost	184	184	184	184
Total Annual Costs	1,612	1,907	2,246	1,916

The costs and benefits of the alternative levels of protection for the selected plan are compared in Table 22. As shown in the table, the level of protection with the greatest net benefits would be the levee/floodwall system constructed to an elevation that would provide protection from Agnes-level (440-year) events on the Susquehanna and 100-year events on Fishing Creek. This NED plan would provide average annual benefits of $3,565,000 with average annual costs estimated at $1,916,000. Annual net benefits are estimated to be approximately $1,649,000, and the benefit-cost ratio is anticipated to be 1.86 to one. Additional analysis and design details of the NED plan are provided in Section 4 of the Feasibility Report / Environmental Impact Statement main report.

[6] Water surface elevations on Fishing Creek during the Agnes flood correspond to a 53-year flood. Therefore, flood damage reduction measures that provide at least a 53-year level of protection on Fishing Creek would protect Fishing Creek damage reaches from an Agnes-magnitude event.

Table 22
NED Plan Optimization
(March 2004 price levels, 50-year period of analysis, $000)

Level of Protection	Average Annual Damages Prevented	Annual FIA[7], Emgcy & Other Savings	Average Annual Benefits	Average Annual Costs	Average Annual Net Benefits	BCR
50-Year	2,191	108	2,299	1,612	686	1.43
100-Year	2,891	143	3,034	1,907	1,128	1.59
500-Year	3,675	143	3,818	2,246	1,572	1.70
440-Year Susquehanna / 100-Year Fishing Creek	3,422	143	3,565	1,916	1,649	1.86

6. THE RECOMMENDED PLAN

Alternative 4 at an Agnes level of protection is the recommended plan. This plan is identified as the "Preferred Alternative" for the purposes of NEPA documentation. The recommended plan will provide flood damage reduction for events with an exceedance probability of approximately 0.21 percent (440-year event). The plan consists of 16,555 linear feet of levee/floodwall systems with fourteen drainage structures, limited road raisings, and four stop-log closure structures. The alignment of the line of protection was refined based on physical, environmental, and economic criteria. The optimal alignment was identified by:

- Avoiding and minimizing adverse effects on study area wetlands,
- Following high ground to the extent possible to minimize floodwall/levee costs, and
- Protecting flood-prone structures, which are located in high-density concentrations.

6.1 Economics of the Recommended Plan

A detailed cost estimate was developed for the selected plan using the Microcomputer Aided Cost Engineering System (MCACES) program. Project implementation costs include: pre-construction engineering and design (PED); real estate acquisition; project construction; construction management / supervision and administration (S&A); wetlands mitigation; cultural mitigation; escalation; and contingencies. A summary of the cost estimate for the selected plan is provided in Table 23. The change in costs for Alternative 4 from those shown in Table 21 reflect the final feasibility level design and MCACES cost estimate prepared for the selected plan. The detailed MCACES cost estimate is included as an attachment to the Cost Engineering Appendix provided with the report package. The costs of the selected flood damage reduction plan are summarized below.

[7] Flood Insurance Administration (FIA).

Table 23
MCACES Cost Estimate – Selected Plan

Account & Item Description	Cost	Contingency	Total Cost
02 Relocations	4,623,000	924,000	5,547,000
06 Fish & Wildlife Facilities	1,322,000	330,000	1,652,000
11 Levees & Floodwalls	17,610,000	3,728,000	21,338,000
18 Cultural Resources Preservation	400,000	100,000	500,000
TOTAL CONSTRUCTION COSTS	**23,955,000**	**5,082,000**	**29,037,000**
01 Lands & Damages	4,953,000	1,040,000	5,993,000
30 Preconstruction Engineering & Design	2,588,000	388,000	2,976,000
31 Construction Management	2,634,000	263,000	2,897,000
TOTAL PROJECT COSTS	**34,130,000**	**6,773,000**	**40,903,000**

6.1.1 Interest During Construction

Interest during construction (IDC) was calculated to account for the cost of capital during the construction period prior to the realization of project benefits. Construction costs were separated into two categories for the IDC analysis: Susquehanna River levee costs and Fishing Creek levee/floodwall system costs. This separation was done to account for the construction schedule of the project and separability of costs.

It was assumed that the Susquehanna portion of the project would be completed in 12 months, and would provide at least a partial barrier to floodwaters at the end of the first 12 month period. Cost timing for the Susquehanna portion of the project is as follows:

- Land costs: period 1
- Relocations & security: periods 2 through 4
- Erosion & sediment control: period 5
- Levee system construction: periods 6 through 10
- Environmental and cultural mitigation: periods 11 and 12.

The Fishing Creek system is expected to take approximately 24 months to construct, and construction would take place on the right and left banks simultaneously. Costs for Engineering & Design and Construction Management were evenly distributed across the 12 periods.

Cost timing for the Fishing Creek portion of the project is as follows:

- Mitigation purchases (fee simple): acquired prior to construction
- Land costs exclusive of mitigation purchases: period 13
- Relocations & security: periods 14 through 17
- Erosion & sediment control: periods 18 through 21
- Levee/floodwall system construction: periods 22 through 31
- Environmental and cultural mitigation: periods 32 through 36.

Costs for Engineering & Design and Construction Management were evenly distributed across the 24 periods

Project costs were amortized over the expected period of construction (12 or 24 months) at an interest rate of 5.375 percent. It was assumed that all payments were incurred mid-month. Table 24 shows the IDC calculations for the recommended plan.

Table 24
Interest During Construction Calculation

Implementation Period	Funds Spent in Period	Months to Completion	Interest Amount
1	1,816,614	11.5	93,472
2	763,555	10.5	35,793
3	763,555	9.5	32,313
4	763,555	8.5	28,848
5	213,720	7.5	7,109
6	1,613,764	6.5	46,420
7	1,613,764	5.5	39,192
8	1,613,764	4.5	31,996
9	1,613,764	3.5	24,832
10	1,613,764	2.5	17,698
11	236,767	1.5	1,555
12	236,767	0.5	517
13	4,067,862	23.5	439,205
14	1,048,170	22.5	108,114
15	1,048,170	21.5	103,081
16	1,048,170	20.5	98,069
17	1,048,170	19.5	93,079
18	265,463	18.5	22,315
19	265,463	17.5	21,062
20	265,463	16.5	19,815
21	265,463	15.5	18,573
22	1,126,053	14.5	73,539
23	1,126,053	13.5	68,316
24	1,126,053	12.5	63,117
25	1,126,053	11.5	57,940
26	1,126,053	10.5	52,785

Table 24
Interest During Construction Calculation

Implementation Period	Funds Spent in Period	Months to Completion	Interest Amount
27	1,126,053	9.5	47,653
28	1,126,053	8.5	42,544
29	1,126,053	7.5	37,456
30	1,126,053	6.5	32,391
31	1,126,053	5.5	27,348
32	841,803	4.5	16,691
33	841,803	3.5	12,953
34	841,803	2.5	9,232
35	841,803	1.5	5,527
36	841,803	0.5	1,838

6.1.2 Annual Operation and Maintenance

Annual O&M costs include regular inspection of the floodwall, levee, and closure structures. Maintenance costs include levee mowing and vegetation control, floodwall fence maintenance, and closure structure lubrication and cleaning.

Levees: General maintenance includes mowing every two week for six months of the year. In addition miscellaneous maintenance items include fertilization, vegetation removal, checking profiles, filling holes, etc. Estimated annual cost $60,100.

Closure Structures: General maintenance includes items such as inspecting the structure for settling, overall condition of the concrete abutments, repairing and monitoring cracks, cleaning and painting of metal parts, lubricating moving parts, testing the gate alignment, etc.. Estimated annual cost $18,200.

Drainage Structures: General maintenance includes testing the gate seats, lubrication, removal of debris, cleaning and painting all metal parts, overall condition of concrete surfaces, repairing and monitoring cracks, etc. Estimated annual cost $25,300.

Slope Protection: General maintenance includes removal of vegetation, checking profiles, replacing materials, etc.. Estimated annual cost $39,200.

Floodwalls: General maintenance includes the elimination of encroachments, removal of debris, removal of graffiti, removal of vegetation roots, checking the overall condition of concrete surfaces, repairing and monitoring cracks, etc. Estimated annual cost $12,000.

Flood Warning System: General maintenance preformed on the river gage and radio equipment. Estimated annual cost $15,500.

Periodic Inspection: Cost for the Corps of Engineers annual inspection. Estimated annual cost $15,000.

The total estimated Operation and Maintenance Costs for the Project are $185,300. Major repair and or replacement costs are not included in the above figures. The features of this project are considered to be durable items, and if properly maintained, will not require replacement during the life of the project.

6.1.3 Project Economic Summary

Table 25 shows the project economic summary for the selected plan, Alternative 4, the NED plan at an Agnes level of protection, has total average annual costs of $2,678,000, total average annual benefits of $2,583,200, total average annual benefits of $3,565,200, a benefit-to-cost ratio of 1.38 to 1, and annual net benefits of $982,000.

With the exception of project benefits, these summary economic figures differ from those provided in Table 22 for the NED plan (average annual costs of $1,916,000, a benefit-to-cost ratio of 1.86 to 1, and annual net benefits of $1,649,000). The difference in costs, which result in changes to each of the project performance measures, are due to information obtained from detailed design after identification of the NED plan.

Cost estimates used during the preliminary screening of project alternatives lacked costs associated with unsuitable fill material (detailed in the HTRW attachment to the Engineering Appendix), environmental mitigation, cultural mitigation, flood damage mitigation measures for the water treatment plant, and electrical sub-station. In addition, the final cost estimate is based on detailed geotechnical data and utility relocation analyses than were available as costs were developed for the screening analysis and NED plan optimization.

Given the significant increase in Alternative 4 costs from the initial screening to plan optimization and recommendation, the project team undertook backcheck review of alternatives 4, 5, 8, and 9 to determine if similar increases in costs would be expected for these alternatives based on the additional information and cost considerations known at the time of plan optimization. Based on substantial review by the project delivery team, it was concluded that cost estimates for each of the alternatives considered during initial plan screening would have equally substantial and proportionate increases in project costs based on currently available data and refined engineering assumptions and requirements. With this knowledge and backcheck review quality control check, the project delivery team confirmed its recommendation of Alternative 4 as the NED plan.

Table 25
Project Economic Summary
March 2004 Price Level, 5.375% Discount Rate
50-Year Period of Analysis

Costs	
Total Project Costs	$ 40,903,000
Less: Adjustment for PL 91-646 Costs	- $ 1,378,500
Interest During Construction	$ 1,832,400
Total Investment Costs	**$ 41,356,900**
Annualized Investment Costs	$ 2,397,900
Annual Operations & Maintenance Costs	$ 185,300
Total Average Annual Costs	**$ 2,583,200**
Benefits	
Residential Damage Reduction	$ 1,292,200
Non-Residential Damage Reduction	$ 2,129,600
Transportation & Pub Infrastructure Damage Reduction	$ 79,800
Additional Debris Removal Costs Avoided	$ 19,100
Electric Utilities Damage Reduction	$ 9,000
Flood Insurance Administrative Cost Savings	$ 35,500
Total Average Annual Benefits	**$ 3,565,200**
Benefit to Cost Ratio	**1.38**
Net Benefits	**$ 982,000**

6.2 Cost Sharing

The fully funded cost of the Project, escalated to the base year of 2009 is shown in Table 26. Table 27 shows the apportionment of cost sharing responsibilities between the Federal government and the non-Federal sponsor, Bloomsburg, Pennsylvania. The table includes costs associated with flood damage reduction features and environmental mitigation features. The total project first costs - including Lands, Easements, Rights-of-way, Relocations, and Disposal areas (LERRD) - are shared on a maximum 65 percent basis by the Federal government and a 35 percent basis by the non-Federal partner. As indicated in Table 28, the Federal share of the entire project's total first cost is $30,055,350; the non-Federal share of total project first costs is $16,183,650. The Federal Government will design the project, prepare detailed plans/specifications and construct the project, exclusive of those items specifically required of the non-Federal sponsor.

The non-Federal partner is responsible for all LERRD and all operation and maintenance (O&M) costs. The LERRD costs are applicable to the non-Federal share of the initial project costs. For example, the total LERRD costs ($12,833,000) borne by the non-Federal sponsor are applicable to the 35 percent chare of total initial non-Federal project costs.

In this particular case, the non-Federal sponsor's responsibility for LERRD costs ($12,833,000) combined with the minimum 5 percent cash contribution ($2,311,950) does not exceed 35 percent of total project costs. An additional cash contribution of $1,038,700 is required to bring the non-Federal contribution to 35 percent of total project costs.

It is important to emphasize that <u>the Town of Bloomsburg will be responsible for any and all costs associated with hazardous, toxic, or radioactive waste (HTRW) as necessary to provide project lands that are clean of HTRW hazards as required for project construction by the Corps. HTRW response costs are not considered part of project costs, nor are they cost-shared or credited as part of Corps flood damage reduction projects</u>.

As documented in the HTRW Attachment to the Engineering Appendix, the Corps has prepared an estimate of non-Federal sponsor HTRW response costs in an attempt to assist the Town of Bloomsburg budget for <u>additional</u> costs it should anticipate beyond the costs quantified in Tables 27 and 28. The current non-Federal sponsor HTRW response estimate totals $895,600. Again, detailed information about this planning level estimate is provided in the HTRW Attachment to the Engineering Appendix.

Table 27
Fully Funded Cost Estimate – NED Plan

Account & Item Description	Cost	Contingency	Escalation	Total Cost
02 Relocations	4,623,000	924,000	771,000	6,318,000
06 Fish & Wildlife Facilities	1,322,000	330,000	230,000	1,882,000
11 Levees & Floodwalls	17,610,000	3,728,000	2,965,000	24,303,000
18 Cultural Resources Preservation	400,000	100,000	70,000	570,000
TOTAL CONSTRUCTION COSTS	**23,955,000**	**5,082,000**	**4,036,000**	**33,073,000**
01 Lands & Damages	4,953,000	1,040,000	522,000	6,515,000
30 Preconstruction Engineering & Design	2,588,000	388,000	459,000	3,435,000
31 Construction Management	2,634,000	263,000	319,000	3,216,000
TOTAL PROJECT COSTS	**34,130,000**	**6,773,000**	**5,336,000**	**46,239,000**

Table 28
Cost Apportionment
Federal and Non-Federal Responsibilities

Total Project Cost[8]		**$ 46,239,000**
Non-Federal Share (minimum 35%)		
5% Cash minimum	**$2,311,950**	
100% LERRDs	**$12,833,000**	
Cash Balance	**$1,038,700**	
Total Non-Federal Share (35%)		**$16,183,650**
Federal Share (65%)		**$30,055,350**

6.3 District's Assessment of Financial Capability

The purpose of the District's assessment is to determine the financial risk that may impact the economic performance of the proposed project. A key component of this financial risk is the financial capability of the non-Federal project partner to meet their responsibilities associated with the construction of the project. The assessment of this capability is based on: (1) prior performances of the non-Federal project partner on similar projects, (2) certainty of revenue sources, (3) methods and timing of payments, and (4) the overall financial position of each non-Federal sponsor.

The draft financing plan developed by the sponsor identifies several revenue sources, each with a varying level of certainty. The sources can be separated into five groups:

- contributions from the Commonwealth of Pennsylvania,
- committed funds from the Town of Bloomsburg,
- local contributions,
- grants, and
- debt.

The Commonwealth of Pennsylvania will provide 50 percent ($8,091,825) of the non-Federal project cost. A letter from Pennsylvania DEP indicating their agreement to provide the Town of Bloomsburg these funds is included as an attachment to this appendix. Pennsylvania has

[8]Excludes non-Federal sponsor costs for HTRW, as discussed in the FR/EIS main document, and the HTRW Section of the Engineering Appendix.

provided a 50 percent share of non-Federal cost on other projects in the past, most notably the Wyoming Valley Levee Raising Project.

The Town of Bloomsburg has committed local funds in the amount of $3,150,000. The Municipal Authority of the Town of Bloomsburg has pledged $2,150,000. The remaining $1,000,000 will come from Community Development Block Grants that the Town currently receives. These funds will be available upon Council approval.

A capital contribution has been discussed for businesses that are benefiting from the project. This contribution is anticipated to be $1,500,000. An additional $1,300,000 is anticipated through various grants from the Commonwealth of Pennsylvania. Other grant programs were identified that could provide funding for the Town.

The remaining financial obligations will be met through a bond issue or a loan program from the Commonwealth of Pennsylvania.

Through the contribution from Pennsylvania DEP and existing revenue that the Town manages, approximately two thirds of the non-Federal share is accounted for by funds that have minimal risk. However, the remaining third of the non-Federal share will come from sources that have a relatively high risk associated with them. This risk is offset somewhat by the Town's willingness to issue bonds or incur debt to cover the remaining non-Federal share. Financial risks are further mitigated by the nature of the project. Nearly $13,000,000 of the non-Federal share is associated with lands, damages, and relocations, which are generally completed before construction begins. At the point when construction begins, a minimal amount of Federal construction funds will have been expended minimizing the financial and economic risks from the Federal perspective. Additional refinements to the financing plan and data required to further assess the sponsor's financial capability will be provided by the sponsor.

The District believes that the level of risk associated with non-performance by the sponsor is moderate based on the information provided on the revenue streams identified in the financing plan. Management of the construction schedule can significantly reduce the financial risk to the Federal government. It is the District's assessment that the non-Federal sponsor's Financing Plan is a workable strategy for providing the non-Federal cost sharing requirements for the Bloomsburg Flood Damage Reduction Project.

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

PLANNING APPENDIX

Attachment B – Public Involvement

attend. Contact Mr. Karpinski (757–728–5531) for meeting agenda and specific locations.

Any member of the public may file a written statement with the committee before, during, or after the meeting. To the extent that time permits, the committee chairman may allow public presentations or oral statements at the meeting.

Gregory D. Showalter,

Army Federal Register Liaison Officer.

[FR Doc. 99–30549 Filed 11–22–99; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Feasibility Study and Draft Environmental Impact Statement (DEIS) for the Bloomsburg Local Flood Protection Project in Columbia County, PA

AGENCY: U.S. Army Corps of Engineers, DOD.

ACTION: Notice of intent.

SUMMARY: In accordance with the National Environmental Policy Act (NEPA), the Baltimore District, U.S. Army Corps of Engineers, is initiating the Bloomsburg Local Flood Protection Feasibility Study in Columbia County, Pennsylvania. This study will include an evaluation of levee/floodwall alignment alternatives to provide adequate protection to the Town of Bloomsburg. The level of protection will be determined through an assessment of flood damages; degree of adverse impacts to the cultural, environmental, and socio-economic surroundings, and a benefit-cost ratio. A DEIS will be prepared that will document existing conditions, project actions, and project impacts. The Town of Bloomsburg is the non-Federal sponsor.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and DEIS can be addressed to Ms. Stacey Underwood, Study Team Leader, Baltimore District; U.S. Army Corps of Engineers, ATTN: CENAB–PL–P, P.O. Box 1715; Baltimore, Maryland 21203–1715, telephone (410) 962–4977. E-mail address: stacey.m.underwood@usace.army.mil

SUPPLEMENTARY INFORMATION:

1. The authorization for the Bloomsburg Reconnaissance Study was the U.S. House of Representatives, Committee on Transportation and Infrastructure resolution, dated September 12, 1996.

2. The Bloomsburg Reconnaissance Study produced by the Corps in 1998 determined that there was both Federal and non-Federal interest in pursuing a feasibility study and implementation of a local flood protection project.

3. In June 1999, the Corps and the Town of Bloomsburg executed a feasibility cost-sharing agreement. The study area is the Town of Bloomsburg, located in central Columbia County, Pennsylvania, approximately 50 miles southwest of Wilkes-Barre. Bloomsburg is situated at the confluence of Fishing Creek and the Susquehanna River.

4. Environmental issues will focus on, but are not limited to, effects on air quality, wetlands, water quality; fish and wildlife resources (including threatened and endangered species); hazardous, toxic, and radioactive waste; aesthetic resources; and cultural resources (including archaeological sites and historic architecture). Benefits, costs, and impacts will be examined in detail to determine whether a flood protection structure is justified and the appropriate alignment for such a structure. The team will evaluate the environmental impacts (both adverse and beneficial) of the proposed actions.

5. The decision to implement these actions will be based on an evaluation of the probable impact of the proposed activities on the public interest, and will also be based on the national concern for protection and utilization of important resources. The benefit that reasonably may be expected to accrue from the proposal will be balanced against the project's reasonably foreseeable costs. The Pennsylvania Department of Environmental Protection and the Baltimore District are preparing a DEIS that will describe the impacts of the proposed project on environmental and cultural resources in the study area and the overall public interest. The DEIS will be in accordance with NEPA and will document all factors that may be relevant to the proposal, including the cumulative effects thereof. If applicable, the DEIS will also apply guidelines issued by the Environmental Protection Agency, under the authority of Section 404(b)(1) of the Clean Water Act of 1977 (Public Law 95–217).

6. The public involvement program will include workshops, meetings, and other coordination with interested private individuals and organizations, as well as with concerned Federal, state and local agencies. Coordination letters and newsletters will be sent to appropriate agencies, organizations, and individuals on an extensive mailing list. Additional public information will be provided through print media, mailings, radio and television announcements.

7. Other participants that will be involved in the study and DEIS process in addition to the Corps, the Pennsylvania Department of Environmental Protection, and the Town of Bloomsburg include the following: the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Natural Resource Conservation Service, and U.S. National Park Service. The Baltimore District invites potentially affected Federal, state, and local agencies, and other organizations and entities to participate in this study.

8. The Bloomsburg Local Flood Protection Feasibility Study and DEIS are tentatively scheduled for public review in December 2001.

Robert W. Lindner,

Chief, Planning Division.

[FR Doc. 99–30550 Filed 11–22–99; 8:45 am]

BILLING CODE 3710–41–M

DEPARTMENT OF EDUCATION

Submission for OMB Review; Comment Request

AGENCY: Department of Education.

SUMMARY: The Leader, Information Management Group, Office of the Chief Information Officer invites comments on the submission for OMB review as required by the Paperwork Reduction Act of 1995.

DATES: Interested persons are invited to submit comments on or before December 23, 1999.

ADDRESSES: Written comments should be addressed to the Office of Information and Regulatory Affairs, Attention: Danny Werfel, Desk Officer, Department of Education, Office of Management and Budget, 725 17th Street, NW., Room 10235, New Executive Office Building, Washington, D.C. 20503 or should be electronically mailed to the internet address DWERFEL@OMB.EOP.GOV.

SUPPLEMENTARY INFORMATION: Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. OMB may amend or waive the requirement for public consultation to the extent that public participation in the approval process would defeat the purpose of the information collection, violate State or Federal law, or substantially interfere with any agency's ability to perform its statutory obligations. The Leader,

Billing Code: 3710-41

DEPARTMENT OF DEFENSE

Department of Army

Corps of Engineers

Intent to Prepare a Feasibility Study and Draft Environmental Impact Statement (DEIS) for the Bloomsburg Local Flood Protection Project in Columbia County, Pennsylvania.

AGENCY: U.S. Army Corps of Engineers, DOD

ACTION: Notice of Intent

SUMMARY: In accordance with the National Environmental Policy Act (NEPA), the Baltimore District, U.S. Army Corps of Engineers, is initiating the Bloomsburg Local Flood Protection Feasibility Study in Columbia County, Pennsylvania. This study will include an evaluation of levee/floodwall alignment alternatives to provide adequate protection to the Town of Bloomsburg. The level of protection will be determined through an assessment of flood damages; degree of adverse impacts to the cultural, environmental, and socio-economic surroundings; and a benefit-cost ratio. A DEIS will be prepared that

will document existing conditions, project actions, and project impacts. The Town of Bloomsburg is the non-Federal sponsor.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and DEIS can be addressed to Ms. Stacey Underwood, Study Team Leader, Baltimore District, U.S. Army Corps of Engineers, ATTN: CENAB-PL-P, P.O. Box 1715, Baltimore, Maryland 21203-1715, telephone (410) 962-4977. E-mail address: stacey.m.underwood@usace.army.mil

SUPPLEMENTARY INFORMATION:

1. The authorization for the Bloomsburg Reconnaissance Study was the U.S. House of Representatives, Committee on Transportation and Infrastructure resolution, dated September 12, 1996.

2. The Bloomsburg Reconnaissance Study produced by the Corps in 1998 determined that there was both Federal and non-Federal interest in pursuing a feasibility study and implementation of a local flood protection project.

3. In June 1999, the Corps and the Town of Bloomsburg executed a feasibility cost-sharing agreement. The study area is the Town of Bloomsburg, located in central Columbia County, Pennsylvania, approximately 50 miles southwest of Wilkes-Barre. Bloomsburg is situated at the confluence of Fishing Creek and the Susquehanna River.

4. Environmental issues will focus on, but are not limited to, effects on air quality, wetlands, water quality; fish and wildlife resources (including threatened and endangered species); hazardous, toxic, and radioactive waste; aesthetic resources; and cultural resources (including archaeological sites and historic architecture). Benefits, costs, and impacts will be examined in detail to determine whether a flood protection structure is justified and the appropriate alignment for such a structure. The team will evaluate the environmental impacts (both adverse and beneficial) of the proposed actions.

5. The decision to implement these actions will be based on an evaluation of the probable impact of the proposed activities on the public interest, and will also be based on the national concern for protection and utilization of important resources. The benefit that reasonably may be expected to accrue from the proposal will be balanced against the project's reasonably foreseeable costs. The Pennsylvania Department of Environmental Protection and the Baltimore District are preparing a DEIS that will describe the impacts of the proposed project on environmental and cultural resources in the study area and the overall public interest. The DEIS will be in accordance with NEPA and will document all factors that may be relevant to the proposal, including the cumulative effects thereof. If applicable, the DEIS will also apply guidelines issued by the Environmental Protection Agency, under the authority of Section 404(b)(1) of the Clean Water Act of 1977 (Public Law 95-217).

6. The public involvement program will include workshops, meetings, and other coordination with interested private individuals and organizations, as well as with concerned Federal, state and local agencies. Coordination letters and newsletters will be sent to appropriate agencies, organizations, and individuals on an extensive mailing list. Additional public information will be provided through print media, mailings, radio and television announcements.

7. Other participants that will be involved in the study and DEIS process in addition to the Corps, the Pennsylvania Department of Environmental Protection, and the Town of Bloomsburg include the following: the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Natural Resource Conservation Service, and U.S. National Park Service. The Baltimore District invites potentially affected Federal, state, and local agencies, and other organizations and entities to participate in this study.

8. The Bloomsburg Local Flood Protection Feasibility Study and DEIS are tentatively scheduled for public review in December 2001.

Robert W. Lindner
Chief, Planning Division

BLOOMSBURG MEDIA LIST

Local Newspapers		
Press-Enterprise Inc. 570-387-1234 X 1301 1-800-228-3483	The Danville News 570-275-3235	The Daily Item 570-286-5671 F 570-286-7695
The Scranton Times		
Local Radio Stations		
WHLM NewsLine 570-387-1345	WCNR 570-784-1200	WKAB Berwick / Hazelton P 570-759-3570/ 570-450-7552 F 570-759-3438/ 570-459-5110
Local TV Stations		
WNEP-TV 16 Moosic, Pa 570-346-7474	WYOU-TV Scranton/Wilkes-Barre 570-961-2222 F 570-344-4484	WBRE-TV Wilkes-Barre 570-823-9273 1-800-358-9273

TOWN OF BLOOMSBURG
Mary Lenzini Howe, Mayor
301 East Second Street • Bloomsburg, PA 17815
Phone: 717-784-7703 • FAX: 717-784-1518

May 18, 1998

Colonel Bruce A. Berwick
District Engineer
Baltimore District
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Colonel Berwick:

The purpose of this letter is to state the interest of the Town Council, Town of Bloomsburg, Pennsylvania, in partnering with the U.S. Army Corps of Engineers on a local flood protection Study for the Town of Bloomsburg.

Members of our respective staffs and Pennsylvania Department of Environmental Protection anticipate a meeting in July 1998 to discuss the study process, scope and cost-sharing. We are now prepared to initiate negotiations on the project study plan (PSP), which will include the detailed scope and cost of the feasibility study. The cost sharing for the study is 50 percent Federal funding and 50 percent funding by the non-Federal sponsor(s). Also, up to one-half of the non-Federal share can consist of in-kind services, which is work performed by or separately financed by the sponsor(s). We also understand that project construction cost sharing is 65 percent Federal and 35 percent non-Federal. The Bloomsburg Council has funding available to initiate the feasibility study, assuming we successfully negotiate the PSP. I understand the Corps of Engineers also has funding available for the study.

I look forward to a successful study for Bloomsburg. If you require further information, please contact either me (717-784-7123, Ext. 133; marylh@townhall.bafn.org) or have your staff contact Gerry Depo, out Town Administrator (717-784-7123, Ext. 125; FAX, 717-784-1518; gerrydepo@townhall.bafn.org).

Very truly yours,

Mary Lenzini Howe

MARY LENZINI HOWE
Mayor

Cc: Daniel J. Bauman, Council Member
Gerry Depo
File

10/18/99 16:40 US DEPT OF COMMERCE EDA 001

U.S Department of Commerce
Economic Development Administration
The Curtis Center-Suite 140 South
Independence Square West
Philadelphia, PA 19106

PHILADELPHIA REGIONAL OFFICE
FACSIMILE TRANSMITTAL FORM

DATE: 10-18-99

TO: STACEY UNDERWOOD

COMPANY/OFFICE: COE - BALT, MD

TEL. NO: ______ **FAX NO:** 410-962-4698

FROM: JERRY WALLACE

OFFICE: EDA - Phila Reg. Office

TEL. NO: 215-597-2808 **FAX NO:** (215) 597-6669

COMMENTS:
FYI. Let's talk.

IF ALL PAGES ARE NOT RECEIVED, PLEASE CONTACT SENDER
Page 1 of _______ Pages

U.S. DEPARTMENT OF COMMERCE
Economic Development Administration
The Curtis Center
Suite 140 South
Independence Square West
Philadelphia, Pennsylvania 19106

SEP 2 9 1999

In reply refer to:
Project No.:01-79-03939

Mr. Dennis E. Robinson
Executive Director
SEDA Council of Governments
R R # 1 Box 372
Lewisburg, PA 17837

Dear Mr. Robinson:

We are pleased to inform you that the Economic Development Administration (EDA) has approved a Financial Assistance Award in an amount not to exceed $58,000 in response to your application for economic adjustment assistance for SEDA - COG.

The total Project cost is $129,000 which is based on the line item estimates contained in Special Terms and Conditions.

Enclosed are three signed copies of the Financial Assistance Award. Your agreement to the terms and conditions of the Award should be indicated by the signature of your principal official on all three of the signed copies of the Financial Assistance Award. Two of the executed copies should be returned to the Director, Philadelphia Regional Office, The Curtis Center, Suite 140S - Independence Square West, Philadelphia, PA 19106. If not signed and returned within 30 days of receipt, the Grants Officer may declare the Award null and void.

You are cautioned not to make any commitments in reliance on this Award, nor to enter into negotiations relative hereto, until you have carefully reviewed the terms and conditions and have determined that you are in compliance or that you can comply therewith. Any commitments or undertakings entered into prior to obtaining the approval of the Government in accordance with its regulations and requirements will be at your own risk.

Sincerely,

Paul M. Raetsch
Regional Director

Enclosure

Form CD-478
(10/98)

United States
Department of Commerce

FEDERAL ASSISTANCE INFORMATION SHEET (FAIS)

1. BUREAU NAME: Economic Development Administration

2. NAME AND ADDRESS OF APPLICANT:

   SEDA - Council of Governments
   R.R. #1, Box 372
   Lewisburg, Pennsylvania 17837

3. APPLICANT CONTACT NAME, TITLE, AND TELEPHONE NUMBER:

   Dennis E. Robinson
   Executive Director
   570-524-4491

4. APPLICANT CONGRESSIONAL DISTRICT: 5

5. AWARD NO.: 01-79-03939

6. PROPOSED FEDERAL FUNDING: $58,000

7. CFDA NO. AND PROGRAM NAME:

   11.307; Special Economic Adjustment Assistance Program

8. SCOPE OF WORK:

   Flood mitigation studies to identify methods to reduce the negative economic and physical impacts of future floods.

— c PD

Pennsylvania Department of Environmental Protection

208 West Third Street, Suite 101
Williamsport, PA 17701-6448

October 29, 1999

Northcentral Regional Office

Fax 570-327-3565

Mr. Robert W. Lindner
Chief, Planning Division
Department of the Army
Baltimore District Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Re: Town of Bloomsburg Flood Control Project
Columbia County, Pennsylvania

Dear Mr. Lindner:

The representative from the Northcentral Regional Office for any meetings pertaining to the flood protection project at Bloomsburg will be Mr. George Grose, telephone 570-327-3702, or as an alternate F. Alan Sever, P.E., telephone 570-327-3700. It is our understanding that the primary DEP contact for this project will still be Mr. Michael D. Conway of our Bureau of Waterways Engineering in Harrisburg. Our regional representative is available to attend all appropriate meetings but I believe Mike Conway will be making any appropriate decisions for the Department.

If you have any questions regarding this matter, please feel free to contact me at 570-327-3320.

Sincerely,

William P. Parsons
Assistant Regional Director
Northcentral Regional Office

cc: Mike Conway
F. Alan Sever
George Grose
File

WPP/FAS/bls

SEDA COG

A LOCAL DEVELOPMENT DISTRICT

serving the counties of

Centre
Clinton
Columbia
Juniata
Lycoming
Mifflin
Montour
Northumberland
Perry
Snyder
Union

October 14, 1999

Mr. Robert W. Lindner, Chief
Planning Division
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Lindner:

I have received your letter of September 30, 1999, announcing the partnership among the U.S, Army Corps of Engineers, Pennsylvania Department of Environmental Protection, and the Town of Bloomsburg for the purpose of conducting a feasibility study for a local flood danger reduction project.

Please continue to direct correspondence regarding progress on this project to me.

Sincerely,

Thomas P. Bresenhan
Program Director, Flood Recovery

TPB/mw

C:\My Documents\MAW\TOMPAT\FLOOD\BloomsburgCOE.doc

SEDA
Council of
Governments

RR #1 Box 372
Lewisburg
PA 17837
USA

(570) 524-4491
fax 524-9190

503

COLUMBIA COUNTY
REDEVELOPMENT AUTHORITY
700 SAWMILL ROAD
BLOOMSBURG, PA 17815
WILLIAM L. KLINK, EXECUTIVE DIRECTOR
570-784-9373
Fax: 570-387-8806
TDD: 570-389-5745

October 14, 1999

Mr. Robert W. Lidner, Chief
Planning Division
Department of the Army
Baltimore District Corp of Engineers
P.O. Box 1715
Baltimore, MD 21203-1175

Dear Mr. Lidner:

In compliance with your request for an agency point of contact, I will be taking that responsibility myself. I look forward to working with you and your staff.

Sincerely,

William L. Klink
Executive Director

WLK/jj

563

Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
P.O. Box 8451
Harrisburg, PA 17105-8451
October 18, 1999

Bureau of Facility
Design and Construction

Mr. Robert W. Lindner, Chief
Planning Division
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

Dear Mr. Lindner:

The Department of Conservation and Natural Resources is pleased to be invited to participate in the feasibility study to reduce flood damage in the Town of Bloomsburg.

I will be our agency's point of contact. I am the Director of the Bureau of Facility Design and Construction, which supplies the infrastructure support to the Bureaus of Parks and Forestry.

Should you have any questions or need additional information, please feel free to call me at 717-787-7398.

Sincerely,

Eugene J. Comoss, P.E.
Director

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH & BOAT COMMISSION
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5147

October 19, 1999

Robert W. Lindner, Chief
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Re: Feasibility Study - Town of Bloomsburg Local Flood Damage Reduction Project, Columbia County

Dear Mr. Lindner:

In response to your September 30, 1999 letter, the Pennsylvania Fish and Boat Commission can provide only very general aquatic resource information at this time since the Bloomsburg flood damage study is in such a preliminary phase. Essentially, Bloomsburg's location near the confluence of Fishing Creek and the Susquehanna River gives its residents access to both the upstream stocked trout sections of Fishing Creek as well as the varied warmwater/coolwater fishery in its lower end and in the River.

This office will be pleased to coordinate any necessary Fish and Boat Commission input as the feasibility study develops. Feel free to provide future correspondence directly to me as the point of contact, or to call at 814-359-5145.

Thank you for the opportunity to provide comments early in this process.

Sincerely,

Ron Tibbott

Ron Tibbott, Fisheries Biologist
Division of Environmental Services

RT:srh

c: PFBC - Pisko

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Robert W. Lindner
Chief, Planning Division
Baltimore District, Corps of Engineers
Department of the Army
P.O. Box 1715
Baltimore, MD 21203-1715

OCT 22 1999

Dear Mr. Lindner:

Thank you for your letter concerning ongoing investigations of local flood damage reduction for the Town of Bloomsburg, Columbia County, Pennsylvania. Your request for assistance is noted and Mr. Charles A. Rhodes, Jr. has been designated as the contact person for future project coordination.

Mr. Rhodes is an ecologist in the Environmental Protection Agency's (EPA) Environmental Services Division and has over twenty years of experience in the development and review of environmental impact documents prepared under the National Environmental Policy Act (NEPA). Mr. Rhodes has extensive experience in the review of public works projects which require Federal permitting in accordance with Section 404 of the Clean Water Act and the Rivers and Harbors Act.

Although resources are limited, Mr. Rhodes will provide consultation during the feasibility stages to the extent practicable. EPA will subsequently review any resulting documents under EPA's review authorities, if a viable project moves forward to the next phase.

Thank you for your offer to provide input for this study. Please contact Mr. Rhodes at 215/814-2743 for future project coordination and any additional information.

Sincerely,

W. Michael McCabe
Regional Administrator

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

November 18, 1999

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Robert W. Lindner
Chief, Planning Division
US Army Corps of Engineers
Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

Re: File No. ER 99-2780-037-B
COE Feasibility Study: Implementation of
Local Flood Damage Reduction Project
Town of Bloomsburg, Columbia County

Dear Mr. Lindner:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

All agency project assessments requiring the comments of the Pennsylvania State Historic Preservation Officer should include the funding program, a project description, project location, and cultural resource site information as outlined in 36 CFR Part 800.4 (Identifying Historic Properties). Because your request does not include sufficient information, we are unable to proceed with our review until the information on the attached form is provided.

A preliminary review of this project indicates that there are National Register-listed or eligible historic resources in the project area listed below. Project planners should conduct surveys to identify all potential historic resources before final plans are formulated. For assistance in organizing and conducting a survey, please contact the Bureau for Historic Preservation.

Bloomsburg Historic District

If you need further information regarding archaeological survey please contact Noël Strattan at (717) 772-4519. If you need further information concerning historic structures please consult Ann Safley at (717) 787-9121. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely,

K. W. Carr

Kurt W. Carr, Chief
Division of Archaeology &
Protection

Attachment
KWC/tmw

99-2780-037-B

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
BUREAU FOR HISTORIC PRESERVATION: INFORMATION REQUEST FORM

Please submit the items checked:

( ) A. FUNDING/PERMITTING/LICENSING/APPROVAL PROGRAM
1. Name of federal/state/local agency (please identify all agencies involved)
2. Type of involvement(funding/permit/license/approval)
3. Name of Program (CDBG, HUD, Sewer Module, etc.)
4. Name/address of office at which application has been/will be filed.

B. PROJECT DESCRIPTION: Narrative description of assisted and related work including:
( ) Size of project (number of buildings, units, stories, acres)
( ) Use or purpose
(X) Extent and nature of ground disturbing activities (i.e. trenching, grading, foundation excavation, etc.)
(X) Annotated Site map/plan showing proposed ground disturbance
( ) Architectural plans/specifications
(X) Development plans showing existing conditions and proposed new construction
(X) Please explain how buildings of 50 years or older will be affected by project

PHOTOGRAPHS (3" X 5") showing:
( ) Exterior of buildings in project area
( ) Interior of buildings in project area
( ) Buildings over 50 years old in project area keyed to a site plan or U.S.G.S. quadrangle map
( ) Buildings over 50 years old surrounding the project area keyed to a site plan or U.S.G.S. quadrangle map
( ) Streetscapes near project area

C. PROJECT LOCATION

(X) U.S.G.S. 7.5 min. series (topographic) quadrangle with the PROJECT LOCATION(S) AND LIMITS CLEARLY MARKED using colored pen. Please include name of quadrangle.
( ) Street map (for projects in populated areas)
( ) Street map showing project location and historic district boundaries
( ) acreage of project area
( ) miles/feet of project and right-of-way width
( ) street address of property

D. PROJECT SITE

( ) Supply brief history/use of buildings/property, including historic names/dates for the property.
( ) Describe all buildings on the site using the BHP Historic Resource Form
( ) Floor plans of building
( ) Other: ______________________________

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

February 11, 2000

Mr. Robert W. Lindner
Chief, Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Lindner:

This responds to your letter of December 22, 1999, requesting information about federally listed and proposed endangered and threatened species within the area affected by flood damage reduction project located in Columbia County, Pennsylvania. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species.

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act will be required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

This response relates only to endangered or threatened species under our jurisdiction based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Consequently, this letter is not to be construed as addressing potential Service concerns under the Fish and Wildlife Coordination Act or other authorities.

Requests for information regarding State-listed endangered or threatened species should be directed to the Pennsylvania Game Commission (birds and mammals), the Pennsylvania Fish and Boat Commission (fish, reptiles, amphibians and aquatic invertebrates), and the Pennsylvania Department of Conservation and Natural Resources (plants).

Please contact Michael McCarthy of my staff at 814-234-4090 if you have any questions or require further assistance.

Sincerely,

David Densmore
Supervisor

Enclosure

CATAWISSA BOROUGH

George Romania,
Council President

P. O. Box 44
307 MAIN STREET
CATAWISSA, PA. 17820

Phone: (570) 356 - 2561
Fax: (570) 356 - 2794

February 14, 2000

Army Corps. of Engineers
District Office
P. O. Box 1715
Baltimore, MD 21203-1715
Attn: Colonel Berwick

Dear Colonel Berwick,

I would like to express the concerns of the residents and businesses of the Borough of Catawissa in reference to the Wyoming Valley Levee Raising Project. Of special concern is the location of the Catawissa Borough Sewer Plant, on First Street along the River's edge. The Sewer Plant currently services some 1,700 residents and businesses and its' continued operation is crucial to the well-being of the Borough.

In addition to the Sewer Plant, there are homes and businesses located on First Street that have been repeatedly flooded, as recently as January 19, 1996, and during the snow storms of 1993 and 1994. The recent flooding damages have been documented and recorded by both PEMA and FEMA.

Due to the aforementioned conditions, I implore you to consider and include the Borough of Catawissa in both the funding and planning stages of this flood protection project.

Your attention to the needs of the residents of the Borough of Catawissa are always greatly appreciated. Thank you again for your time and consideration.

Yours truly,

George J. Romania,
Council President

CATAWISSA BOROUGH

Herbert Colosimo,
~ Mayor ~
Catawissa Borough

P. O. Box 44
307 MAIN STREET
CATAWISSA, PA. 17820

Phone: (570) 356 - 2561
Fax: (570) 356 - 2794

February 14, 2000

Army Corps. of Engineers
District Office
P. O. Box 1715
Baltimore, MD 21203-1715
Attn: Colonel Berwick

Dear Colonel Berwick,

I would like to express the concerns of the residents and businesses of the Borough of Catawissa in reference to the Wyoming Valley Levee Raising Project. Of special concern is the location of the Catawissa Borough Sewer Plant, on First Street along the River's edge. The Sewer Plant currently services some 1,700 residents and businesses and its' continued operation is crucial to the well-being of the Borough.

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Due to the aforementioned conditions, I implore you to consider and include the Borough of Catawissa in both the funding and planning stages of this flood protection project.

Your attention to the needs of the residents of the Borough of Catawissa are always greatly appreciated. Thank you again for your time and consideration.

Yours truly,

Herb Colosimo

Mayor Herbert Colosimo,
Borough of Catawissa

COLUMBIA COUNTY PLANNING COMMISSION

702 Sawmill Road, Suite 104 Bloomsburg, PA 17815 (570)389-9146
Neal Fogle, Director

March 20, 2000

U.S. Army Corp of Engineers
ATTN: Stacy Underwood
P.O. Box 1715
Baltimore, MD 21203-1715

RE: Columbia County Susquehanna Trail

Dear Ms. Underwood

This letter is a follow-up to our October 29, 1999 phone conversation. That conversation was in response to the Corps September 30, 1999 letter that requested information relative to the Bloomsburg flood protection study area. I had indicated that a proposed trail was proposed through the study area.

As an update on this project, I am enclosing a map of the trail's proposed location, which utilizes the old railroad bridges over the Susquehanna River and Fishing Creek. The County has recently received $800,000 in grant funds to be used towards the design and construction of this trail. The total estimated cost for the entire project, (final design and construction) is approximately $1.9 million.

If you have any questions, please contact our office.

Sincerely,

Neal Fogle
Director

cc: Congressman Kanjorski
Col. Co. Comm.

Bloomsburg Flood Protection Study
Informal Meeting With Fishing Creek Area Residents
TENTATIVE AGENDA FOR STUDY TEAM

Time/Date/Location: 20 January 2000; Blue Moose, 203 West Main St., 3rd flr. Banquet room; 7:00 to 8:30 PM

Meeting Purpose: To present information on the project, planning process, and the soil sampling needed on properties adjacent to Fishing Creek; to explain rights-of-entry and get responses about whether property owners will consider signing ROEs; and to answer questions on the study/project.

Meeting Concept: An informal informational meeting to introduce the team and the study to a small group of affected citizens.

Product/Benefits: To discuss the study and planning process, receive responses on rights-of-entry, and begin the public involvement process, in accordance with NEPA requirements.

6:30 - 7:00	Attendees arrive, sign-in, and view displays
7:00 - 7:10	Welcome and introductions, explain meeting agenda **(Mayor)**
7:10 - 7:20	Study overview **(Underwood)** - study area, partners, schedule, process, soil sampling, importance of Fishing Creek sampling
7:20 - 7:40	Soil sampling - why and where sampling is needed **(Capka)** - how sampling will be done **(DEP)**
7:40 - 8:00	Rights-of-Entry **(Oestreich)** - why needed, sample ROE, who would consider?, will send ROEs to sign
8:00 - 8:25	Questions/Discussion/Comments **(Underwood/team)**
8:25 - 8:30	Closing remarks **(Mayor)** - thanks for coming, further questions, Public Meeting on Feb. 24

Handouts: Welcome sheet with map, comment cards

Displays/Graphics: Maps: project area and Fishing Creek area; photos of levee, floodwall,Fishing Creek, drill rigs

Personnel: Stacey Underwood, Nancy Jedziniak, Dave Capka, Adam Oestreich, Carol Anderson-Austra, (Corps); Mary Lenzini Howe, Mayor; Gerry Depo, Dan Bauman, Christine Hartzell (Bloomsburg); Ed Briner, Lorna Frick, Dale Hamlen, Mike Coway (DEP); Eric High (PennDOT)

Supplies: Boards, tape, name tags, index cards, notepads, pencils/pens, scissors, stapler, comment cards/box, easels, handouts, welcome signs, sign-in sheets, hard candies/baskets.

Prior to Meeting: Arrange tables, chairs, and podium; set up table displays; organize welcome table with sign-in sheets, handouts, name tags; identify attendees to introduce (Cong. Reps, local officials, etc.).

Fishing Creek Meeting
Detailed AGENDA
20 Jan 00

7:00 Welcome and Introductions (**Mayor**)
- Thank everyone for coming
- State importance of flood protection to Town; COE has initiated study based on request from Town and as directed by Congress
- Purpose of tonight's meeting is to begin the public involvement process and to specifically discuss soil sampling necessary along Fishing Creek
- Introduce partners – Town, COE, DEP, PennDOT
- Discuss agenda – quick project overview, details of soil sampling, ROE (permission needed by property owners), Q&A's; mention focus of the meeting is the soil sampling and general public meeting will be held on 24 Feb

7:10 Brief Study Overview (**Underwood**)
- Describe study area (**Study Area Map**)
- Identify cost-sharing partners
- Discuss study schedule (3 years) (See **handout**):
    - Identify Problems and Opportunities
    - Determine Existing Conditions (surveys, H&H, econ, soil sampling, etc)
    - Develop Alternative Solutions (**show photos of levee, floodwall – mention no action**)
    - Evaluate and Compare Alternative Solutions (discuss benefits, costs, impacts)
    - Select Recommended Plan – Town and COE decide
    - Perform Detailed Design
    - Feasibility Report and EIS
    - Public Involvement – public meetings, newsletters, etc (such as tonight's meeting)
- Discuss project schedule – If project is recommended, PED phase, RE acquisition, Construction
- First step is soil sampling – determine conditions and help design
- Because Fishing Creek floods and causes major damages, high likelihood of protection along Fishing Creek; due to lack of space, wall more likely than levee
- COE will lay out sampling plan and DEP will perform sampling – Turn meeting over to Capka

7:20 Details of Soil Sampling (**Capka and DEP**)
- **Capka** – Explain why and where we need to sample (explain some flexibility in locations) (**Show Fishing Creek Photo**)

- **DEP** – Explain how and when drilling will occur (**Show drill rig photos**)
    - Explain that property will be restored

7:40 Right-of-Entry **(Oestreich)**

- Discuss why ROE needed
- **Hand out sample ROE** and explain how it works (discuss survey ROE vs. sampling ROE); ROE does not commit owner to anything else (Construction is long way off)
- Would like to know tonight if people are willing or not to consider providing ROE; ask them to fill out form
- After tonight, we'll lay out sampling plan and formally mail ROE's to homeowners; we'll ask that they reply as quickly as possible so that planning can continue

8:00 Q&A's **(Underwood)**

- Underwood will run Q&A session, calling on team members as needed to answer questions

8:25 Closing Remarks **(Mayor)**

- Mayor thanks everyone for coming
- If anyone has any questions, comments, feel free to call Town or COE; also there are comment cards by the door they can fill out
- Invite them to attend public meeting on February 24th

3/6/00

Bloomsburg Flood Protection Study
Public Scoping Meeting – February 24, 2000

The following comments or questions were made or asked during the scoping meeting held at the Bloomsburg High School. The meeting was well attended, with 254 individuals signing in. Comments/questions have been grouped according to the topic rather than listed in the sequence made or asked. The topics include Planning Process, Bridges/Infrastructure, Communities (Fernville, Catawissa, Scottown, Rupert), Construction/Design, River Conditions/Dredging, DOT, Public Involvement, and Real Estate.

Planning Process

- Concerned about airport expansion and east end of town with flooding.
- [Residents] Southwest of Routes 11 and 42 and in other areas outside of Bloomsburg are concerned and need protection. The study should include these areas.
- Why not [develop a] comprehensive plan?
- Flood prevention, not protection. Runoff and higher levees [upstream] are the problem.
- Who [gets to make the]decision - Commissioners or people?
- Will whole town vote on decision?
- [Concern is whether] people inside and outside recommended plan protection area will be protected.
- What level of protection are we aiming for?
- Columbia County should be involved in the study and bridge removal options.
- What stopped implementation of past studies?
- Over what period of time are B/C ratios considered?
- Seems we will have a B/C ratio acceptable at more frequent event.
- Is this the final study? Will there be study after study?
- Consider multi-purpose hazard mitigation with other agencies.
- Look at Bob [Lindner's] study.

Real Estate

- [The] fair market value of housing is now significantly less since "proposed" floodwall was in the paper.
- House[s] on the wrong side of the river have much less value.
- Property on Fishing Creek across from fairgrounds – if someone builds a new house will [it] be in the flood plain if wall is built.
- People with buyout would have to pay 20% of cost of relocation?
- [Does]eminent domain enter into this?
- 100-year floodplain residents unable to do anything with homes (FEMA requirements) – will levee allow improvements (west end of Bloomsburg)?
- What will [the] tax situation be for buyouts, capital gains?

- How will buyouts be determined? Which homes?
- [Town should] consider not pursuing buyouts until later.
- Will buyouts impose capital gain taxes?

Bridges

- [The] stone pillars of the trolley (aqueduct) bridge were removed – another bridge with two pillars built.
- Railroad bridge should be removed
  - For 8" of elevation/reduction
  - Proposed for 20 years.
  - $ allocated-do now
- Does $1.8 million [mitigation fund]earn interest?
- Rupert Railroad bridge removal is recommended mitigation – 14" elevation.
- Double track bridge [to Fernville is concern].
- Consider removal of Boone's Dam and covered bridge (all barriers).
- 1980 – Railroad bridge to be removed, why not done? We need that relief now.

Infrastructure

- Consider historical significance of area.
- Schools and sewage plant need focus in plan.
- Ft. McClure house historic site by water treatment plant – can we protect it?
- 11th street [gets] sewage from commodes.
- At present flooding levels, equipment at sewer plant has to be pulled up [during floods].
- How will school be protected?
- School auditorium lower.
- Flood protection of any kind should consider keeping sewage plant operational.
- Consider [storm] sewer drainage system in town.
- Will the levee/wall consider future raisings/levels of protection? (Sunbury and Wilkes were overtopped)

Communities

- Concerned with new Fernville stormdrains, not the best.
- How will the residents and sewer system ($1M) be taken care of by township
- Why not put floodwall on Fernville side too?
- Don't want to sell - want protection.
- Future home improvements (in light of buy-outs) a concern (Fernville).
- Flooding creates problems for exiting Fernville.
- No access out of Fernville in emergency.
- Double-track bridge – entrance to Fernville not too safe, it needs to be considered as access.
- Fernville – Scottown survival group block committee – special interest group.
- Did both old studies show induced flooding in Fernville?
- When will buyouts occur in study process (Fernville)?

- Consider downstream flooding on residents and business in Catawissa.

Public Involvement
- Glad for high meeting turnout - folks in Fernville need to be heard.
- Need plebiscite [vote] after study.
- Need to send SASE [self addressed stamped envelope]to Corps [to get response]?
- Need future residents of all communities involved in final decision-making.
- Never contacted by Corps door-to-door near school area.
- No contact in 46 years.

Construction/Design
- How will water get out from behind the levee if overtopped?

DOT
- Why DOT would add traffic to neighborhoods?

Rivers
- Kinney run pushes water as high as 10th street.
- Large drop from Fishing Creek to Catawissa.
- Trees/debris left in Fishing Creek – clearing may help flooding.

Upstream Protection
- Kawneer needs coverage in plan.

Dredging
- Are we not considering opening river channel?

5/10/00

Bloomsburg Flood Protection Study

February 24, 2000 Public Meeting – Bloomsburg High School

Comment Card Responses

Comment cards and sheets with four questions were distributed at the scoping meeting and a number of the cards and sheets were returned. Many included written comments, however, some responses only requested being added to the study mailing list. Of the cards returned without additional written comments, most responses to the question on the card, "Was this meeting helpful?" were positive. Comment cards and sheets that include the writers' names and addresses provide useful clues for the technical study team members, such as which residences are located in specific areas. Written comments are shown below. Each "bullet" indicates a separate response. Anonymous comments are indicated.

- **Was this meeting helpful?** Yes
  We need to really consider areas like Rupert, [Fishing] Creek, etc. We people are definitely affected.

- **Was this meeting helpful?** Yes
  Protect Fernville please. Would volunteer to be part of a Fernville group to address our residents concerns.

- Consider Edger Ave. Bloomsburg (Espy). When this floods, Kinny Run is elevated to a higher degree and would be behind the floodwall/dike if built. Could the residents of Scottown be considered in this study.

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Not moving from cafeteria to auditorium. Should have been in auditorium to start with.
  Columbia County Comm. are in the process of doing a stormwater study on Kinney Run as part of our Act 167 watershed plan study. Larson Design Group has been hired for study. Can you contact me for coordination of Corp study and our study on Kinney Run.

- **Was this meeting helpful?** Yes
  I think some people are not really listening to speakers – they do not have "Open minds" about a wall or levee – whether it's age or stubbornness – I don't know – but I thought all speakers were very informative and if people would really listen – they would understand. Some people already have their minds made up, so it wouldn't matter what anyone said.

- **Was this meeting helpful?** Yes
  The Town Council's presentation was highly biased and misleading. In future meetings, please give equal time for other viewpoints and challenges to its presentation.

- **Was this meeting helpful?** Yes
  Must study areas around Bloomsburg so they can also be protected. Areas such as Rupert, Montour twp., Fernville, and also the area at the airport.

- **Was this meeting helpful?** Yes
  Staff handled questions very well.

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Use a pass along microphone.
  Where will wall be located as from what point along river to what point?
  Need an enlarge[d] map of Bloomsburg flood areas located at place residents can go look at.

  What is good about having a flood protection plan/project for Bloomsburg?
  Good. But we need more and deeper study on outlaying [sic] areas from wall.

  What is negative about having a flood protection plan/project for Bloomsburg?
  Not enough protection for all residents in flood areas other than Magee and fairgrounds.

  What would the ideal flood protection plan/project for Bloomsburg look like?
  Dredging the river.

  What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?
  Control of Kinney Run to stop back up from river to and including 10th St. and blockage of Ferry Road to Kawneer and airport along with eastern end of townhomes.

  P.S. Have surveyor's stake in front of house just outside living room. What does it mean? #10130 on street. High or low area – water possibility?

- **How could we make this meeting better?** Microphones are needed on the floor, for questions.
  Most people in this flood protection program are senior citizens and have a hearing problem. You need to hear the question in order to understand the answer.

- **Was this meeting helpful?** Yes
  Will there be consideration taken in to account for the location of the existing water treatment plant on Fishing Creek and whether induced flooding may be a problem at that site?

- **Was this meeting helpful?** No
  How could we make this meeting better? By protecting all. By putting dike or levee along the river from Scott Twp. to mouth of Fishing Creek, then up Fishing Creek to wherever. Kawneer also has a lot of employees (450). This is the only way to protect all. 90 Million was spent at Lock Haven, a smaller population than Bloomsburg.

- Cannot see in good conscience how some can be taken care of and not others. What about W. 11th St., W. 12th St., Bloomsburg High School, Municipal Authority, Airport, Kawneer Co.

- **What is good about having a flood protection plan/project for Bloomsburg?**
  It is good only if everyone is protected. It doesn't take a rocket scientist to see we need a dike along the river to also protect Kawneer Co./airport/park/school/sewage plant/homes on 12th and 11th streets.

What is negative about having a flood protection plan/project for Bloomsburg?
When some part[s] are being protected and others are not. Especially South Bloomsburg 11th and 12th streets where real estate tax is very high.

What would the ideal flood protection plan/project for Bloomsburg look like?
Dike or levee along the river starting at airport to mouth of Fishing Creek up to Fernville Bridge. It sure doesn't take a rocket scientist to see this.

What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?
That all be protected not just being built to satisfy one Co. - Magee-Reiter.

It is well-known that GM owns the machinery at Magee-Reiter and if flooded will move elsewhere.

If dike or levee is erected where first proposed in 1997 and you induce flooding upon 11th and 12th St. residence[s], town park, etc, high school, there could be a Federal lawsuit claim.

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Start out in auditorium.
  Glad to hear Bob Lindner has familiarity of our area and past studies since the 70's.

  What is good about having a flood protection plan/project for Bloomsburg?
  Finally, a few thoughts to residents and business in a location other than Wilkes-Barre and Scranton area.

  What is negative about having a flood protection plan/project for Bloomsburg?
  Disruption of lives, land, relocations.

  What would the ideal flood protection plan/project for Bloomsburg look like?
  Protection for whole town, including the river up to Espy area, include Fernville Flood Zone Q. If not to be protected – all Flood Zone A to be bought out

  What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?
  Protection for Bloomsburg Water Company located on Fishing Creek.

- **What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?**
  I believe you need to consider and look at Bloomsburg's water company sub-station which is located on Bloomsburg side of Fishing Creek off Millville Road. It is low-lying and does get flooded now. If a floodwall were to go up the town could be without water!

  You stated what the floodwall would protect by number of homes, businesses and industries. Have you done a study of the number of homes, businesses and industries the floodwall would affect by flooding them more?

I am a business owner over in Fernville, which concerns me. I am a partner in a flower shop and employ three other people. We have a greenhouse along with our floral shop, which does get flooded now. I agreed something needs to be done, but just what I'm not sure which is best and would benefit more people.

- **Was this meeting helpful?** ?
  Some misinformation spread. Council presentation not helpful. The "techno" fix has been selected. How does this fit into project impact? FEMA

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Bigger meeting place.
  Check storm drainage system.

- **Was this meeting helpful?** Not sure.
  How could we make this meeting better? Larger meeting area.
  Property owner – West 12th St.
  What happens to my property? Why isn't the wall continuing on to the airport and beyond? Why is dredging not economical?

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Smaller groups
  Has the Corps of Engineers rejected out of hand removing the islands in the Susquehanna and dredging?

- **Was this meeting helpful?** Yes
  I own property in the flood area.

- Have house on Pt. Noble Dr.

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Bigger meeting area at the beginning.
  Answered questions well.

- **Was this meeting helpful?** Yes
  What about the sewer plant!
  If it isn't protected and shuts down because of high water lots of homes will be flooded by sewage waste long before water becomes a problem.

- Please send presentation by Stacey Underwood.

Anonymous comment:

- **What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?**
  Effects of high velocity flow from Fishing Creek being increased in areas outside of the dike. Increased, deeper, and more frequent flooding from Fishing Creek outside dike.

Anonymous comment:

- **What is good about having a flood protection plan/project for Bloomsburg?**
  To protect jobs, to protect homes/property, to protect lives, to insure future capital investments.

  What is negative about having a flood protection plan/project for Bloomsburg?
  Some people will have to re-locate, it will cost $

  What would the ideal flood protection plan/project for Bloomsburg look like?
  Environmentally friendly, have access road on top, incorporate recreation with levee

  What are your concerns about having a flood protection plan/project for Bloomsburg or with this study?
  That it won't be done soon enough!

- **Was this meeting helpful?** Yes
  I am a member of Ft. McClure Chapter Daughters of the American Revolution. Our house is located next to the sewage plant. Historic value – details upon request.

- **Was this meeting helpful?** Yes
  How could we make this meeting better? Have the person in charge of Real Estate there.

- **Was this meeting helpful?** Yes
  Letter attached: Flood Wall Study – Your presentation the other evening was quite interesting. However, most of the discussion was directed at the west end of Bloomsburg with the Fair Grounds being mentioned several times.

  Those of us who live at the east end of Bloomsburg need to know that the over all picture has been studied. A "big" concern in the east end is our Senior High School, Junior High School, Sewage Plant, Town Park and the Airport (which they are planning on spending thousands of dollars for expansion.) Kawneer also being at the east end of Bloomsburg. Dikes up river, being bad for Bloomsburg, and then to put a wall at the west end of town can only worsen flooding problems for the east end of town, and – possibly make it even worse for Fernville. Kinney Run – also a problem at east end.

  Dredging the river seemed to get the "thumbs-down" at the discussion because of the cost. But by putting the proposed amount of money in a wall that could cause more problems to other areas, there will be no other monies available for Bloomsburg to correct the problems it has made worse. It seems that it would be logical to dredge the river and use the dredge for a levee on the town side of the river. The mountain occupies the other side of the river so a levee would only be needed on the town side. A serious study should be made of the area in which dredging was done – The gentleman presented a newspaper during the question and answer period in which dredging was done somewhere and proved feasible. That article could provide a lot of answers to the option of dredging.

  Prevention should be studied as a solution – not what to do with the water after it's over its banks. To work toward containing the water within its banks would seem the right direction to go, rather than to build a wall to contain water that is already a flood. To do this would probably eliminate a large percentage of our flood problems, Sunbury being a good example.

I realize that all of this was discussed the other evening but you "did" want our input. Our group stayed until the end of the discussion, when [it] seems things went astray with the people wanting to know the value of their homes and should they remodel or not. We're putting the carriage before the horse with that discussion, unless the wall at the west end is a done deal.

A very serious project!! As you stated at the meeting, you cannot please everyone, but to divide the town of Bloomsburg by protecting one end of town with a wall that causes worse flooding in another – is not the solution.

- We need flood protection in Bloomsburg even though everyone cannot be included in the protected area. Some type of protection is better than none at all!

- Good meeting – I hope these folks can be brought to look at the big picture. I have a feeling for your problems having been involved in town government for approx. 40 years.

- Put the walls up save our homes from water coming in every other of [sic] years.

Bloomsburg Flood Protection Study
Meeting With Residents of Fernville and Kinney Run Areas

March 23, 2000

On Thursday, March 23, members of the study team plan to meet informally with residents of two Bloomsburg area neighborhoods to discuss perceived flooding problems. At 9:00AM the team will meet at the children's playground (Kidsburg) in the public park to discuss issues in the Kinney Run area. At 11:00AM the team will meet at the Hemlock Township Firehall with residents of the Fernville area.

Purpose of the meetings will be to exchange information and begin to identify problems associated with flood events in the two neighborhoods. It is anticipated that team members may briefly describe their work, but the meeting focus will be on receiving information from local residents. After gathering, introducing ourselves, and making brief statements, the group may share data, such as photos, maps, and news articles, and/or walk along key flood areas.

The products or benefits of the meeting are expected to be improved communication with local residents, acquiring information on past flood events, and developing ideas on potential project opportunities and constraints.

TENTATIVE AGENDA

9:00/11:00	Meet at Kidsburg (Kinney Run) or Firehall Hemlock Township
9:05/11:05	Introductions
9:10/11:10	Study overview
9:15/11:15	Discussion/Questions/Answers
9:30/11:30	Tour of area
10:30/12:30	Wrap-up/Thanks for participating

For additional information, call the Corps of Engineers Planning Division at 1-800-295-1610, Nancy Jedziniak at 410-962-2926, or Carol Anderson-Austra at 410-962-2910. Internet address <bloomsburg@usace.army.mil>

Regular mail can be sent to the following address:
U.S. Army Corps of Engineers
Attn: CENAB-PL-P (Bloomsburg)
PO Box 1715
Baltimore, Maryland 21203-1715

Memo

Date: 12/14/99

To: Amy E Guise, COE

CC: file

From: Carl DeLuca, DEP Bureau of Waterways Engineering

RE: Bloomsburg, PA Levee Project

Dear Amy:

Enclosed is a copy of the Archaeological Phase 1A investigation that you requested. Please share with others working on the project. Thank you.

Any questions please give me a call, 717-772-5320

Thanks

Carl

KITTATINNY
ARCHAEOLOGICAL
RESEARCH, INC.
Cultural Resource Consultants

P.O. Box 1117, Stroudsburg, PA 18360
717-620-2591
P. O. Box 73, Downingtown, PA 19335
610-269-7161

FAX 717-620-0186

16 July 1999

Mr. Michael D. Conway, Director
Department of Environmental Protection
Bureau of Waterways Engineering
P.O. Box 8460
Harrisburg, PA 17105-8460

-e: Bloomsburg Flood Protection Project
Phase IA Archaeological Investigation - Management Summary

Dear Mr. Conway:

As requested. please find enclosed the management summary of our Phase IA Archaeological Investigation of the above-referenced project. A proposal for the recommended Phase IB investigation will be sent under separate cover.

If you have any questions please feel free to call.

Yours truly.

Valerie B. Perazio. M.A.
Project Manager

VBP/wjm

Enclosures

KAR Projectl #199708A

KITTATINNY ARCHAEOLOGICAL RESEARCH, INC.

A PHASE IA ARCHAEOLOGICAL INVESTIGATION OF THE PLANNED BLOOMSBURG FLOOD PROTECTION PROJECT, BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

ER # UNASSIGNED

Management Summary
16 July 1999

Jeffrey P. Blomster
and
Philip A. Perazio

Prepared by:
Kittatinny Archaeological Research, Inc.
Stroudsburg, Pennsylvania

Prepared for:
Bureau of Waterways Engineering
Department of Environmental Protection
Harrisburg, Pennsylvania

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LIST OF FIGURES

INTRODUCTION

Kittatinny Archaeological Research, Inc. (KAR) of Stroudsburg, Pennsylvania has conducted a Phase IA Archaeological Investigation of the planned Bloomsburg flood protection project, located in Bloomsburg, Columbia County, Pennsylvania (Figure 1). This investigation was undertaken at the request of the Pennsylvania Department of Environmental Protection— Bureau of Waterways Engineering (DEP). This investigation is required under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 507 et seq. (1988). The investigation was conducted in accordance with the current BHP guidelines (1991) and with the Curation Guidelines of the Section of Archaeology, The State Museum of Pennsylvania (1997).

Study Area

The planned project consists of two components. The southern component of the project involves construction of a large segment of levee (approximately 2,200 meters [7.260 feet]) that will form an arc traversing parking areas associated with the Bloomsburg Fairgrounds and adjacent cultivated fields on the west and southwest sides of town. A portion of this segment crosses and briefly runs parallel with the Conrail tracks which run through the southern portion of Bloomsburg (Figure 2). The study area is located in the Fishing Creek/Susquehanna River floodplain and contains soils developed on alluvium and glacial outwash (see below). The potential therefore exists for deep sediment accumulation and burial of cultural deposits in at least some portions of the study area.

The northern component involves construction of a proposed combination of levee and floodwall segments on both sides of a roughly 1,400-meter- (4,620-foot-) long segment of Fishing Creek on the northwest side of Bloomsburg. This construction is necessary to protect the western portion of Bloomsburg from flooding by Fishing Creek to the west and the North Branch of the Susquehanna River to the southeast (Figure 2). Construction on the southeastern bank of Fishing Creek will consist primarily of floodwall, plus a small segment of levee. The floodwall will be erected in the stream bed. Consequently, it is unlikely to impact any potentially culture-bearing deposits. The short levee segment, to be located at the northeastern end of this alignment, will be on the first terrace, where cultural materials may be present. Construction on the opposite (i.e., northwestern) side of Fishing Creek will consist of a levee, possibly in several discontinuous segments, on the edge of the first terrace. Again, cultural deposits may be present in this area. Similarly, cultural deposits may be present throughout the length of the west-southwest levee alignment. This second component of the project is provisional, and as such, has not been investigated through archaeological fieldwork by KAR.

While no standing structures are located within the southern project area, there are utility poles and parking areas associated with the Bloomsburg Fairgrounds within or immediately adjacent to the project corridor. In addition to the Conrail tracks mentioned above, the southernmost corridor of the project area runs parallel to a paved road. The majority of the project area lies in open areas or cultivated fields; the area directly north of the Conrail tracks has undergone extensive landfilling and appears to serve as an informal dump. At the time of the Phase IA investigation, no estimate of the width of the potential impact of the project corridor was available.

Natural Setting

The study area is located within the Zig-Zag Mountains subsection of the Middle (or Appalachian Mountain) Section of the Ridge and Valley physiographic province, and is situated along the very broad, terraced valley bottom of the Susquehanna River. The soils of the study area are underlain by bedrock units ascribable to the Devonian Age Hamilton Group, which consists of two formations: Marcellus and Mahantango (Berg 1980). Details of the physiography and general geology of the study area are provided in Appendix A.

The soil survey for Columbia County identifies two soils located within the southern component of the project area. North of the Conrail tracks, the soil is Chenango silt loam, 0 to 3 percent slopes (ChA); this soil formed in glacial outwash of gravel and sand, derived principally from acid gray sandstone, shale, and various erratics. Chenango soils are deep and well drained; bedrock can lay 10 to 100 feet below the ground surface (Parrish 1991). South of the Conrail tracks, the soil is Tioga silt loam, high bottom, 0 to 3 percent slopes (Tt). Unlike Chenango soils, Tioga soils formed in alluvium that was recently deposited on floodplains. Like Chenango soils, Tioga soils are deep and well-drained. The potential productivity of Tioga soils is rated as excellent, while that of Chenango silt loam is described as good. The presence of alluvium in the case of the Tioga soil could indicate that potentially culture-bearing deposits may be buried at significant depth below the plow zone.

The northern—and provisional (see above)—component of the project area features three Chenango series soils: Chenango gravelly sandy loam, 0 to 3 percent slopes (CgA); Chenango gravelly sandy loam, 3 to 12 percent slopes (CgB2); and Chenango silt loam, 0 to 3 percent slopes (ChA). As noted above, these soils formed in glacial outwash and are deep and well drained. This land would have been a suitable habitat for openland and woodland wildlife. North of Fishing Creek, there is a pocket of Klinesville and Leck Kill shaly silt loams, 35 to 70 percent slopes (KkE). Because of the extreme slope, these soils would have had limited potential to attract human occupation and activity.

As indicated by the description of the soils within the southern project area, the land is generally level (with the exception of the land covered by KkE soils), gently sloping towards the active channel of the North Branch of the Susquehanna River. Elevations within the majority of the project area range from 465 to 478 feet above sea level. There is one major change in elevation just north of Trench 3 (see Figure 2), the extreme slope of which is due at least partially to modern landscape modification. There is also a minor change in elevation in the vicinity of the Conrail tracks, also due partly to recent construction activities of this embankment. Additionally, one of the backhoe soundings (Trench 5) was located in a previous flood mitigation effort—an old levee. This levee represents the highest elevation within the project area (478 feet). The geomorphologists have identified one terrace tred or surface within the study area; this lies at a surface elevation of 470 feet above mean sea level (see Appendix A). An intermittent stream is indicated on the County soil map (Parrish 1991:Sheet 27) in the vicinity of the Conrail tracks within the project area.

Cultural Setting

In order to assess the potential for the presence of cultural materials in the Bloomsburg flood protection project area, background research was conducted to determine the nature of previously documented archaeological sites within the study area and its general vicinity. Background research consisted of visits to various repositories of documentary and cartographic records in order to collect relevant data. These repositories include the BHP, the State Archives, and various local and regional historical organizations, as well as information from individuals knowledgeable about the history and prehistory of the study area.

There have been no formal archaeological investigations conducted within the southern component of the current Bloomsburg flood protection project area, nor have any sites been recorded within any portion of the project corridor. In fact, an examination of the Pennsylvania Archaeological Site Survey (PASS) forms reveals that only twenty-two prehistoric and historic sites had been listed for Columbia County as of April 1999. However, one project was conducted in the vicinity of the western portion of the northern component of the project area—the 1,400-meter (4,620-foot) stretch of Fishing Creek where a combination of levee and floodwall have been proposed. This project identified a buried A-horizon that would have been conducive to prehistoric human occupation, but nearly all cultural materials recovered were historic, and much of the area had been substantially disturbed (Bohlin et al. 1995). The one prehistoric artifact recovered was found with historic-age sediments.

Within a two to three mile radius of the current project area, there have been nine archaeological sites recorded, both through Cultural Resource Management (CRM) investigations and projects undertaken by the Department of Anthropology at Bloomsburg University, which is conducting ongoing research at the Streater Site. Rounding out the picture of cultural resources in the project vicinity is the presence of several historic sites that have been designated as eligible for listing on the National Register. This includes the historic district of Bloomsburg, less than half a mile to the northeast of the project area, as well as covered bridges throughout Columbia County, which has the third largest number of covered bridges in the state.

Less than 600 meters (2,000 feet) southwest of the project area, excavations by the Bloomsburg University field school in 1988 near historic Fort McClure (see below) recovered diagnostic prehistoric artifacts ranging from the Early Archaic to Middle Woodland periods. This site, 36CO16, is located adjacent to a small knoll at the lowest terrace on the North Branch of the Susquehanna River.

Various projects southeast of Bloomsburg, focused on the airport and East Bloomsburg Bridge, have further documented prehistoric materials dating as early as the Late Archaic (Koetje 1994). Extensive testing of the East Bloomsburg Bridge site (36CO10) revealed a relatively continuous sequence of utilization from the Late Archaic through Early Woodland periods, with radiocarbon dates ranging from 1,000 B.C. to A.D. 500. This site has been interpreted primarily as a special purpose location as opposed to a residential or village site (Kardas and Larrabee 1988). Additionally, a primarily Middle and Late Woodland site (36CO9), possibly a semi-permanent hamlet, was identified by extensive CRM investigations for the Catawissa Bridge Replacement project to the south (East et al. 1988).

Other sites in the project area vicinity have been identified through surface collections made by local enthusiasts and students (e.g., 36CO1, 36CO3, and 36CO5). In general, prehistoric site density increases with proximity to the Susquehanna River. Taking a broader perspective on the region, looking to the west, numerous prehistoric sites have been reported for the Danville 7.5' Quadrangle on both banks of the Susquehanna River.

After contact with Europeans, this region often served as a location for Native American groups pushed out of other regions of the northeast, such as the Susquehannocks in the seventeenth century. A major Native American trail, the Great Warrior's Path (Wallace 1993) followed the North Branch of the Susquehanna River and would have passed south of the project area along the north bank of the Susquehanna. This trail reportedly went through a Shawnee town where Bloomsburg is now located (Beckman et al. 1996).

The river has functioned as a major transportation route in both prehistoric and historic times. Fort McClure was constructed at the junction of Fishing Creek and the Susquehanna River in 1781. Prior to the 1770s, the project area vicinity was generally not occupied by Europeans. Bloomsburg itself was first laid out in 1802. While the Beers map of 1876 does not show any structures located in the general vicinity of the southern component of the current project area, it has been established that some of the earliest homes in the area (from the 1770s) were located close to the mouth of Fishing Creek (Beckman et al. 1996). Although the ownership of these lands (circa 1876) is detailed on the Beers map, the homes are not located within the project corridor.

The growth of Bloomsburg is evident along the northern, provisional, component of the project area. The 1876 Beers map illustrates several streets and house lots south of and adjacent to Fishing Creek in the eastern half of this proposed project corridor. This portion of the northern component of the project area would have a moderate to high potential of encountering Historic period cultural remains, although probably not from the earliest Euroamerican occupation of this region.

Given the location of other prehistoric sites in the Bloomsburg area, the generally flat terrain, and the location of the project area close to both Fishing Creek and the North Branch of the Susquehanna River, there is a moderate to high potential for the presence of prehistoric occupations in the current Area of Potential Effect (APE) for both components of the proposed project area. The potential for the occurrence of significant historic cultural remains is low in the southern component, and moderate to high in the northern component.

As noted above, structures related to early historic occupation do not appear to have been located within the southern component of the project area. This impression was confirmed by discussions with residents of the area. One resident remarked how much the project area had changed in the last 40 to 50 years. When he was a boy, the northern portion of the southern ~~project~~ area, now maintained and utilized for overflow parking for the Bloomsburg fair, had been fields alternating with small wooded patches; at that time, there was still a significant faunal population that local residents hunted. While several significant historical structures are still extant—such as a mill—within a mile of the project corridor, none of these lie in the area to be disturbed by the proposed levee and floodwall construction. On the other hand, the eastern half of the corridor in the northern component of the project area will intersect properties listed on historic maps in this vicinity.

FIELD INVESTIGATIONS

The purpose of a Phase I investigation is to identify cultural resources (i.e., archaeological sites and standing structures) located within a given study area which are potentially eligible for listing on the National Register of Historic Places. Due to many variables which determine the level of effort appropriate for any given study area, the Phase I investigation is often separated into IA and IB sub-phases. A Phase IA investigation includes background research and limited field work. Data generated by a Phase IA investigation are then used to develop a cultural resource sensitivity model; this forms the basis either for a design for a Phase IB testing strategy or a full Phase IA report should further testing not be deemed necessary. Should any sites be encountered which are potentially significant or eligible for listing on the National Register of Historic Places, further investigation (i.e., Phase II) may be required.

In order to determine if any portions of the current project area have a high probability for the presence of deeply buried cultural materials, KAR performed a Phase IA field investigation on 2 April 1999. Due to the possibility that potentially culture-bearing deposits may be buried at significant depths below the plow zone, especially within the substantial alluvial deposits represented by the Tioga soils (see above), field investigations consisted of above ground inspection and geomorphologic examination of deep trenches. Six backhoe trenches were emplaced at various intervals (described below) along the southern component of the project corridor (Figure 2). All trenches were excavated to channel lag (lateral accretion) deposits and examined by Dr. Frank J. Vento and Mr. Byron Shaw (see Appendix A), as well as by archaeologists. As noted above, only the southern component of the project area was investigated at this time.

The first two trenches were placed west of the grounds of the Bloomsburg Fair, with Trench 2 placed approximately 825 feet (248 meters) south of Trench 1. Both Trenches 1 and 2 were oriented approximately north-south. Trench 3, located 500 feet (150 meters) south of Trench 2, was oriented east-west, and placed approximately 33 feet (10 meters) to the west of the stake that had been placed by the engineers to mark its location. The stake was surrounded by standing water; thus an alternate placement was selected. Trench 3 and the surrounding area has been extensively disturbed by landfilling activities; relatively intact carpet fragments were recovered in this sounding. The final three trenches were also oriented approximately east-west. Trench 4 was located parallel and south of the Conrail tracks, approximately 450 feet (136 meters) south and 800 feet (242 meters) east of Trench 3. Trench 5 was located an additional 500 feet (150 meters) east and 450 feet (136 meters) south of Trench 4, and as noted above, situated in an old levee, resulting in an additional 50 cm of fill covering a buried plow zone deposit. Trench 6 was located 500 feet (150 meters) south and 650 feet (197 meters) east of Trench 5, emplaced south of a paved road, and was the closest sounding to the North Branch of the Susquehanna River. The geomorphologists noted that the investigations revealed the presence of only one broad, probable Port Huron subage terrace within the project area. The results of the backhoe soundings are reported in Appendix A.

RECOMMENDATIONS

The Phase IA Archaeological Investigation exposed buried soil horizons which could contain prehistoric human occupations in the southern component of the planned Bloomsburg flood protection project. Previous research has documented the presence of artifact-bearing deposits in the late Wisconsin-age Port Huron terrace; based on the backhoe soundings, a probable Port Huron terrace has been identified within the entire investigated portion of the levee corridor. Thus, there is a moderate to high potential for the presence of Native American cultural remains in the study area vicinity. The potential for historic (i.e., Euroamerican) occupations within the confines on the southern component of the project area itself is limited; however, as noted above, some of the earliest occupations of this area were located along Fishing Creek. The northern component of the planned Bloomsburg flood protection project is provisional, and was not field tested at this time.

KITTATINNY ARCHAEOLOGICAL RESEARCH, INC.
PHASE IA ARCHAEOLOGICAL INVESTIGATION
BLOOMSBURG FLOOD PROTECTION PROJECT
Management Summary
16 July 1999

Based on the results of the Phase IA investigation, KAR recommends Phase IB testing in all portions of the proposed levee corridor that were investigated with the exception of the highly disturbed landfill segment represented by Trench 3. This testing should extend to the top of relict lateral accretion; the depths of these deposits have been determined by the geomorphologists (see Appendix A). A proposal for Phase IB research accompanies this management summary.

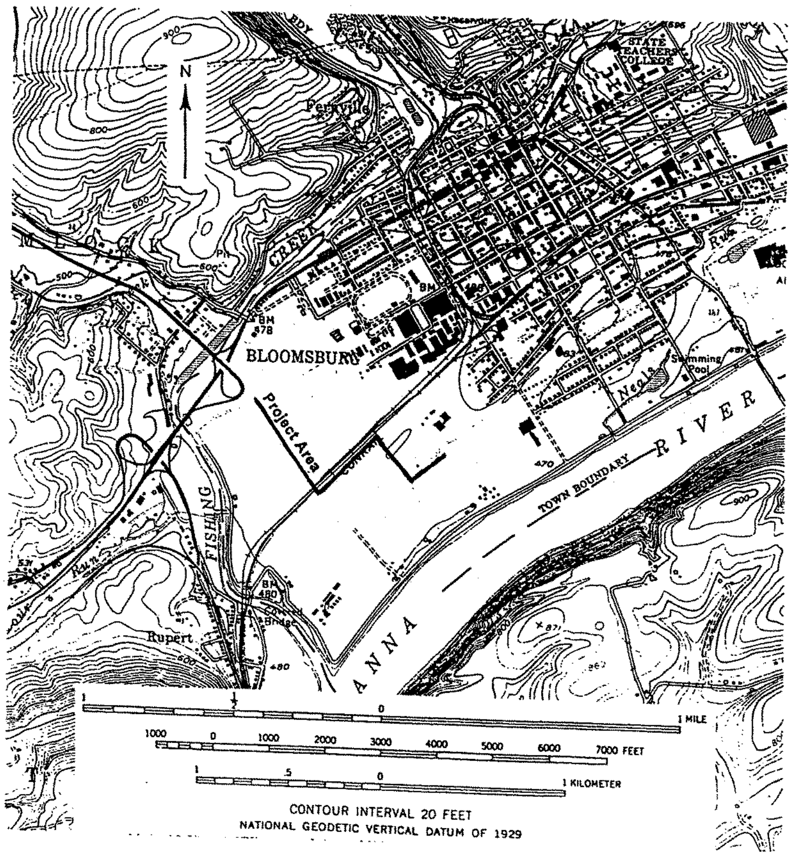

FIGURE 1. Topography.
SOURCE: United States Geological Survey (1975a,b)

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PHASE IA ARCHAEOLOGICAL INVESTIGATION
BLOOMSBURG FLOOD CONTROL PROJECT

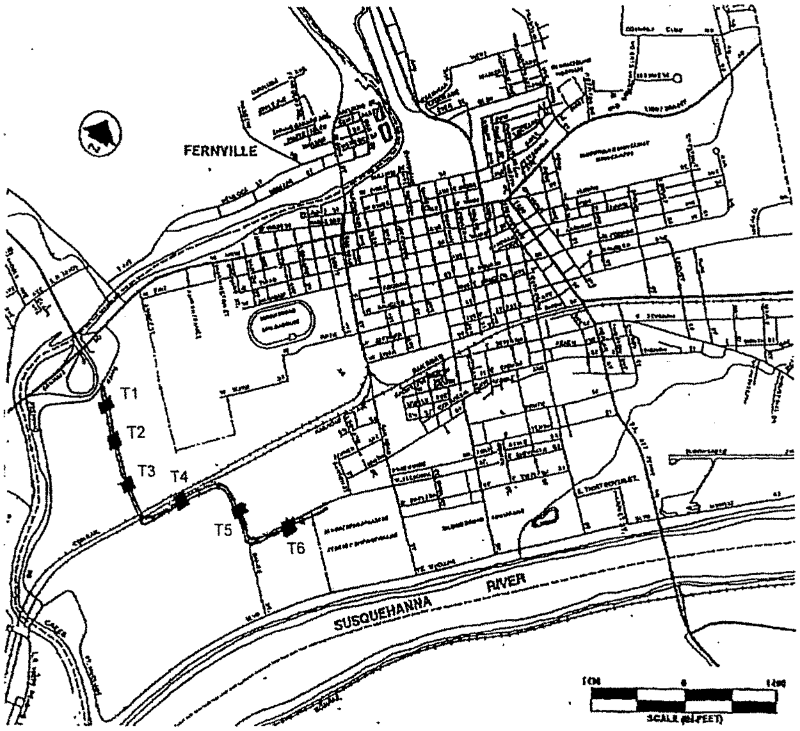

FIGURE 2. Project Plan.
SOURCE: Pennsylvania Department of Environmental Protection (personal communication, 1998)

KITTATINNY ARCHAEOLOGICAL RESEARCH, INC.
PHASE IA ARCHAEOLOGICAL INVESTIGATION
BLOOMSBURG FLOOD PROTECTION PROJECT

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APPENDIX A

A PHASE IA GEOLOGICAL / GEOMORPHOLOGICAL INVESTIGATION OF THE PLANNED BLOOMSBURG FLOOD PROTECTION PROJECT, BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA

by

Frank J. Vento and Byron Straw

INTRODUCTION

Under contract to Kittatinny Archaeological Research, Inc. (KAR), the authors conducted a Phase IA geological/geomorphological examination of the proposed Bloomsburg Flood Protection Project, Columbia County, Pennsylvania (Figure 1). The Phase I study area is situated along the very broad, terraced valley bottom of the Susquehanna River at Bloomsburg, Pennsylvania. Presently, only one terrace tred or surface can be defined within the study area. This terrace presently lies at a nominal surface elevation of 470 feet above mean sea level and occurs some 5 meters above the active channel of the Susquehanna River. The terrace tred is probably correlatable with other previously mapped segments of the late Wisconsin-age Port Huron terrace. The basal channel lag/outwash deposits present on this terrace likely dates to terminal late Wisconsin times (circa 11,000–12,000 B.P.). These basal lateral accretion deposits are then overlain by a variably thick package of Holocene age vertical accretion/overbank sediments.

Purpose of Investigation

The objectives of the geomorphological study were to determine: (1) age of the terraces and associated soils within the project area, (2) mode of emplacement of the terrace deposits as relates to depositional history, (3) soil pedogenesis and diagenesis, and (4) the depths to which Phase I testing should extend to identify any and all potentially significant cultural resources.

Scope of Investigation

This investigation was performed by Dr. Frank J. Vento and Mr. Byron Straw, as part of a Phase IA study for the Pennsylvania Department of Environmental Protection and their archaeological contractor, KAR. This study included a review of both general and specific references on the bedrock geology and quaternary history of the project area. In addition, topographic maps, geologic, hydrologic, and soil survey maps were reviewed.

Field and archival investigations were initiated on 1 April 1999 and subsequently completed 12 April 1999. Fieldwork included both a pedestrian surface reconnaissance of the entire project area as well as the emplacement of six, deep, backhoe trench soundings along segments of the proposed levee corridor (Figure 2). The positioning of the trenches was based upon topography, lateral coverage of the corridor, and specific landform type. All excavated trenches were mapped using standard soil/stratigraphic nomenclature and photographed in both 35 mm color and black and white formats. Each trench was excavated to basal, relict, channel lag (lateral accretionary) deposits.

PERTINENT ENVIRONMENTAL BACKGROUND INFORMATION

Physiography

The Bloomsburg Flood Protection Project area is located within the Zig-Zag Mountains subsection of the Middle Section of the Ridge and Valley physiographic province (Thornbury 1965).

The Ridge and Valley province extends for a distance of 1,200 miles (1,920 kilometers), from the St. Lawrence Lowland to Alabama. Its width varies from about 14 miles (22.4 kilometers) at the New York-New Jersey state line to 80 miles (128 kilometers) along a line between Harrisburg and Williamsport, Pennsylvania (Thornbury 1965:109).

The Ridge and Valley province exhibits many striking geomorphic features, some of which include: (1) marked parallelism of ridges and valleys due to folding; (2) conspicuous influence of alternating strong and weak strata upon topographic forms; (3) several major transverse streams (Susquehanna River) with notable development of subsequent streams (forming a distinctive trellis drainage pattern); (4) many ridges which display enough accordance (similar height) of summit level to suggest that their crests may represent former erosional surfaces; and (5) hundreds of water gaps and wind gaps which indicate frequent past cases of stream diversion and piracy.

All sites are located in what is termed the Middle Section (also called the Appalachian Mountain Section) of the Ridge and Valley Province. Throughout its length the Middle Section is bounded to the west by the Allegheny Front, a prominent escarpment that forms the eastern edge of the Appalachian Plateaus physiographic province. The Allegheny Front lies roughly 100 kilometers (62 miles) northwest of the proposed project area.

The Valley and Ridge province is a result of differential erosion of folded and faulted rock strata. The region consists of alternating resistant and non-resistant sedimentary rocks which have been laterally compressed during Paleozoic time by plate tectonic forces into a series of anticlinal and synclinal folds. The more resistant sandstones and conglomerates now stand as ridges or mountains, while the less resistant shales and limestones underlie the valleys. The dominant ridge former in the Middle section include the Tuscarora sandstone (Silurian), Oriskany Group (Devonian), Pocono Group (Mississippian), and Pottsville Group (Pennsylvania).

The ridges and valleys trend northeast and commonly display a trellis drainage pattern. Ridges rise to over 2,200 feet (673.2 meters) and have a relief from several hundred to 1,600 feet (489.6 meters) above the valley bottoms. Some of these mountains, within the Middle Section (such as Bald Eagle Mountain), can be traced over hundreds of miles, interrupted only by water and wind gaps.

General Geology

The bedrock units which underlie the quaternary age alluvial deposits within the study area are ascribable to the Devonian Age Hamilton Group. The Hamilton Group consists of two formations, the Marcellus and Mahantango. Within the project area the formations are undifferentiated and consist primarily of olive gray, fossiliferous siltstone and shale, interbedded with fine grained to medium grained sandstone.

Drainage and Hydrology

The moderately rugged topography of Columbia County, Pennsylvania is drained by the Susquehanna River and its tributaries. Runoff and subsequent flooding along the Susquehanna River and tributaries (i.e., Fishing Creek) are highly dependent upon variations in rainfall and spring snowmelt. The highest annual discharges along the Susquehanna River typically occur during the winter and early spring when there is a surplus of ground water and increased rates of surface runoff; while the lowest flows occur during the late summer and early fall during periods of increased evapo-transpiration and decreased precipitation.

RESULT OF INVESTIGATION

Terrace Reconstruction

Previous research along the Susquehanna River has defined a terrace system that comprises a low, late Holocene age terrace and four (Port Huron, Valley Heads, Binghamton, Olean), higher late Wisconsin age terrace treds (Peltier 1949; Vento and Rollins 1989). At this writing, artifact-bearing buried soil solas (paleosols) appear restricted to the Port Huron (5 meters nominal height above the active channel) and Valley Heads (7 meters nominal height above channel) terraces. The absence of any multiple allogenic genetic surfaces (paleosols) on these stable, higher, older terraces (Binghamton and Olean), is an indication that very late Pleistocene and Holocene overbank deposition has rarely reached the heights of the Binghamton (9–10 meters nominal elevation above the active channel) and Olean (14 meters nominal elevation above the channel) age terraces. Rather, these terraces typically display a single cumulic (mature) A-horizon (often plowed, Ap), overlying a thick, cambic to poorly developed argillic B-horizon. Archaeological materials are consistently found either within the A-horizon or at the top of the underlying (often intruded) B-horizon.

Results of Backhoe Trench Excavations

Interestingly, there appears to be only a single, broad, probable Port Huron subage terrace present within the entire investigated portion of the levee corridor. Presently, this late Wisconsinan age terrace lies some 4 to 6 meters above the active river channel at a nominal surface elevation of 470 feet above mean sea level.

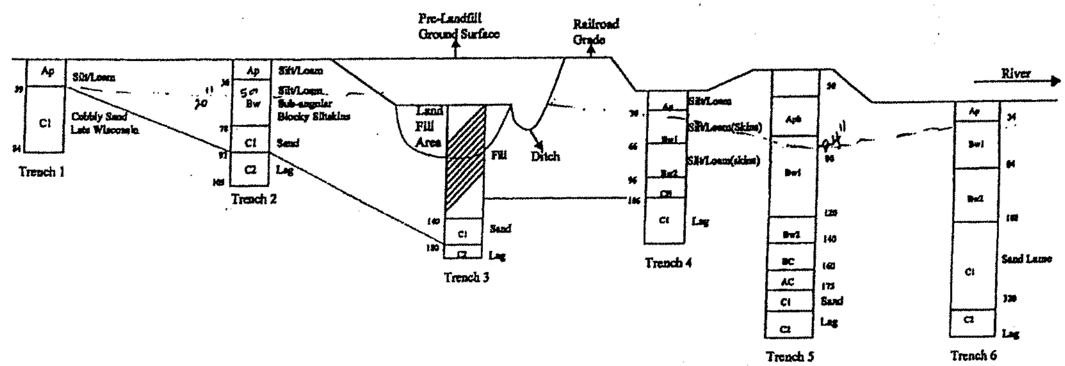
During emplacement of the six deep backhoe trench soundings, it was clear that the more distal trenches (ones located furthest from the active river channel) contained a much thinner package of Holocene age vertical accretion deposits than those trenches situated closer to the active channel. Figure A1 is a continuous cross section which shows the soil stratigraphy encountered in each of the six backhoe trench units. Note that in Trenches 1, 2, and 4, the package of vertical accretion deposits is less than 1 meter in thickness. Trench 3 was emplaced in an old landfill area and documents vertical disturbance from landfilling activities extending well into relict channel lag deposits. The landfill activities has completely removed any potential artifact-bearing vertical accretion deposits in this area. Trench 5, which was situated on an old levee landform, and Trench 6 contained the thickest sequence of Holocene age overbank deposits with 1.25 meters and 1.08 meters, respectively. In both trenches, the fine grained overbank deposits were consistently underlain by a stacked sequence of coarse grained sand lamellae bands typically found in association with emplacement in a proximal levee/bank-edge position.

Recommendations

Based upon all levels of geological investigation, the following recommendations can be made with regard to the depths to which Phase I archaeological testing should extend to ensure recovery of any and all potentially significant prehistoric cultural resources.

(1) No further testing is recommended in the area of the old landfill segment of the levee corridor. Past grading and filling of the area has completely removed any of the once in situ Holocene age vertical accretion deposits. Presently, the fill package disconformably overlies relict channel lag deposits of probable late Wisconsinan age.

(2) Phase I testing in all other portions of the proposed levee corridor should extend to the top of relict lateral accretion (e.g., point bar or channel lag) deposits. In Trenches 1, 2, and 4, the top of lateral accretion deposits occur at 34 cm, 78 cm, and 96 cm below ground surface. In Trenches 5 and 6, testing should extend to the top of the stacked sequence of bedded C-horizons. These coarse grained lateral accretion deposits were encountered at 175 cm and 108 cm below ground surface, respectively. The deeper depth of occurrence in Trench 5 is due to a 50–cm-thick fill deposit capping a now buried plow zone horizon (Figure A1).



Vertical Scale ?

FIGURE A1. Trench Profiles.

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PHASE IA ARCHAEOLOGICAL INVESTIGATION
BLOOMSBURG FLOOD PROTECTION PROJECT

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30 March 2000

TRASMITTAL MEMORANDUM

SUBJECT: Bloomsburg Local Flood Protection Feasibility Study – Cultural Resources

TO: Dale Hamlen, DEP (FAX 717-772-0409)

Dale,

Ken Baumgardt and Nancy Jedziniak contacted Tom Jones of Groenendall and Jones regarding the scope and area of the historic structures survey for the Bloomsburg Project. Although the project area is the town of Bloomsburg and the village of Fernville, the study location for this component is limited to the 500-year floodplain, as shown on the FEMA Flood Insurance Map for the area. When the final alignment is selected specific areas may have to be looked at, but the 500-year floodplain should define the majority of the Area of Potential Effect.

The Phase I is to contain three components, 1) collection of existing information, 2) survey and documentation of all historic structures more than 50 years old, and 3) impact analysis. Mr. Jones told us that he has already been in contact with the City of Bloomsburg and the Pennsylvania State Historic Preservation Officer, and there is little existing information for the town outside of the historic district. He will continue to collect whatever there is, and he will prepare an appendix that will include the survey and National Register forms. Among the historic resources to be discussed in the Existing Conditions are the Bloomsburg Historic District, McClure House, Fort McClure, Armstrong House and barn (also known as Magee Mill?), Covered Bridge, Barton House, Aqueduct Mill, and the Warrior Path/Trail. Some of these are in the survey area, and other will not be affected by the project, but they still need to be discussed, if briefly.

The survey will use established SHPO forms to document the architecture and history of the structures in the survey area. From this survey, he will be able to assess which (if any) of the structures need to have a more intensive level of investigation and documentation.

Mr. Jones will attend the charrette on May 17th, and present to the team a preliminary review of the historic structures in the study area and a preliminary assessment of the impacts (direct and indirect) to the potentially National Register eligible structures there. Impacts to these structures may not be critical in the alignment selection process, but limiting the impacts to historic resources is one element of the alignment selection process.

These structures were named at our team meeting on March 22, 2000, and Gerry Depo, Town of Bloomsburg was tasked with providing a list of historic structures that may be eligible for the Historic Register within the 500-year flood plain. I will pass this along to you once I receive it.

Mr. Sam Young, Larson Design Group (717-323-6603), mentioned to me that when he worked for the Soil Conservation Service about 5-7 years ago, they conducted their archaeological training in some farm fields in Bloomsburg. Apparently, you could not walk a few feet without "discovering" something cultural. He would be a good person to follow up with for information regarding which farm fields they worked in, what depth they were discovering resources, what types of resources were being collected, etc. If a project is feasible, potential alignments include traversing farmland.

I was also told that Bloomsburg University conducts or has conducted some archaeological investigations in the area. This may be worth investigating.

If you have any further questions or concerns, please contact me at (410-962-2894).

THANKS!
Ken Baumgardt, Corps Archaeologist
U.S. Army corps of Engineers

FAX TRANSMITTAL

U.S. Army Corps of Engineers
Baltimore District

FROM: AMY M. GUISE
US Army Corps of Engineers-Baltimore
ATTN: CENAB-PL-RP
P.O. Box 1715
Baltimore, MD 21203-1715

Telephone: **(410) 962-2941**
Fax: **(410) 962-4698**
amy.m.guise@usace.army.mil

DATE: 9 February, 2000

TO: Carl DeLuca **FAX:** 717-772-0409

RE: Bloomsburg Feasibility Study

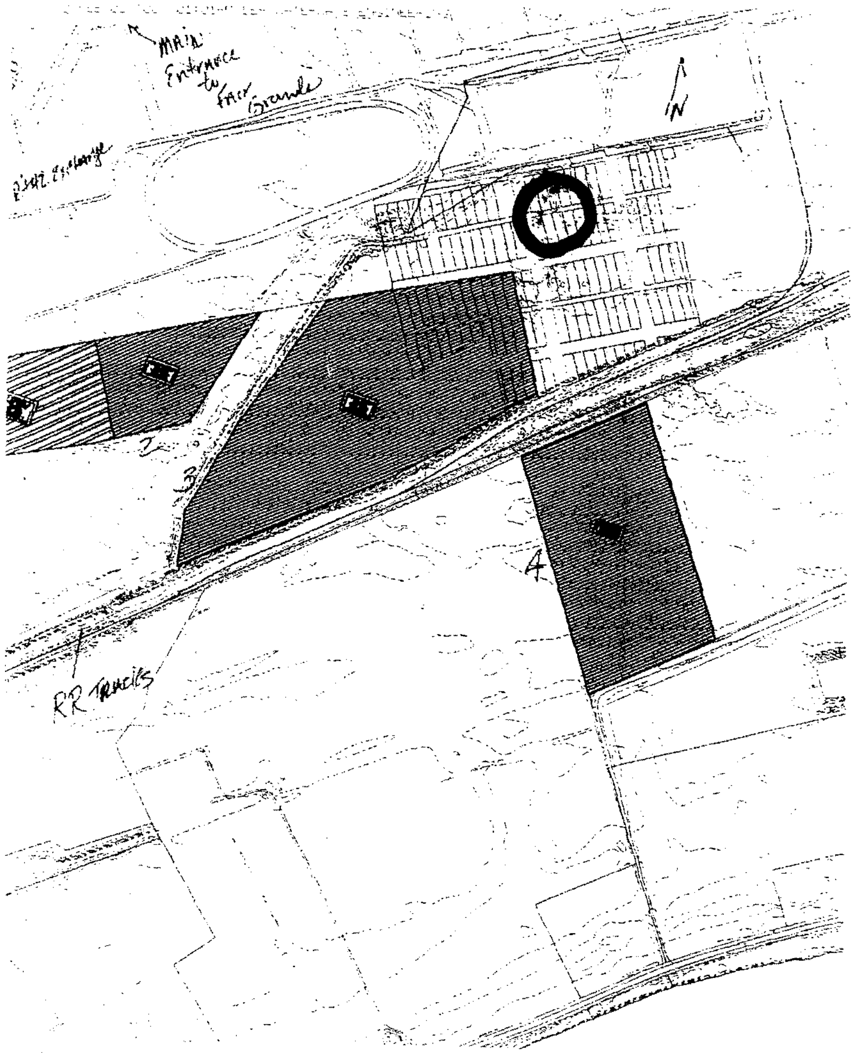
Number of pages including cover sheet: **2**

Message

Carl,

I have attached a map showing an additional HTRW site identified by Dan Bauman (570-784-4526) with the Town of Bloomsburg. You may contact him for more information (size, contents, age, etc.) for the existing conditions section of the EIS.

Thanks,
Amy


MAIN Entrance to Fair Grounds
N
2
3
4
RR TRACKS

CONVERSATION RECORD

TIME 11 00 | DATE 4/3/00

TYPE ☐ VISIT ☐ CONFERENCE ☑ TELEPHONE ☐ INCOMING ☑ OUTGOING

Location of Visit/Conference:

ROUTING	
NAME/SYMBOL	INT

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: Neale Fogle

ORGANIZATION (Office, dept., bureau, etc.): Columbia County

TELEPHONE NO.: 570 389 9146

SUBJECT: Columbia County Susquehanna Trail.

SUMMARY

SP/Su

Construction - begin/end next year. 2001

Start/finish length of trail 6 mi

GIS info.

municipal park in Catawissa - start

Tim Murphy. -

proposal - grant application
detailed design - this summer.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION: Nancy Jedziniak

SIGNATURE

DATE: 4/3/00

ACTION TAKEN

SIGNATURE | TITLE | DATE

50271-101 1985-485-494 CONVERSATION RECORD OPTIONAL FORM 271 (12-76) DEPARTMENT OF DEFENSE

United States Department of Agriculture

USDA

NRCS Natural Resources Conservation Service

One Credit Union Place, Suite 340, Harrisburg, PA 17110
717-237-2200 717-237-2238 fax

April 15, 2002

Mr. Wesley E. Coleman
Chief, Civil Projects Development Branch
Department of the Army, Corp of Engineers
PO Box 1715
Baltimore, MD 21203-1715

Re: Bloomsburg Local Flood Protection Feasibility Study
Columbia County, PA

As requested in a letter dated April 11, 2002, we have reviewed the project location for possible areas of concern to the USDA Natural Resources Conservation Service.

Some of the areas inside the project boundaries are mapped as Prime Farmland or Additional Farmland of Statewide Importance (Area identified on map as Unique Farmland is actually Prime Farmland). If these areas have not already been converted to development or are not indicated as urbanized area on U.S. Census maps, and if federal funds will be used to convert them to non-agricultural use, a Farmland Conversion Impact Rating, FormAD-1006 should be completed to evaluate the impacts to agricultural lands. Copies of the form can be downloaded from http://www.info.usda.gov/nrcs/fpcp/fppa.htm

None of the soil mapping units in the project area are classified as hydric soils, but considering their location there may be small inclusions of wetlands within them that are too small to identify on a map at the scale of the soil survey map. An on-site investigation should be done to determine the presence of wetlands.

All soils have a slight hazard for erosion, based on flatness of slopes. However as for any project involving earthmoving, both temporary and permanent erosion and sedimentation control practices should still be planned, implemented and maintained. We recommend consultation with the Columbia County Conservation District for review of erosion and sedimentation control plans and practices.

Contact me at (717) 237-2216; FAX (717) 237-2238; email: barry.frantz@pa.usda.gov; if you need more information.

Barry Frantz

Barry Frantz
Soil Conservationist

Encl.: Soil map; Important Farmlands List, Columbia County; Hydric Soils, Columbia County
cc: Paul Yankovich, District Conservationist, Bloomsburg, PA

PRIME FARMLAND

Survey Area- COLUMBIA COUNTY, PENNSYLVANIA

Map Symbol	Prime Farmland Code	Soil Mapunit Name
AaA	1	ALBRIGHTS GRAVELLY SILT LOAM, 0 TO 3 PERCENT SLOPES
AaB2	1	ALBRIGHTS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES, MODERATELY ERODED
AeA	1	ALLENWOOD SILT LOAM, 0 TO 3 PERCENT SLOPES
AeB2	1	ALLENWOOD SILT LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
Ba	1	BARBOUR FINE SANDY LOAM
Bb	1	BARBOUR GRAVELLY LOAM
Bc	1	BARBOUR SILT LOAM
Bd	1	BASHER FINE SANDY LOAM
BrA	1	BRACEVILLE LOAM, 0 TO 3 PERCENT SLOPES
BrB	1	BRACEVILLE LOAM, 3 TO 8 PERCENT SLOPES
BuB	1	BUCHANAN COBBLY LOAM, 3 TO 8 PERCENT SLOPES
CfB2	1	CANFIELD CHANNERY SILT LOAM, 3 TO 8 PERCENT SLOPES, MODERATELY ERODED
CgA	1	CHENANGO GRAVELLY SANDY LOAM, 0 TO 3 PERCENT SLOPES
CgB2	1	CHENANGO GRAVELLY SANDY LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
ChA	1	CHENANGO SILT LOAM, 0 TO 3 PERCENT SLOPES
ChB2	1	CHENANGO SILT LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
LaB2	1	LACKAWANNA CHANNERY LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
LeB2	1	LAIDIG GRAVELLY LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
LkA	1	LECK KILL CHANNERY SILT LOAM, 0 TO 3 PERCENT SLOPES
LkB2	1	LECK KILL CHANNERY SILT LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
LlA	1	LECK KILL CHANNERY SILT LOAM, DEEP, 0 TO 3 PERCENT SLOPES
LlB2	1	LECK KILL CHANNERY SILT LOAM, DEEP, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
LsB2	1	LORDSTOWN CHANNERY SILT LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
Mb	1	MIDDLEBURY FINE SANDY LOAM
Md	1	MIDDLEBURY SILT LOAM
PkA	1	PEKIN SILT LOAM, COBBLY VARIANT, 0 TO 3 PERCENT SLOPES
PkB2	1	PEKIN SILT LOAM, COBBLY VARIANT, 3 TO 8 PERCENT SLOPES, MODERATELY ERODED
Tf	1	TIOGA FINE SANDY LOAM
Tg	1	TIOGA GRAVELLY LOAM
Ts	1	TIOGA SILT LOAM
Tt	1	TIOGA SILT LOAM, HIGH BOTTOM
WaA	1	WASHINGTON SILT LOAM, 0 TO 3 PERCENT SLOPES
WaB2	1	WASHINGTON SILT LOAM, 3 TO 12 PERCENT SLOPES, MODERATELY ERODED
WbA	1	WATSON SILT LOAM, 0 TO 3 PERCENT SLOPES

PRIME FARMLAND

Survey Area- COLUMBIA COUNTY, PENNSYLVANIA

Map Symbol	Prime Farmland Code	Soil Mapunit Name
WfB2	1	WELLSBORO CHANNERY SILT LOAM, 3 TO 8 PERCENT SLOPES, MODERATELY ERODED
WnA	1	WILTSHIRE SILT LOAM, 0 TO 3 PERCENT SLOPES
WnB2	1	WILTSHIRE SILT LOAM, 3 TO 8 PERCENT SLOPES, MODERATELY ERODED

Prime Farmland Code	Description
1	All areas are prime farmland.

HYDRIC SOILS - COLUMBIA COUNTY, PENNSYLVANIA

Map Symbol	Map Name	Hydric Component	Location Notes
	Map units with major components hydric:		
ANB2	Allis silt loam, neutral substratum, 3 to 8 percent slopes, moderately eroded	Allis (NY0108)	
AT	Atherton loam	Atherton (NY0223)	
HS	Holly silt loam	Holly (OH0032)	
LN	Lickdale silt loam	Lickdale (MD0017)	
LO	Lickdale very stony silt loam	Lickdale (MD0082)	
MU	Mucky Peat	Mucky Peat (PA8007)	
PA	Papakating silty clay loam	Atkins (WV0008)	
SDA	Shalmadine silt loam, 0 to 3 percent slopes	Shelmadine (PA0088)	
SDB2	Shalmadine silt loam, 3 to 8 percent slopes, moderately eroded	Shelmadine (PA0088)	
SH	Shelmadine very stony silt loam	Shelmadine (PA0089)	
ZP	Zipp silt loam	Zipp (PA0048)	
	Map units with inclusions of hydric components:		
AAA	Albrights gravelly silt loam, 0 to 3 percent slopes	Wet spots	
AAB2	Albrights gravelly silt loam, 3 to 8 percent slopes, moderately eroded	Wet spots	
AAC	Albrights gravelly silt loam, 8 to 15 percent slopes	Wet spots	
ARA	Alvira silt loam, 0 to 3 percent slopes	Shelmadine	
ARB	Alvira silt loam, 3 to 8 percent slopes	Shelmadine	
ASB2	Alvira shaly silt loam, 3 to 8 percent slopes, moderately eroded	Shelmadine	
ASC2	Alvira shaly silt loam, 8 to 15 percent slopes, moderately eroded	Shelmadine	
BA	Barbour fine sandy loam	Holly	
BB	Barbour gravelly loam	Holly	
BC	Barbour silt loam	Holly	
BD	Basher fine sandy loam	Holly	
BRA	Braceville loam, 0 to 3 percent slopes	Atherton	
BRB	Braceville loam, 3 to 8 percent slopes	Atherton	
BUB	Buchanan cobbly loam, 3 to 8 percent slopes	Lickdale	
BVB	Buchanan very stony loam, 0 to 8 percent slopes	Lickdale	

HYDRIC SOILS - COLUMBIA COUNTY, PENNSYLVANIA

Map Symbol	Map Name	Hydric Component	Location Notes
CFB2	Canfield channery silt loam, 3 to 8 percent slopes, moderately eroded	Lickdale	
KAB2	Klinesville shaly silt loam, 3 to 12 percent slopes, moderately eroded	Seep spots 1/	Seepy areas
KAC2	Klinesville shaly silt loam, 12 to 20 percent slopes, moderately eroded	Seep spots 1/	Seepy areas
KAC3	Klinesville shaly silt loam, 12 to 20 percent slopes, severely eroded	Seep spots 1/	Seepy areas
KLB	Klinesville and Leck Kill very stony silt loams, 0 to 12 percent slopes	Seep spots 1/	Seepy areas
KLD	Klinesville and Leck Kill very stony silt loams, 12 to 35 percent slopes	Seep spots 1/	Seepy areas
LGB	Lawrenceville and Duncannon silt loams, 3 to 8 percent slopes	Wet spots	Depressions, drainageways
LGC2	Lawrenceville and Duncannon silt loams, 8 to 12 percent slopes, moderately eroded	Wet spots	Depressions, drainageways
MA	Made Land	Wet spots	Depressions, bottom lands
MB	Middlebury fine sandy loam	Holly	Bottom lands
MD	Middlebury silt loam	Holly	Bottom lands
MN	Mine Dumps	Wet spots 1/	Depressions
MRB	Morris channery silt loam, 3 to 8 percent slopes	Lickdale	Depressions, drainageways
MSB	Morris very stony silt loam, 0 to 8 percent slopes	Lickdale	Depressions, drainageways
PKA	Pekin silt loam, cobbly variant, 0 to 3 percent slopes	Wet areas	Low flats, depressions
PKB2	Pekin silt loam, cobbly variant, 3 to 8 percent slopes, moderately eroded	Wet areas	Low flats, depressions
RAA	Ravenna channery silt loam, 0 to 3 percent slopes	Lickdale	Depressions, drainageways
RAB	Ravenna channery silt loam, 3 to 8 percent slopes	Lickdale	Depressions, drainageways
RW	Riverwash	Holly, wet areas	Bottom lands
ST	Strip mine spoil	Wet spots 1/	Depressions
TF	Tioga fine sandy loam	Holly	Bottom lands
TG	Tioga gravelly loam	Holly	Bottom lands
TS	Tioga silt loam	Holly	Bottom lands
TT	Tioga silt loam, high bottom	Holly	Bottom lands
WBA	Watson silt loam, 0 to 3 percent slopes	Shelmadine	Low flats, depressions
WBB2	Watson silt loam, 3 to 8 percent slopes, moderately eroded	Shelmadine	Drainageways, depressions
WBC2	Watson silt loam, 8 to 15 percent slopes, moderately eroded	Shelmadine	Drainageways, depressions

C SOILS - COLUMBIA COUNTY, PENNSYLVANIA

	Hydric Component	Location Notes
percent slopes	Seep spots 1/	Seepy areas
percent slopes,		
	Seep spots 1/	Seepy areas
35 percent slopes	Seep spots	Seepy areas
percent slopes,		
	Lickdale	Depressions, drainageways
5 percent slopes,		
	Lickdale	Depressions, drainageways
8 percent slopes	Lickdale	Depressions, drainageways
slopes	Wet spots	Depressions, drainageways
slopes,		
	Wet spots	Depressions, drainageways
slopes,		
	Wet spots	Depressions, drainageways

U.S. Department of Housing and Urban Development

Pennsylvania State Office
The Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3380

APR 16 2002

Mr. Wesley E. Coleman, Jr.
Civil Projects Development Branch
Department of the Army
Corps of Engineers
Baltimore District
P.O. Box 1715
Baltimore Md. 21203-1715

Dear Mr. Coleman:

Thank you for your letter of April 11, 2002, transmitting a report on the progress of the Bloomsburg, Pennsylvania Local Flood Protection feasibility study, which was initiated by your office in July 1999.

In your letter you request information concerning interests within our agency's area of responsibility, so that you can identify environmental issues for consideration in your evaluation of preliminary alternatives. Our primary concerns with such proposals are with social and economic impacts, impacts on residential areas, loss of public facilities, and with displacement.

Thank you for providing us with the opportunity to participate in the Corps decisions concerning the criteria to be used in the alternatives evaluation process.

If you have any questions concerning this letter, please contact me at (215) 656-0624, extension 3222. This Office may also be reached via text telephone (TTY) by dialing (215) 656-3452.

Sincerely,

William Skwersky
Environmental Protection Specialist

BUREAU OF FISHERIES

Rickalon L. Hoopes, Director
(814) 359-5154
FAX: (814) 359-5153

COMMONWEALTH OF PENNSYLVANIA
FISH & BOAT COMMISSION
450 Robinson Lane
Bellefonte, PA 16823-9620

DIVISION OF FISHERIES MANAGEMENT

Richard A. Snyder, Chief
(814) 359-5110
FAX: (814) 359-5153

IN REPLY REFER TO
SIR #9155

April 22, 2002

U.S. DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Planning Division
Wesley E. Coleman, Jr.
P.O. Box 1715
Baltimore, Maryland 21203-1715

Dear Mr. Coleman:

RE: **Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species**
Bloomsburg Local Flood Protection Feasibility Study
Bloomsburg, Columbia County, Pennsylvania

I have examined the map accompanying your recent correspondence which shows the location for the proposed above referenced project.

Presently, none of the fishes, amphibians or reptiles we list as endangered or threatened are known to occur at or in the immediate vicinity of this study area.

To allow faster processing of Species Impact Reviews (SIRs) in the future, we are requesting that the attached, revised "SIR Request Form" be completed and returned to this office together with other relevant project information. Please make copies of the attached form and use with all future project reviews. If you have received, and in fact are using the new form, disregard the above request. Please note that the Pennsylvania Fish & Boat Commission conducts Species Impact Reviews **only for reptiles, amphibians, fishes, and aquatic invertebrates.** Reviews concerning other natural resources must be submitted to other appropriate agencies. In any future correspondence with us regarding this specific project, please refer to the SIR number above. Thank you in advance for your cooperation.

Sincerely,

Andrew L. Shiels

Andrew L. Shiels, Leader
Nongame and Endangered Species Unit

/ta

Enclosure (1)

9:?

Pennsylvania Natural Diversity Inventory

Scientific information and expertise for the conservation of Pennsylvania's native biological diversity

May 10, 2002

Fax 717-783-5109
717-787-3444

Bureau of Forestry

Wesley Coleman, Jr.
Army Corps of Engineers
PO Box 1715
Baltimore, MD 21203-1715

Re: Pennsylvania Natural Diversity Inventory Review of the Proposed Bloomsburg PA Local Flood Protection Feasibility Study, Columbia County **PER NO: 12880**

Dear Mr. Coleman:

In response to your request on April 11, 2002 the Pennsylvania Natural Diversity Inventory (PNDI) information system was used to gather information regarding the presence of resources of special concern within the referenced site. PNDI records indicate no occurrences of **plant** species of special concern within the project area, therefore we do not anticipate any impact on endangered, threatened, or rare plant species at this location.

Because of the close proximity of the project to species of special concern, our office recommends that you contact **Andy Shiels** of the Pennsylvania Fish & Boat Commission **(814) 359-5113** for recommendations on potential impact on endangered animals in the area.

Pennsylvania Fish and Boat Commission
Bureau of Fisheries and Engineering
450 Robinson Lane
Bellefonte, PA 16823

This response represents the most up-to-date summary of the PNDI data files and is applicable for one year. However, an absence of recorded information does not necessarily imply actual conditions on site. A field survey of any site may reveal previously unreported populations. Should project plans change or additional information on listed or proposed species become available this determination may be reconsidered. Please phone this office if you have questions concerning this response or the PNDI system.

Sincerely,

Jeanne Harris
Jeanne Harris
Environmental Review Specialist

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

215 Limekiln Road
New Cumberland, Pennsylvania 17070
http://pa.water.usgs.gov

May 10, 2002

Ms. Mimi A. Bistany
Study Biologist
Dept. of the Army, Corps of Engineers
Baltimore District
P. O. Box 1715
Baltimore, Maryland 21203-1715

Re: Bloomsburg, Pennsylvania, Local Flood Protection Feasibility Study

Dear Ms. Bistany:

The U. S. Geological Survey, Pennsylvania District Water Resources Discipline Office, has reviewed the proposed alignments suggested by the subject Study Plans and has no current structures or activities that will be significantly affected by either of the potential alignments. As a result, this Office has no particular environmental issues of concern to incorporate into the Environmental Impact Statement at this time.

If you have any questions concerning our review, please feel free to contact me at (717) 730-6971 or by electronic mail at rahainly@usgs.gov.

Sincerely,

Robert A. Hainly
Robert A. Hainly
Assistant District Chief

cc: William P. Schaffstall, USGS, Chief, Hydrologic Surveillance Program, Williamsport, Pennsylvania
Ronald E. Thompson, USGS, Surface Water Specialist, New Cumberland, Pennsylvania

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE, HARRISBURG, PA 17110-9797

May 15, 2002

Mr. Wesley E. Coleman, Jr.
Civil Projects Development Branch
US Army Corps of Engineers
PO Box 1715
Baltimore, MD 21203-1715

In re: Local Flood Protection Feasibility Study
Town of Bloomsburg
Columbia County, PA

Dear Mr. Coleman:

This is in response to your letter of April 11, 2002, requesting information concerning endangered and threatened species of birds and mammals and impact to State Game Lands as related to the proposed project.

Our office review has determined that no state listed endangered or threatened species of birds or mammals are known to occur within the proposed project area. Except for occasional transient individuals, this project should not impact any endangered or threatened species or birds or mammals recognized by the Pennsylvania Game Commission. Also, no State Game Lands are located close enough that any impacts to them are anticipated by the proposed project. However, should project plans change or if additional information on endangered or threatened species or State Game Lands becomes available, this determination may be reconsidered.

The proposed project will impact wetlands which this agency considers as critical and unique habitat. You should be aware that any impacts to wetlands or other bodies of water will require permits from the Department of Environmental Protection under Chapter 105 and the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

ADMINISTRATIVE BUREAUS:
PERSONNEL: 717-787-7836 ADMINISTRATION: 717-787-5670 AUTOMOTIVE AND PROCUREMENT DIVISION: 717-787-6594
LICENSE DIVISION: 717-787-2084 WILDLIFE MANAGEMENT: 717-787-5529 INFORMATION & EDUCATION: 717-787-6286 LAW ENFORCEMENT: 717-787-5740
LAND MANAGEMENT: 717-787-6818 REAL ESTATE DIVISION: 717-787-6568 AUTOMATED TECHNOLOGY SYSTEMS: 717-787-4076 FAX: 717-772-2411
WWW.PGC.STATE.PA.US

If you have any questions, please contact me at (717) 783-5957.

Very truly yours,

James R. Leigey

James R. Leigey
Wildlife Impact Review Coordinator
Section Oil/Gas and Mineral Development
Bureau of Land Management

JRL/pfb

Cc: Leigey
File

3630-FM-WQ0037 Rev. 3/97

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PROTECTION
AND WATERWAYS ENGINEERING

For Department Use Only
PNDI Search - Computer ____ Map ____
Reviewer ____
Date ____ Phone No. ____

SUPPLEMENT NO. 1
PENNSYLVANIA NATURAL DIVERSITY INVENTORY SEARCH FORM

A. This Supplement No. 1 provides the site information necessary to perform a computer search for species of special concern listed under the Endangered Species Act of 1973, the Wild Resources Conservation Act, the Pennsylvania Fish and Boat Code or the Wildlife Code. Records regarding species of special concern are maintained in a computer data base called the "Pennsylvania Natural Diversity Inventory" (PNDI).

B. Complete the information below and mail to the appropriate regional office or the delegated County Conservation District (SEE REVERSE SIDE FOR LIST OF OFFICES AND ADDRESSES).

C. **This Supplement No. 1 will be returned to you with information relevant to your project concerning species of special concern. Include it and any correspondence received from the agencies below, with your submission of a Chapter 105 Permit Application for a Water Obstruction and Encroachment Permit and/or a Dam Permit and/or a General Permit Registration and/or an Environmental Assessment.**

D. The information in PNDI is routinely updated. Results of this PNDI search are valid for one year.

PROJECT LOCATION:
Columbia
County
Town of Bloomsburg
Township and/or Municipality

NAME: R Michael Gephart
ADDRESS: 4311 E. Park Circle
Harrisburg, Pa. 17111

PHONE (8:00 AM TO 4:00 PM): 717-561-1103 Ext 6

1) Name of the United States Geological Survey (U.S.G.S.) 7½ Minute Quadrangle Map where project is located:
Catawissa Pa
2) Project size (in acres): 0.034

3) Indicate location of approximate project center on the U.S.G.S. Quad map by measuring in inches (to nearest one-tenth) from the lower right corner of the full U.S.G.S. Quadrangle map.

- North (Up) 15.0 inches
- West (to the left) 13.5 inches

W 3.1" N 6.3"
N: 6.3"
W: 3.1"
(example, not to scale)

4) Attach an 8½" x 11" photocopy (DO NOT REDUCE) of the section of the U.S.G.S. Quadrangle Map which identifies the project location and outlines the approximate boundaries of the project.

FOR DEPARTMENT USE ONLY

☐ No known record of habitats for species of special concern has been identified in the area designated above.

☐ No impact to species of special concern. (PNDI staff person ____ on ____)
initials date

☐ Potential impact to species of special concern. Written recommendations on measures necessary to resolve this matter will be provided by:

☐ Dept. of Conservation & Natural Resources
Bureau of Forestry/FAS
P.O. Box 8552
Harrisburg, PA 17105-8552
717-787-3444

☐ Mr. Andrew L. Shiels
PA Fish & Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
814-359-5113

☐ Mr. Denver A. McDowell
PA Game Commission
2001 Elmerton Ave.
Harrisburg, PA 17110-9797
717-783-8743

☐ PNDI Interpretation Requested

Element Occurrence Code ____

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Eastern Pennsylvania Field Office
P.O. Box H
Tobyhanna, Pennsylvania 18466-0080

June 14, 2002

Mr. Wesley E. Coleman, Jr.
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Coleman:

The Fish and Wildlife Service has received your letter, dated April 11, 2002, regarding the update of the Blooomsburg, Pennsylvania Local Flood Protection (BLFPS) feasibility study. This letter is presented in partial fulfillment of the Fish and Wildlife Coordination Act (FWCA), and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

The Service's primary objective under the FWCA is to ensure that approved project plans include necessary means and measures to guarantee the conservation of fish and wildlife resources and, therefore, fulfill the conservation mandate of the FWCA. Full and early participation in the planning process is essential to the accomplishment of Service and FWCA objectives

The Service has performed 2.5 days of work on the BLFPS. According to the Scope of Work, dated August 1999, the Service was expected to complete a FWCA report for the BLFPS in a total of 10.5 days. Although we recognize additional work on this project is necessary, we feel that there has been insufficient coordination on the BLFPS in a manner consistent with the 1980 Transfer Fund Agreement (as amended in 1982) between the Service and the Corps. Your letter, referenced above, has been the only correspondence with this office since December 20, 1999, and there was no negotiation of this Scope of Work prior to our receipt of the final military interdepartmental purchase request. As a result, the Service cannot provide a report that fulfills the statutory requirements of Section 2(b) of the FWCA at this time. In accordance with the Transfer Fund Agreement, the Corps and the Service should negotiate an updated Scope of Work which would identify data limitations that should be obtained for purposes of fulfilling the terms of the FWCA. We are willing to meet with you to discuss deficiencies and concerns with regard to providing a meaningful FWCA for the BLFPS.

Telephone conversations between our agencies suggest that your staff may be unaware of the Transfer Fund Agreement, a copy is enclosed. If you have any questions, please contact me at 570-894-1275.

Sincerely,

Jared Brandwein
Supervisor

Enclosure

US Army Corps
of Engineers
Baltimore District

News Release

Public Meeting to initiate Bloomsburg flood protection study by Town, DEP, and U.S. Army Corps of Engineers

Baltimore – The U.S. Army Corps of Engineers, Baltimore District, the Town of Bloomsburg, Pa., and the Pennsylvania Department of Environmental Protection will host a public meeting to provide information on the Bloomsburg Local Flood Protection Feasibility Study. The public meeting will be held at the Bloomsburg High School on February 24, 2000, at 7:00PM.

The feasibility study will be a comprehensive investigation to determine the feasibility of protecting Bloomsburg from flooding by the Susquehanna River and Fishing Creek. The study will investigate both structural and non-structural flood protection alternatives. Structural alternatives may include the construction of floodwalls or levees. Non-structural alternatives may include flood proofing or re-location of structures.

The February public meeting is part of a public involvement program that will solicit input from the public throughout the study process. Several informal discussions will be held with specific citizen interest groups prior to the public meeting. Following the February meeting, three additional public meetings will be scheduled to maintain communication between the study team and the public.

Apr-07-00 09:25A Columbia Co. Cons. Dist. 717+784+3247 P.01

Facsimile Transmittal

Columbia County Conservation District
702 Sawmill Road, Suite 204
Bloomsburg, PA 17815
Phone 570-784-1310 Ext. 102
Fax 570-784-3247

Fax number: 1-410-962-4698

Date: 4/7/00

Attention: Amy Geise

From: Joan Shively

Number of pages (including this cover): 7

- [x] As requested
- [ ] For your information
- [ ] Note and File
- [ ] Per Phone Call
- [ ] Please reply

Comment(s):

Revised 8/83
By: GHL

LIST OF SOIL MAPPING UNITS THAT QUALIFY AS ADDITIONAL FARMLAND OF STATEWIDE IMPORTANCE

Columbia County, Pennsylvania

Manuscript Symbol	Mapping Unit Name
AaC	Albrights gravelly silt loam, 8 to 15 percent slopes
AeC2	Allenwood silt loam, 12 to 20 percent slopes, moderately eroded
ArA	Alvira silt loam, 0 to 3 percent slopes
ArB	Alvira silt loam, 3 to 8 percent slopes
AsB2	Alvira shaly silt loam, 3 to 8 percent slopes, moderately eroded
AsC2	Alvira shaly silt loam, 8 to 15 percent slopes, moderately eroded
At	Atherton loam
BeB2	Belmont silt loam, 3 to 12 percent slopes, moderately eroded
BeC2	Belmont silt loam, 12 to 20 percent slopes, moderately eroded
BkB2	Berks shaly silt loam, 3 to 12 percent slopes, moderately eroded
BkC2	Berks shaly silt loam, 12 to 20 percent slopes, moderately eroded
CaB2	Calvin shaly silt loam, neutral substratum, 3 to percent slopes, moderately eroded
CaC2	Calvin shaly silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded
CgC2	Chenango gravelly sandy loam, 12 to 20 percent slopes, moderately eroded
DaB2	Dekalb channery loam, 3 to 12 percent slopes, moderately eroded
DaC2	Dekalb channery loam, 12 to 20 percent slopes, moderately eroded
HbA	Hartleton channery silt loam, 0 to 3 percent slopes
HbB2	Hartleton channery silt loam, 3 to 12 percent slopes
HbC2	Hartleton channery silt loam, 12 to 20 percent slope, moderately eroded
Hs	Holly silt loam
KaB2	Klinesville shaly silt loam, 3 to 12 percent slopes, moderately eroded
LaC2	Lackawanna channery loam, 12 to 20 percent slopes, moderately eroded
LeC2	Laidig gravelly loam, 12 to 20 percent slopes, moderately eroded
LgB	Lawrenceville and Duncannon silt loams, 3 to 8 percent slopes
LgC2	Lawrenceville and Duncannon silt loams, 8 to 12 percent slopes, moderately eroded
LkC2	Leck Kill channery silt loam, 12 to 20 percent slopes, moderately eroded
LlC2	Leck Kill channery silt loam, deep, 12 to 20 percent slopes, moderately eroded
LpB2	Litz silt loam, 3 to 12 percent slopes, moderately eroded
LsC2	Lordstown channery silt loam, 12 to 20 percent slopes, moderately eroded
MrB	Morris channery silt loam, 3 to 8 percent slopes
OcB2	Oquaga channery silt loam, 3 to 12 percent slopes, moderately eroded
OcC2	Oquaga channery silt loam, 12 to 20 percent slopes, moderately eroded
RaA	Ravenna channery silt loam, 0 to 3 percent slopes
RaB	Ravenna channery silt loam, 3 to 8 percent slopes

Revised 8/83
By: GHL

Columbia-2

Manuscript Symbol	Mapping Unit Name
WaC2	Washington silt loam, 12 to 20 percent slopes, moderately eroded
WbC2	Watson silt loam, 8 to 15 percent slopes, moderately eroded
WcB2	Weikert channery silt loam, 3 to 12 percent slopes, moderately eroded
WfC2	Wellsboro channery silt loam, 8 to 15 percent slopes, moderately eroded
WmB2	Westmoreland silt loam, 3 to 12 percent slopes, moderately eroded
WmC2	Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded
WnC2	Wiltshire silt loam, 8 to 15 percent slopes, moderately eroded
WoB2	Wooster channery silt loam, 3 to 12 percent slopes, moderately eroded
WoC2	Wooster channery silt loam, 12 to 20 percent slopes, moderately eroded
Zp	Zipp silt loam

Columbia Alliance
405.02
Statistical Research

Bloomsburg Area Flood Protection Consumer Opinion Study

Research Background

Andrews, Sacunas & Saline (AS&SI) conducted a telephone survey with 201 residents of Bloomsburg, Hemlock Twp. and Montour Twp. during the period of March 25 through March 31. The following are the total populations of these three areas:

Bloomsburg	-	12,439	(80.7%)
Hemlock Twp.	-	1,546	(10.0%)
Montour Twp.	-	1,419	(9.2%)
Total		15,404	(99.9%)

AS&SI randomly selected survey participants from a list of **all residents** in the 17815 zip code area. Each potential respondent was qualified as being a resident of both the target zip code area and the town or one of the specified townships. The number of participants from each area reflects the relative populations of each, as follows:

Bloomsburg	-	175	(87.0%)
Hemlock Twp.	-	16	(7.8%)
Montour Twp.	-	10	(4.9%)
Total		201	(99.7%)

We selected to not weight the data to reflect the populations. Given the numbers, the weighting would have been very minor in any case.

Based on this sample, the *confidence level* of the findings ranges from 95 - 99%, as noted within the survey. This means that if the same survey were conducted again, there is a 95 - 99% chance that the exact same results would be repeated.

The survey *error rate* is plus or minus 3.0%. This means that if the results from 200 surveys revealed that 50% were in favor of an option, then assuming everyone had an equal opportunity for selection, a normal distribution of the data, the most conservative estimate of the population variance, and a 95%

confidence interval, the real or true statistic would fall between 47% and 53% if we were to interview everyone in the population.

Both factors indicate that these findings can be extrapolated to represent the entire target universe, defined as all Bloomsburg, Hemlock Twp. and Montour Twp. residents.

Age and Sex

The ages of survey respondents ranged from under age 25 (but at least 18) to age 75 or older. The largest group of respondents were aged 35 - 64, the median age was just over 55 years old. In total, 35.3% of respondents were male; 64.7 percent were female.

Flood Experience

The majority of respondents themselves and members of their households (more than 76%) had no past flood damage to their homes or places of work. Roughly 21% had damage to either their homes or workplaces. The numbers on these two, separate questions were remarkably similar.

Following this pattern, nearly 67% of respondents said they, themselves, and their household members would ***not*** sustain damage to their home or workplace if the Susquehanna or Fishing Creek were to overflow. Roughly 20% said their home or workplace would sustain damage.

The area has a high level of home ownership. Nearly 72% of respondents owned their homes; the remaining 28% rented or otherwise did not own their dwelling.

Top Line Results

The Importance of Flood Protection

Flood protection was viewed as the **number one concern** of respondents - **unprompted**. Of the total, 38.3% of respondents mentioned flood protection as their top issue by a significant margin, followed by quality of schools/education (26%) and job creation and business growth (24%).

When respondents were then asked to rank the top three issues they themselves raised, 37% ranked flood protection number one, followed in order by the same concerns mentioned above. Another 6.8% ranked flood protection their second top-most concern; and another 3.1% ranked it third. So, flood protection is among the top three issues for nearly 47% of residents.

Respondents were then focused specifically on the issue of flood protection. When asked to rank the importance of flood protection to the area, 88.1% ranked it as either very important (58.2%) or somewhat important (29.9%). Only 11.4% ranked flood protection as not important.

Taken by area, 87.4% of Bloomsburg respondents ranked flood protection as important. A full 92.3% of Hemlock and Montour township respondents ranked it as important.

Cross tab: The study additionally cross-tabbed this question with respondents' flood experiences to see if it affected opinions. Generally, experiences of past damage to homes and workplaces seemed to **not** ignite stronger opinions. In other words, experience with past flooding did not significantly affect the respondent's opinions.

For example, of those who ranked flood protection as the first of their top three concerns, 16.6% had experienced past home damage from flooding, compared to 17.9% who did not sustain damage. Of those who said they would sustain damage if the Susquehanna or Fishing Creek overflowed their banks, 16% ranked flood protection as their top concern. This compares to the nearly 15% who ranked flood protection as number one and said they would not sustain damage.

Among those who ranked flood protection as number one, just 8% said they would sustain business property damage compared to 20.3% who said they would not.

One last illustration: of those who said flood protection for the local area is "very important," 16.4% and 9.9% said they **would** sustain home or property damage, respectively, in the event of future flooding. This compares to 36.8% and 38.3% **would not** sustain home or business damage, respectively, in the event of flooding.

Awareness of Communications about Flood Protection

Respondents' recall of seeing information or hearing about flood protection during the two months preceding the survey was very high, with 74.6% of respondents answering "Yes." Interestingly, nearly 21% of respondents said they had not seen or heard *anything*.

Where did they get their information? Of those respondents who did recall, newspaper stories and editorials (most likely in the Bloomsburg Press Enterprise with a 40.7% specific recall) were the main source with 58.7% mentioning them. Another 26% mentioned newspaper ads, 15.3% TV, and 15% "other" (included town meetings, the ACOE, friends, co-workers, etc.).

As for the content of the information, most recalled hearing about the town meeting, a floodwall or the feasibility study. It is interesting to note that respondents mentioned many various subjects they had heard about, but no subject was "a crazy rumor." Virtually all comments were reasonable.

This suggests there is not a lot of "way out there" misinformation floating around, and, if it is, residents seem able and willing to discern useful, probable information from speculation. This also reinforces that the issue of flood protection is very important to residents - they want and seek out factual, credible information.

Concerns about the Feasibility Study

The survey team read respondents a basic clarifying statement about the feasibility study currently underway (see attached survey, question 4). When asked about their concerns surrounding the feasibility study *and any flood protection solution that may result from it*, 30.3% of respondents mentioned cost as their main concern. This was followed by the impact on property values (13.9%) and negative environmental impacts (10.9%). The list of concerns with one or two mentions is long, containing no surprises.

Observations: There is considerable concern (by a significant margin) about the cost, suggesting that this same concern will arise surrounding any flood protection solution proposed. Cost emerged already as a key concern for the floodwall/levee solution.

To Do Nothing

The survey team read respondents a basic clarifying statement about the option to make no changes (see attached survey, question 5). Coinciding with respondents' view that flood protection is important, nearly 41% oppose the idea of doing nothing. More than 22% would favor doing nothing, and nearly 27% are undecided. Nine percent have no opinion.

The reasons respondents held their opinions varied widely, with most reiterating flood protection was needed to benefit the whole community, and that something needed to be done (nearly 32%). Those opposed appeared to take the view that they were not affected (nearly 13%).

The chief concerns about not pursuing any flood protection system were past flood damage (nearly 25%), cost (nearly 13%) and the impact upon area property values (12.4%). It is interesting to note that nearly 25% of respondents had no concerns or questions about doing nothing about flood protection.

Observations: While there is strong support to implement some flood protection solution, there is a critical group of "undecideds" here. Of those, 13% said that changes are needed for the welfare of the whole community. Another 14% said they need more information, and 11% said they were not affected.

Nonetheless, of the undecideds, more than 22% *still* said they were concerned about past flood damage. More than 18% were concerned about the cost of doing nothing (presuming in this case they were referring to the costs of flood damage to the community). This suggests that there are ripe opportunities for education and an ongoing information effort.

To Build a Floodwall and Levee System

The survey team read respondents a basic clarifying statement about the option of constructing a floodwall and levee (see attached survey, question 6).
Here, it is important to note that the largest group of respondents are undecided (36.3%), followed by those who oppose the option (27.4%) and those who are in favor (21.4%). More than 12% had no opinion.

The reasons respondents felt the way they did varied widely, with nearly 20% saying they needed more information. Smaller percentages of respondents also cited the potential location of the structure, the fact that everyone is not protected, and the fact that they were not personally affected as reasons behind their opinions.

To gain more clarity, respondents were asked about their concerns about this option. Nearly 26% cited cost, 13.4% cited negative environmental impacts and 9.5% cited impact on property values, among other varied concerns. Nearly 16% said they had no questions or concerns.

Observations: This option, because residents have so much information already, naturally comes under the most scrutiny. Residents also have cost information on this option stemming from Rep. Kanjorsky's visit where he specifically raised the issue. This option also touches residents' sense of fairness and concern about family members, neighbors, etc. living in areas that have been well defined (i.e., Fernville) over time.

The "undecideds" are a key audience here. Recall that these people most likely deem flood protection important. Their support will be vital to any final solution. Fortunately, their chief reservation is that they need more factual information to decide as nearly 39% said they need more details.

To Dredge Fishing Creek and/or the Susquehanna

The survey team read respondents a basic clarifying statement about the option of dredging Fishing Creek and/or the Susquehanna River (see attached survey, question 7). Surprisingly, a little more than 62% of respondents were in favor of this option. Nearly 11% were opposed and 17.4% were undecided. Six percent had no opinion.

When asked why they felt the way they did, roughly 42% appeared to perceive that it made logical sense that dredging would be an effective solution. Among other varied responses, 6% were not sure it would work, 8.5% needed more information, and 5% said it would be a cheaper solution (than a floodwall/levee).

Concerns expressed about this option, again, were varied, with 22.9% citing cost concerns and nearly 18% citing negative environmental impacts.

Observations: It is key to mention that the question set-up statements did not give residents relative cost information on any of the options. AS&SI's initial understanding is that dredging is a very cost-prohibitive option and that it also must be repeated every few years as sediment rebuilds.

So, while dredging is a popular solution, is may be due in part because it appears to have minimal negative effects on residents and is perceived as less costly than a floodwall/levee. Relative cost information, however, may have changed opinions.

Where Respondents Get Their Information

When asked what sources they would turn to for information about flood protection options, 19.4% said they would call or meet with their township supervisor, and nearly 20% said they would turn to the local newspapers. It is interesting to note that 16.4% would look to the Internet and e-mail, and 31.3% would turn to a variety of sources, including the ACOE, the library and town meetings (28.4% of those citing other sources mentioned town meetings). More than 16% said they don't know where they would turn.

In terms of credibility and trust, face-to-face contact has the most support, with nearly 15% citing town meetings, and 11.4% calling or meeting with their township supervisors. Newspapers and other standard media dropped off with low percentages, and - importantly - 24.4% said they don't know what source they could trust.

Political Activism

Question 14 of the survey asked respondents to verify their participation in a number of activities over the past 5 years. From this list, AS&SI selected participation in the following to qualify for a definition of "Politically Active."

- Started a petition
- Called your Congressman or Senator
- Called an elected local official
- Wrote a letter to the editor
- Volunteered for a local task force or committee

Generally, about half of the respondents are defined as politically active on key questions gauging the importance of flood protection. However, no "issue group" emerged surrounding any particular solution, concern or status (i.e., age, sex, impacted by flood or not, an environmental issue, residents group). Information-gathering habits of the politically active or inactive are about the same.

One observation worth noting is that politically active respondents are more likely to turn to sources other than the media for information. For example, more than 63% would turn to "other" sources compared to 36.5% of inactives. High ranking other sources were the ACOE, the library, and City Hall.

These other sources were also deemed much more credible by the politically active than by the inactive (nearly 70% vs. 30.3%, respectively).

Columbia Alliance

Statistical Research Findings

Telephone Survey - March 25 - March 31, 2000

- 201 randomly selected residents in Bloomsburg, Hemlock and Montour Townships in 17815 zip code area
- Screened for residency, minimum age, eligibility
- Confidence level: 95-99%
- Error rate: +/- 3%
- Age: Largest group 35-64

ANDREWS SACUNAS & SALINE INCORPORATED

Key Findings

The Importance of Flood Protection

- Flood protection is the #1 concern among respondents, both unprompted and then ranked among other issues
- 38.3% of respondents mentioned flood protection by a significant margin, followed by quality of schools/ education (26%) and job creation and business growth (24%)
- Ranked as "important" across the whole survey area

ANDREWS SACUNAS & SALINE INCORPORATED

Key Findings

The Importance of Flood Protection

- Experience with past flood damage to homes or businesses appears to **not** significantly affect respondents' opinions
- Of those respondents who said flood protection is "very important," most would **not** sustain damage to homes or businesses in the event of future flooding

Examples:

- **16.4%** would sustain flood damage to home, **36.8%** would not sustain flood damage to home
- About **10%** would sustain flood damage to **business** compared to **38.3%** who said they would not

Key Findings

Awareness of Communications about Flood Protection

- Nearly 75% said they had seen or heard information about flood protection
- 21% had not seen or heard *anything*
- Nearly 59% of those who had seen or heard information recalled newspaper stories and editorials
- 26% mentioned newspaper ads
- 15% mentioned TV
- 15% mentioned "other" (town meetings, ACOE, friends, etc.)

ANDREWS
SACUNAS
& SALINE
INCORPORATED

Key Findings

Concerns about the Feasibility Study

- 30.3% are concerned about cost of the study and/or the flood protection plan that may result from it
- Nearly 14% are concerned about the impact on property values
- Nearly 11% are concerned about bad environmental impacts
- Cost concerns here forebode cost as a driving issue going forward

ANDREWS SACUNAS & SALINE INCORPORATED

Key Findings

To Do Nothing

- 41% oppose doing nothing
- 22% favor doing nothing
- 27% are undecided

Why?

- 32% believe flood protection will benefit the whole community; "something needs to be done"

Concerns?

- 25% had no concerns or questions about doing nothing about flood protection; 25% concerned about past damage
- "Undecideds" are a key group here

Key Findings
To Build a Floodwall & Levee System

- 36.3% are undecided
- 27.4% oppose
- 21.4% favor

Why?

- 20% of respondents said they needed more information

Concerns?

- 26% cite cost as their main concern
- 13.4% cite negative environmental impacts

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SACUNAS
& SALINE
INCORPORATED

Key Findings
To Build a Floodwall & Levee System

- "Undecideds" are a key group here
- Most likely deem flood protection as important
- 39% of undecideds said they need more details
- Probably perceived as the "likely" option - residents are jumping to decision-making phase already
- **Note:** Residents have by far the most information on this option - including <u>costs</u>

Key Findings

To Dredge Fishing Creek and/or the Susquehanna

- 62% in favor (path of least disruption)
- 17.4% undecided
- 11% opposed

Why?

- Perceive it makes logical sense (42%)

Concerns?

- Nearly 23% cite cost concerns
- 18% cite bad environmental impacts
- Note: Residents had no comparative cost information - or likely any idea what dredging costs

Key Findings

Where Residents Get Their Information

- 31.3% of respondents would turn to "other" sources - ACOE, the library and town meetings
- Roughly an equal number of respondents (20%) would turn to newspapers and township supervisors
- 16.4% would turn to the Internet and e-mail
- 24.4% don't know who they can trust

ANDREWS SACUNAS & SALINE INCORPORATED

Key Findings

Political Activism

- About half of respondents on key questions can be defined as "politically active"
- No "issue groups" emerged
- Information-gathering habits hold across the group
- Politically active more likely to turn to "other" sources compared to inactives (63% to 36.5%, respectively)
- 70% of politically active deem "other" sources as more credible compared to 30% of inactives

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF AGRICULTURE
February 3, 1998

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Waterways Engineering
Attn: Michael D. Conway, Director
P.O. Box 8460
Harrisburg, Pennsylvania 17105-8460

RE: **Bloomsburg Flood Levee Project**
Columbia County, Pennsylvania

Dear Mr. Conway:

I am writing on behalf of Fred and Steve Kistler in an effort to protect their farmland from the proposed levee to be constructed by your agency. Mr. Kistler indicated to the Department that the proposed location of the levee would not only take productive farmland but also divide the remaining Kistler farm property, making its productivity decrease significantly.

The 100 acre farm currently produces three main crops: sweet corn for Whiteford Packing Co., snap beans for Hanover Brands, and tomatoes for Furman Foods. The rich soil on this land supports this intensive vegetable operation providing for the livelihood of the Kistlers.

Pennsylvania takes great pride in its #1 industry, agriculture, and has preserved over 107,000 acres of farmland in 37 counties including Columbia County. To show his support of agriculture, Governor Ridge signed an Executive Order entitled the **Agricultural Land Preservation Policy** (4 PA Code, Chapter 7), copy enclosed. This policy calls for the analysis of alternatives when state funds or state administered federal funds are used to convert agricultural lands to non-agricultural uses. In order to comply with this policy, the Department suggests alternatives of shifting the levee onto the landfill property and shifting the levee closer to the Kistler's property line be faithfully considered. The Department recognizes that your Bureau has engineering constraints that must be addressed.

One benefit of having one of these alternatives selected is a larger contiguous tract will be left for agricultural use. By eliminating the bifurcation of a significant portion of the farm property, the economic viability of the operation is better protected.

Please consider these comments as this project progresses.

Sincerely,

J. Wayne Yorks

J. Wayne Yorks
Regional Director

REGION II OFFICE
2130 COUNTY FARM ROAD
MONTOURSVILLE PA 17754-9621
717-433-2640
717-433-4770 Fax

cc: Tom Becker
Steve Kistler

CCMA

Columbia Crop Management Association
c/o Cooperative Extension Service
702 Sawmill Rd. Suite 102
Bloomsburg, PA 17815
Phone: (717) 784-6660

Department of Environmental Protection
Bureau of Waterways Engineering
Attn.: Michael D. Conway, Director
P.O. Box 8460
Harrisburg, PA 17105-8460

Dear Mr. Conway;

I am writing to you about a situation which has been brought to my attention by Fred and Steve Kistler. I am a crop consultant in Columbia, Montour, Northumberland, and Luzerne counties. In 1997 I scouted over 7000 acres of cropland for 29 farmers every week. I have scouted the farm owned by Fred Kistler in Bloomsburg, PA near the Susquehanna River for the last three years. This land is some of the finest agricultural land in the area, capable of producing top yields under all types of conditions.

I have heard that you are reviewing a flood wall plan that would destroy part of this land. I am asking you to reconsider this plan. The wall will not only destroy the land where the wall is to be built, but will likely destroy about 25 acres of land between the wall and the railroad tracks by altering the drainage and making the field inaccessible to equipment. This land is currently used to raise high-value vegetable crops that are irrigated as needed. A flood wall will make it impossible to use this land as large machinery are used in the production of these crops. Irrigation will definitely become impossible as this piece will be too isolated to make irrigation practical and it may be impractical to get water on that side of the wall.

Please consider that your plan will ruin about 25 acres of Class 1 agriculture land which currently earns the farmer up to $1000 / acre per year in net income. Keeping this wall beside the railroad tracks or on the other side of the tracks will be less intrusive for this farm, will not destroy as much of a rare natural resource, will expand the flood plain by another 25 acres or more which will reduce the chances of any flood topping any flood wall erected, and should not require any additional requirements in the construction.

Thank you for taking these factors into consideration as you conduct your review.

Sincerely;

Fred R Musser

Fred Musser
Certified Crop Advisor

cc John Gordner
Steve Kistler

Feb. 7, 2000

Stacey Underwood
Army Corp of Engineers
Planning Division
Baltimore Hdq.

Dear Stacey,

This is a follow-up letter to our telephone conversation of Feb. 4. At the start of the Pa. D.E.P. Bloomsburg floodwall study I expressed my opposition to the involvement of my farmland with the project. To briefly summarize, It was directed to D.E.P., by the Governors office that the Pa. Ag. Land Preservation policy prohibits state funds and state-administered federal funds to be used to convert primary Ag-land to other uses when alternatives are possible. The D.E.P. acknowledged this policy and have proposed a levee alignment in compliance. This alignment involves land on my property, however it is the least intrusive to my farm operation of the alignments I have seen , and I will accept it. I expect the Army Corp. of Engineers , as you study alternative levee alignments, to follow the same effort as D.E.P. to preserve my farmland. I will not accept A levee that divides my land as obviously D.E.P. has provided an alternative to that.

Attached FYI , are copies of letters written to D.E.P. in support of my position and the reply from D.E.P. that resulted with their proposed levee alignment. Also included is a copy of the Pa. Ag. Land Preservation Policy and a map provided by D.E.P. of their proposed alignment across my land. If you have any questions that I might need to answer feel free to call.

Sincerely,
Stephen Kistler *Stephen Kistler*

R.D.2 box 39E
Orangeville, Pa.
17859
570 784 9060

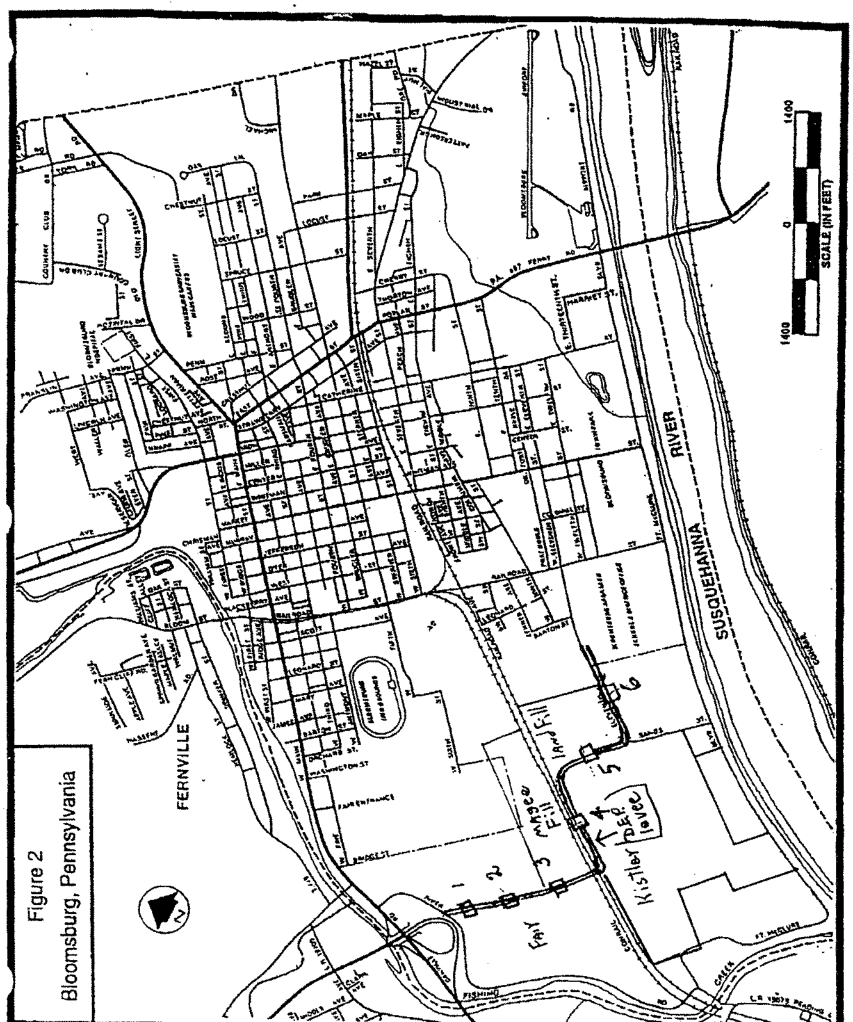

Figure 2
Bloomsburg, Pennsylvania

Post Office Box 218
Montoursville, Pennsylvania 17754-0218
Telephone: 570-368-4258
February 28, 2000

Subject: Columbia County
S.R. 4042, Section 001
Bloomsburg Levee Access Road

Mr. Stephen Kistler
RD 2, Box 39E
Orangeville, PA 17859

Dear Mr. Kistler:

This is in reference to your letter of February 7, 2000 concerning the Bloomsburg levee access roadway project. We understand that you are concerned with the potential impacts of this roadway project, and the levee project currently being studied, on your farmland in west Bloomsburg.

Per your discussions with Mr. Eric High, P.E., of our Design Liaison Unit, and as discussed at the February 24, 2000 public meeting for the levee project, we are in the preliminary study phase for the potential roadway project and have not yet selected any specific locations for the access road. Additionally, the U.S. Army Corps of Engineers (USACOE) is beginning their environmental and feasibility studies to determine if a levee is feasible and, if so, what alignment would provide the highest benefit to cost ratio. Therefore, this is the appropriate time for you to contact both this department and the USACOE to highlight your concerns, and we appreciate your input.

Later this spring and summer, we will be evaluating what effect a roadway with termini at the Route 11/42 interchange and in the area of the industries along 11th and Railroad Street would have on the traffic flow through Bloomsburg. The results of this study and the amount of support for the roadway project will determine if we advance to the next step in the design process and begin evaluating the environmental and economic impacts of various roadway alignments. Further, the presence and alignment of the potential levee in west Bloomsburg will have a significant impact on the feasibility, location, cost, and environmental impacts of the proposed roadway. Based upon the schedule presented by the USACOE at the February 24, 2000 public meeting, their environmental and feasibility studies will not be completed until mid-2002. Due to the interrelationship of the levee and roadway projects, we are cooperating with the USACOE in their studies and, therefore, the roadway project will be developed within the same timeframe as the levee project.

Per the Pennsylvania Agricultural Land Preservation Policy, we are bound to evaluate feasible alternatives to prevent conversion of productive farmland to other uses, including transportation use. Therefore, if the roadway project advances to the point of alternative alignment and environmental studies, we will evaluate all alternatives to avoid impacting your productive farmland in west Bloomsburg.

If you have any further questions or concerns, please contact Mr. High, at the above address and/or phone number.

Sincerely,

Paul E. Heise, P.E.
District Engineer
Engineering District 3-0

0300/EEH/eeh/dmp
570-368-4258
File:J:\DESIGN\Special Projects\EEH Folder\00-38 Response To Mr Kistler (2-26-00).Doc

Copy to:
Stacey Underwood, Bloomsburg Study Project Manager
U.S. Army Corps of Engineers
CENAB-PL-P
Post Office Box 1715
Baltimore, MD 21203-1715

P. E. Heise #00-38
L. R. Beck (RMH, EEH, LJL)

COMMITTEES

GAME AND FISHERIES, CHAIRMAN
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Senate of Pennsylvania

27TH DISTRICT
EDWARD W. HELFRICK
SENATE BOX 203027
173 MAIN CAPITOL BUILDING
HARRISBURG, PA 17120-3027
(717) 787-8928
FAX: (717) 787-9715

101 WEST STATE ROUTE 61
MT. CARMEL, PA 17851-2539
(570) 339-5937
FAX: (570) 275-7400

702 SAWMILL ROAD
SUITE 103
BLOOMSBURG, PA 17815
(570) 784-3464

SHAMOKIN DAM BOROUGH BUILDING
144 WEST 8TH AVENUE
P.O. BOX 456
SHAMOKIN DAM, PA 17876
(570) 743-1918

February 18, 2000

Stacey Underwood
Army Corps of Engineers
Planning Division
P.O. Box 1715
Baltimore, MD 21203

Dear Ms. Underwood:

I call your attention to the enclosed letter I have received from Stephen Kistler of Orangeville relating to the proposed Bloomsburg flood protection project. While I strongly support the proposed project, as one of the prime sponsors of agricultural land preservation efforts over the past twenty-four years, I believe Mr. Kistler's concerns are valid.

Please provide me with an update of the status of the flood protection project, as well as any information you may be able to provide concerning preferred alignments.

Sincerely,

Ed Helfrick

EDWARD W. HELFRICK
State Senator

EWH/TBR/vkt

Enclosure

cc: Honorable James M. Seif, Secretary, DEP
Stephen Kistler

2-10-00:11:41AM: 5703873303 MAIL ROOM ETC HBG OFFICE ;7172757400 # 1/ 3

Feb. 10, 2000

Senator Edward Helfrick
101 West State Rt. 61
Mt. Carmel, Pa.

Senator Ed Helfrick,

My name is Stephen Kistler and I am A farmer in Columbia County Pa. I am writing this letter of information to solicit support to preserve my farmland from division by A flood control levee, and access road. Two years ago Pa. D.E.P. initiated A floodwall feasibility study to determine the need and costs of A flood protection measure for A portion of the town of Bloomsburg. As A landowner that would be involved in this project I was asked to allow permission for surveys and tests to be done on my property. At this time I expressed my opposition to the involvement of my farmland with this project to D.E.P. I also lobbied support from state officials, including your office, who spoke successfully on behalf of my cause. To briefly summarize, it was directed to D.E.P. by the Governors office that the Pa. Ag. Land Preservation policy prohibits state funds and state administered federal funds to be used to convert primary Ag-land to other uses when alternatives are possible. The D.E.P. acknowledged this policy and have studied A levee alignment in compliance.(see attached map) This alignment still involves land on my property, however it is the least intrusive to my operation of the alignments I have seen, and I will accept it.

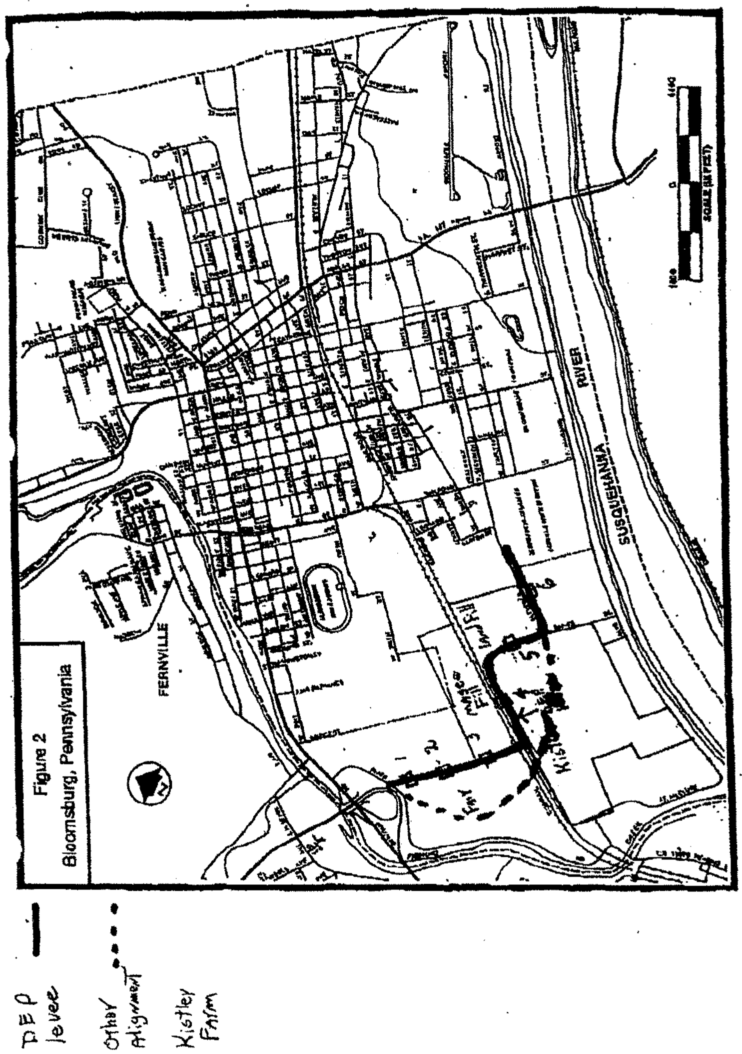
However, presently the Army Corps of Engineers in conjunction with Penn. D.O.T. are studing several alternative alignments for a levee and road, that could divide my farmland if implemented. The land on my farm is fertile river bottom soil, of which their are limited acres of in our state. This soil supports an intensive vegetable rotation of tomatoes, snapbeans and sweetcorn to provide for my families income. Certainly this is the caliber of farmland we need to preserve for Pa. agriculture.

Once again I am asking for your support to help preserve my farm from the destruction this project could cause. . The Pa. D.E.P. has studied a levee alignment that follows the perimeter of my farm, rather than crossing it.If you would contact Penn. D.O.T. and the Army Corps, I would be very grateful. Please ask them to follow the D.E.P. project alignment on my land, or any alignment that would preserve my farm intact. If you have any questions that I need to answer please contact me. Thank you for your consideration of this matter and for the support of Pa. agriculture.

Sincerely,
Stephen Kistler
Stephen Kistler

R.D.2 Box 39E
Orangeville, Pa. 17859
570-784-9060

2-10-00;11:41AM; 5703873303 MAIL ROOM ETC HBG OFF CE



Post Office Box 218
Montoursville, Pennsylvania 17754-0218
Telephone: 570-368-4258
February 28, 2000

Subject: Columbia County
S.R. 4042, Section 001
Bloomsburg Levee Access Road

Honorable Edward W. Helfrick
Senate of Pennsylvania
Senate Box 203027
173 Main Capitol Building
Harrisburg, PA 17120-3027

Dear Senator Helfrick:

This is in reference to your letter of February 18, 2000 regarding Mr. Stephen Kistler's concerns regarding the Bloomsburg levee and access roadway projects.

Both the U.S. Army Corps of Engineers (USACOE) levee project and our roadway project are in the preliminary study phases. The USACOE has recently initiated their environmental and feasibility studies for the levee project. To date, no specific levee locations or alignments have been selected. They are scheduled to complete their environmental and feasibility studies by mid-2002.

As a result of testimony provided by the Town of Bloomsburg during our Twelve Year Program update, we have been allocated $500,000 to perform preliminary studies on an access roadway to be coordinated with the levee project from the Route 11/42 interchange to the industries along 11th and Railroad Streets in west Bloomsburg. This spring and summer we will be performing a detailed traffic study of Bloomsburg to determine what effect the access roadway will have on traffic patterns in Bloomsburg. Depending upon the results of this traffic study (i.e., does the study demonstrate a need for the roadway project), the USACOE levee feasibility study and resulting levee alignments, continuing support for the roadway project, and allocation of funding, we may then begin evaluating the cost, environmental impacts, and feasibility of specific roadway alignments. Due to the interrelationship of the levee and roadway projects, we are cooperating with the USACOE and are working within their study timetable.

Attached, for your information, is a copy of our response to a letter we received from Mr. Kistler stating his concerns relating to impact upon his productive farmland in west Bloomsburg. If you have any further questions or concerns, please contact myself or Mr. Eric High, P.E., Project Manager.

Sincerely,

Paul E. Heise, P.E.
District Engineer
Engineering District 3-0

Attachment

0300/EEH/eeh/dmp
570-368-4258
File:J:\DESIGN\Special Projects\EEH Folder\00-57 Response To Sen Helfrick (Re Stephen Kistler) (2-26-00).Doc

Copy to:
Stacey Underwood, Bloomsburg Study Project Manager
U.S. Army Corps of Engineers
CENAB-PL-P
Post Office Box 1715
Baltimore, MD 21203-1715

Michael M. Ryan, P.E.
Deputy Secretary for Highway Administration
9th Floor, Forum Place

Paul A. Gnazzo, Director
Office of Legislative Affairs
9th Floor, Forum Place

P. E. Heise #00-57
L. R. Beck (RMH, EEH, LJL)
R. P. Mason

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF AGRICULTURE
BUREAU OF FARMLAND PROTECTION

February 24, 2000

PennDOT - Engineering
ATTN: Mr. Eric High
115 Jordan Ave.
Montoursville, PA 17754

RE: **Bloomsburg Flood Levee Project**
Columbia County, PA
Steve Kistler Farm

Dear Mr. High:

I am writing on behalf of Steve Kistler in an effort to protect his farmland from a possible levee and access road under study by your agency. Mr. Kistler has indicated to the Department that alignments under study for these projects could take land as well as divide the farm property, making it less productive.

The 100-acre tract consists of one of the most limited and fertile soils in the state. It provides for the livelihood of the Kistler family by supporting intensive vegetable production. This is the very type of farm we need to preserve in Pennsylvania.

Pennsylvania takes great pride in agriculture, its number one industry. The Commonwealth has preserved over 150,000 acres of farmland in 42 counties, including Columbia County. To show his support of agriculture, Governor Ridge signed Executive Order 1997-6, the Agricultural Land Preservation Policy. This policy calls for the analysis of alternatives when state funds or state administered federal funds are used to convert agricultural lands to non-agricultural uses.

Two years ago this policy was recognized by the Department of Environmental Protection (DEP) during their feasibility study of the same project. In compliance with this policy, DEP has studied an alignment following the perimeter of the Kistler farm, thereby not dividing the property.

Depending upon the project alignment, the project may be subject to review by the Agricultural Lands Condemnation Approval Board (ALCAB), established by Act 100 of 1979. The Board has jurisdiction over certain projects affecting productive agricultural lands.

2301 NORTH CAMERON ST.
HARRISBURG, PA 17110-9408
717-783-3157
FAX: 717-772-8798

Thank you for the opportunity to comment on this project. Please call us at (717) 783-3167 if you have any questions regarding this matter.

Sincerely,

Raymond C. Pickering

Raymond C. Pickering, Director

cc: Ms. Stacey Underwood, USACE
Mr. Wayne Yorks, PDA Region 2

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
PO Box 8460
Harrisburg, PA 17105-8460

February 24, 2000

Bureau of Waterways Engineering 717-772-5989

Mr. Stephen Kistler
RR 2, Box 39E
Orangeville, PA 17859

Re: DEP File No. C19:3

Dear Mr. Kistler:

Governor Tom Ridge has asked me to respond to your letter of February 10, 2000 regarding preservation of your agricultural land.

The Department continues to be actively involved with the Corps of Engineers (COE) in the development of their project. We have stressed the reasons for our levee alignment and the necessity to comply with the Governor's Agricultural Land Preservation policy. A joint meeting with the COE, the Pennsylvania Historical and Museum Commission (PHMC) and our office also addressed the alignment. The PHMC must assess the impact any project would have on historic and cultural resources. Other alignments that disrupt more of the agricultural base could be considered a negative cultural impact.

As the COE project progresses, we will continue to support and promote compliance with the Agricultural Land Preservation Policy. If you have any questions, please contact David P. Lambert at 717-783-7724 or me at the above number.

Sincerely,

Michael D. Conway

Michael D. Conway
Director

cc: Eric High, PennDOT
Stacey Underwood, COE

Shirley, Log#20004942, Code C:
Respond by 2/29/2000. Thanks.

Feb. 10, 2000

Governor Thomas Ridge
Rm.225 Main capitol Building
Harrisburg Pa.

Governor Ridge,

My name is Stephen Kistler and I am A farmer in Columbia County Pa. I am writing this letter of information to solicit support to preserve my farmland from division by A flood control levee, and access road. Two years ago Pa. D.E.P. initiated A floodwall feasibility study to determine the need and costs of A flood protection measure for A portion of the town of Bloomsburg. As A landowner that would be involved in this project I was asked to allow permission for surveys and tests to be done on my property. At this time I expressed my opposition to the involvement of my farmland with this project to D.E.P. I also lobbied support from state officials, including your office, who spoke successfully on behalf of my cause. To briefly summarize, it was directed to D.E.P. by the Governors office that the Pa. Ag. Land Preservation policy prohibits state funds and state administered federal funds to be used to convert primary Ag-land to other uses when alternatives are possible. The D.E.P. acknowledged this policy and have studied A levee alignment in compliance.(see attached map) This alignment still involves land on my property, however it is the least intrusive to my operation of the alignments I have seen, and I will accept it.

However, presently the Army Corps of Engineers in conjunction with Penn. D.O.T. are studing several alternative alignments for a levee and road, that could divide my farmland if implemented. The land on my farm is fertile river bottom soil, of which their are limited acres of in our state. This soil supports an intensive vegetable rotation of tomatoes, snapbeans and sweetcorn to provide for my families income. Certainly this is the caliber of farmland we need to preserve for Pa. agriculture.

Once again I am asking for your support to help preserve my farm from the destruction this project could cause. . The Pa. D.E.P. has studied a levee alignment that follows the perimeter of my farm, rather than crossing it.If you would contact Penn. D.O.T. and the Army Corps, I would be very grateful. Please ask them to follow the D.E.P. project alignment on my land, or any alignment that would preserve my farm intact. If you have any questions that I need to answer please contact me. Thank you for your consideration of this matter and for the support of Pa. agriculture.

Sincerely,
Stephen Kistler
Stephen Kistler

R.D.2 Box 39E
Orangeville, Pa. 17859
570-784-9060

Post Office Box 218
Montoursville, Pennsylvania 17754-0218
Telephone: 570-368-4258
March 14, 2000

Subject: Columbia County
S.R. 4042, Section 001
Bloomsburg Levee Access Road

PA Department of Agriculture
Bureau of Farmland Protection
2301 North Cameron Street
Harrisburg, PA 17110-9408

Attn: Mr. Raymond C. Pickering, Director

Dear Mr. Pickering:

This is in reference to your letter of February 24, 2000 regarding Mr. Stephen Kistler's concerns related the Bloomsburg levee and access roadway projects.

Both the U.S. Army Corps of Engineers (USACOE) levee project and our roadway project are in the preliminary study phase. The USACOE has recently initiated their environmental and feasibility studies for the levee project, and the Pennsylvania Department of Environmental Protection (PADEP) is actively involved in development of the levee project. To date, no specific levee locations or alignments have been selected, and they are scheduled to complete their environmental and feasibility studies by mid-2002.

As a result of testimony provided by the Town of Bloomsburg during our Twelve Year Program update, we have been allocated \$500,000 to perform preliminary studies on an access roadway to be coordinated with the levee project from the Route 11/42 interchange to the industries along 11th and Railroad Streets in west Bloomsburg. This spring and summer we will be performing a detailed traffic study of Bloomsburg to determine what effect the access roadway will have on traffic patterns in Bloomsburg. Depending upon the results of this traffic study (i.e., demonstrating a need for the roadway project), the USACOE levee feasibility study and resulting levee alignments, continuing support for the roadway project, and allocation of funding, we will then begin evaluating the cost, environmental impacts, and feasibility of specific roadway alignments. Due to the interrelationship of the levee and roadway projects, we are cooperating with the USACOE and PADEP and are working within their study timetable. Ultimately, the geometry and location for the proposed roadway will be largely governed by the USACOE levee project.

We recognize the importance of protecting Pennsylvania's productive farmlands. Should the roadway project continue into preliminary design and environmental analysis, we will consider and evaluate alternatives for the roadway that avoid or minimize impacts to the Kistler property where reasonable and feasible.

Attached, for your information, is a copy of our response to a letter we received from Mr. Kistler stating his concerns relating to impact upon his productive farmland in west Bloomsburg. If you have any further questions or concerns, please contact myself or Mr. Eric High, P.E., Project Manager, at the address and/or telephone number listed above.

Sincerely,

Paul E. Heise, P.E.
District Engineer
Engineering District 3-0

Attachment

0300/EEH/eeh/dmp
570-368-4258
File:J:\DESIGN\special projects\EEH Folder\00-38A Response to DEA (Re Stephen Kistler) (3-13-00).doc

Copy to:
U.S. Army Corps of Engineers
CENAB-PL-P
P.O. Box 1715
Baltimore, MD 21203-1715
ATTN: Ms. Stacey Underwood
Bloomsburg Study Project Manager

PA Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 8460
Harrisburg, PA 17105-8460

Michael M. Ryan, P.E.
Deputy Secretary for Highway Administration
9th Floor, Forum Place

P. E. Heise #00-38A
L. R. Beck (RMH, EEH, LJL)

3/29/2000

Phone Conversation Memo

I received a call from Mr. Steve Kistler (570-784-9060) of Bloomsburg. He said that his 113 acre farm property contains a number of potentially significant cultural resources, including, (1) portions of the Fort McClure site, an 18th century frontier fortification; (2) part of the Warrior's Path, a late prehistoric trail, (3) portions of the north branch of the Pennsylvania Canal, and (4) one or more prehistoric sites that have yielded hundreds of prehistoric artifacts.

Mr. Kistler stated that he worked with DEP in the past to select an alternative which would not bisect his farm, and would also avoid cultural resource impacts by running the alignment along a disturbed corridor on the edge of his property. He furthermore invited me to his farm in mid-April, after the farm has been plowed, to conduct a walk-over of the property and to accurately document the locations of these resources.

I explained the cultural resource and other planning processes involved in our selection of a preferred alternative, and assured him that the impacts to both the cultural resources and the farmland on his property would be included in the impact analyses and alignment selection for the Bloomsburg LFP

Ken Baumgardt

Report Of History Relative To

The Kistler Farm

Bloomsburg , Pennsylvania

Compiled By
Steve Kistler
April 5, 2000

This valley of the North Branch of the Susquehanna River was originally known as Wyoming, or in Indian, Maughwauwame, signifying " large plains". A number of Indian tribes inhabited the region now composing the counties lying on the North and West Branch; but the earliest historical bands in Columbia county Pa. seem to have been the Shawanese, who had a village on the flats below Bloomsburg near the mouth of Fishingcreek. In 1999 A stone monument and plaque was placed at the mouth of Fishingcreek in rememberance of the Native American inhabitants that once lived here. This is also the location of the 113 acre Kistler farm. The Shawanese came from the Carolinas, and kept moving north, until by agreement they were allowed to settle upon the Susquehanna about 1697.(1) Through the valley ran some of the most important and frequently traveled "war paths" known in the history of the race. The great Warriors Path, also called the Fishingcreek path went from Athens N.Y. to Sunbury Pa. The great Warriors Path was used not only in war but also in peace. It was the designated road for Iroquois ambassadors traveling south to" brighten the chain of friendship" with brother Onas at Philadelphia or with Maryland and Virginia at Lancaster. The path here in Columbia County ran through a shawanee town at Bloomsburg and crossed Fishingcreek. (2) It was on this very path that Moses Van Campen, the most prominent Indian fighter on the North Branch was captured and his brother and father killed by Indians while enroute from Fort McClure. The description of the location of this path reveals that it must have crossed the Kistler farm parallel with the River heading towards Fishingcreek where it crossed. Included in this report are photographs of some of the hundreds of Indian artifacts that have been collected from the fields of the farm .The Kistler family collection has been collected by four generations of the family,all found while cultivating the land.

On May 10 1769 James McClure from Lancaster County, with a party of five,camped at the mouth of Fishingcreek enroute to Wyoming. A survey of this land was completed on June 3,1769. The tract was named Beauchamp and consisted of 300acres 3/4 of a mile above Fishingcreek .The tract was purchased by James McClure " called McClures choice" from William Smith on Aug. 22 1769.A Log cabin was built by McClure on the site of the present day building in 1769. On Aug. 1774 James McClure Jr. was the first child born to white parents in this area. James McClure Sr. died 1777-1778. As a result of the Wyoming Massacre "an Indian and Tories raid in the north of the valley on July 3 1778 where 227 settlers scalps were taken" the remaining McClure family fled to Lancaster in 1778. At this time the McClure homestead was occupied by Major Moses VanCampen "son-inlaw of the McClures". This is when the home was surrounded by palisades and dubbed as Fort McClure. This protection was erected to provide temporary shelter from Indian raids but was regularly garrisoned by rangers in time of war.(3) One hundred twenty-six years after the construction of Fort McClure, on April 11, 1907 the Fort McClure Chapter of the D.A.R. placed and dedicated a marker upon the site of the original fort. The marker is in memory of Major Moses Van Campen,"famous old Indian fighter." A photograph is included in this report. This fort was located next to the Kistler farm.

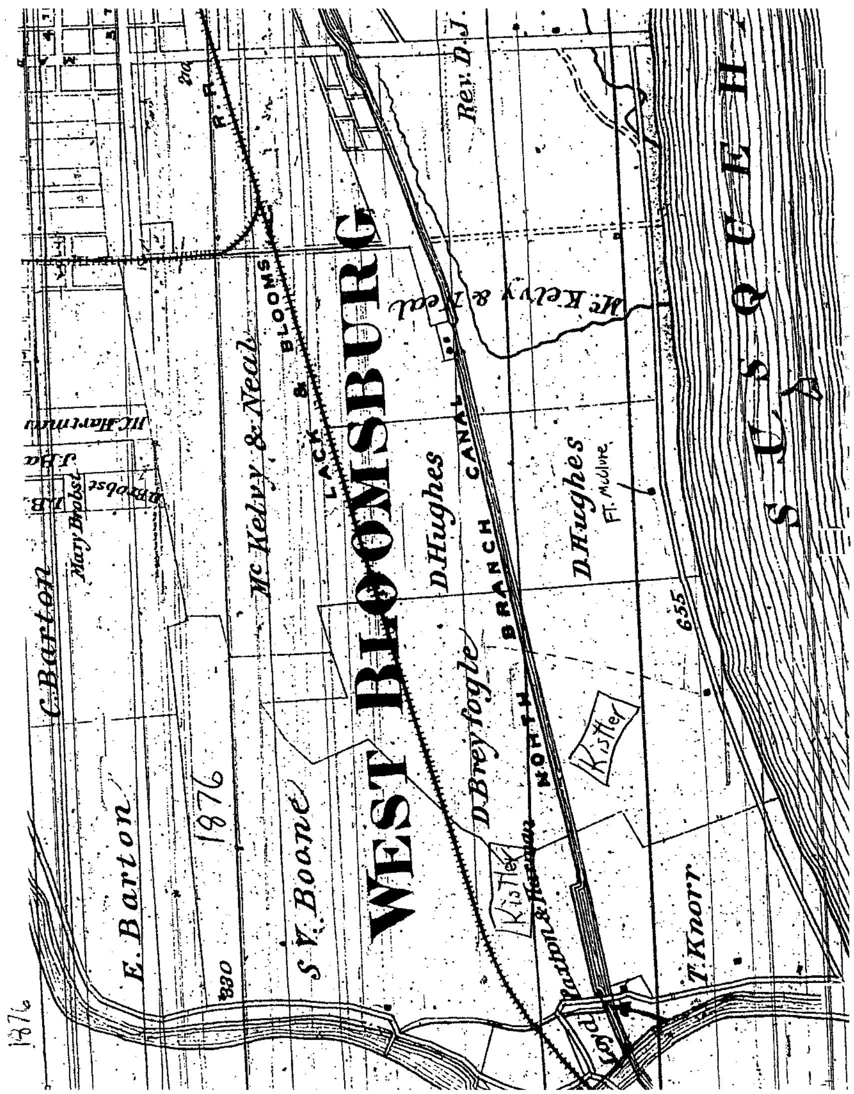
Also crossing through the center of the farm was about 1750 feet of the Pennsylvania North Branch canal. The three acres of ground that the canal covered was returned to the farm in 1928 and is farmed today. The location across the farm is still visible. This branch covered 72.5 miles from Northumberland Pa. to Lackawanna Creek. Ground was broken on July 4 1828 in Berwick Pa. to dig the canal.It started operation in 1834. Canal traffic was at its height during the civil War, and ceased operating in 1900.(4)

1 History of Columbia County
Freeze-1883, pg. 1,7,9

2 Indian Paths of Pennsylvania
1965 pg. 72

3 Frontier Forts of Pa.
Vol. 1 pg. 372

4 The Columbian
Pa. North Branch Canal Vol. 1
Oct. 1960


WEST BLOOMSBURG
LACK & BLOOMS
NORTH BRANCH CANAL
Mc Kelvy & Neal
D.Hughes
D.Hughes
S.V. Boone
E. Barton
C.Barton
D.Breyfogle
Kistler
Kistler
T.Knorr
Rev. D.J.
Mary Brobst
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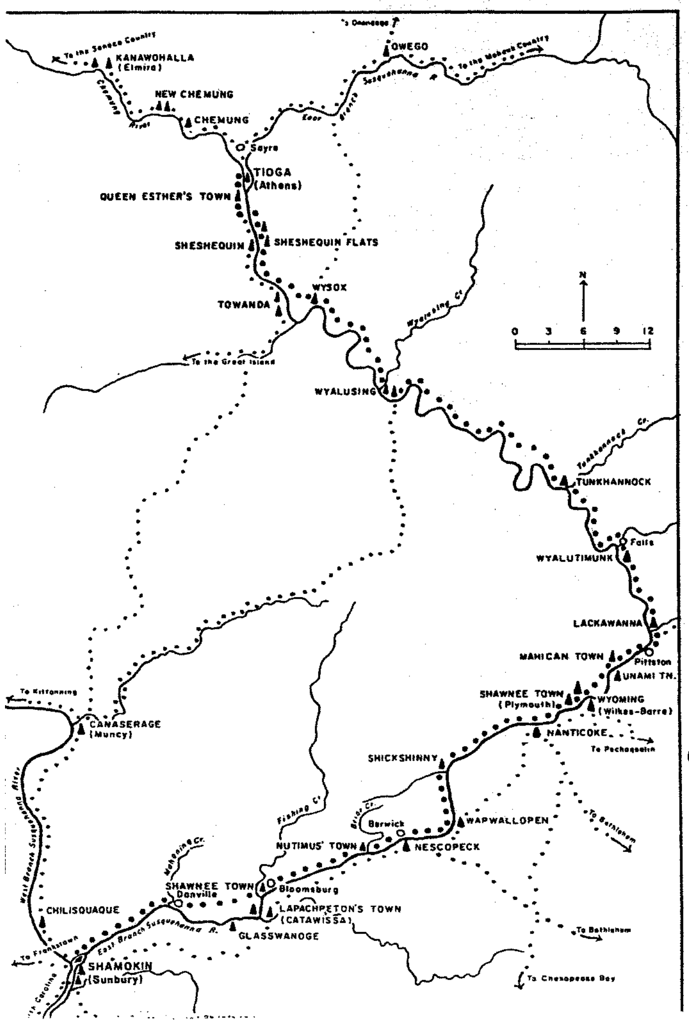


▲ Indian Village
O Fort McClure

1999 Press Enterprise Article

Press Enterprise/Tom Adams

This close-up view of the new Native American memorial, top, erected along Fort McClure Boulevard in Bloomsburg shows the plaque that is dedicated to the remembrance of the Native American inhabitants of the area over the past 6,000 years.

Elayne and Tom Costlow, of Danville, above, look over the memorial. The couple were bike riding and noticed the monument.

Native American monument to be dedicated today

By MICHAEL T. BURKHART
Press Enterprise Writer

BLOOMSBURG — A spot where Native Americans camped thousands of years ago is now marked with a stone monument, which will be dedicated this afternoon.

The monument was recently placed near the confluence of the Susquehanna River and Fishing Creek, where evidence of campfires and tools were found during a 1996 archeological dig led by Bloomsburg University professor DeeAnne Wymer.

The spot — in a field owned by the Streater family — would have been a good place to camp, Wymer said, because the river and Fishing Creek could have been used for travel.

Pieces of wood from a fire pit found about three feet under the soil were sent for radiocarbon dating and were found to be more than 9,000 years old, Wymer said.

The monument was placed by the Miquon Chapter of the Daughters of the American Colonists. The dedication will be held at 2:30 p.m. today, after the group has lunch and hears an address from Wymer, said Carol Streater, the group's state historian. The public is invited to the dedication.

The monument was set late last month in a concrete slab on a graded area along Fort McClure Boulevard. The land is owned by the Streater family, but the town will cut the grass around the monument.

A brass plaque says the monument was placed "in remembrance of the Native American inhabitants here over the past 6,000 years."

The stone, about four feet high, came from the pier of an aqueduct over Fishing Creek for the North Branch of the Pennsylvania Canal, Streater said.

The aqueduct pier was removed sometime after Hurricane Agnes struck in 1972, Streater said. The stone was found left behind in the creek bed.

Catawissa Monument Co. mounted the plaque and engraved the stone, Streater said.

The marker is placed along the road on the outside of a curve. Streater said the group plans to talk to the town about protecting the monument from motorists who might not make the turn and crash into the stone.

"I hope that won't happen," Streater said. "I do think we need some protection there."

JULY 4, 1976

SCHEDULE OF ACTIVITIES

12:00 Noon
Ringing of the Church Bells — Area Churches
Fort McClure House open for tours
Crafts in the Colonial manner (until dusk)

1:00 P.M.
Welcome — Mrs. Robert N. Rishel, D.A.R. Regent
Pledge of Allegiance
Prayer of 1907 — Rev. Raymond Edwards
Introduction of Mrs. Coray H. Miller, Pennsylvania State Regent, D.A.R.
Children's Colonial Games

2:30 P.M.
Van Campen Ranging Company — Demonstration on the green

7:00 P.M.
Baroque music presentation

8:30 P.M.
Movie "The Story of a Patriot" — Fort McClure lawn (Please bring your chair.)
Candlelight Tours of Ft. McClure House

WELCOME TO FORT McCLURE HOUSE

The idea of a Colonial Fair was conceived by The Fort McClure Chapter, D.A.R. members as a fitting commemoration of our nation's birth and a tribute to our local heritage.

In the midst of the commercialism so prevalent in much of our "Bicentennial" celebrating, the Daughters of the American Revolution and other cooperating organizations decided to provide an event at which you couldn't spend money, even if you wanted to! All of today's activities are free and are intended to provide an opportunity for sharing ideas and skills, for enjoying the beauty of a local landmark and for just plain relaxed conversation.

We hope that the Van Campen Ranging Company demonstration, the Fort McClure House, the craft demonstrations, children's games, colonial music and "The Story of a Patriot" will provide a day for you to remember both past and present blessings — and will bring you to a closer understanding of the hopes and dreams of the colonial men and women whose memory we honor this day.

The Planning Committee

THE FORT McCLURE STORY

"In the latter half of the 18th Century, James McClure from Paxton, Lancaster County, Pennsylvania, while trying to reach Wyoming, Pennsylvania, camped at the mouth of Fishing Creek near the present town of Bloomsburg.

Impressed with the area, he remained here, and in 1772 a tract of land was patented to him under the name "McClure's Choice." Here he built a log cabin, and in 1774 his son, James McClure, Jr., was born.

James McClure became a man of position and influence, and when the Revolutionary War broke out he was prominent in the councils of the Province.

At the time of the Wyoming Massacre, July 3, 1778, area residents fled down the Susquehanna River, Mrs. McClure among them. In February 1781, Moses Van Campen, a fighter of great reknown and the son-in-law of McClure, stockaded the McClure residence to help maintain a military line of defense across the valley.

Though Fort McClure apparently was never formally attacked, there were lurking Indians about, and many flights of terrified inhabitants to the stockade. It may truthfully be said that the fort was a necessity and a haven of refuge at a very critical period in the history of the North Branch Valley."

The above information, reprinted from the D.A.R. Yearbook, is described in more detail in the **Battle History of Columbia and Montour Counties** published in 1887 and in the recent book by Edwin M. Barton, **Columbia County Two Hundred Years Ago.**

The following exerpt from the Battle History is of special interest:

"When James McClure, in the year of 1772, looked upon this as the region of his future home, it is possible that while he realized its advantages, he was also cognizant of the danger of thus living at such a distance from the limits of civilization and in a country as yet unmarked by its influence.

Some facts regarding his previous history may indicate the motives of his immigration. James McClure was of Scotch-Irish descent, and a resident of that part of Lancaster county then known as the Paxton district, but included since 1785 in Dauphin county. He was connected, by marriage, with Captain Lazarus Stewart, and with George Espy, the proprietor of Espytown. It cannot be definitely determined whether he took an active part in those exploits which have made the "Paxton Rangers" such conspicuous characters in the colonial border annals, or whether he remained unmoved by those outrages which incited his neighbors to armed hostility in defiance of the proprietary government. That he was in active sympathy with his brother-in-law, Captain Stewart, when the latter espoused the defense of the Connecticut colony at Wyoming, seems evident from certain statements in a letter from Fort Augusta, by the military representative of the Penns, from which it appears, that, on Wednesday, May 10, 1769, James McClure, with several others, was encamped at the mouth of Fishing creek, en route for Wyoming. It is not further stated whether he reached Wyoming or not; but it seems probable that, for political reasons, his residence in Lancaster county was no longer agreeable, and that when a number of families from Paxton removed to Hanover township, in Wyoming, he went no farther than the mouth of Fishing creek, still, however, within the nominal boundaries of the "Town of Westmoreland." The tract upon which he located was surveyed in June, 1769, for Francis

Stewart, who conferred upon it the name of "Beauchamp." It was patented for Mr. McClure, in 1772, under the name of "McClure's Choice," and here, in a rude log cabin, James McClure, Jr., was born, in 1774, this being the first birth of a white child within the forks of the Susquehanna.

The McClures were not the only settlers in this part of Wyoming township for any length of time. In the year of their arrival, 1772, Evan Owen and John Doan became their neighbors. They came from Chester county, with the intention of forming, at the mouth of Fishing creek, a community in which their faith should predominate, as it subsequently did at Catawissa. Evan Owen lived south of a small stream which flowed through the town of Bloomsburg, and near its source, John Doan's land adjoined the McClure tract. Samuel Boone, also a member of the Society of Friends, emigrated from Exeter township, Northampton county, in 1775, and secured the title to four hundred acres of land, including the farm owned by one of his descendants. His land comprised the "Point" between the river and the creek, and extended along the banks of both. From all the evidence obtainable on this subject, it would appear that but three other families, the Claytons, Coopers and Kinneys, lived within the present limits of Bloomsburg, before the war of the revolution. Thomas Clayton was a Quaker from Chester county; Kinney was from New Jersey; nothing is known concerning the Coopers, except a tragic incident in connection with the Indian troubles. And thus, in the interval of comparative quiet which followed the French war, civilization was extended to this county. But before the settlement had experienced the first severity of the next struggle, the death of James McClure, Sr., deprived it of one of those most capable of acting in its defense. In abetting the schemes of Lazarus Stewart, the apparent disloyalty to his state was a vigorous, but palliative, remonstrance against the vacillation of the authorities in providing for the defense of Paxton; as a member of the committee of safety for Wyoming township, in 1776, he was equally vigorous in advocating measures for the protection of the settlements, although in the preceding year Colonel Plunkett had passed up the river with an armed force, and repassed the McClure plantation in hasty retreat, after an unsuccessful attempt to reduce Wyoming.

His family did not remain at their home long after his death. Among the victims of the Wyoming massacre, July 3, 1778, was Capt. Lazarus Stewart. With the assistance of friends his wife collected her household goods upon a raft supported by two canoes, and thus descended the Susquehanna with her family. Alarmed by her story of danger and desolation, Mrs. McClure collected her family and embarked in a similar craft. They reached Lancaster county in safety, and remained until the close of the war permitted a return to their respective homes. In the meantime Fort McClure was built, consisting of a row of palisades around her house, for the double purpose of protecting it and affording a safe retreat for the neighbors in case of emergency. It is probable that during Mrs. McClure's absence it was occupied by Major Moses Van Campen, who had married her daughter. The site of the fort is now marked by a dwelling house on the farm of Douglas Hughes."

Mr. Barton recounts this history in Chapter 1 of his book as follows:

"A report by a military representative of the Penns, May 12, 1769, noted that he found James McClure along the river above the mouth of Fishing Creek. McClure stated, according to this report, that he was a member of a party of five, the advance party of a group of one hundred on the way to join the Connecticut settlement at Wyoming, and that they were chiefly from Lancaster County.

McClure's Settlement at Fishing Creek

The leader was Lazarus Stewart, who had married the daughter of Josiah Espy, another Lancaster county resident. Her sister was the wife of James McClure. This relationship between these two brothers-in-law, Stewart and McClure, may help to explain McClure's association with this Connecticut movement; also his taking up of land in the neighborhood of Fishing Creek, but under Connecticut's claim for its control. In 1769, McClure's settling there would, under Pennsylvania's laws, have made him a squatter. Three years later as the opposition on the part of Pennsylvania to these Connecticut settlements became stronger and stronger, McClure completed his purchase under Pennsylvania law. He bought from Francis Stewart, almost surely a speculator, but no relation to Lazarus Stewart.

This property, first occupied as a Connecticut tract had been named Beauchamp (Beautiful Field), but when purchased from Stewart, was named McClure's Choice. McClure soon built a log cabin. In this log cabin in 1774, was born James McClure, Jr., claimed to be the first white child born in the area between the North and West Branches of the Susquehanna. McClure became a vigorous leader in the defense of this outpost of civilization until his death. It was about this same time that Espy completed his land purchase, farther up the river and also under Pennsylvania authority. We can only infer that, as the steps taken by the Pennsylvania government to oppose the Connecticut intrusion became more and more determined, McClure and Espy both decided that it would be more prudent to accept Pennsylvania's jurisdiction.

One hundred-twenty-six years after the construction of Fort McClure, on April 11, 1907, the Fort McClure Chapter of the Daughters of the American Revolution placed and dedicated a marker upon the site of the original fort. The marker was in memory of Major Moses Van Campen . . . "famous old Indian Fighter," and was unveiled by Miss Amy McClure, a kin to the major. As he delivered the dedicatory address, Alfred J. P. McClure, great grandson of Major James McClure and father of Amy McClure, commented, "Most of the things worth remembering in the future will depend upon their markings by the mothers who belong to the D.A.R."

His words were prophetic in that some 48 years later, the Fort McClure Chapter completed the restoration of the log portion of the Fort McClure House.

July 4, 1976, is also a very important day in the life of Fort McClure House. Today is the first day that the entry hall, living room and kitchen have been opened to the public. These recently redecorated rooms, along with the log meeting room, are furnished temporarily by a number of area residents who have graciously loaned furniture and accessories for this occasion.

It is the hope of the Fort McClure Chapter that the restoration of the home can continue and that appropriate period furnishings may be made available from individuals and organizations who share our interest in preserving this local landmark. Anyone interested in this effort to refurnish the home should contact Mrs. T. J. Evans, Bicentennial Chairman and member of the Bicentennial Decorating Committee.

[CLICK **HERE** AND TYPE COMPANY NAME]

FACSIMILE TRANSMITTAL SHEET

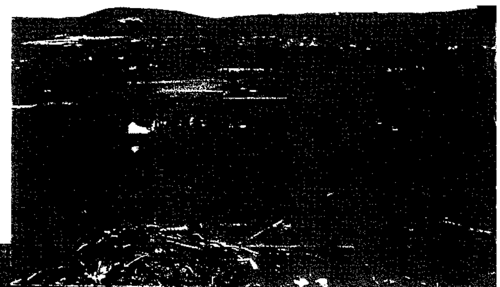
TO: Tom Jones Phil Perrazio	FROM: Ken Baumgardt
COMPANY: Kittatinny Archeology	DATE: 04/11/00
FAX NUMBER: 610 252 7902 570 402 7332	TOTAL NO. OF PAGES INCLUDING COVER: 11
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE:	YOUR REFERENCE NUMBER:

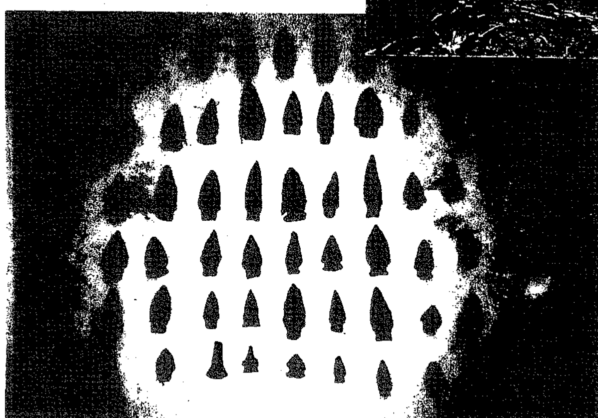
X URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:
Information provided to me by Steve Kistler of Bloomsburg.

[CLICK HERE AND TYPE RETURN ADDRESS]

Arial Photo of Kistler Farm →





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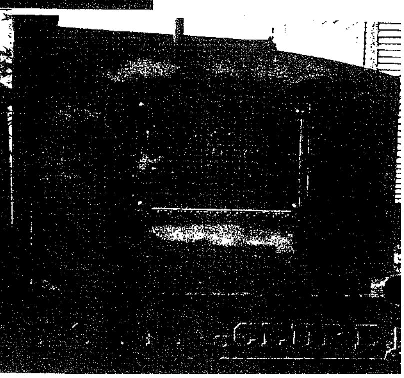
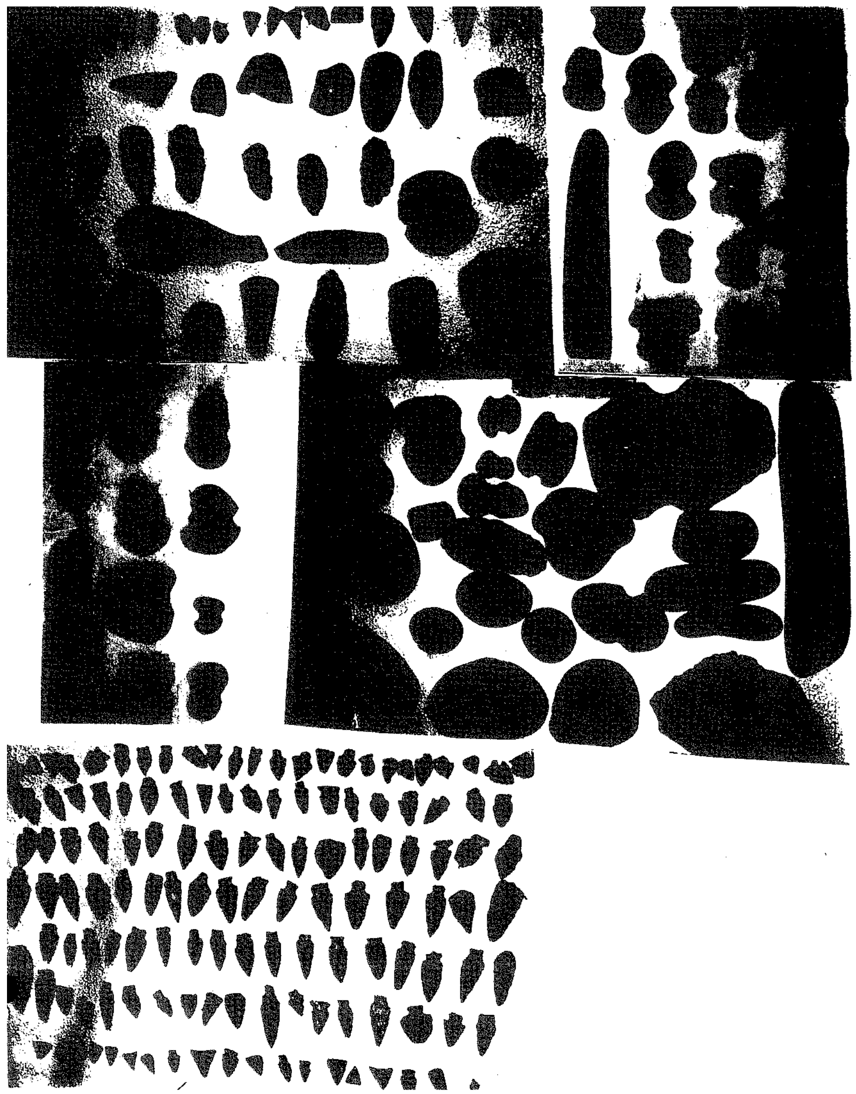




US Army Corps of Engineers
Baltimore District

TOWN OF BLOOMSBURG
The only TOWN in Pennsylvania

Bloomsburg
Local Flood Protection Feasibility Study

NEWSLETTER #2 *FALL 2000*

FEASIBILITY STUDY SCHEDULE

1999
July - Study Initiation

2000
Feb - Public Meeting #1, Continue Collecting Information on Existing Conditions, Cross Section Surveys, and Soil Sampling

2001
- Develop and Evaluate Alternative Solutions
- Public Meeting #2 – Present Alternatives
- Prepare Detailed Designs for Selected Plan
- Prepare Draft Feasibility Report and Environmental Impact Statement (EIS)

2002
- Public Review of Draft Feasibility Report/ EIS
- Public Meeting #3 – Present the Recommended Plan
- Final Feasibility Report/EIS

BLOOMSBURG STUDY TEAM ACTIVITIES

The Flood Protection Feasibility Study team is continuing to collect information about existing conditions in the Bloomsburg area. Gathering and analyzing information about Bloomsburg's social, economic, and environmental conditions is the first step in developing solutions to its flooding problems. Over the last several months, the study team has collected data on both Fishing Creek and the Susquehanna River to find where Bloomsburg floodwater comes from, where it goes, and exactly what damage it causes. High water levels over the past year in Fishing Creek and the Susquehanna River have delayed completion of survey data collection by six months. However, we have recently completed the elevation surveys and are now beginning to work with the information.

The high water marks from past floods, as well as information on recent water surface elevations, were collected in order to understand historic flood events. Estimated costs for past flood emergencies, post-flood clean-ups, and repair or replacement of municipal infrastructure, such as roads and sewer lines damaged by floods, was also collected. This information, along with the information on past high water marks, will be placed into a computer model and used to evaluate the economic benefits of a flood protection project.

Additional tasks the team will be focusing on in the coming months include gathering information on the types of soil, or foundation conditions, along a potential alignment of project construction. Soil sampling involves taking samples from holes approximately 3 to 5 inches in diameter and drilled up to 40 feet deep. After removing the soil samples, the holes will be filled in and the property restored to its original condition. The samples will be evaluated and that information will help to determine the kind of structure the soil can support. The drilling of nine holes along the Bloomsburg side of Fishing Creek, which has been coordinated with property owners, will be completed in November.

Tasks that have been completed for the study include a well-attended public scoping meeting, held last February at the Bloomsburg High School. The purpose of the scoping meeting was to introduce the study and study team members to the community as well as gather area residents' ideas, comments, and concerns about the study. Following the scoping meeting, Corps team members also toured flood-prone areas of Bloomsburg and Fernville and talked to neighborhood residents. The numerous questions and comments received during this scoping period will be factored into the study process and documented in the study report. In May 2000, team members, including the Town of Bloomsburg, the Pennsylvania Departments of Environmental Protection and Transportation, participated in a workshop to share information about the study area and develop a project strategy.

The workshop helped develop study goals, such as:

- To provide protection from the effects of a high level flood, such as the "100-year event" or an Agnes-level flood event, whichever produces the higher flood level;
- To identify a potential project that is cost effective (provides at least $1 in benefits for each $1 in cost);
- To protect as large an area and as many residents as possible;
- To minimize negative impacts to surrounding communities, major industries, utilities, and schools;
- To develop a plan that is acceptable to the public.

The team agreed that potential solutions should try to meet project goals, to the extent practicable, without causing additional problems with water collecting within the project limits. The team also looked at the problems and opportunities related to flood protection in Bloomsburg and developed a preliminary list of alternative solutions. In accordance with Corps policy, the final list of alternatives will include a range of alternatives, from "no action" to alternatives that may be too costly to construct. Benefits and costs are developed and analyzed for each alternative. Traditionally, the recommendation that emerges as a viable alternative is one where the benefits are greater than the costs. Now that survey results are in and data analysis can begin, the study team will be working toward developing alternative solutions.

ONGOING STUDIES/PROJECTS IN THE AREA

Several studies besides the Flood Protection Feasibility Study are being conducted in the Bloomsburg area and involve related topics - the river, floodplain, or hazard mitigation. The feasibility study team is coordinating its findings with these other study teams.

Pennsylvania Department of Transportation (PennDOT). In conjunction with the Corps' Feasibility Study, PennDOT is conducting preliminary engineering and traffic studies to investigate the feasibility of building a roadway as part of the potential flood protection project. The roadway could provide an alternate access route from the Routes 11/42 Interchange to the industries located along Railroad Street as well as the Bloomsburg High School/Middle School complex and residences in the area.

PennDOT began traffic studies in the Town of Bloomsburg this past June and will be completing the studies this fall. The results of this work will be used to evaluate the level of need for the proposed roadway and the effects that the roadway will have on travel patterns through the town. When the traffic studies are completed, PennDOT plans to hold a public meeting to present the results of the study and solicit public input regarding the proposed roadway project.

In addition to the potential roadway project, Bloomsburg has requested that PennDOT remove the existing state-owned bridge on State Route 4003 (Red Mill Road) over Fishing Creek because of concerns about the bridge's effect on flood water elevations. The traffic studies currently being conducted will also evaluate the effect the removal of this bridge will have on local travel patterns.

Currently, funding has been allocated to perform only engineering and environmental studies for the roadway project. No funding has been allocated for right-of-way acquisition or construction. Funding for preliminary studies for the bridge removal project have recently been added to the Department's Twelve-Year Program. The decision to implement one or both of these projects will be made after input from the public is received and the Corps' Feasibility Study is complete.

Stormwater Management Study. The Columbia County Planning Commission has hired the Larson Design Group to conduct a stormwater management study that will assess 41 tributaries of the Susquehanna River watershed over 47 square miles. The study will evaluate stormwater problems in these small tributaries and recommend new stormwater ordinances to control runoff from future development. The study will also make a recommendation on the need for additional studies to address specific problems. This study will evaluate Kinney's Run; but not consider water backing up from the Susquehanna during flood events.

Keystone Opportunity Zone (KOZ). The Bloomsburg Town Council and the Columbia Alliance for Industrial Growth have hired the engineering firm Criterium Peters Engineers to evaluate the feasibility of developing a 22-acre floodplain site near Kinney's Run, the airport, and the recycling center as an industrial park. The firm will determine what utilities are needed and how much fill material would have to be placed to raise the site to the 100-year flood level.

Rail Trail Project. The Columbia County Planning Commission initiated the Susquehanna Rail Trail project that would expand existing recreation trails in the Bloomsburg area.

Wastewater Treatment Plant. The Sewer Operating Authority is implementing a $2.7 million improvement program at the Bloomsburg Wastewater Treatment Plant, which includes upgrading the electrical system, replacing the existing 25-year old pumps, and improving the chlorination system. This will allow the sewer plant to stay in operation longer than it has during past floods and become operational sooner after a flood event.

Bloomsburg Airport Expansion. The Bloomsburg Airport Expansion Study is looking at extending and slightly realigning the existing runway. L. Robert Kimball, the engineering firm working on the project, is currently conducting an environmental assessment for the realignment. Four final alternative plans, including elevating the runway and construction of a taxiway parallel to the existing runway, are being considered. A decision is expected this fall and construction is anticipated to begin in 2002.

SEDA-COG - Hazard Mitigation Plan. The Town of Bloomsburg, along with *SEDA-COG*, has formed a committee to prepare a Hazard Mitigation Plan to guide implementation of hazard mitigation activities, such as flood relief. The plan will (1) identify existing natural hazards, including floods; (2) assess risks to residences, public and commercial buildings, and community facilities; (3) establish goals for reducing losses; and (4) identify specific projects to reduce losses from natural hazards. The plan will also identify potential funding sources. Planners are looking at previous studies, flood insurance maps, and the Corps' flood protection study to determine what hazards might affect buildings, public health, and the economy. The plan is scheduled to be completed in March 2001 and will be available for public review and comment. Prior to adopting the plan, public information meetings will be scheduled by the Bloomsburg Town Council. The recommendations from this study are independent of the ongoing Corps feasibility study.

PUBLIC INVOLVEMENT AND FURTHER INFORMATION

Throughout the study process, the study team welcomes the ideas, opinions, and concerns from citizens and natural resource experts. The information gathered will assist the study team in making decisions, especially during the identification of alternative solutions and the selection of the recommended plan. Your input will help us determine the best project. Public involvement activities such as newsletters, press releases, and public meetings will be used throughout the study process.

If you would like to be added to the mailing list or if you do not wish to be on our list, please mail in the top portion of the last page. Any questions or comments may be sent to the address below or you may call the study manager, Ms. Nancy Jedziniak at 410-962-2926 or fax us at 410-962-4698. Toll-free calls from outside the Baltimore metropolitan area can be made to 1-800-295-1610. Questions and comments can also be sent via e-mail to bloomsburg@usace.army.mil

U.S. Army Corps of Engineers, Baltimore District, CENAB-PL-P
ATTN: Bloomsburg Feasibility Study
P.O. Box 1715
Baltimore, MD 21203-1715

Visit the U.S. Army Corps of Engineers website at http://www.nab.usace.army.mil. This newsletter and information on other District activities are included.

Please **add** my name to the study mailing list.
Please **remove** my name from the study mailing list.
Please **correct** my name/address as shown below.

Name (Please Print): ______________________________

Title: ______________________________

Company/Organization: ______________________________

Address: ______________________________

Telephone Number: ______________ Fax Number: ______________

E-mail Address: ______________________________

Comments/Suggestions: ______________________________

____

____

U.S. Army Corps of Engineers, Baltimore District
Attn: CENAB-PL-P, Bloomsburg Feasibility Study
P.O. Box 1715
Baltimore, Maryland 21203-1715

US Army Corps of Engineers
Baltimore District

NEWSLETTER

Bloomsburg Local Flood Protection Feasibility Study

WINTER 2000

FEASIBILITY STUDY BEGINS

A feasibility study is being conducted to look at flood protection for the Bloomsburg area. The feasibility study was initiated in July 1999 and is co-sponsored by the U.S. Army Corps of Engineers, the Town of Bloomsburg, and the Pennsylvania Department of Environmental Protection (DEP). The Pennsylvania Department of Transportation (PennDOT) is a cooperating agency with a strong interest in this study.

STUDY BACKGROUND & PURPOSE

The feasibility study is continuing the investigations begun during an earlier reconnaissance study completed by the Corps in May 1998. The reconnaissance study concluded that the Town of Bloomsburg experiences major flood damages from both the Susquehanna River and Fishing Creek, as demonstrated by the serious flooding in 1936, 1972, 1975, and 1996. The study also concluded that further study is warranted to determine whether a flood protection project could substantially and cost-effectively reduce flood damages. The second phase of the Corps study process, the feasibility study, is underway and will evaluate the need for non-structural and structural flood protection measures (such as levees and floodwalls). The study will evaluate several alternative plans and ultimately identify a recommended plan.

Both the reconnaissance and feasibility studies were authorized by a resolution adopted by the Committee on Transportation and Infrastructure of the United States House of Representatives in September 1995. The study area is located in the 11th Congressional District, represented by the Honorable Paul E. Kanjorski.

IDENTIFIED PROBLEM

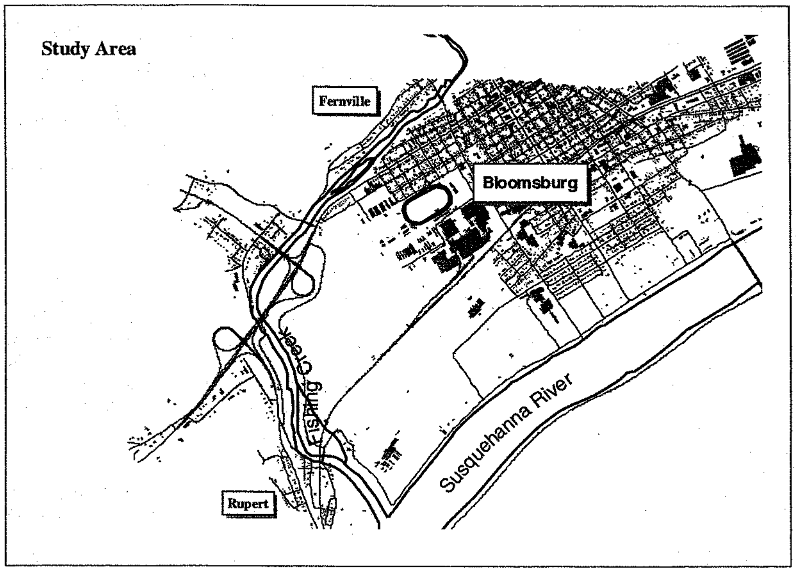
As identified in the reconnaissance study, the Town of Bloomsburg is subject to severe flooding from both the Susquehanna River and Fishing Creek. Major flooding occurs in three locations: along the Susquehanna River, along Fishing Creek, and at the confluence of the Susquehanna River and Fishing Creek. A large portion of the population in these sectors has had to be evacuated to emergency quarters during flood events.

Within the last 50 years, Bloomsburg has incurred substantial damages from both major and minor events. The flood of record occurred in 1972 as a result of tropical storm Agnes, when the river stage reached over 31.2 feet. Damages incurred during the Agnes event are estimated to be over $61,000,000 in today's dollars.

STUDY AREA

The study area for this feasibility study is the Town of Bloomsburg, which is located approximately 50 miles southwest of Wilkes-Barre, in central Columbia County, Pennsylvania. The study area also includes the adjacent villages of Fernville and Rupert. Bloomsburg is situated at the confluence of Fishing Creek and the Susquehanna River. The Susquehanna River forms the southern boundary of the Town and is the most prominent drainage feature in the area, draining approximately 10,576 square miles. Fishing Creek forms the northern and western boundary of the town and drains an area of 385 square miles.

PUBLIC MEETING – FEBRUARY 24



STUDY PROCESS & SCHEDULE

Projects completed by the Corps are developed through a two-phase study process (reconnaissance, then feasibility), followed by a preconstruction engineering and design (PED) phase and finally, the construction phase. Feasibility studies, such as this one, are conducted in four stages: Problem Confirmation and Description of Existing Conditions, Development of Alternative Solutions, Evaluation of Solutions and Selection of a Recommended Plan, and Detailed Design of the Recommended Plan. The Bloomsburg Feasibility Study team is currently working on describing existing conditions in the project area and will be developing alternative solutions in the near future.

* **Problem Confirmation and Description of Existing Conditions**: The feasibility phase involves a detailed analysis of existing conditions to confirm current problems in the study area. Data on existing conditions such as land use, fish and wildlife habitat, previously damaged structures, roads, utilities, cultural resources, hydraulic modeling, surveys, and geotechnical (soil) investigations will be collected. Based on this information, the team can better determine the specific problem and understand the conditions of the study area.

* **Development of Alternative Solutions:** Once the problem has been confirmed and the existing conditions are known, the study team will develop alternative solutions for solving or reducing the flooding problem. During the feasibility study, both structural (levees and floodwalls) and non-structural alternatives (such as floodproofing and relocations) will be considered. Each of the alternatives identified will be analyzed and evaluated.

* **Evaluation of Solutions and Selection of Recommended Plan**: The evaluation of each alternative will be based on a comparison of project

benefits to the project costs. The reduction in flood damages that will occur with each alternative plan will be determined along with the cost of constructing the plan. The recommended plan will attempt to provide the best solution to the flooding problem in Bloomsburg that is both cost-effective and environmentally acceptable.

The environmental impacts of each of the alternatives and the recommended plan will be documented in an Environmental Impact Statement (EIS). The environmental impacts of the recommended plan will be evaluated based on the effects of the project on such things as fish and wildlife habitat and other natural resources, economics, cultural resources, and the general needs and welfare of the public.

* **Detailed Design Phase:** If the Corps and Sponsors recommend a project for construction, the engineers must then design the project. They will lay out the configuration of the project and determine all of the design requirements. This allows the team to fully document all of the impacts the project will have on the environment and enables the team to develop a project cost.

FEASIBILITY STUDY SCHEDULE

Feb 2000	Public Scoping Meeting
Mar 2000	Problem Confirmation and Description of Existing Conditions
Jun 2000	Development of Alternative Solutions
Jul 2000	Public Meeting
Oct 2000	Evaluation of Solutions
Nov 2000	Public Meeting
Dec 2000	Selection of Recommended Plan
Sep 2001	Detailed Design
Dec 2001	Draft Feasibility Report and EIS
Feb 2002	Public Review of EIS
Mar 2002	Public Meeting
Jun 2002	Final Feasibility Report and EIS

RELATED PENNDOT PROJECTS

In conjunction with the Corps' Bloomsburg Local Flood Protection study, the Pennsylvania Department of Transportation (PennDOT) is beginning preliminary engineering studies to investigate the incorporation of a roadway into a potential levee project. The potential project, if approved, would construct a roadway on a levee at the eastern terminus of the proposed flood protection project. The roadway would connect the existing Route 11/Route 42 interchange to 11th Street.

The roadway would provide an alternate access route to the industries located along 11th and Railroad Street as well as the Bloomsburg High School/Middle School complex and the residences in the area. Penn DOT will be conducting traffic studies for the roadway project in early 2000 to evaluate the level of need for the proposed roadway.

In addition to the potential roadway extension, Bloomsburg has requested that PennDOT remove the existing state-owned bridge on State Route 4003 (locally known as "Red Mill Road") over Fishing Creek. The request to remove the bridge, known as the "Double Track" bridge, is based on concerns related to the amount of water that can pass under the bridge during floods and its effect on the water levels in Fishing Creek during a flood event. Currently, the bridge removal project is a candidate for next fall's update to PennDOT's Twelve-Year Program. Any questions regarding PennDOT's activities should be directed to:

Eric High, P.E., Civil Engineer Manager
PA Department of Transportation
715 Jordan Avenue, PO Box 218
Montoursville, PA 17754
(570) 368-4258 FAX: (570) 368-4311

PUBLIC SCOPING MEETING
Bloomsburg Flood Protection Feasibility Study
February 24, 2000, 7:00 - 9:00 p.m.

Bloomsburg High School

(Snow Date: March 2, 2000 at the Blue Moose)

QUESTIONS & ANSWERS

- ***Who are the non-Federal Sponsors and what are their roles, responsibilities and total cost contribution?***

The non-Federal sponsors of the local flood protection study include the Town of Bloomsburg and the Pennsylvania Department of Environmental Protection (DEP). The Sponsors are involved in the entire study process and are responsible for performing some of the technical tasks. The sponsors as a group contribute 50% of the total study cost. The total study cost is estimated at $2.1 million, of which the Town and DEP are providing $530,000 in cash and $523,000 in technical tasks.

- ***What is the time frame for the Corps of Engineers' study and the time frame for construction?***

A final feasibility report is scheduled for completion in June 2002. The Planning, Engineering and Design (PED) phase, which includes preparation of plans and specifications so that a contractor can build the project, is scheduled for 2002-2004. Any real estate acquisitions are anticipated to be completed by 2004. Construction is anticipated to begin in 2004.

- ***How many public meetings are scheduled for this study?***

Four public meetings are scheduled for this study. The first will be held on February 24, 2000, at the Bloomsburg High School. The purpose of the initial "scoping" public meeting is to introduce the study process and the study team and to begin working with citizens to develop a plan that reflects local values and ideas. The second meeting will discuss alternative solutions; the third will present the tentative recommended plan; and the fourth meeting will be to receive public comments following release of the draft report for public review.

- ***What is a Right-of-Entry and why will some residents be requested to provide one?***

A right- of-entry is permission given by a property owner so that study team members may have access to private property to perform specific tasks, such as surveying or soil sampling, without buying the land. The Right-of-Entry is a simple one-page document that provides evidence that permission to access the property was granted and explains the obligations, responsibilities, and liabilities assumed. During the feasibility study, the Corps will request a right-of-entry from residents whose property is needed for technical investigations, such as soil sampling.

- ***What is the Corps policy on real estate acquisition, if a project is built?***

Corps policy requires the non-Federal Sponsor (the Town of Bloomsburg) to provide the minimum interest in real property necessary to support the project. This could be a fee simple (purchase of the land), a permanent easement and/or a temporary easement interest. If properties must be acquired to construct the project, owners will receive an offer based on an appraisal of fair market value for the interest (amount of land or use of the land) acquired.

- ***What is the difference between a levee and a floodwall and how will the Corps decide where to use each?***

A floodwall is any wall having as its principa function the prevention of flooding of adjacent land. Types of walls include steel or vinyl sheetpile, concrete, or mechanically stabilized earth. A levee is defined as an earth (soil) embankment having its primary purpose as furnishing flood protection for adjacent land.

Land constraints are the primary factors that determine where a floodwall will be built instead of a levee. A levee is much wider than a floodwall; therefore, floodwalls are used when space constraints do not permit a levee. A floodwall is considerably more expensive to construct than a levee, however, so levees are usually selected where feasible. If the higher cost is justified, floodwalls can be used in areas where land constraints are not factors; however this is very rare.

- ***Is the Corps definitely going to build a levee and floodwall?***

The determination of whether or not a local flood protection project is feasible will not be made until after all of the alternative solutions are evaluated and compared, including the "no project"

U.S. Army Corps of Engineers, Baltimore District
Attn: CENAB-PL-P, Bloomsburg Feasibility Study
P.O. Box 1715
Baltimore, Maryland 21203-1715

alternative. This decision is scheduled for Fall 2000. If a project is deemed feasible, and the Corps and the Town of Bloomsburg agree to move forward with a project, the study team will complete the design and finalize the feasibility report and EIS. The U.S. Congress will then make the decision of whether or not to authorize and fund the project for construction.

PUBLIC INVOLVEMENT

Throughout the study process, the study team will solicit the ideas, opinions, and concerns from interested citizens and natural resource experts. This will assist the study team in making decisions, especially during the identification of alternative solutions and the selection of the recommended plan. Public involvement activities such as newsletters, press releases, and meetings will be used throughout the study process. Four public meetings will be held to present the study process and progress, with the first meeting to be held on February 24, 2000. Your input will help us determine the best project.

FURTHER INFORMATION

If there is anyone you know who would be interested in receiving information on this feasibility study, or if you do not wish to be on our mailing list, please mail in the bottom portion of the last page.

Any questions or comments may be sent to the address below or you may call the study manager, Ms. Nancy Jedziniak at 410-962-2926 or fax us at 410-962-4698. Toll-free calls from outside the Baltimore metropolitan area can be made to 1-800-295-1610. Questions and comments can also be sent via e-mail to bloomsburg@usace.army.mil

U.S. Army Corps of Engineers,
Baltimore District, CENAB-PL-P
ATTN: Bloomsburg Feasibility Study
P.O. Box 1715
Baltimore, MD 21203-1715

Visit the U.S. Army Corps of Engineers website at http://www.nab.usace.army.mil. This newsletter and information on other District activities are included.

Please **add** my name to the study mailing list.
Please **remove** my name from the study mailing list.
Please **correct** my name/address as shown below.

Name (Please Print): ______

Title: ______

Company/Organization: ______

Address: ______

Telephone Number: ______ Fax Number: ______

E-mail Address: ______

Comments/Suggestions: ______

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Attn: CENAB-PL-P, Bloomsburg Feasibility Study
P.O. Box 1715
Baltimore, Maryland 21203-1715

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

April 4, 2002

REPLY TO
ATTENTION OF

Planning Division

Mr. David Densmore
U.S. Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

Dear Mr. Densmore:

The purpose of this letter to update you on the progress of the Bloomsburg Pennsylvania Local Flood Protection feasibility study, which was initiated by the Baltimore District, U.S. Army Corps of Engineers (Corps) in July 1999, and to request your agency's assistance in the plan formulation for this study.

Corps feasibility studies are conducted using a six-staged planning process, as defined below:

1. Identify problems and opportunities;
2. Inventory baseline conditions;
3. Formulate alternatives;
4. Evaluate effects of the alternatives;
5. Compare alternatives; and
6. Select a recommended plan.

At this time, the Bloomsburg feasibility study is progressing into the alternatives evaluation phase. In addition to various non-structural flood protection alternatives, two preliminary structural flood protection alignments have been proposed. These potential alignments are illustrated in Enclosure 1.

The Baltimore District is requesting information concerning interests within your agency's area of responsibility to assist us in identifying environmental issues that may affect the implementation of these preliminary alternatives. Specific issues of concern include: presence of any threatened or endangered species; jurisdictional wetlands or other critical habitats; prime and unique farmlands; highly erodible soils; hazardous wastes; land use; public utilities; and other infrastructure at or near the proposed alignments. All information obtained will be used during plan formulation and evaluation, and documented in the study's Environmental Impact Statement.

Identical letters have been sent to the agencies and organizations identified on the enclosed mailing list (Enclosure 2). The Baltimore District will also be conducting separate consultation with the Pennsylvania State Historic Preservation Office concerning any potential archaeological and historical resources.

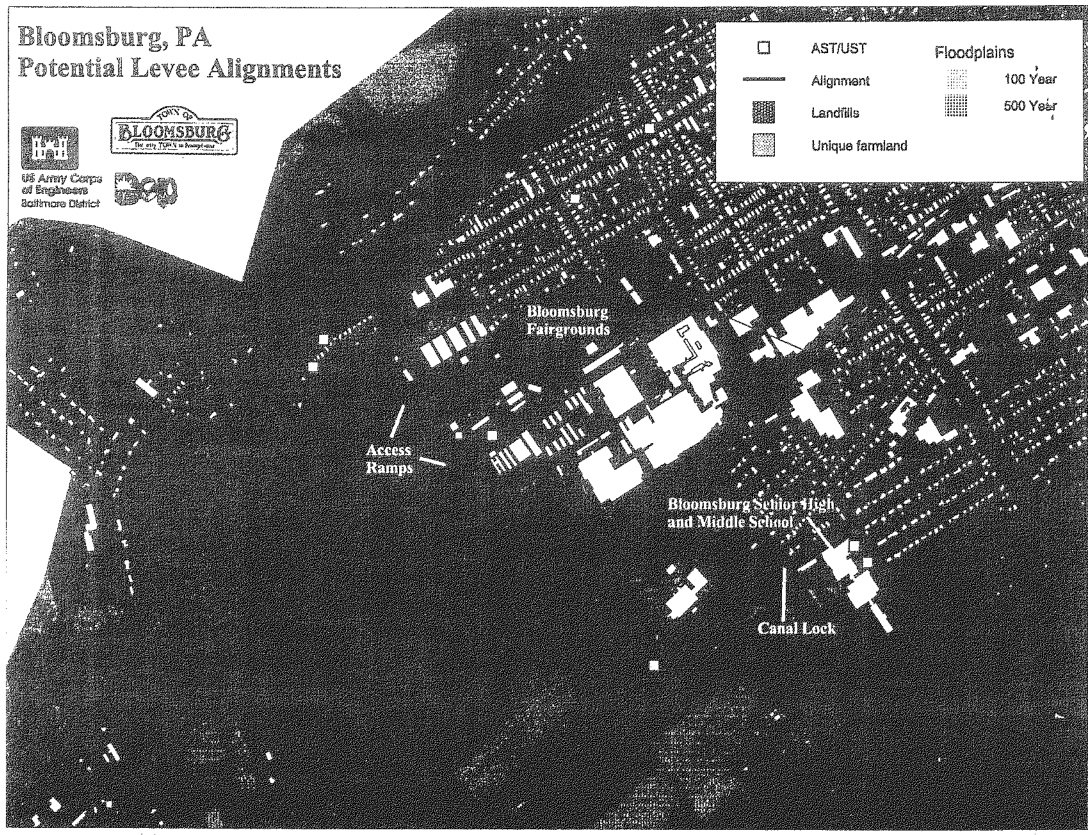
We would appreciate receiving your response with written information within your agency's responsibilities within 30 days from the date you receive this letter. Written comments may be faxed to (410) 962-4698 or provided by electronic mail to Michele.A.Bistany@usace.army.mil. The Baltimore District will continue to update your agency on the progress of this flood protection study. If you have any questions regarding this letter, please contact Ms. Mimi A. Bistany, Study Biologist, at (410) 962-4934.

Sincerely,

Wesley E. Coleman

Wesley E. Coleman, Jr.
Chief, Civil Projects Development Branch

Enclosures



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Enclosure 2
Mailing List

Mr. Jared Brandwein
Pennsylvania Field Office
U.S. Fish and Wildlife Service
P.O. Box H
Tobyhanna, Pennsylvania 18466-0800

Ms. Jeanne Brennan
Pennsylvania Natural Diversity Inventory
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, Pennsylvania 17105-8552

Mr. Edward G. Briner, III
Pennsylvania Department of Environmental Protection
Bureau of Waterways Engineering
P.O. Box 8460
Harrisburg, Pennsylvania 17105-8460

Mr. Gary R. Camus
Pennsylvania Game Commission
Administrative Office
2001 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Mr. Michael Conway
Director, Waterways Engineering
Pennsylvania Department of Environmental Protection
P.O. Box 8460
Harrisburg, Pennsylvania 17105-8460

Ms. Kate Crowley
Pennsylvania Department of Environmental Protection
Northeast Regional Office
2 Public Square
Wilkes-Barre, Pennsylvania 18711-0790

Dr. Barry Frantz
U.S. Department of Agriculture
Natural Resources Conservation Service
One Credit Union Place
Suite 340
Harrisburg, Pennsylvania 17110-2993

Mr. Gene Gruber
Regional Environmental Officer
Federal Emergency Management Agency, Region 3
Liberty Square Building, Second Floor
105 South 7th Street
Philadelphia, Pennsylvania 19106-3392

Mr. Bob Hainly
U.S. Geological Survey
Water Resources Division
840 Market Street
Lemoyne, Pennsylvania 17043-1586

Mr. David Heicher
Chief
Water Quality and Monitoring Protection
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, Pennsylvania 17102-0423

Mr. Ed Hummel
Economic Development Administration
Curtis Center, Suite 140
6th and Walnut Street
Philadelphia, Pennsylvania 19106

Mr. Ron Killins
State Hazardous Material Officer
Pennsylvania Emergency Management Agency
2605 Interstates Drive
Harrisburg, Pennsylvania 17110-9364

Mr. Don Martino
Pennsylvania Department of Environmental Protection
Dam Safety Section
P.O. Box 8554
Harrisburg, Pennsylvania 17105-8554

Mr. Michael M. Morin
Housing and Development Specialist
PA Department of Community Affairs
101 Penn Avenue
Scranton, PA 18503

Mr. John Nichols
National Marine Fisheries Service
Oxford Field Office
904 South Morris Street
Oxford, Maryland 21654

Ms. Katherine Pomerantz
Federal Emergency Management, Region III
Regional Environmental Officer
Liberty Square Building, Second Floor
105 South 7th Street
Philadelphia, Pennsylvania 19106-3392

Mr. Tom Pluto
U.S. Army Corps of Engineers
Regulatory Branch
3947 South Atherton Street
Suite A
State College, PA 16801

Mr. Anthony Ross
Game and Land Officer Manager
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, Pennsylvania 17110-9797

Mr. Andrew L. Sheils
Non Game and Endangered Species Management
Pennsylvania Fish and Game Commission
450 Robinson Lane
Bellefonte, Pennsylvania 16823-1920

Mr. William Skwersky
U.S. Department of Housing and Urban Development
Pennsylvania State Office
100 Penn Square East
Philadelphia, Pennsylvania 19107-3392

Mr. Steve Smithonic
Pennsylvania Game Commission
Northeast Regional Office
P.O. Box 220, RD 5
Dallas, Pennsylvania 18612-0220

Dr. Ed Sokoloski
District Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
1300 Old Point Road
Mayfield, Pennsylvania 18433

Mr. Ralph Spagnolo
Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103

Mr. Ron Thompson
Water Resources Division
Pennsylvania District
U.S. Geological Survey
840 Market Street
Lemoyne, Pennsylvania 17043-1586

Mr. Ron Tibbit
Pennsylvania Fish and Boat Commission
P.O. Box 67000
Harrisburg, Pennsylvania 17106

Mr. Kerry Wilson
Chief, Community Planning and Mitigation Division
Department of Community and Economic Development
Commonwealth of Pennsylvania
Harrisburg, Pennsylvania 17120

Pennsylvania Department of Environmental Protection

Bureau of Waterways Engineering
Rachel Carson State Office Building
P.O. Box 8460
Harrisburg, PA 17105-8460

FAX TRANSMITTAL SHEET

TO: Jonathan Koch FAX NO.- 410-962-4698

PHONE NO. ______

FROM: Scott Cox

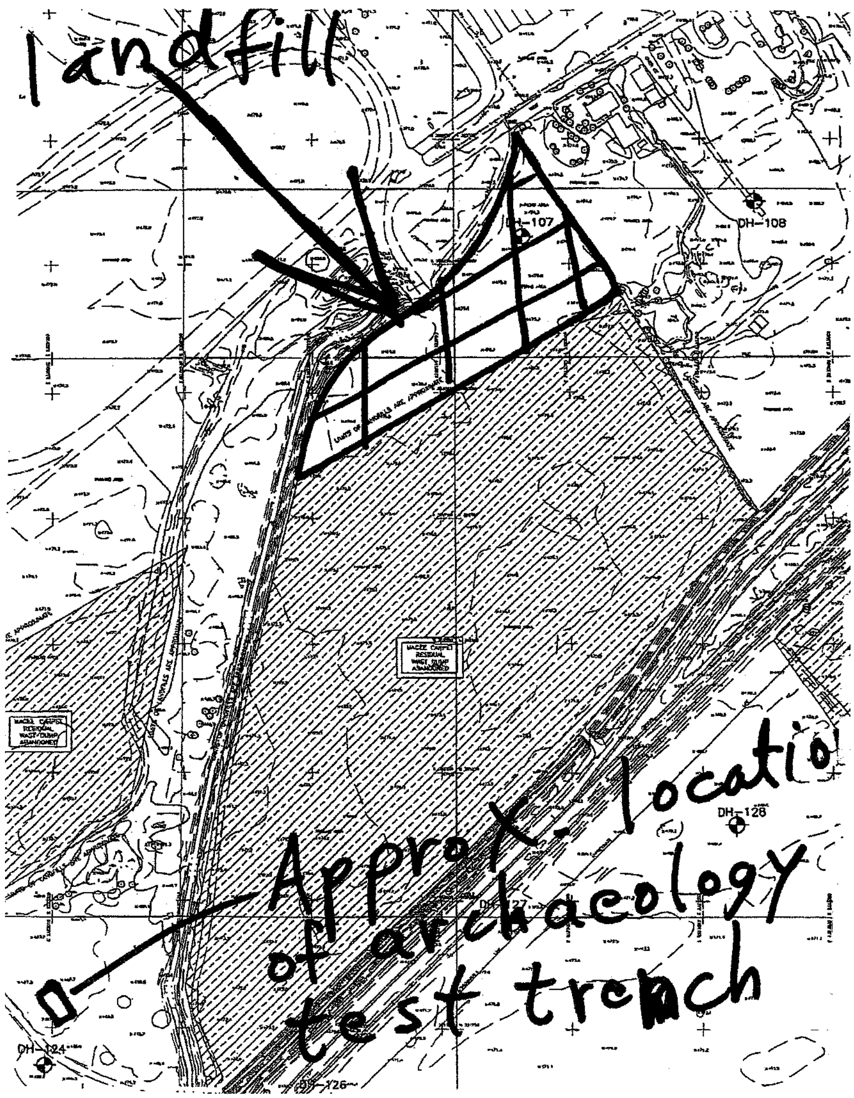
OFFICE PHONE NO. 717-783-7995 FAX NO. 717-772-0409

NUMBER OF PAGES NOT INCLUDING COVER SHEET: 1

DATE: 5-7-02

SPECIAL INSTRUCTIONS TO RECEIVER: Bloomsburg landfill information. Archaeology report indicates only carpet fragments at test pit. Photos of pit appear to show ash also.

If you do not receive the number of pages indicated, please contact the sender.


landfill
DH-107
DH-108
DH-126
DH-124
Approx. locatio
of archaecology
test trench

ACTION: PP-C
CF: PL
DE

June 29, 2003

Mr. Charles J. Fiala, Jr.
Colonel, Corps of Engineers
District Manager
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Fiala:

What a shock it was to me to see Mr. Vinicio Vannicola and Mr. Steven Gebhardt surveying the street in front of my home on Drinker Street here in Fernville, PA. A couple of days earlier I attended a meeting at our local firehouse and learned that according to the present plans drawn up by the Army Corps of Engineers, our home would be outside the protective flood wall, i.e., we would be in the planned flood zone.

At this meeting a woman, speaking for the Corps, told us that their surveying crew would consider old, historic structures. The fact that our home was built in 1875, (I have a sign hanging outside my house which declares this) seems to deny credence to what she was claiming to be fact.

When the two men finished their work, they came and spoke to my wife and me seeing how distraught our present situation caused me to become. They informed me that the enclosed map was not carved in stone and plans could be changed. I was glad to hear this because at 70 years of age, and after undergoing two heart operations and suffering a stroke, congestive heart failure plus presently suffering from degenerative disk disease, I am in no condition to up and move. Besides, this is my/our home which I remolded and where I came to spend the last days of my life.

With this in mind, they advised me to get this letter out to you and to express my fears and my concerns. I hope you will take this matter under consideration and pray to God that you will. Hopefully, you can send some one as understanding as Mr. Gebhardt and Mr. Vannicola were to us who will look more closely at the desperate situation my wife and I now find ourselves in.

Thank you for your time and any interest you will show us. Will you <u>please</u> keep us informed so we won't worry so?

Sincerely,

Marion F. Staniszewski

Marion F. Staniszewski

Enclosure:

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/29/05
Name Of Project Bloomsburg Local Flood Protection Project	Federal Agency Involved U.S. Army Corps of Engineers, Baltimore
Proposed Land Use Flood protection project (levee)	County And State Columbia County, Pennsylvania
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☐ No ☐	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS

PART III *(To be completed by Federal Agency)*		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		11.5			
B. Total Acres To Be Converted Indirectly		0.0			
C. Total Acres In Site		~~11.5~~ 40 +/-	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value					
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		0	0	0	0
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	12			
2. Perimeter In Nonurban Use	10	10			
3. Percent Of Site Being Farmed	20	20			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average	10	5			
8. Creation Of Nonfarmable Farmland	25	5			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	15			
11. Effects Of Conversion On Farm Support Services	25	1			
12. Compatibility With Existing Agricultural Use	10	8			
TOTAL SITE ASSESSMENT POINTS	160	101	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	101	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	101	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ■ No ☐

Reason For Selection:

Alignment of Flood Protection project layed out to aovid major impact to ag operations. Property is Kistler Fram

(See Instructions on reverse side) Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

October 21, 2004

Mr. Jeffrey L. Trulick
Project Manager
U.S. Army Corps of Engineers
Baltimore District, Planning Division
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Trulick:

This verifies ongoing coordination between you and members of my staff (Tony Tur and Cindy Tibbott) regarding the proposed Bloomsburg Flood Protection Project in Columbia County, Pennsylvania. Per those discussions, due to staffing shortages here and the relatively minor impacts to fish and wildlife habitat expected to result from any of the project alternatives being considered, we are declining the opportunity to prepare a Fish and Wildlife Coordination Act Planning Aid Letter or Report. We acknowledge the Corps of Engineers commitment to minimize wetland impacts, and to provide compensatory mitigation for any unavoidable wetland losses. We do anticipate being able to provide a Fish and Wildlife Coordination Act response to this project proposal by providing comments on the draft Environmental Impact Statement.

Thank you for your efforts to keep us involved in this project. Please direct any questions to Ms. Tibbott at 814-234-4090.

Sincerely,

David Densmore
Supervisor

Information on Modifying the Extending Plan of Operations (Plan), Gold Acres Mining District, Launder County, NV.

Summary: EPA expressed concerns that BLM has deferred until mine closure the designation and evaluation of post-mining beneficial uses and applicability of beneficial use requirements for pit lakes and concerns regarding the long-term mitigation and monitoring fund. EPA is also concerned that the Final SEIS does not address the issues critical to establishing the effectiveness of the fund and whether it will be available for future mitigation and monitoring needs should they arise. EPA recommended additional information on these issues be included in the Record of Decision.

EIS No. 20050115, ERP No. FS-NRC-E06023-AL, Generic EIS—License Renewal of Nuclear Plants, Joseph M. Farley Nuclear Plants, Units 1 and 2, Supplemental 18 to NUREG–1437 (TAC NOS. MC0768 and MC0769; Houston County, AL.

Summary: EPA continues to have environmental concerns about the availability of long-term offsite storages of radioactive waste, and future surface water withdrawals for plant operations which could be affected by State agreements. Radiological monitoring of all plant effluents, and appropriate storage of radioactive waste will be necessary during the license renewal period.

Dated: May 10, 2005.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 05–9586 Filed 5–12–05; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6663–3]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–7167 or *http://www.epa.gov/compliance/nepa/.* Weekly receipt of Environmental Impact Statements Filed 05/02/2005 Through 05/06/2005 Pursuant to 40 CFR 1506.9.

EIS No. 20050185, Final EIS, NRC, MI, Generic—Donald C. Cook Nuclear Plant, Units No. 1 and 2, (TAC No. MC1221 and MC1222) License Renewal, Supplement 20 to NUREG 1437, Berrien County, MI, Wait Period Ends: 06/13/2005, Contact: William Dam, 301–415–4014.

EIS No. 20050186, Draft EIS, AFS, NY, Finger Lakes National Forest Project, Proposed Land and Resource Management Plan, Forest Plan Revision, Implementation, Seneca and Schuyler Counties, NY, Comment Period Ends: 08/15/2005, Contact: Jay Strand 802–767–4261. Ext 522.

EIS No. 20050187, Draft EIS, SFW, MN, Upper Mississippi National Wildlife and Fish Refuge Comprehensive Conservation Plan (CCP) Implementation, MN, WI, IL and IA, Comment Period Ends: 08/31/2005, Contact: Don Hultman 507–452–4232.

This document is available on the Internet at: *http://www.fws.gov/midwest/planning/uppermiss/*

EIS No. 20050188, Final EIS, FTA, 00, Permanent World Trade Center (WTC) PATH Terminal Project, Reconstruction of a Permanent Terminal at the WTC Site in Lower Manhattan, Port Authority Trans-Hudson (PATH), Several Permits Required for Approval, The Port Authority of New York and New Jersey, NY and NJ, Wait Period Ends: 06/13/2005, Contact: Bernard Cohen 212–668–1770.

EIS No. 20050189, Draft EIS, COE, PA, The Town of Bloomsburg, Columbia County, Pennsylvania Flood Damage Reduction Project, Implementation, Integrated Feasibility Report, Susquhanna River and Fishing Creek, Town of Bloomsburg, Columbia County, PA, Comment Period Ends: 06/27/2005, Contact: Jeff Trulick 410–962–6715.

EIS No. 20050190, Draft EIS, FHA, MI, Detroit Intermodal Freight Terminal (DIFT) Project, Proposes Improvement to Intermodal Freight Terminals in Wayne and Oakland Counties, MI, Comment Period Ends: , 08/16/2005, Contact: Abdelmoez Abdalla 517–702–1820.

Amended Notices

EIS No. 20050105, Draft EIS, AFS, MI, Huron-Manistee National Forests, Proposed Land and Resource Management Plan, Implementation, Several Counties, MI, 06/20/2005, Contact: Jeff Pullen 231–775–2421 Revision of FR Notice Published on 03/18/2005: CEQ Comment Period Ending 06/16/2005 has been Extended to 06/20/2005.

EIS No. 20050118, Draft EIS, AFS, MI, Ottawa National Forest, Proposed Land and Resource Management Plan, Forest Plan Revision, Implementation, Baraga, Gogebic, Houghton, Iron, Marquette and Ontonagan Counties, MI, Comment Period Ends 06/27/2005, Contact: Robert Brenner 906–932–1330 Revision of FR Notice Published on 03/25/2005: CEQ Comment Period Ending on 06/23/2005 has been Extended to 06/27/2005.

EIS No. 20050153, Final EIS, FHW, UT, Southern Corridor Construction, I–15 at Reference Post 2 in St. George to UT–9 near Hurricane, Funding, Right-of-Way Grant and U.S. Army COE Section 404 Permit Issuance, St. George, Washington and Hurricane, Washington County, UT, 06/22/2005, Wait Period Ends: 06/22/2005, Contact: Gregory Punske 801–963–0182.

Revision of FR Notice Published on 04/22/2005: CEQ Comment Period Ending 05/23/2005 has been Extended to 05/22/2005.

Dated: May 10, 2005.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 05–9587 Filed 5–12–05; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[OPPT–2005–0030; FRL–7715–4]

Certain New Chemicals; Receipt and Status Information

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: Section 5 of the Toxic Substances Control Act (TSCA) requires any person who intends to manufacture (defined by statute to include import) a new chemical (i.e., a chemical not on the TSCA Inventory) to notify EPA and comply with the statutory provisions pertaining to the manufacture of new chemicals. Under sections 5(d)(2) and 5(d)(3) of TSC, EPA is required to publish a notice of receipt of a premanufacture notice (PMN) or an application for a test marketing exemption (TME), and to publish periodic status reports on the chemicals under review and the receipt of notices of commencement to manufacture those chemicals. This status report, which covers the period from April 14, 2005 to April 27, 3005, consists of the PMNs pending or expired, and the notices of commencement to manufacture a new chemical that the Agency has received under TSCA section 5 during this time period.

DATES: Comments identified by the docket identification (ID) number OPPT–2005–0030 and the specific PMN initiated by the Military Departments and Defense Agencies to be conducted by industry, universities or in government laboratories. The agenda for this meeting will include programs on RF technology, microelectronics, electro-optics, and electronic materials.

In accordance with Section 10(d) of Pub. L. No. 92–463, as amended, (5 U.S.C. App. 2), it has been determined that this Advisory Group meeting concerns matters listed in 5 U.S.C. 552b(c)(1), and that accordingly, this meeting will be closed to the public.

Dated: May 17, 2005.

Jeannette Owings-Ballard,

OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 05–9620 Filed 5–12–05; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army

Armed Forces Epidemiological Board; Meeting

AGENCY: Department of the Army; DoD.

ACTION: Notice of meeting.

SUMMARY: In accordance with section 10(a)(2) of Pub. L. 92–463, The Federal Advisory Committee Act, announcement is made of the following meeting:

Name of Committee: Armed Forces Epidemiological Board (AFEB).

Dates: June 21, 2005 (Open meeting). June 22, 2005 (Open meeting). *Times:* 8 a.m.–5 p.m. (June 21, 2005). 8 a.m.–4:15 p.m. (June 22, 2005).

Location: The Hope Hotel and Conference Center, Building 823, Area A, Air Force Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio 45433–5000.

Agenda: The purpose of the meeting is to address pending and new Board issues, provide briefings for Board members on topics related to ongoing and new Board issues, conduct subcommittee meetings, and conduct an executive working session.

FOR FURTHER INFORMATION CONTACT: Colonel Roger Gibson, Executive Secretary, Armed Forces Epidemiological Board, Skyline Six, 5109 Leesburg Pike, Room 682, Falls Church, VA 22041–3258, (703) 681–8012/3.

SUPPLEMENTARY INFORMATION: The entire sessions on June 21, 2005 and June 22, 2005 will be open to the public in accordance with Section 552b(b) of Title 5, U.S.C., specifically subparagraph (1) thereof and Title 5, U.S.C., appendix 1, subsection 10(d). Open sessions of the meeting will be limited by space accommodations. Any interested person may attend, appear before or file statements with the Board at the time and in the manner permitted by the Board.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 05–9582 Filed 5–12–05; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of Draft Integrated Feasibility Report & Environmental Impact Statement for the Flood Damage Reduction Project, Bloomsburg, PA

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of availability.

SUMMARY: In accordance with the requirements of the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Baltimore District has prepared a Draft Integrated Feasibility Report & Environmental Impact Statement (EIS) for the flood damage reduction project for the Town of Bloomsburg, in Columbia County, PA. The integrated report investigates the potential environmental effects of an array of alternative plans based on reducing flood damages in Bloomsburg. The preferred alternative includes 16,555 linear feet of levee/floodwall systems with fourteen drainage structures, and nine closure structures, six of which incorporate limited road raisings. We are making the integrated report and EIS available to the public for a 45-day review and comment period.

DATES: Comments need to be received on or before June 27, 2005, to ensure consideration in final plan development. A public meeting on the flood damage reduction measures presented in the integrated report and EIS will be held on Thursday, June 16, 2005 beginning at 7 p.m.

ADDRESSES: Send written comments concerning this proposed project to U.S. Army Corps of Engineers, Baltimore District, Attn: Mr. Jeff Trulick, CENAB–PL–P, P.O. Box 1715, Baltimore, MD 21203–1715. Submit electronic comments to *jeff.trulick@usace.army.mil.* The public meeting will be held at the Bloomsburg Fire Department Banquet Hall at 911 South Market Street, in Bloomsburg, PA.

FOR FURTHER INFORMATION CONTACT: Mr. Jeff Trulick, Study Manager, (410) 962–6715 or (800) 295–1610.

SUPPLEMENTARY INFORMATION: The Town of Bloomsburg, PA is located in Columbia County within the Middle Susquehanna River sub-basin. The Susquehanna River forms the Town's southern boundary, and Fishing Creek forms the northern and western boundary.

The primary water resources problem along the Susquehanna River at Bloomsburg is recurrent flooding. Recurrent flooding that occurs in the Bloomsburg study area is a result of the morphology of the Susquehanna River and the regional topography. When the Susquehanna River and a local tributary, Fishing Creek, simultaneously rise above flood stage, overbank flooding can cover up to 33 percent of the landmass within the Town of Bloomsburg's boundaries.

Flood damages are attributable to overbank flooding from the Susquehanna River and to flooding along Fishing Creek. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. The Bloomsburg study area includes approximately 525 residential structures and 75 businesses.

The recommended flood damage reduction plan is the National Economic Development (NED) Plan with a Tropical Storm Agnes (440-year) level of protection from Susquehanna river flooding, and 100-year level of protection from Fishing Creek flooding. The recommended plan consists of 16,555 linear feet of levee/floodwall systems with fourteen drainage structures, and nine closure structures, six of which incorporate limited road raisings. The alignment of the line of protection was refined based on physical, environmental, and economic criteria.

The project consists of a system of earthen levees, mechanically stabilized earth (MSE) floodwalls, concrete floodwalls, railroad and road closure structures and roadway relocations to provide ramps over the line of protection. Earthen levees are proposed for the majority of the line of protection, though MSE walls will be required along portions of Fishing Creek in both Bloomsburg and Fernville and a concrete floodwall (H-Pile wall) will be required along portions of Fishing Creek in Bloomsburg. Limited riprap will be used to protect the steep banks of Fishing Creek from bank crest to below the stream invert along the lower project reaches along Fishing Creek.

Permanent environmental impacts would include restricted views by the levee/floodwall system of Fishing Creek from Bloomsburg and Fernville, excavation and off-site disposal of approximately 4,500 cubic yards of hazardous, toxic and radioactive waste materials, conversion of approximately 11.5 acres of farmland designated as Prime Farmland or additional Farmland of Statewide Importance to non-agricultural use, long-term loss of nearly 3,000 linear feet of riparian habitat along Fishing Creek, the loss of less than one acre of wetlands, and taking of residential homes and business structures within the levee/floodwall footprint.

A public hearing on the Draft SEIS will be held at the Bloomsburg Fire Department Banquet Hall (*see* **DATES** and **ADDRESSES**). A map showing the location of the Bloomsburg Fire Department can be found at *http://wphc.us/Default.aspx?alias=wphc.us/bfd*. The meeting will provide an opportunity for the public to present oral and/or written comments. For submission of electronic comments, your comment must be contained in the body of your message; do not send attached files. Include your name and address in your message. All persons and organization that have an interest in the flood damage reduction measures as they affect Columbia County and the environment are urged to attend the meeting and provide comments.

USACE has distributed copies of the Draft report and EIS to appropriate members of Congress, State and local government officials, Federal agencies, and other interested parties. Copies are available for public review at the following locations:

(1) Bloomsburg Public Library, 225 Market Street, Bloomsburg, PA 17815.

(2) Columbia County Historical Library, 225 Market Street, Bloomsburg, PA 17815.

(3) Columbia County Traveling Library, 15 Perry Avenue, Bloomsburg, PA 17815.

You may view the Draft report and EIS in addition to related information on our web page at *http://www.nab.usace.army.mil/publications/non-reg_pub.htm*.

After the public comment period ends on June 27, 2005, USACE will consider all comments received. The integrated report and EIS will be revised as appropriate and a Final Integrated Report and EIS will be issued.

The Draft Integrated Report and EIS has been prepared in accordance with (1) The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*), (2) regulations of the Council on Environmental quality for implementing the procedural provisions of NEPA (40 CFR parts 1500–1508), and (3) USACE regulations implementing NEPA (ER–200–2–2).

Jeff Trulick,

Study Manager.

[FR Doc. 05–9583 Filed 5–12–05; 8:45 am]

BILLING CODE 3710–41–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement in Conjunction With Proposed Sediment Management and Restoration Measures on the Grand Calumet River and non-Federal Portions of the Indiana Harbor Canal in Lake County, IN

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The study involves sediment management and restoration measures on the Grand Calumet River and non-Federal portions of the Indiana Harbor Canal. Potential alternatives to be evaluated are type and extent of dredging, possibility of capping areas, disposal options and restoration measures.

The Draft Environmental Impact Statement (DEIS) is expected to be released for public review in June 2006. As part of the scoping process, written comments will be accepted for a 60-day period, starting from the date of this notice. Comments should be submitted to Mr. Keith Ryder (*see* **ADDRESSES**).

DATES: Public scoping meetings will be held on:

1. May 24, 2005, 2–4 p.m., East Chicago, IN.

2. May 24, 2005, 5:45–7:45 p.m., Gary, IN.

ADDRESSES: The meeting locations are:

1. East Chicago, IN—East Chicago City Hall, 4525 Indianapolis Boulevard, East Chicago, IN 46312.

2. Gary, IN—Gary Public Library, Main Branch, 220 West Fifth Avenue, Gary, IN 46402.

Submit written comments to Mr. Keith Ryder, U.S. Army Corps of Engineers, Suite 600, 111 North Canal Street; Chicago, IL 60606–7206.

FOR FURTHER INFORMATION CONTACT: Mr. Keith Ryder, (312) 846–5587.

Gary E. Johnston,

Colonel, U.S. Army, District Engineer.

[FR Doc. 05–9584 Filed 5–12–05; 8:45 am]

BILLING CODE 3710–HN–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Coastal Engineering Research Board (CERB)

AGENCY: Department of the Army, DoD.

ACTION: Notice of meeting.

SUMMARY: In accordance with Section 10(a)(2) of the Federal Advisory Committee Act (Pub. L. 92–463), announcement is made of the following committee meeting:

Name of Committee: Coastal Engineering Research Board (CERB).

Date of Meeting: June 7–9, 2005.

Place: William A. Egan Civic and Convention Center, 555 West 5th Avenue, Anchorage, AK 99501.

Times:

8 a.m. to 4:15 p.m. (June 7, 2005)
8 a.m. to 5 p.m. (June 8, 2005)
8 a.m. to 4:30 p.m. (June 9, 2005)

FOR FURTHER INFORMATION CONTACT: Inquiries and notice of intent to attend the meeting may be addressed to Colonel James R. Rowan, Executive Secretary, Commander, U.S. Army Engineer Research and Development Center, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180–6199.

SUPPLEMENTARY INFORMATION: *Proposed Agenda:* On Tuesday morning, June 7, the Board will meet in Executive Session. On Tuesday afternoon, June 7, there will be presentations entitled "Tsunami Warning Center Operations," "Pacific Risk Management Ohana," "Alaska Modeling and Data Issues," "Alaska Ocean Observing System," and "Island Ocean Observing System." On Wednesday morning, June 8, there will be presentations entitled "Honolulu District Coastal Research and Development Needs," "Climate Change Impacts on Alaska Coastline," "Regional Integrated Sciences and Assessments," and "Subsistence and Cultural Issues." The afternoon session on June 8 will include presentations entitled "Denali Commission," "North Slope Science Initiative," and "Report of Newtok," plus a panel discussion pertaining to Shishmaref, Alaska. On Thursday morning, June 9, there will be presentations entitled "Port of

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

PLANNING APPENDIX

Attachment C – Environmental

The Town of Bloomsburg Flood Damage Reduction Project

Columbia County, Pennsylvania

Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged and Fill Material (40 CFR Part 230)
Section 404(b)(1) Evaluation
Clean Water Act
August 2005

The Bloomsburg, Pennsylvania, Flood Damage Reduction Feasibility Study is being conducted under the U.S. Army Corps of Engineers' General Investigations Program. The study was authorized by a resolution of the Committee on Transportation and Infrastructure of the U.S. House of Representatives, adopted 14 September 1995. The purpose of this 404(b)(1) evaluation is to comply with the provisions of Section 404 of the Clean Water Act of 1977 [33 U.S.C. 1344(r)].

I. PROJECT DESCRIPTION

a. Location - The Town of Bloomsburg, Pennsylvania is located in Columbia County within the Middle Susquehanna River subbasin. The Susquehanna River forms the Town's eastern and southern boundary, and Fishing Creek forms the northern and western boundary. (See Figures 2-1 and 2-2 in the Feasibility Report/Environmental Impact Statement).

b. General Description - The Baltimore District, U.S. Army Corps of Engineers will provide flood damage reduction to the Town of Bloomsburg for events with an exceedance probability of approximately 0.21 percent (440-year event). The plan consists of approximately 17,000 linear feet of levee/floodwall systems with fourteen drainage structures, limited road raisings, and eight closure structures, five of which incorporate limited road raisings. The alignment of the line of protection was refined based on physical, environmental, and economic criteria. The optimal alignment was identified by:

- Avoiding and minimizing adverse effects on study area wetlands and other special aquatic sites,
- Following high ground to the extent possible to minimize floodwall/levee costs, and
- Protecting flood-prone structures, which are located in high-density concentrations.

In levee and floodwall projects, stone slope protection (riprap) is usually required to protect stream banks from erosion and lateral migration that could eventually undermine the structural stability of levees and floodwalls. For this reason, stone slope protection is often installed for the entire length of the levee/floodwall from the top of protection to the invert of the stream channel. Initial design along Fishing Creek considered a similar approach on both banks, but where possible, the design was modified and the alignment was set back from the top of bank. This modification eliminates the need for bank protection along the entire project and only those areas especially vulnerable to erosion needing to be armored. These areas include abutments for bridges, storm water outfalls, and areas where the design is confined with insufficient setbacks from the creek banks. The complete avoidance of work in the creek and riparian area could not be avoided due to real estate constraints and the need for the levee to be near the creek to perform it basic function.

The levee along Fishing Creek would result in approximately 3,000 linear feet of stream bank being riprap armored from the top of protection to the stream invert. This figure represents the total linear feet from both the left descending bank and the right descending bank, and is roughly 34 percent of the total linear feet (both banks) of the levee/floodwall system.

In addition to the activities necessary to construct the local flood protection, this proposal would include all routine maintenance (e.g., mowing, inspections, re-paving, repairs to structures, in-kind replacements) for both the sponsor operations and maintenance (O&M) and Corps-related activities necessary to maintain the safety or integrity of the flood damage reduction system. All of these actions would be assumed included in the proposed action. After repeated flooding events, localized areas of erosion could occur and would require placement of additional riprap. Also, limited channel cleaning via excavation of gravel deposits may also be needed: mainly in Fishing Creek.

Selection of the levee/floodwall alignment considered wetlands and attempted to minimize the environmental effects. Currently approximately 3.1 acres of wetlands are planned to be directly impacted by the project. Approximately 0.7 acres of wetlands are within the expected area of disturbance for the proposed alignment near the fairgrounds and approximately 2.4 acres of forested wetlands are planned for impact in the Fishing Creek floodplain in Fernville (See Section 2.4.2 of the Feasibility Report/EIS). The fairground wetlands consist of approximately 0.2 acres of mixed palustrine forested and shrub-scrub wetlands and about 0.5 acres of palustrine emergent wetlands. The railroad grade bisected a wetland system and over time, this wetland has been impacted by farming practices, gravel roads, excavation, filling and other human impacts. As such, the functional capacity of this wetland system has been degraded over the past 200 years. The wetlands in the Fishing Creek floodplain in Fernville are relatively intact and represent close to reference conditions for forested floodplain wetlands in the Fishing Creek watershed. The impacts planned for the construction of the levee through the fairgrounds area cannot be avoided or further minimized. The impacts for the Fishing Creek wetlands will be subject to further minimization during the PED phase of the project. The project team anticipates that the 2.4 acres of impact will be redcued to below one acres of impact by a re-alignment of the levee centerline in the area of upper Fernville. This would reduce the overall direct wetland impacts to less than two acres for the entire project. The complete avoidance of wetlands is not possible due to real estate constraints and the need to avoid known landfill areas. The impacts to these wetland areas will be mitigated during construction of the levee as discussed in Section 5.16 of the Feasibility Report/EIS.

Approximately 1.1 acres of uplands just west (riverside) of the proposed levee and between wetlands "A" and "E" (see Figure 2-3 in Section 2 of the Feasibility Report/EIS) will be graded to retain surface water, seeded with a native wetland seed mix and planted with native wetland trees and shrubs or allow to revegetate with volunteer species brought into the site by annual flooding.

c. Purpose – The purpose of the project is to reduce the impact of flooding from the Susquehanna River and Fishing Creek on the Town of Bloomsburg. The primary water resources problem along the Susquehanna River at Bloomsburg is recurrent flooding. Flood damages are attributable to overbank flooding from the Susquehanna River and to flooding along Fishing Creek, which is exacerbated by backwater flooding from the Susquehanna River. Past flood events have resulted in extensive damages to structures and their contents and have threatened public safety. In addition, floods have disrupted major transportation systems, requiring closure of roads, railroads, and the municipal airport. As indicated in Figure 3-1, extensive portions of the Bloomsburg study area are within the 500-year floodplain of the Susquehanna River and Fishing Creek. The 500-year floodplain includes approximately 525 residential structures, and 75 businesses and local government buildings.

Recurrent flooding that occurs in the Bloomsburg study area is a result of the morphology of the Susquehanna River and the regional topography. In the vicinity of Bloomsburg, the river has very little slope and has shallow banks. As a result, the river flows more slowly in this reach. During heavy rainfall events (or rapid snowmelts), the river quickly swells and overflows its banks. Additionally, the main stem Susquehanna River is prone to ice-jam related flooding. When winter ice breaks up, the slow-moving flow causes the ice to jam easily, creating obstacles and impounding water.

Backwater flooding from Fishing Creek is caused when the Susquehanna River overflows its banks and hinders discharge from Fishing Creek to the mainstem of the Susquehanna. When the Susquehanna River and Fishing Creek simultaneously rise above flood stage, the rivers can cover up to 33 percent of the landmass within the Town's boundaries. Flooding on Fishing Creek can happen quickly with little or no warning. Floods along Fishing Creek, as well as along the Susquehanna River, are slow to recede due to the flat topography, thereby isolating areas and exacerbating property damage.

d. General Description of Discharge Material – Discharge material to be placed along Fishing Creek would be a well-graded mixture of stone with a maximum weight not exceeding 350 pounds (21-inch) with a minimum weight of at least 3 pounds (3-inch).

   The activities resulting in loss to waters of the U.S. involve the construction of the levee along Fishing Creek when in close proximity to the water as described above, and the filling of approximately 0.7 acres of wetlands within the expected area of disturbance. The fill material at this location will be clean dirt fill material and stone for the river side of the levee.

e. Description of the Proposed Discharge Site – The discharge of materials along Fishing Creek would be at the toe of the levee onto the shallow river bottom. Assuming the extension is 10 feet into both sides of the stream channel, over the entire 3,000 linear feet, the result would be riprap placement on approximately 0.7 acre of Fishing Creek bottom. The river bottom throughout this area is believed to be an unconsolidated layer of sands, gravels, and cobbles, which overlies red shale bedrock, with the red shale ridges protruding up from the creek bottom in some areas. There are areas of submerged aquatic vegetation on the creek bottom within the affected area.

   The discharge of materials into the wetland would consist of competent material and fill for the construction of the levee. These wetlands consist of approximately 0.7 acre of mixed palustrine forested/shrub-scrub and emergent wetlands in the River floodplain near the Fairgrounds and approximately 2.4 acres of palustrine forested wetlands in the Fishing Creek floodplain.

f. Description of the Discharge Method – Along Fishing Creek, the rock fill material would likely be placed in the river by end dumping from trucks onto storage piles atop the creek banks and placement by crane or excavator. Some excavation in the creek bed will be required on either bank for the dug in toe of the levee slope. Some dewatering via sandbags or other physical diversions of the water and pumping of the work area will likely be required.

   The levee segment affecting wetlands would be constructed with dozers, backhoes, and rollers.

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope – The riprap protection would be placed at approximately 462 feet above MSL and lower and is assumed to extend approximately 10 feet into the creek, then graded up the bank to the top of protection.
The wetlands occur at approximately 470 feet above MSL on an old landfill area in the river floodplain and along the floodplain bench of Fishing Creek. Slopes are relatively flat (1-2%) due to the floodplain setting. Slopes in the actual creek channel may be a bit steeper but not significantly.

(2) Sediment Type – The Fishing Creek sediment predominantly consists of an unconsolidated layer of sands, gravels, and cobbles, which overlies red shale bedrock. The bedrock is occasionally exposed.
The wetlands area substrate is silt-loam based Udorhents in the river floodplain and is a Dystrudept (Chenango) in the creek floodplain.

(3) Discharge Material Movement – The riprap placed along Fishing Creek is engineered and designed to not move from their placed locations during design storms or storm with less stream velocity.
The levee built through the wetlands is also designed to be firm and permanent in their placement.

(4) Physical Effects on Benthos – Placement of the riprap along Fishing Creek would result in the loss of benthic habitat through displacement and burial. Over time the placed riprap would be re-colonized and provide refuge within the rock interstitial spaces. During the placement of materials, a localized increase in turbidity is expected.

Filling of the wetlands for levee construction will result in the destruction of any benthics in the footprint by elimination of this habitat. However, since these are mainly all formed by overbank flooding and have no perennial standing or flowing water, there are few aquatic benthic organisms in these wetlands.

(5) Other Effects – Prior to placing the stone along the 3,000 linear feet where it is required to the stream invert, all stream-side vegetation in this reach will be removed. As a result, local allochthonous input from vegetation in the armored area will no longer occur. This would lead to a localized decrease in the nutrient input available for all detritus. Removal of the vegetation would also contribute to a small thermal impact by the increased exposure to sunlight thereby favoring more heat tolerant benthos. However, due to the open canopy over this segment of the creek (due to the width of the creek) and due to

the rural nature of the rest of the upper watershed of the creek, this is not anticipated to have a significant adverse effect.

(6) Actions Taken to Minimize Impacts –

1. Construction specifications provided to the contractor would state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement. Environmental protection measures would be employed at the construction site to avoid and minimize impacts to the aquatic environment resulting from the discharge. Additionally, the type of equipment and machinery used during construction would minimize effects.
2. Placement of the riprap would include care to access the streamside with a minimum of disturbance in the construction area.
3. For riprap used, not more than 10% by weight of soil and rock fragments passing the 3-inch screen would be permitted within the material in order to reduce turbidity during placement.
4. The original design for levee along Fishing Creek would have resulted in riprap placement from the top of protection to the stream channel invert along the entire reach of flood protection. (The original design would have had rock placed in the stream for 8,000 linear feet instead of 3,000). This concept design and approach was evaluated and discarded to move the alignment and minimize in-water construction avoiding temporary or permanent effects to the Fishing Creek or submerged aquatic vegetation. Moving the levee alignment landward (away from Fishing Creek) where economically or physically practicable minimized effects.
5. Prior to initiating construction, a National Pollutant Discharge Elimination System (NPDES) general permit for discharges of stormwater associated with construction activities would be obtained and include an approved erosion and sediment control plan. Selected contractors would be identified as co-permitees for the duration of the construction process.
6. On site inspections during construction.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water –

a. Salinity – No change expected.
b. Chemistry – No change expected.
c. Clarity – Minor and temporary change expected.
d. Color – Minor and temporary change expected.

e. Odor – No change expected.
f. Taste – N/A
g. Dissolved Gas Levels – No change expected.
h. Nutrients – Localized decrease in allochthonous input. Localized temporary increase due to nutrients bound to some sediment released into the water column during construction.
i. Eutrophication – Not expected to occur.
j. Others as Appropriate – None expected.

(2) Current Patterns and Circulation –

a. Current Patterns and Flow – Minor localized changes in current flows or patterns due to the placement of the riprap with Fishing Creek.
b. Velocity – No discernable change during flood stage but a slight, localized permanent increase in velocity at flood stages. No major adverse impacts are anticipated.
c. Stratification – No change expected.
d. Hydrologic Regime – No change expected.

(3) Normal Water Level Fluctuations – No change expected.
(4) Salinity Gradients – No change expected.
(5) Actions to Minimize Impacts –

1. Erosion protection measures (riprap along levee to the stream invert) are included in the project design to prevent project features from being adversely affected by the induced localized flow turbulence.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site – Minor and short-term increases would occur in Fishing Creek during construction. Turbidity levels would also increase during earth moving for levee construction filling the wetlands, though this will be minor due to the lack of flowing water in these areas.
(2) Effects on Chemical and Physical Properties of the Water Column

a. Light Penetration – A minor and temporary decrease is anticipated during construction. No change expected after construction.
b. Dissolved Oxygen – No change expected.
c. Toxic Metals or Organics – No change expected.
d. Pathogens – No change expected.
e. Aesthetics – A temporary reduction in aesthetic value expected during construction. No permanent change to the water column expected.
f. Others as Appropriate – N/A.

(3) Actions Taken to Minimize Effects –

1. Actions taken to minimize effects include best management practices such as staked silt fences would minimize erosion and turbidity and erosion during construction activities.
2. For riprap used in the construction of the levee armoring, not more than 10% by weight of soil and rock fragments passing the 3-inch screen would be permitted within the rock fill material in order to reduce turbidity during placement.
3. Dewatering of stream segments for construction to minimize any sediment transported downstream.

d. Contaminant Determinations – Preliminary HTRW investigations (Summarized in Section 2.8 of the Feasibility Study/EIS) have determined that contaminant sources are located in proximity to the wetlands. More detailed investigations (Summarized in Section 5.8) to characterize the nature and extent of contamination will occur during the PED phase. Care will be taken to design construction methods that will minimize the effects. All fill materials would conform to all applicable Pennsylvania Water Quality Standards to ensure minimal disruption to the aquatic ecosystem.

e. Aquatic Ecosystem and Organism Determinations –

(1) Effects on Plankton – Minor and temporary effects expected because of a temporary increase in suspended sediment during construction.

(2) Effects on Benthos – Placement of the riprap along Fishing Creek would result in the loss of benthic habitat through displacement and inundation. Over time the placed riprap would be re-colonized and provide some refuge within the rock interstitial spaces. During the placement of materials, a localized increase in turbidity would be expected.

(3) Effects on Nekton – The placement of materials would likely cause nektonic species to leave the area until the completion of disturbance. After construction is completed, riprap would provide habitat for nekton.

(4) Effects on the Food Web – Minor, temporary, and localized effects to the food web could be expected as a result of construction.

(5) Effects on Special Aquatic Sites – Placement of the riprap in 0.7 acre of Fishing Creek channel [See Section I (e) above] would affect vegetated shallows (freshwater submerged aquatic vegetation) and the riffle and pool complexes. The extent of vegetated shallows and riffle and pool complex affected would be less than the total area of impact (0.7 acre) potentially affected but will be better known as the detailed design plans and specification are assembled for the project.
Construction of the levee would require the filling of approximately 0.7 acre of wetlands in the river floodplain and

2.4 acres of forested wetlands in the Fishing Creek floodplain. While the impact to the river floodplain wetlands cannot be further minimized, the team anticipated being able to relocate the Fernville levee alignment to minimize the impact to the Fishing Creek wetlands to under one acre. These impacts (currently at 3.1 acres of wetlands) will be reduced below two acres during PED phase by moving the Fernville levee alignment back from the edge of the creek.. Also, a wetland mitigation project and a fish passage project are both planned to offset the remaining impacts to wetlands and the creek.
Threatened and Endangered Species – There are no threatened or endangered species known to exist in the project impact area.

(6) Other Wildlife – The disturbance of Fishing Creek bottom would displace benthic species during construction, but the placed materials would be quickly re-colonized and provide a benefit other aquatic species.
Filling of the wetlands would temporarily disturb animals utilizing the habitat. The area constructed as wetlands mitigation would be re-colonized by wildlife species as it matures.

(7) Actions to Minimize Impacts – The original design for levee along Fishing Creek would have resulted in riprap placement from the top of protection to the stream channel invert along the entire reach of flood protection. (The original design would have had rock placed in the stream for 8,000 linear feet instead of 3,000). This concept design and approach was evaluated and discarded to move the alignment and minimize in-water construction avoiding temporary or permanent effects to the Fishing Creek or submerged aquatic vegetation. Moving the levee alignment landward (away from Fishing Creek) where economically practicable minimized effects.

f. <u>Proposed Disposal Site Determinations</u> – There is no disposal of dredged material as a part of this proposal. Therefore no considerations of disposal site determinations are appropriate.

g. <u>Determination of Cumulative Effects on the Aquatic Ecosystem</u> – There would be a permanent loss of approximately 0.7 acre of benthic habitat below ordinary high water, but these areas will re-colonize with benthic invertebrates and could improve foraging habitat for fin fish. There would be only a temporary and minor effect on the water quality and nekton during placement of materials for the groins. Removal of woody vegetation would lead to a slight increase in solar heating of the water. The predicted slight increase in temperature is not expected to create a significant cumulative effect because Fishing Creek is naturally transitioning to a warm water fishery through this reach. (See section 5.4.4 Fish). In the 1960's PennDOT built the Route 11 interchange over and around the channel of Fishing Creek. It is not clear how many wetlands were impacted by this action but there is an estimated 2000 feet of creek channel that was affected. In 2005, a stream restoration project was constructed just upstream of the water treatment plant on Fishing Creek. This impacted 1.4 miles of creek channel. Also, PennDOT has a study planned to remove an old sheet pile dam just upstream of the Route 80 bridges in Fishing Creek. Yet another stream restoration project was constructed in 2003 by the USFWS in Light Street, just upstream of Bloomsburg on Fishing Creek. In the long term (5-10 years) it is the District's judgment that these projects and the planned fish passage project in lower Fishing Creek at Boone's dam (as part of the mitigation for this project) will have a beneficial effect on the creek ecosystem.

The Susquehanna River Basin extends 450 miles in length from its headwaters to the Chesapeake Bay and drains approximately 27,510 square miles along over 30,000 miles of streams from portions of New York, Pennsylvania, and Maryland. The Corps regulates 13 multi-purpose reservoirs and more than 56 local flood protection projects in the Susquehanna River Basin. In addition to the Corps projects, various state agencies, commercial interests, and natural resource preservation organizations have constructed 10 reservoirs and 48 local flood protection projects. Combined, the Susquehanna River Basin has approximately 23 reservoirs and over one hundred local flood protection projects.

Of the 1,400 communities in the Susquehanna River basin, about 1,160 have residents located in flood-prone areas. Consequently, flood control projects are concentrated around municipalities for the protection of life and property. The Corps of Engineers local flood protection projects have altered approximately 128 miles of riparian corridor with the construction of levees and floodwalls. Cumulative environmental effects from the watershed-wide flood protection include:

Hydrologic and Hydraulic Effects

- Increased flood velocity of the Susquehanna and its tributaries when confined within levees and floodwalls and a concomitant increased scour of sediment materials.
- Increased water surface elevations upstream of the levees, floodwalls, and detention structures.
- Decreased time of concentration for flood flows into the Susquehanna and its tributaries by isolating the flows from the floodplain.

Biological Effects

- Eliminated the deposition of sedimentation and nutrients on floodplain soils by isolating flood flows from historic floodplains.
- Eliminated the hydraulic connection to special aquatic habitats (e.g., wetlands) in the historic floodplain.
- Elimination of the riparian habitat (typically bottomland hardwood forest) removed for the construction of the flood damage reduction projects.
- Elimination of wildlife habitat removed for the construction of the flood damage reduction projects.

HTRW Release Effects

- Confined flows within levee and floodwalls significantly limit or prevent the contamination of drinking water supplies, dispersion of hazardous, toxic, and/or radioactive waste (HTRW), overtopping of sewage treatment systems, and dispersion of large quantities of solid waste.

h. Determination of Secondary Effects on the Aquatic Ecosystem – None identified.

III. FINDING OF COMPLIANCE

a. No adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.
b. No other reasonable alternatives are available for the action that would accomplish the project objectives.
c. Although seeking a Section 404(r) exemption for this project, the planned placement of material will comply with the Pennsylvania Water Quality Standards.
d. The proposed placement of riprap and fill materials for levee construction are not expected to violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.
e. The use of the selected site would not harm any endangered species or their critical habitat.
f. No marine Sanctuaries, as designated by the Marine Protection, Research, and Sanctuaries Act of 1972, are in the project area.
g. The proposed construction of the flood protection for the Town of Bloomsburg would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish and shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse impacts on aquatic ecosystem diversity, productivity, and stability and recreation aesthetics and economic values would not occur.
h. On the basis of the Section 404(b)(1) Guidelines, the proposed construction areas and discharge site for the material are specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem. Sediment erosion control devices would be implemented in compliance with Federal, State, and local law

BLOOMSBURG FEASIBILITY STUDY **20 December 1999**

MEMORANDUM FOR FILE
SUBJECT: Environmental Field Visit

ATTENDEES:
- Amy Guise, US Army Corps of Engineers, Baltimore District, ecologist
- Carl DeLuca, PADEP, Harrisburg, biologist
- Leon Liggitt, PennDOT 3-0, liaison engineer
- Chris King, PennDOT 3-0, environmental planner
- Joe Verbka, PennDOT 3-0, archaeologist
- Tony Tur, USFWS—invited, did not attend

The group reviewed the proposed PADEP alignment and discussed integrating the PennDOT road extension. Environmental impacts and recommendations were also agreed upon. Any portion of the PennDOT road extension that is directly part of the levee will be documented in the Bloomsburg Feasibility Study NEPA document. Any portion of the road that goes beyond the Corps project must be documented separately.

EXISTING CONDITIONS (to supplement the preliminary assessment by PADEP dated 10/ 1997)
- Numerous cultural landmarks (historic resources) and high potential for archeological impacts (house, old mill, 1929 James Magee Memorial Park, fort along "X" Road, etc.).
- Landfills and wetlands present but able to be avoided with alternative alignments.
- Farmland south of the fairground and Magee carpet with "soggy" northern corner. Area considered PC wetland from best professional judgment. A jurisdictional determination was not completed at this site.
- No listings for the area found in the PNDI.
- Village of Rupert, along Fishing Creek, with approximately 4 homes impacted from induced flooding (estimate based on field view and not modeling).
- Unprotected side of Fishing Creek (Fernville) with a lot of potential for internal/basement flooding from upslope. Proposing protection along this side may increase this problem.
- Communities directly outside of the levee and floodwall must be discussed in the NEPA documentation with respect to environmental justice (Fishing Creek, trailer park, Rupert).

DESIGN RECOMMENDATIONS
- SW corner of earth levee to be moved further SW to avoid landfills and wetlands. This would place the levee down an existing dirt road through the parking area. Access must be provided over the levee to get from one parking area to the other. The PennDOT road would also be atop this portion of the levee.
- PennDOT indicated that Dan Bauman (at 11/19/99 team meeting) requested that the proposed street tie into 8 ½ street. During field visit, we looked at areas to the west of 8 ½ Street, West Sixth Street and West 11th Street. As follow up, Corps anticipates tying proposed levee road into 11th Street as originally proposed.
- Depending on farmer, may be able to shorten levee footprint by bisecting the "soggy" area (as described above) from the easily farmed area.

30 March 2000

TRASMITTAL MEMORANDUM

SUBJECT: Bloomsburg Local Flood Protection Feasibility Study – Cultural Resources

TO: Dale Hamlen, DEP (FAX 717-772-0409)

Dale,

Mr. Ken Baumgardt (Corps archaeologist) and Ms. Nancy Jedziniak (Corps study manager) contacted Mr. Tom Jones of Groenendall and Jones regarding the scope and area of the historic structures survey for the Bloomsburg Feasibility Project. Although the project area is the town of Bloomsburg and the village of Fernville, the study location for this component is limited to the 500-year floodplain, as shown on the FEMA Flood Insurance Map for the area. When the final alignment is selected so little areas may have to be looked at, but the 500-year floodplain should define the majority of the Area of Potential Effect.

The Phase I is to contain three components, (1) collection of existing information, (2) survey and documentation of all historic structures more than 50 years old, and (3) impact analysis. Mr. Jones told us that he has already been in contact with the City of Bloomsburg and the Pennsylvania State Historic Preservation Officer, and there is little existing information for the town outside of the historic district. He will continue to collect whatever there is, and he will prepare an appendix that will include the survey and National Register forms.Among the historic resources to be discussed in the Existing Conditions are the Bloomsburg Historic District, McClure House, Fort McClure, Armstrong House and barn (also known as Magee Mill?), Covered Bridge, Barton House, Aqueduct Mill, and the Warrior Path/Trail. Some of these are in the survey area, and other will not be affected by the project, but they still need to be discussed, if briefly.

The survey will use established SHPO forms to document the architecture and history of the structures in the survey area. From this survey, he will be able to assess which (if any) of the structures need to have a more intensive level of investigation and documentation.

Mr. Jones will attend the Charrette on May 17th, and present to the team a preliminary review of the historic structures in the study area, and a preliminary assessment of the impacts (direct and indirect) to the potentially National Register eligible structures there. Impacts to these structures may not be critical in the alignment selection process, but limiting the impacts to historic resources is one element of the alignment selection process.

These structures were named at our team meeting on March 22, 2000, and Mr. Gerry Depo, Town of Bloomsburg was tasked with getting a list of historic structures together that may be eligible for the Historic Register. I will pass this along to you once I receive it.

UST/ASTs
Bloomsburg, PA

Site	Facility	Location	Status	UST/AST	Notes
1	Coastal Mart #7417	510 Main Street	Active	3 USTs	In accordance w/ PADEP regs.
2	Ore Ida Foods, Inc.	595 W. 11th Street	Active	2 ASTs	In accordance w/ PADEP regs.
	Ore Ida Foods, Inc.	595 W. 11th Street	Closed	3 USTs	
3	Bloomsburg Middle School	11th & Railroad Streets	Active	1 UST	Exempt from PADEP regs.
4	Bloomsburg High School	12th & Railroad	Active		Exempt from PADEP regs. Need to get **exact** location on H.S. grounds.
5	FH 38280, Gas Station	429 W. Main Street	Active - Temp. Status	5 USTs	Temporary Status – USTs are being evaluated for either upgrade or removal.
6	Bloomsburg Fair Services	Fairgrounds – Next to Maint.Bldg.	Closed	2 USTs	*Nancy will verify location.*
7	Fracalossi	977 W. Main Street	Closed	2 USTs	
8	Citgo West	1000 W. Main Street	Closed	7 USTs	

David Miller & Associates, Inc.

Memo

To: Mary Dan, Bill Abadie
From: Michael McGarry
CC: Vini Vannicola, Robert Wiley
Date: July 16, 2003
Re: Bloomsburg Local Protection Project Wetlands Delineation Report and Field Data Sheets

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The attached information is a summary of the wetlands work recently completed for the Bloomsburg Local Protection Project. The field data sheets are also provided separately in Excel format. If there are any questions, please contact me at 716.942.6363.

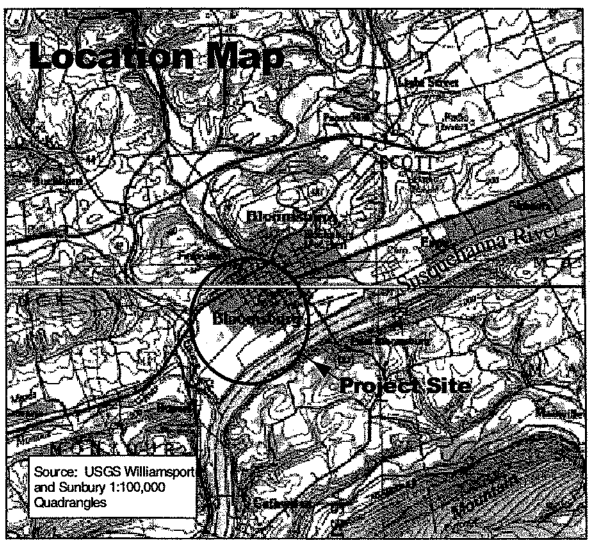
Regards,

Mike McGarry

Bloomsburg Local Flood Protection Project Wetlands Delineation Report

A field investigation was conducted on June 5 and 6, 2003 at the site of the Bloomsburg Flood Protection Project to assess and determine the presence of areas having the characteristics of Clean Water Act, Section 404 Jurisdictional Wetlands. The Bloomsburg Local Flood Protection Project site (project), as shown on Figure 1 is located within the 100-year floodplain of the Susquehanna River within and near the community of Bloomsburg, Pennsylvania. The project site investigated included the footprints and vicinities of two alternatively proposed levee alignment corridors, ringing the southwest side of Bloomsburg and a proposed levee along Fishing Creek, designed by the Baltimore District US Army Corps of Engineers to reduce the flooding hazard (Figure 2). The presence of wetlands was assessed using the "Corps of Engineers Wetland Delineation Manual," Technical Report Y-87-1, and supplements and specific regulatory guidance modifications subsequently issued.

Figure 1



The entire alignments of all proposed levees were observed and assessed for wetlands presence. Wetlands were identified only along the southeastern side of the Columbiana County Fairgrounds and delineated using a Trimble Geoexplorer 3 global positioning system. The 10 mapped wetlands are shown as Figure 3. Table 1 summarizes delineated wetlands by type and acreage. Wetland delineation datasheets are attached.

Figure 2. Bloomsburg Local Flood Protection Project Levee Locations

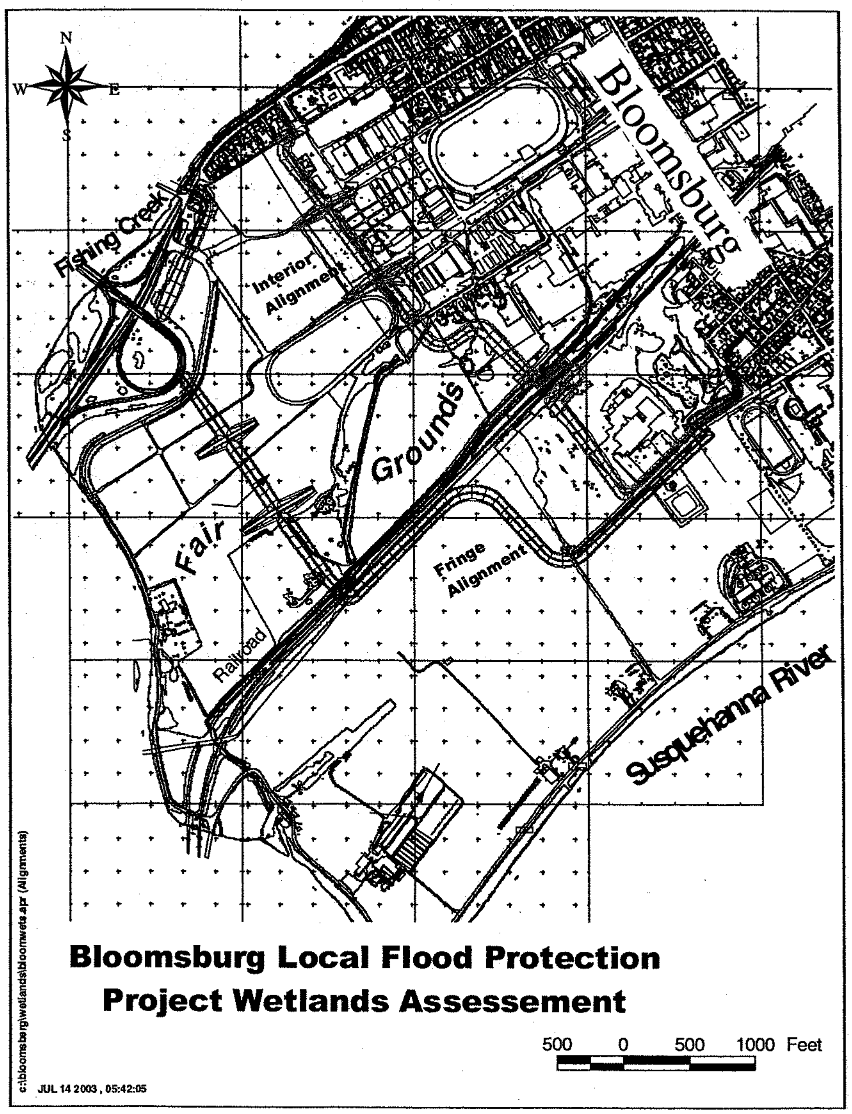


FIGURE 3. Wetlands Locations

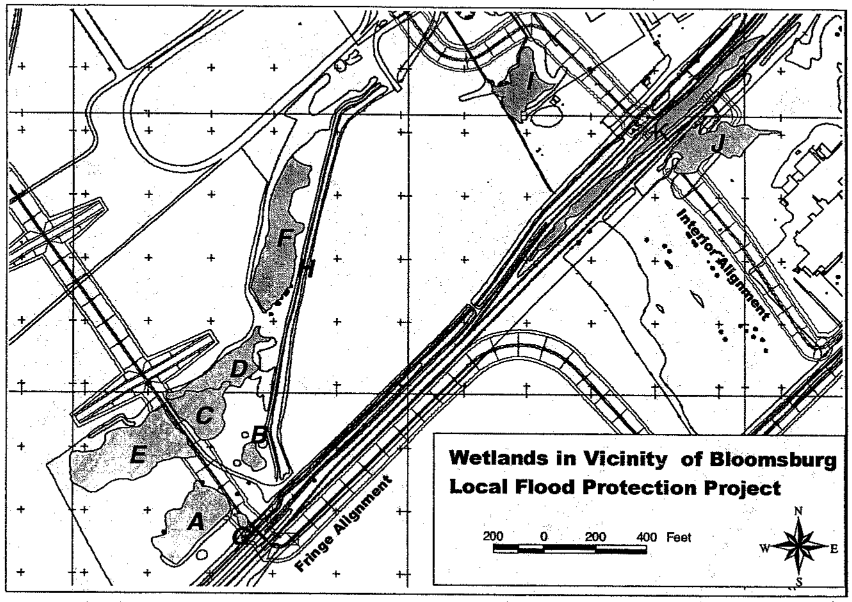


Table 1. Bloomsburg Local Flood Protection Project Wetlands

Unit ID	Wetland Type	Area (acres)
A	PEM/PSS/PFO	1.13
B	PEM	0.16
C	PEM	0.72
D	PFO	0.73
E	PEM/PFO	1.91
F	PFO	1.50
G	PEM	0.05
H	PEM	0.42
I	PFO	0.67
J	PEM/PSS	0.91
K	PFO/PSS	0.95
	Total	**9.16**

Table Key:
PEM: Palustrine Emergent wetland
PSS: Palustrine Shrub-scrub wetland
PFO: Palustrine Forested wetland

Species	CODE	Indicator	LIFEFORM
Actinomeris alternifolia	ACAL	FAC	Herb
Achillea millifolium	ACMI	FACU	Herb
Acer negundo	ACNE	FACW	Tree
Actea pachypoda	ACPA	NI	Herb
Acalypha rhomboidea	ACRH	FACW	Herb
Acer rubrum	ACRU	FAC	Tree
Acer saccharum	ACSA	FACU-	Tree
Acer saccharinum	ACSN	FACW	Tree
Aconitum uncinatum	ACUN	NI	Herb
Adiantum pedatum	ADPE	FAC-	Herb
Aesculus octandra	AEOC	NI	Tree
Agrostis hyemalis	AGHY	FAC	Herb
Agrostis tenuis	AGTE	FAC	Herb
Althea rosea	ALRO	NI	Shrub
Alnus serrulata	ALSE	OBL	Shrub
Alisma subcordatum	ALSU	OBL	Herb
Amelanchier arborea	AMAR	FAC-	Shrub
Amphicarpa bracteata	AMBR	FAC	Herb
Angelica atropurpurea	ANAT	OBL	Herb
Andropogon scoparius	ANSC	FACU	Herb
Anemone virginiana	ANVI	NI	Herb
Apocynanum cannibium	APCA	FACU	Herb
Aristolochia macrophylla	ARMA	NI	Vine
Arctium minus	ARMI	NI	Herb
Asplenium angustum	ASAN	NI	Herb
Asarum canadensis	ASCA	UPL	Herb
Aster divarcatus	ASDI	UPL	Herb
Asclepias incarnata	ASIN	OBL	Herb
Aster prenanthoides	ASPR	FAC	Herb
Aster puniceus	ASPU	OBL	Herb
Asclepias syracia	ASSY	UPL	Herb
Asclepias tuberosa	ASTU	UPL	Herb
Aster umbellatus	ASUM	FACW	Herb
Athyrium thelypteroides	ATTH	FAC	Herb
Baptisia tintoria	BATI	UPL	Shrub
Betula nigra	BENI	FACW	Tree
Berberis thunbergii	BETH	FACU	Shrub
Bidens cernua	BICE	OBL	Herb
Bidens frondosa	BIFR	FACW	Herb
Bidens vulgata	BIVU	FACW	Herb
Blephilla hirsuta	BLHI	FACW+	Herb
Bohemaria cylindrica	BOCY	FACW+	Herb
Bromus cilliatus	BRCI	FACW	Herb
Campanula americana	CAAM	FAC	Herb
Carex blanda	CABL	FAC	Herb
Carpinus caroliniana	CACA	FAC	Shrub
Carex caroliana	CACL	FACU	Herb
Carya cordiformis	CACO	FACU+	Tree
Carex complanata	CACO	FACU	Herb

Carex crinita	CACR	OBL	Herb
Castanea dentata	CADE	UPL	Herb
Carex flaccosperma	CAFL	FAC	Herb
Carex frankii	CAFR	OBL	Herb
Carya glabra	CAGL	FACU-	Herb
Carex hirtifolia	CAHI	FACW	Herb
Carex hytricina	CAHY	OBL	Herb
Carex intemescens	CAIN	FACW+	Herb
Carex lupulina	CALP	OBL	Herb
Carex lurida	CALU	OBL	Herb
Carya ovata	CAOV	FACU-	Herb
Caltha palustris	CAPA	OBL	Herb
Cardamine pennsylvanica	CAPE	OBL	Herb
Carex scoparia	CASC	FACW	Herb
Carex stricta	CAST	OBL	Herb
Carex swanii	CASW	FACW	Herb
Caulophyllum thalictroides	CATH	NI	Herb
Carya tomentosa	CATO	UPL	Tree
Carex tribuloides	CATR	FACW+	Herb
Carex vulpinoidea	CAVU	OBL	Herb
Centaurea maculosa	CEMA	UPL	Herb
Cephlanthus occidentalis	CEOC	OBL	Shrub
Chelone glabra	CHGL	OBL	Herb
Chrysanthemum leucanthemum	CHLE	UPL	Herb
Cinna arundinacea	CIAR	FACW+	Herb
Circium discolor	CIDE	UPL	Herb
Circea quadrisculata	CIQU	NI	Herb
Clematis virginiana	CLVI	FAC	Vine
Cornus ammomum	COAM	FACW	Shrub
Collinsonia canadensis	COCA	FAC+	Herb
Cornus florida	COFL	FACU-	Shrub
Conium maculatum	COMA	FACW	Herb
Convolvulus sepium	COSE	UPL	Herb
Corinilla varia	COVA	UPL	Herb
Commelina virginiana	COVI	FACW	Herb
Cryptotaenia canadensis	CRCA	FAC	Herb
Cuscuta gronovii	CUGR	NI	Herb
Cuphea viscosissima	CUVI	FAC-	Herb
Cyperus rivularis	CYRI	FACW+	Herb
Cyperus strigosus	CYST	FACW	Herb
Daucus carrota	DACA	UPL	Herb
Dactylis glomerata	DAGL	UPL	Herb
Desmodium perplexum	DEPE	UPL	Herb
Dennstaedia punctiloba	DEPU	UPL	Herb
Dianthus armeria	DIAR	UPL	Herb
Dicanthelium clandestinum	DICL	FAC+	Herb
Digitaria ischemum	DIIS	UPL	Herb
Dioscorea quaternata	DIQU	FACU	Vine
Dipsacus sylvestris	DISY	NI	Herb
Dioscorea villosa	DIVI	FAC+	Herb

Diospyros virginiana	DSVS	FAC-	Tree
Echinochloa pungens	ECPU	FACW	Herb
Eleocharis acicularis	ELAC	OBL	Herb
Elodea canadensis	ELCA	OBL	Herb
Eleocharis obtusa	ELOB	OBL	Herb
Elymus virginicus	ELVI	FACW-	Herb
Epilobium coloratum	EPCO	OBL	Herb
Epigea repens	EPRE	UPL	Shrub
Epifagus virginiana	EPVI	UPL	Herb
Equisetum arvense	EQAR	FAC	Herb
Erigeron annuus	ERCA	FACU	Herb
Erigeron philidelphicus	ERPH	FACU	Herb
Euphorbia corollata	EUCO	UPL	Herb
Euphorbia dentata	EUDE	UPL	Herb
Euphorbia lathyris	EULA	UPL	Herb
Eupatorium maculatum	EUMA	FACW	Herb
Euphorbia maculata	EUMA	FACU-	Herb
Eupatorium perfoliatum	EUPE	FACW+	Herb
Eupatorium purpureum	EUPU	FAC	Herb
Eupatorium rugosum	EURU	UPL	Herb
Fagus grandifolia	FAGR	FACU	Tree
Festuca ovina	FEOV	FACU-	Herb
Festuca rubra	FERU	FAC	Herb
Fraxinus pennsylvanica	FRPE	FACW	Tree
Galium aparine	GAAP	FACU	Herb
Galium tinctorium	GAAT	OBL	Herb
Gaylussacia baccata	GABA	FACU	Shrub
Gaura biennis	GABE	FACU	Herb
Gaultheria procumbens	GAPR	FACU	Shrub
Galium trifolium	GATR	FACU	Herb
Gerardia tenufolia	GETE	NI	Herb
Gnapthalum uliginosum	GNUL	UPL	Herb
Gymnocladus dioca	GYDI	UPL	Tree
Hamamelis virginiana	HAVI	FAC-	Shrub
Helenium autumnale	HEAU	FACW+	Herb
Helianthus decapetalus	HEDE	FACU	Herb
Helianthus divarcatus	HEDI	NI	Herb
Helianthus giganteus	HEGI	NI	Herb
Helianthus tuberosus	HETU	FAC	Herb
Hieracium venosum	HIVE	UPL	Herb
Hordeum vulgare	HOVU	FAC	Herb
Hypericum canadense	HYCA	FACW	Herb
Hypericum ellipticum	HYEL	OBL	Herb
Hypericum mutilum	HYMU	FACW	Herb
Hystrix patula	HYPA	UPL	Herb
Hypericum prolificum	HYPR	FACU	Shrub
Hypericum virginicum	HYVI	OBL	Shrub
Impatiens capensis	IMCA	FACW	Herb
Impatiens pallida	IMPA	FACW	Herb
Ipomoea purpurea	IPPU	UPL	Herb

Juncus acuminatus	JUAC	OBL	Herb
Justicea americana	JUAM	OBL	Herb
Juglans cineria	JUCI	FACU+	Tree
Juncus effusus	JUEF	FACW+	Herb
Juglans nigra	JUNI	FACU	Tree
Juncus subcaudatus	JUSU	OBL	Herb
Juncus tenuis	JUTE	FAC-	Herb
Juniperus virginiana	JUVI	FACU	Tree
Kalmia latifolia	KALA	FACU	Shrub
Lathyrus latifolia	LALA	NI	Herb
Lespedeza hirta	LEHI	UPL	Herb
Lespedeza nuttalii	LENU	NI	Herb
Leersia oryzoides	LEOR	OBL	Herb
Leersia virginica	LEVI	FACW	Herb
Lindernaria dubia	LIDU	OBL	Herb
Liriodenron tulipfera	LITU	FACU	Tree
Lobelia cardinalis	LOCA	OBL	Herb
Lobelia inflata	LOIN	FACU	Herb
Lonicera japonica	LOJA	FAC	Vine
Lobelia puberella	LOPU	FACW-	Herb
Lobelia siphilitica	LOSP	FACW+	Herb
Lonicera tartarica	LOTA	FACU	Shrub
Ludwidgia alternifolia	LUAL	FACW	Shrub
Ludwidgia palustris	LUPA	OBL	Herb
Lycopus americana	LYAM	OBL	Herb
Lysimachia ciliata	LYCI	OBL	Herb
Lysimachia numularia	LYNU	OBL	Herb
Magnolia acuminata	MAAC	FACU	Tree
Maianthemum canadense	MACA	FAC-	Herb
Mentha piperita	MEPI	FACW+	Herb
Mimulus alata	MIAL	OBL	Herb
Mithella repens	MIRE	FACU	Shrub
Minulus ringens	MIRI	OBL	Herb
Monotropa uniflora	MOUN	UPL	Herb
Nyssa sylvatica	NYSY	FAC-	Tree
Oenethera biennis	OEBI	FACU	Herb
Oenethera parvifolia	OEPA	FACU	Herb
Onoclea sensibilis	ONSE	FACW	Herb
Osmorhiza longistylus	OSLO	FACU	Herb
Osmunda regalis	OSRE	OBL	Herb
Oxydendron arborea	OXAR	NI	Shrub
Oxalis corniculata	OXCO	FACU	Herb
Oxalis stricta	OXST	UPL	Herb
Panicum cappilare	PACA	FAC-	Herb
Paspalum circulare	PACI	NI	Herb
Parthenocissus quinquifolia	PAQU	FACU	Vine
Panicum spherocarpon	PASP	FACW	Herb
Penthorum sediodes	PESE	FACW	Herb
Phytolacca americana	PHAM	FACU+	Herb
Phalaris arundinaceae	PHAR	FACW	Herb

Phryma leptostachya	PHLE	UPL	Herb
Physocarpus opulifolius	PHOP	FACW-	Shrub
Phlox ovata	PHOV	UPL	Herb
Phleum pratensis	PHPR	FAC	Herb
Pinus echinata	PIEC	UPL	Tree
Pilea pumilla	PIPU	FACW	Herb
Pinus strobus	PIST	FACU	Tree
Pinus tadea	PITA	FAC-	Tree
Pinus virginiana	PIVI	UPL	Tree
Plantago lanceolata	PLLA	UPL	Herb
Plantago major	PLMA	FACU	Herb
Plantanus occidentalis	PLOC	FACW	Tree
Polystichum accrostichoides	POAC	UPL	Herb
Polygonum aviculare	POAV	UPL	Herb
Polygonatum biflorum	POBI	OBL	Herb
Polygonum coccineum	POCO	OBL	Herb
Populus deltoides	PODE	FAC	Tree
Potamogeton foliosus	POFO	OBL	Herb
Polygonum hydropiperoides	POHP	OBL	Herb
Polygonum hydropiper	POHY	OBL	Herb
Poa palustris	POPA	FACW	Herb
Polygonum pensylvanicum	POPE	FACW	Herb
Poa pratensis	POPR	FACU	Herb
Polygonum saggitattum	POSA	OBL	Herb
Polygonum scandens	POSC	FAC	Herb
Prenanthes serpentaria	PRSE	UPL	Herb
Prunus serotina	PRSE	FACU	Tree
Pteridium aquilinum	PTAQ	UPL	Herb
Quercus alba	QUAL	FACU	Tree
Quercus illicifolia	QUIL	UPL	Shrub
Quercus imbricaria	QUIM	UPL	Tree
Quercus palustris	QUPA	FACW	Tree
Quercus prinus	QUPR	UPL	Tree
Quercus rubra	QURU	FACU	Tree
Quercus velutina	QUVE	UPL	Tree
Ranunculus acris	RAAC	FACW	Herb
Rhus glabra	RHGL	UPL	Shrub
Rhododendron maximum	RHMA	FAC	Shrub
Rhododendron nudifolium	RHNU	UPL	Shrub
Rhus typina	RHTY	UPL	Shrub
Rosa multiflora	ROMU	FACU	Shrub
Rosa palustris	ROPA	FACW	Shrub
Robinia psuedoacacia	ROPS	FACU-	Tree
Rubus allgheniensis	RUAL	FACU-	Shrub
Rumex crispus	RUCR	FACU	Herb
Rudbeckia lacinata	RULA	FACW	Herb
Rudbeckia media	RUME	NI	Herb
Rumex obtusifolia	RUOB	FACU-	Herb
Rubus occidentalis	RUOC	UPL	Shrub
Sassafras albidum	SAAL	FACU	Tree

Salix amagladoides	SAAM	OBL	Shrub
Sambucus canadensis	SACA	FACW	Shrub
Sanguinaria canadensis	SACN	FACU	Herb
Saggitaria latifolia	SALA	OBL	Herb
Salix nigra	SANI	OBL	Tree
Saponaria officialis	SAOF	FACU-	Herb
Sanicula trifoliata	SATR	NI	Herb
Scirpus americanus	SCAM	OBL	Herb
Scirpus atrovirens	SCAT	FACW	Herb
Scirpus cyperinus	SCCY	OBL	Herb
Sctellaria laterifolia	SCLA	FACW	Herb
Scirpus validus	SCVI	OBL	Herb
Selanginella apoda	SEAP	FACW	Herb
Setaria vulgaris	SEVU	FACU	Herb
Sicyos angulatus	SIAN	FACU	Herb
Sium suave	SISU	OBL	Herb
Smilax glauca	SMGL	FACU	Vine
Smilax hispida	SMHI	FAC	Vine
Smilax rotundifolia	SMRO	FAC	Vine
Solidago altissima	SOAL	FACU-	Herb
Solidago canadensis	SOCA	FACU	Herb
Solanum carolinence	SOCL	UPL	Herb
Solanum dulcamara	SODU	FAC-	Herb
Solidago gigantea	SOGI	FACW	Herb
Solidago graminifolia	SOGR	FACW	Herb
Solidago juncea	SOJU	NI	Herb
Solidago nemoralis	SONE	UPL	Herb
Sorgastrum nutans	SONU	UPL	Herb
Spirea alba	SPAL	FACW+	Shrub
Spiranthes cernua	SPCE	FACW	Herb
Sparganium chlorocarpum	SPCH	OBL	Herb
Stellaria media	STME	UPL	Herb
Stellaria pubera	STPU	FACU	Herb
Symplocarpus foetidus	SYFO	OBL	Herb
Thalictrum polygamum	THPO	UPL	Herb
Tillia americana	TIAM	FACU	Tree
Toxicodendron radicans	TORA	FAC	Vine
Tovara virginica	TOVI	FACU	Herb
Trifolium alba	TRAL	UPL	Herb
Trifolium repens	TRRE	UPL	Herb
Trifolium rubra	TRRU	UPL	Herb
Tsuga canadensis	TSCA	FACU	Tree
Tussilago farfara	TUFA	FACU	Herb
Typha lattifolia	TYLA	OBL	Herb
Ulmus americana	ULAM	FAC	Tree
Vallisneria americana	VAAM	OBL	Herb
Vaccinium vacillans	VAVA	UPL	Shrub
Verbascum blattaria	VEBL	UPL	Herb
Verbena hastata	VEHA	FACW+	Herb
Verbesina noveboracensis	VENO	FACW+	Herb

Verbascum thapsus	VETH	UPL	Herb
Verbena urticifolia	VEUR	FACU	Herb
Vicia americana	VIAM	NI	Herb
Viburnum recognitum	VIRE	FACW	Shrub
Vitis riparia	VIRI	FACW	Vine
Zizia trifoliata	ZITR	UPL	Herb

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

'roject/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
\pplicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
nvestigator	Robert L. Wiley , PWS #000418	State:	PA

)o Normal Circumstances Exist?	Yes	No	Community ID:	PEM/PFO
s the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	A
s the area Potentially a Problem Area?	Yes	No	Plot Id:	A-1

/EGETATION — Hydrophytic Vegetation Present? **YES**

ominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	PHAR	Herb	FACW	6	SPAL	Shrub	FACW+
2	CAHI	Herb	FACW	7	SANI	Tree	OBL
3	ASIN	Herb	OBL	8	ACRU	Tree	FAC
4	COAM	Shrub	FACW	9	ACSN	Tree	FACW
5	VIRE	Shrub	FACW	10	POPA	Herb	FACW

'ercent of Dominant Species that are OBL, FACW, of FAC — 100%

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 0 years, base on dominant cover type and tree age.

HYDROLOGY — Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Field Observations

Depth of Surface Water (in.)	1
Depth to Free Water (in.)	0
Depth to Saturated Soil (in.)	0

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from County Fairgrounds.

SOILS — Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	VPD
Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

n.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
)-6	A	10YR 3/3/	5YR 4/6	Many	SL, FE&MN conc.s, firm
-16	B/C	10YR 4/6	N7/0	Many	SCL, MN conc.s on ped facies

Hydric Soil Indicators:

	Histsol	X	Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.
Hydric indicators incipient.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PEM
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	B
Is the area Potentially a Problem Area?	Yes	No	Plot Id:	B-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	SOCA	Herb	FACU	6		#N/A	#N/A
2	CAHI	Herb	FACW	7		#N/A	#N/A
3	EUMA	Herb	FACU-	8		#N/A	#N/A
4	PHAR	Herb	FACW	9		#N/A	#N/A
5	EUPE	Herb	FACW+	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC **80%**

Remarks Site is highly modified. Sucessional stage is wet old -field

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Wetland Hydrology Indicators

Primary Indicators

	Inundated
	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators

	Oxidized Root Channels in Upper 12 inches
	Water Saturated Leaves
	Local Soil Survey
	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetland occurs in spoil from excavation of wetland H, from this survey.

SOILS

Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	PD
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-12	upper	10YR 4/1	10YR 5/8	many	Silty clay loam

Hydric Soil Indicators:

	Histsol	X	Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is non-horizonal silty clay dredge material form ditch maintenance.

DATA FORM

Is this Sampling Point within a Wetland?			YES
Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA
Do Normal Circumstances Exist?	Yes No	Community ID:	PEM
Is the Site Significantly Disturbed? (Atypical situation)	Yes No	Transect ID:	C
Is the area Potentially a Problem Area?	Yes No	Plot Id:	C-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	PHAR	Herb	FACW	6		#N/A	#N/A
2	CAVU	Herb	OBL	7		#N/A	#N/A
3	SCCY	Herb	OBL	8		#N/A	#N/A
4	CAHI	Herb	FACW	9		#N/A	#N/A
5	JUAC	Herb	OBL	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC **100%**

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
X	Water Marks
X	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Field Observations

Depth of Surface Water (in.)	4
Depth to Free Water (in.)	0
Depth to Saturated Soil (in.)	0

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from County Fairgrounds.

SOILS

Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-6"	A	10YR 4/1			Clay loam, MN at 4", firm

Hydric Soil Indicators:

	Histsol	X	Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silty clay-loam based Udorhents.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland?			YES
Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003

Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley, PWS #000418	State:	PA
Do Normal Circumstances Exist?	Yes No	Community ID:	PFO
Is the Site Significantly Disturbed? (Atypical situation)	Yes No	Transect ID:	D
Is the area Potentially a Problem Area?	Yes No	Plot Id:	D-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

Dominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	ACSN	Tree	FACW	6	ACNE	Tree	FACW
2	PLOC	Tree	FACW	7		#N/A	#N/A
3	FRPE	Tree	FACW	8		#N/A	#N/A
4	COAM	Shrub	FACW	9		#N/A	#N/A
5	SPAL	Shrub	FACW+	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC **100%**

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	>6
Depth to Free Water (in.)	0
Depth to Saturated Soil (in.)	0

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
	Water Marks
X	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from County Fairgrounds.

SOILS

Hydric Soils Present? **YES**

Map Unit Name (Series and Phase)	SOIL SURVEY NOT AVAILABLE	Drainage Class	
		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-6	A	10YR 5/1			silt loam
6-12	B	10YR 6/1	5R 5/8	Many	Clay

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
X	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley, PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PEM/PFO
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	E
Is the area Potentially a Problem Area?	Yes	No	Plot Id:	E-1

VEGETATION — Hydrophytic Vegetation Present? **YES**

Dominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	CAVU	Herb	OBL	6	CALU	Herb	OBL
2	SCCY	Herb	OBL	7	SPAL	Shrub	FACW+
3	TYLA	Herb	OBL	8	COAM	Shrub	FACW
4	PHAR	Herb	FACW	9		#N/A	#N/A
5	CAHI	Herb	FACW	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC 100%

Remarks Site is highly modified. Primary herbaceous succession on fill material.
40 years, base on dominant cover type and tree age.

HYDROLOGY — Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments and roads. Man-made features trap runoff from County Fairgrounds.

SOILS — Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-6	A	10YR 3/3/	5YR 4/6	Many	SL, FE&MN conc.s, firm
6-16	B/C	10YR 4/6	N7/0	Many	SCL, MN conc.s on ped facies

Hydric Soil Indicators:

	Histsol	X	Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PFO
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	F

Is the area Potentially a Problem Area?	Yes	No	Plot Id:	F-1	

VEGETATION — Hydrophytic Vegetation Present? **YES**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	ACSN	Tree	FACW	6		#N/A	#N/A
2	FRPE	Tree	FACW	7		#N/A	#N/A
3	ACNE	Tree	FACW	8		#N/A	#N/A
4	COAM	Shrub	FACW	9		#N/A	#N/A
5	SPAL	Shrub	FACW+	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC 100%

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY — Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
X	Water Marks
X	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from County Fairgrounds.

SOILS — Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-6	A	10YR 5/1			silt loam
6-12	B	10YR 6/1	5R 5/8	Many	clay loam

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA
Do Normal Circumstances Exist? Yes No		Community ID:	PEM
Is the Site Significantly Disturbed? (Atypical situation) Yes No		Transect ID:	G
Is the area Potentially a Problem Area? Yes No		Plot Id:	G-1

VEGETATION — Hydrophytic Vegetation Present? **YES**

Dominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	CAHI	Herb	FACW	6	EUPE	Herb	FACW+
2	SCCY	Herb	OBL	7	PHAR	Herb	FACW
3	SCAT	Herb	FACW	8	LUPA	Herb	OBL
4	EUMA	Herb	FACU-	9	TYLA	Herb	OBL
5	SOCA	Herb	FACU	10	JUEF	Herb	FACW+

Percent of Dominant Species that are OBL, FACW, or FAC: **80%**

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY — Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Wetland Hydrology Indicators

Primary Indicators

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from County Fairgrounds.

SOILS — Hydric Soils Present? **YES**

Map Unit Name (Series and Phase)	SOIL SURVEY NOT AVAILABLE	Drainage Class	
		Field Characteristics	Sandy loam
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-12	A	10YR 4/1			Fine sandy loam

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents. Recently deposited dredge material.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PEM
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	H
Is the area Potentially a Problem Area?	Yes	No	Plot Id:	H-1

VEGETATION — Hydrophytic Vegetation Present? **YES**

Dominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	TYLA	Herb	OBL	6		#N/A	#N/A
2	CAHI	Herb	FACW	7		#N/A	#N/A
3		#N/A	#N/A	8		#N/A	#N/A
4		#N/A	#N/A	9		#N/A	#N/A
5		#N/A	#N/A	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC 100%

Remarks Cattail/sedge emregents reestablishing in recently dredged ditch.

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur in constructed, shallow ditch.

SOILS

Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-12	10YR 6/1				

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Highly reduced substrate due to long-term inundation.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA
Do Normal Circumstances Exist?	Yes No	Community ID:	PFO
Is the Site Significantly Disturbed? (Atypical situation)	Yes No	Transect ID:	I
Is the area Potentially a Problem Area?	Yes No	Plot Id:	I-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

Dominant Plant Species		Stratum	Indicator	Dominant Plant Species		Stratum	Indicator
1	ACRU	Tree	FAC	6		#N/A	#N/A

2	ACSN	Tree	FACW	7		#N/A	#N/A
3	SANI	Tree	OBL	8		#N/A	#N/A
4	COAM	Shrub	FACW	9		#N/A	#N/A
5		#N/A	#N/A	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC 100%

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
X	Water Marks
X	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Field Observations

Depth of Surface Water (in.)	>6
Depth to Free Water (in.)	0
Depth to Saturated Soil (in.)	0

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Man-made features trap runoff from developed sites from south..

SOILS

Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Not accessible for soil inspection. Inunudation apparent. Vegatation similar to other nearby wetlands.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PEM/SS/FO
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	J
Is the area Potentially a Problem Area?	Yes	No	Plot Id:	J-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	ACSN	Tree	FACW	6	SCAT	Herb	FACW
2	ACNE	Tree	FACW	7	CAVU	Herb	OBL
3	FRPE	Tree	FACW	8	CALU	Herb	OBL

4	COAM	Shrub	FACW	9	LEOR	Herb	OBL
5	SCCY	Herb	OBL	10	SPAL	Shrub	FACW+

Percent of Dominant Species that are OBL, FACW, of FAC **100%**

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY

Wetland Hydrology Present? **YES**

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
X	Water Marks
X	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments.

SOILS

Hydric Soils Present? **YES**

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-4	A	10YR 6/2	5YR 5/8	Many	Silty clay loam
4-12	B/C	5Y 6/1			Clay loam

Hydric Soil Indicators:

	Histsol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
X	Sulfidic Odor		Listed on Local Hydric Soils List
	Aquic Moisture Regime		Listed on National Hydric Soils List
X	Gleyed or Low-chroma Colors		Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.

DATA FORM
ROUTINE WETLAND DETERMINATION

Is this Sampling Point within a Wetland? **YES**

Project/Site	Bloomsburg Local Flood Protection Project	Date:	6/2/2003
Applicant/Owner	US Army Corps of Engineers -BAL	County:	Columbia
Investigator	Robert L. Wiley , PWS #000418	State:	PA

Do Normal Circumstances Exist?	Yes	No	Community ID:	PFO
Is the Site Significantly Disturbed? (Atypical situation)	Yes	No	Transect ID:	K
Is the area Potentially a Problem Area?	Yes	No	Plot Id:	K-1

VEGETATION

Hydrophytic Vegetation Present? **YES**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	FRPE	Tree	FACW	6		#N/A	#N/A
2	ACSN	Tree	FACW	7		#N/A	#N/A
3	ACNE	Tree	FACW	8		#N/A	#N/A
4	COAM	Shrub	FACW	9		#N/A	#N/A
5	SCCY	Herb	OBL	10		#N/A	#N/A

Percent of Dominant Species that are OBL, FACW, of FAC

Remarks Site is highly modified. Sucessional stage ranges from very recently disturbed to more than 40 years, base on dominant cover type and tree age.

HYDROLOGY

Wetland Hydrology Present? YES

Recorded Data (Describe in Remarks)

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Wetland Hydrology Indicators

Primary Indicators

X	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
X	Sediment Deposits
X	Drainage Patterns in Wetlands

Field Observations

Depth of Surface Water (in.)	
Depth to Free Water (in.)	
Depth to Saturated Soil (in.)	

Secondary Indicators

X	Oxidized Root Channels in Upper 12 inches
X	Water Saturated Leaves
	Local Soil Survey
X	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks Wetlands occur on old landfill with densely compacted cap and or behind berms created by RR embankments. Impounded pool between RR grades caused by blocked culvert.

SOILS

Hydric Soils Present? YES

Map Unit Name	SOIL SURVEY NOT AVAILABLE	Drainage Class	
(Series and Phase)		Field Characteristics	SILT-LOAM
Taxonomy (Subgroup)		Confirm Map Type?	na

Profile Description

Depth (in.)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions, Structure, etc.
0-12	5Y 5/1				Mixed Udorhents

Hydric Soil Indicators:

	Histsol
	Histic Epipedon
	Sulfidic Odor
	Aquic Moisture Regime
X	Gleyed or Low-chroma Colors

	Concretions
	High Organic Content in Surface Layer in Sandy Soils
	Listed on Local Hydric Soils List
	Listed on National Hydric Soils List
	Other (Explain in Remarks

Remarks Substrate is silt-loam based Udorhents.

Bloomsburg Wetland Functional assessments

This analysis of wetland function is based on the Hydrogeomorphic Method (HGM) (Smith, et al, 1992). Although no HGM guidebook for this area exists, a review of the HGM guidebook on the Corps ERDC website led to several potential guidebooks which apply to riverine wetland systems in the U.S. There are two guidebooks for low gradient, riverine floodplain wetlands in the Kentucky/ Tennesee valley area and one from the Rocky Mountains area. After a detailed review of the HGM setting which these three guidebooks were developed for, the District wetland scientist arrived at a conclusion that the Rocky Mountain HGM guidebook may be applicable to the setting the Bloomsburg project is in. The similarity of documented wetland functions is driven primarily by the similarity in hydrologic regime (flashy flows) and geologic history and setting (glaciated valleys and significant bedloads). Further consultation with Buddy Clarain at ERDC and Mike Gilbert (principal authors for the guidebook) confirmed that it is reasonable to transport the guidebook's process to the central PA area.

The wetlands of the study area for this project are freshwater wetlands of varying cover types that are typical of central Pennsylvania. Giving the setting in the watershed, the wetlands in the study area are low gradient floodplain wetlands connected to higher order tributaries (1^{st} and 2^{nd}) and have a suite of functions including: Flood water attenuation, sediment trapping, nutrient trapping and transformation, habitat and water quality. Due to the historic land development patterns and uses in the study area (Town established in the mid 1880's) the wetlands in the study area have varying levels of functional capacity.

In June of 2003, a wetland delineation was conducted for the project alignments. Another wetland system was added to this delineation in July of 2005. All of these wetlands occur in either the Susquehanna River floodplain or the Fishing Creek floodplain and are hydrologically connected by flood events and by dry weather surface runoff to those tributaries.

The natural condition of all of the wetlands in the study area is a forested cover type with a flood water driven geomorphology. The natural hydrologic regime for these wetland systems has a flood water (surface water) component and a groundwater (seep and upwelling) component. The underlying geological conditions in this study area are a mixture of bedrock (both deep and near surface) and gravelly channel materials mixed with silty loams and clays. So for the Wetland Assessment Area (WAA) a reference or highly functional condition would be a forested wetland system in the floodplain that is saturated in the spring, dry in the summer and covered with several feet of floodwaters during high water events. This results in a heterogeneous surface condition with multiple trunked trees, scour channels, backwater areas and pools of standing water enduring for several weeks after a high water event. This reference condition along major watercourses would perform all of the functions above at a high capacity. For the purposes of this analysis, the functional capacity index (FCI) is set at 1.0 for this historical condition.

From the time of settlement in this area in the late 1700's, the clearing of land for agricultural and other activities has reduced the functional capacity of many of the wetlands around the study area. For the wetlands along the Fishing Creek floodplain, the impact was not as bad as the wetlands along the Susquehanna River floodplain.

The wetlands (primarily still forested) along the Fishing Creek floodplain remain unfragmented for the most part. These wetland systems have experienced some small impacts due to infrastructure projects (water treatment plant, electric substation, small roads and a couple of low head dams), public works projects (small bridge crossings and an old Works Progress Administration (WPA) levee system) but have much of their original functional capacity left for all of the aforementioned functions.

The wetlands in the Susquehanna River floodplain that occur in the study area are remnants of a once larger wetland system that has been fragmented by various alterations since the 1700's. The clearing of the floodplain for timber and for agriculture were the first impacts. The railroad that serves this area bisected the larger wetland system in the late 1800's. In the 1900's, industrial activities at the companies in the area had impacts to this larger wetland. The current condition of the wetlands in this floodplain is mixed. Some are larger in size and perform at a higher functional capacity and some are small or have been altered from their presumed original forested condition and their original presumed hydrological condition and as such have a much lower functional capacity for many of the cited functions. The following discussion assigns a FCI for the current condition of each function in both the Fishing Creek wetland systems and the Susquehanna River wetland systems in the study area.

For the purposes of assigning the functional capacity indices for these wetlands, a system based loosely of the HGM process was used. Through the work of Smith, et al (1993) and more recent guidebooks and personal communication (Omaha District POC) and field work by District wetland scientists, a scoring system ranging from 0-1.0 was used to assign functional capacity indices to the suite of functions documented to be performed by these wetlands in the study area. A zero indicates that there has been a full loss of functional capacity across the array of functions (not usually possible as long as the wetland exists) while a 1.0 indicates a pristine condition or at least a maximum capacity references condition in the watershed or HGM setting (not usually possible in any area with cumulative human disturbances).

Fishing Creek wetland system FCI assignment

This wetland system is dominated by forested cover, is connected to the Fishing Creek channel, actively floods, filters and binds sediments and nutrients and provides habitat and a wildlife corridor up and down the lower segment of Fishing Creek.

Flood water attenuation	1.0/0.8
Sediment trapping/cycling	1.0/0.8
Nutrient trapping/cycling	1.0/0.8
Wildlife habitat	1.0/0.8
Water quality	1.0/0.8

Overall FCI 0.8

Susquehanna River wetland system FCI assignment

This wetland system actually now is composed of 12 wetlands in a group that used to be a more intact, larger wetland in pre-settlement times (1700's). Some of the wetlands are forested cover, some are scrub/shrub and some are emergent wetlands. There is also a small ditch/stream through the area which drains surface and groundwater to the creek and then to the Susquehanna River. Due to all of the historic alterations, this wetland system's FCI is much lower relative to its reference condition and relative to other, more intact floodplain wetlands in the area.

Flood water attenuation	1.0/0.5.
Sediment trapping/cycling	1.0/0.3
Nutrient trapping/cycling	1.0/0.3
Wildlife habitat	1.0/0.3
Water quality	1.0/0.4

Composite FCI SUM FCIs(1-5)/5=0.36

Resulting Compensatory mitigation needs.

The resulting composite FCI for the Fishing Creek wetlands indicated that these are highly functioning and warrant further analysis to avoid and minimize the impacts currently planned for those areas. Replacing the functions found in a 0.8 FCI forested wetland also has the added temporal loss associated with gaining those forested characteristics back. Giving the mature and multi-trunked nature of the forest stand in this area (read Basal area) and given the heterogeneity of the physical condition of the floodplain (forest floor), this could take a decade or more to regain even a portion of the functional capacity currently present in that segment of Fishing Creek. The result of factoring in this temporal loss of functional capacity drives the acres of wetlands mitigation higher than a simple replacement of acres impacted. This type of wetlands system has a high risk of successful replacement or rehabilitation of the functions and therefore requires the planning of several acres of forested wetland mitigation project to manage against that risk.

The resulting composite FCI for the wetlands in the Susquehanna River floodplain shows the functional capacity reduction over time via human impacts. Fragmentation into smaller parts, hydrological alterations, cover type alterations, monotypic vegetative communities, excavation and dumping of solid waste and fill material have all adversely impacted the functional capacity of this wetland system. Relative to reference wetlands in this study areas and when compared (qualitatively) with other wetlands in the reference domain of the Susquehanna River floodplain in undeveloped and less developed areas, these wetlands are low value. Although there are remnants of forested wetlands and some wetlands that are several acres in size, the overall FCI for this system has been assigned as a 0.36. This wetland system has a low risk for the replacement or rehabilitation of functional capacity due to the cover type and the lack of temporal offset in achieving those functions.

Compensatory Wetland Mitigation Requirements

The current planned impact to 2.4 acres of forested wetlands along Fishing Creek will be minimized greatly during the design phase and may be eliminated in total. The alignment cannot be moved from its current location in the wetland floodplain since the team has no topographic information in this area and therefore cannot know where to move the alignment. The team will focus on avoiding this impact during the design phase. If impacts are not able to be avoided and compensatory mitigation is warranted, the composite FCI of 0.8 will be used and the replacement of that FCI will likely warrant several acres of mitigation site for each acre that is directly impacted. The team assumes that this impact can be minimized to less than one acres by moving the alignment back to high ground.

For the wetland impacted in the Susquehanna River floodplain, the impact as currently designed is to 0.7 acres of wetland with a 0.36 composite FCI. Since an emergent wetland is being impacted, the temporal loss of FCIs is not a major issue when planning the mitigation requirements. Given the charge to government agencies in the E.O. 11990 asserting a no net loss policy for wetlands, the net loss in this case would be to low value wetlands and the impact assessment and the resulting compensatory mitigation warrant no more than necessary to replace those lost functions. The team could also chose to replace those FCIs with higher functioning FCIs such as forested wetlands, though these would take longer to accrue the target FCIs than would an emergent wetland project. Therefore the team has planned one project with similar FCIs with an immediate return on the investment and a plan with higher target FCIs with a temporal loss of accrual of target FCIs. To aid the decision makers, an incremental cost/cost effectiveness analysis has been prepared for several plans.

All plans will include buffer of 50 feet around site. All PFO plans include shrubs as part of the planting scheme. Also, the assumption is that for all small to medium tress that would be planted, the impact zones and the area around the mitigation site would be used to harvest woody stems, organic material and woody debris. The design goal is to have a self sustaining wetland project with minor O&M, mainly post flood inspections for damages, debris, etc. The standard five year monitoring period will be incorporated into the O&M plan and can either be conducted by the sponsor or the Corps.

Plan A 0.7 acres of emergent wetland, planted to recoup functions within 3-5 years

Plan B 0.7 acres of emergent wetland, not planted, recoups functions over 5-10 years.

Plan C 1.5 acres of PFO wetland, planted (with seedlings) to recoup functions over 10-25 years.

Plan D 1.5 acres of PFO wetland, allowed to naturally succeed, recoup functions over 25-50 years.

Incremental cost effectiveness for wetland mitigation

The results of the functional assessments of the wetland systems impacted by the levee construction indicate that for the 0.7 acres of emergent wetlands with low functional capacity, 0.7 acres of wetlands should be restored in the Susquehanna River floodplain, as currently planned.

For the forested wetlands in Fernville that will be impacted, the functional capacity is much higher due to the forested and more unfragmented condition. The literature and best professional judgment would indicate that to achieve a no net loss of functional capacity, more than one acre of wetland should be constructed or restored to offset the temporal loss of functions provided by the wetlands in the Fernville Fishing Creek floodplain.

The assumption for costs is that a trained heavy equipment operator can excavate approximately 5 acres of wetland acres in one day. The materials for an emergent wetland would be minor since the site would simply need to be seeded for soils stabilization and then the annual river flooding would provide volunteer seeding and within two years an emergent wetland system should be present and functioning at least as well as the 0.7 acres impacted by the project.

For the forested system, the same time for excavation would apply but more cost for materials would be needed. In order to jump start the site, mulch, trees, shrubs and other organic material would need to be imported into the excavated area. These can be salvaged from the larger construction site or can be bought and planted. Another option would be to set the stage for a natural succession to a forested cover condition and to not plant the site, thereby saving some plant material costs. To offset the temporal loss of wetland functions, a preliminary impact of 0.7 acre of emergent wetlands yields 0.7 acres of emergent wetland construction. The planned impact of 2.4 acres of forested wetlands will be minimized during PED to straddle the floodplain terrace in Fernville. This design change will minimize the forested wetland impact to approximately one acre or less. Using the future minimized condition, the CE/ICA yields a 1.5 acre forested mitigation site to compensate for the loss of wetland functions.

Incremental cost & cost effectiveness analysis for fisheries mitigation

The concept behind the fish habitat mitigation at Boone's Dam is to provide fish passage up and down the creek past the location of the dam. Stocked shad are returning to this stretch of the Susquehanna River (USFWS, Pers. Comm, 2004) and should be gaining in population numbers and would utilize the lower end of Fishing Creek as habitat. Since the dam is an old timber and rock crib dam and is a low hazard dam, it would be relatively inexpensive to construct a project to accomplish the stated goal.

The options available at this dam are No Action, notching the dam and keeping a majority of the structure, removing the entire cross section of the dam, building a bypass channel or building a fish ladder. These are separated by orders of magnitude as far as costs. However, they all have the same stated purpose and would all have similar habitat outputs (PFBC, Pers.comm, 2004, 2005).

The highest cost project on the order of $200,000 or more would be the fish ladder or bypass channel. A ladder would be a more detailed design and would have annual O&M to keep the ladder clean of debris and gravel and functioning. A bypass channel, fishway or rock ramp would have less annual O&M. So, given the choice, a bypass channel, fishway or rock ramp would be the most cost effective choice given similar habitat outputs. The idea of notching the dam may sound less expensive on the face of it but when the condition of the dam is taken into account, a notching project may involve the stabilization or bracing of the remaining piece of the dam after the notch is cut.

Also, the sizing of the notch and the height of the jump may prove difficult for native fish that would return to this area so the outputs may be harder to achieve. Given this, a full removal of the majority of the cross section of the dam would be a more cost effective project. Similar scale dams have been fully removed by others in the Commonwealth for $25-$50,000. Stabilization of the remainder of a post notch dam may be double that amount. Also, leaving a remainder of the dam would have unintended velocity and current pattern during a high water event that may cause the project to fail.

The choice for this mitigation feature then comes down to either a bypass channel, fishway or rock ramp (one order of magnitude for project costs) or full removal of the dam ($50,000). Given the similar habitat outputs, the District is recommending a full removal if this project is pursued as fish habitat mitigation.

Wetland Mitigation Options Cost Estimate

Plan ID	Herbaceous Wetland Plan Name	Plan Tasks	Cost / Task
Plan A	0.7 Acres of emergent wetland, planted with Seedmix #1		
		Earthwork (Time & Materials)	$10,000
		Plant Materials	$700
		Planting Labor ($1,000/day x 5 days)	$5,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$23,200**
Plan B	0.7 Acres of emergent wetland, planted with Seedmix #2		
		Earthwork (Time & Materials)	$10,000
		Plant Materials	$134
		Planting Labor ($1,000/day x 5 days)	$5,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$22,634**
Plan C	0.7 Acres of emergent wetland, recruited herbacous plants	Earthwork (Time & Materials)	$10,000
		Plant Materials	$0
		Planting Labor	$0
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$17,500**

Plan ID	Forested Wetland Plan Name	Plan Tasks	Cost / Task
Plan I	1.5 acre of forested wetland, planted with seedlings	Earthwork (Time and Materials)	$25,000
		Plant Materials	$2,321
		Planting Labor ($2,000/day X 10 days)	$20,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$54,821**
Plan II	1.5 acre of forested wetland, planted with container saplings	Earthwork (Time and Materials)	$25,000
		Plant Materials	$3,400
		Planting Labor ($2,000/day X 10 days)	$20,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$55,900**
Plan III	1.5 acres of forested wetland, recruited woody plants	Earthwork (Time & Materials)	$25,000
		Plant Materials	$0
		Planting Labor	$0
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$32,500**

Planting Plan A

Seasonally Flooded Area Annual & Perennial Wildlife Food Mix (ERNMX-128) - Ernst, 2002

Area (ft^2)
30,493 is 70% of 1 acre

Species	Bulk Seeding Rate (lbs/ac)	% Mix	lbs Needed	Unit Cost/lb	Total Cost
	10.50034				
Echinochloa crusgalli		0.2	2.100069	$0.70	$1.47
Poa palustris		0.2	2.100069	$8.00	$16.80
Polygonum lapathifolium		0.2	2.100069	$8.00	$16.80
Elymus virginicus		0.2	2.100069	$8.00	$16.80
Bidens aristosa		0.1	1.050034	$32.00	$33.60
Panicum virgatum		0.05	0.525017	$3.50	$1.84
Carex lupulina		0.025	0.262509	$96.00	$25.20
Carex crinita		0.025	0.262509	$80.00	$21.00
		1	10.50034		
Plan A Total Cost					**$133.51**

Planting Plan B

FACW Wetland Meadow Mix (ERNMX-122)

Area (ft^2)
30,493 is 70% of 1 acre

Species	Bulk Seeding Rate (lbs/ac)	% Mix	lbs Needed	Unit Cost/lb	Total Cost
	10.50034				
Elymus virginicus		0.2	2.100069	$8.00	$16.80
Carex vulpinoidea		0.19	1.995065	$16.00	$31.92
Scirpus atrovirens		0.05	0.525017	$64.00	$33.60
Heliopsis helianthoides		0.05	0.525017	$80.00	$42.00

Planting Plan I

Seedilings (flat of 25 per) - Octoraro, 2004

Species Name
Fraxus pennsylvanicus
Acer saccharinum
Platanus occidentalis
Betula populifolia
Cornus amomum
Viburnum trilobum
Cephalanthus occidentalis
Plan I Total Cost

Planting Plan II

18-24 inch #2container (trees) -
Octoraro, 2004
12-18 inch #1 container (shrubs

Species Name
Fraxus pennsylvanicus
Acer saccharinum
Platanus occidentalis
Betula populifolia

Verbena hastata	0.05	0.525017	$68.00	$35.70
Eupatorium perfoliatum	0.05	0.525017	$128.00	$67.20
Solidago graminifolia	0.05	0.525017	$84.00	$44.10
Juncus effusus	0.05	0.525017	$12.00	$6.30
Carex lupulina	0.03	0.31501	$96.00	$30.24
Eupatorium maculatum	0.03	0.31501	$144.00	$45.36
Scirpus polypjilus	0.03	0.31501	$80.00	$25.20
Carex comosa	0.02	0.210007	$80.00	$16.80
Scirpus cyperinus	0.02	0.210007	$80.00	$16.80
Carex lurida	0.02	0.210007	$96.00	$20.16
Bromus altissima	0.02	0.210007	$144.00	$30.24
Glyceria grandis	0.02	0.210007	$80.00	$16.80
Eupatorium fistulosum	0.015	0.157505	$144.00	$22.68
Veronia noveboracensis	0.01	0.105003	$120.00	$12.60
Aster umbellatus	0.01	0.105003	$96.00	$10.08
Geum laciniatum	0.01	0.105003	$144.00	$15.12
Penthorum sedoides	0.01	0.105003	$96.00	$10.08
Zizia aurea	0.01	0.105003	$120.00	$12.60
Ludwigia alternifolia	0.01	0.105003	$272.00	$28.56
Helenium autumnale	0.01	0.105003	$160.00	$16.80
Carex scoparia	0.01	0.105003	$160.00	$16.80
Cinna arundinacea	0.01	0.105003	$180.00	$18.90
Mimulus ringens	0.01	0.105003	$136.00	$14.28
Geum aleppicum	0.005	0.052502	$144.00	$7.56
	1	10.50034		
Plan B Total Cost				**$665.30**

Acer negundo
Silix nigra
Cornus amomum
Viburnum trilobum
Cephalanthus occidentalis
Plan II Total Cost

Area (ft^2)
65340

Common Name	Unit Cost	Unit Area to plant	Spacing (feet on center)	Spacing Squared	Quantity	Total Cost
Green Ash	$3.20	9334	12	144	65	$207.43
Silver Maple	$3.20	9334	12	144	65	$207.43
Sycamore	$3.20	9334	12	144	65	$207.43
Gray Birch	$3.20	9334	10	100	93	$298.70
Silky Dogwood	$3.20	9334	8	64	146	$466.71
Cranberrybush	$3.20	9334	8	64	146	$466.71
Buttonbush	$3.20	9334	8	64	146	$466.71
						$2,321.13

s) - Octoraro, 2004

Area (ft^2)
65340

Common Name	Unit Cost	Unit Area to plant	Spacing (feet on center)	Spacing Squared	Quantity	Total Cost
Green Ash	$6.00	7260	12	144	50	$302.50
Silver Maple	$6.00	7260	12	144	50	$302.50
Sycamore	$6.00	7260	12	144	50	$302.50
Gray Birch	$6.00	7260	10	100	73	$435.60

Box Elder	$6.00	7260	12	144	50	$302.50
Black Willow	$6.00	7260	12	144	50	$302.50
Silky Dogwood	$4.25	7260	8	64	113	$482.11
Cranberrybush	$4.25	7260	8	64	113	$482.11
Buttonbush	$4.25	7260	8	64	113	$482.11
						$3,394.43

Plan ID	Herbaceous Wetland Plan Name	Plan Tasks	Cost / Task
Plan A	0.7 Acres of emergent wetland, planted with Seedmix #1		
		Earthwork (Time & Materials)	$10,000
		Plant Materials	$700
		Planting Labor ($1,000/day x 5 days)	$5,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$23,200**
Plan B	0.7 Acres of emergent wetland, planted with Seedmix #2		
		Earthwork (Time & Materials)	$10,000
		Plant Materials	$134
		Planting Labor ($1,000/day x 5 days)	$5,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$22,634**
Plan C	0.7 Acres of emergent wetland, recruited herbacous plants	Earthwork (Time & Materials)	$10,000
		Plant Materials	$0
		Planting Labor	$0
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$17,500**

Plan ID	Forested Wetland Plan Name	Plan Tasks	Cost / Task
Plan I	1.5 acre of forested wetland, planted with seedlings	Earthwork (Time and Materials)	$25,000
		Plant Materials	$2,321
		Planting Labor ($2,000/day X 10 days)	$20,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$54,821**

Plan II	1.5 acre of forested wetland, planted with container saplings	Earthwork (Time and Materials)	$25,000
		Plant Materials	$3,400
		Planting Labor ($2,000/day X 10 days)	$20,000
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$55,900**
Plan III	1.5 acres of forested wetland, recruited woody plants	Earthwork (Time & Materials)	$25,000
		Plant Materials	$0
		Planting Labor	$0
		Monitoring (Time & Materials)	$7,500
	Total Plan Cost		**$32,500**

	Herbaceous Wetland Mitigation Base Alternatives	
Plan ID	Name	Cost
No Action Plan		$0
Plan A	0.7 Acres of emergent wetland, planted with Seedmix #1	$23,200
Plan B	0.7 Acres of emergent wetland, planted with Seedmix #2	$22,634
Plan C	0.7 Acres of emergent wetland, recruited herbacous plants	$17,500

	Forested Wetland Mitigation Base Alternatives	
Plan ID	Name	Cost
No Action Plan		$0
Plan I	1.5 acre of forested wetland, planted with seedlings	$54,821
Plan II	1.5 acre of forested wetland, planted with container saplings	$55,900
Plan III	1.5 acres of forested wetland, recruited woody plants	$32,500

Herbaceous Wetland Mitigation Alternatives Cost Effective and Incremental Cost Analysis

Alternative	Plan ID	Name	[1]Environmental Output (Functional Capacity Units) at 50 Years	Cost (Actual $)	Incremental Cost	Incremental Output	Incremental Cost per Unit: $/FCU
1	No Action Plan		0	$0	$0	0	$0
4	Plan C	0.7 Acres of emergent wetland, recruited herbacous plants	0.36	$17,500	$17,500	0.36	$48,611
3	Plan B	0.7 Acres of emergent wetland, planted with Seedmix #2	0.36	$22,634	$5,134	0	N/A
2	Plan A	0.7 Acres of emergent wetland, planted with Seedmix #1	0.36	$23,200	$18,066	0	N/A

= Best Buy

[1]Compensatory Mitigation must have at least the same FCU as the existing impacted wetland.

The vast majority of outputs are realized the first year after completion. Full functionality is expcted within 3 to 5 years

Forested Wetland Mitigation Alternatives Cost Effective and Incremental Cost Analysis

Alternative	[2]Plan ID	Name	[1]Environmental Output (Functional Capacity Units) at 50 Years	Cost (Actual $)	Incremental Cost	Incremental Output	Incremental Cost per Unit: $/FCU
1	No Action Plan		0	$0	$0	0	$0
2	Plan III	1.5 acres of forested wetland, recruited woody plants	0.32	$32,500	$32,500	0.32	$101,563
3	Plan I	1.5 acre of forested wetland, planted with seedlings	0.64	$54,821	$22,321	0.32	$69,753
4	Plan II	1.5 acre of forested wetland, planted with container saplings	0.8	$55,900	$1,079	0.16	$6,744

= Best Buy

[1]Compensatory Mitigation must have at least the same FCU as the existing impacted wetland. See mitigation minimization discussion on PED changes

[2]Refer to the Plan Timeline below for phased outputs per alternative. All forested wetland mitigation plans eventually reach 0.8 FCU's.

Forested Wetland Mitigation Functional Capacity Unit Alternate Time Frames

[2]Forested Wetland Plan I Timeline

Year	Output	
_0-5	0.08	10% of each function can be achieved at this stage
_5-15	0.24	30% of each function can be achieved at this stage
_15-25	0.32	40% of all functions except wildlife habitat (100%) can be achieved at this stage
25-50	0.64	80% of all functions except wildlife habitat (100%) can be achieved at this stage
50-100	0.8	100% of all functions except wildlife habitat (100%) can be achieved at this stage
100+	declines due to forest stand mortality	

[2]Forested Wetland Plan II Timeline

Year	Output	
_0-5	0.16	20% of each function can be achieved at this stage
_5-15	0.32	40% of each function can be achieved at this stage
_15-25	0.48	60% of all functions except wildlife habitat (100%) can be achieved at this stage
25-50	0.8	100% of all functions except wildlife habitat (100%) can be achieved at this stage
50-100	0.8	100% of all functions except wildlife habitat (100%) can be achieved at this stage
100+	declines due to forest stand mortality	

[2]Forested Wetland Plan III Timeline

Year	Output	
_0-5	0.016	2% of each function can be achieved at this stage
_5-15	0.08	10% of each function can be achieved at this stage
_15-25	0.16	20% of all functions can be achieved at this stage

25-50	0.32	40% of all functions except wildlife habitat (100%) can be achieved at this stage
50-100	0.8	100% of all functions except wildlife habitat (100%) can be achieved at this stage
100+	declines due to forest stand mortality	

Air Quality Analysis
General Conformity Determination

Introduction

As required by the 1990 Federal Clean Air Act Amendments, the U.S. Environmental Protection Agency (EPA) enacted two separate Federal conformity rules. Those rules (incorporated as Section 40 CFR Parts 51 and 93) are designed to ensure that Federal actions do not cause or contribute to air quality violations in areas that do not meet the national ambient air quality standards. The two rules include transportation conformity, which applies to transportation plans, programs, and projects, and general conformity, which applies to all other non transportation-related projects.

The proposed project would be subject to the general conformity rule because the Corps is participating in the project. Section 40 CFR Part 51, Subpart W, and Part 93, Subpart B require a general conformity determination. The general conformity regulation requires that Federal agencies sponsoring non transportation-related activities show that the emissions associated with those activities conform to state implementation plans (SIPs) if emissions meet specific criteria. First, the emissions must occur in areas designated as nonattainment areas for one or more of the Federal ambient air quality standards. Second, those emissions must exceed certain de minimis threshold levels.

The EPA Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, called "criteria" pollutants. They include carbon monoxide, nitrogen dioxide, ozone, lead, particulates, and sulfur dioxide. For Columbia County, the only parameter not attaining the air quality standard is the ozone standard. Areas that are designated in nonattainment of the ozone standard are further classified, in order of increasing severity, as Incomplete Data, Marginal, Moderate, Serious, Severe, and Extreme; the designation for Columbia County is Marginal. Columbia County is further sub-classified as an ozone transport region.

Ozone is a gas that forms in the atmosphere when three atoms of oxygen are combined (0_3). It is not emitted directly into the air by an aspect of the project, but at ground level is created by a chemical reaction between oxides of nitrogen (NO_x), and volatile organic compounds (VOC) in the presence of sunlight.

Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC, also known as ozone precursors. Strong sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. Many urban areas tend to have high levels of ozone, but other areas are also subject to high ozone levels as winds carry NO_x emissions hundreds of miles away from their original sources. This is why Columbia County is considered an ozone transport region.

Conformity Evaluation

The Clean Air Act General Conformity Rule (58 FR 63214, November 30, 1993, Final Rule, Determining Conformity of General Federal Actions to State or Federal Implementation Plans) dictates that a conformity review be performed when a Federal action generates air pollutants in a region that has been designated a nonattainment or maintenance area for one or more NAAQS.

The general conformity rule was designed to ensure that Federal actions do not impede local efforts to control air pollution. It is called a conformity rule because Federal agencies are required to demonstrate that their actions "conform with" (i.e., do not undermine) the approved State Implementation Plan (SIP) for their geographic area. The purpose of conformity is to (1) ensure Federal activities do not interfere with the air quality budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQS. Federal agencies make this demonstration by performing a conformity review. The proposed actions at Bloomsburg would be subject to detailed conformity determinations unless these actions are clearly considered *de minimis* emissions. Use of the *de minimis* levels assures that the conformity rule covers only major Federal actions. EPA has set the de minimis threshold at 100 tons per year for NOx and 50 tons per year for VOCs for an ozone transport region such as Columbia County. If the *de minimis* emissions were exceeded by the proposed action, a conformity determination would be required.

Methodology

A conformity review requires consideration of both *direct* and *indirect* air emissions associated with the proposed action. Direct emissions are those that occur as a direct result of the action, and occur at the same time and place as the action. Sources that would contribute to direct emissions from this project would include demolition or construction activities associated with the proposed action and equipment used to facilitate the action (e.g., construction vehicles). Indirect emissions are those that occur at a later time or distance from the place where the action takes place, but may be reasonably anticipated because of the proposed action. To be counted as an indirect emission, the Federal proponent for the action must have continuing control over the source of the indirect emissions. Sources of indirect emissions for this project would include commuter activity to and from the construction site (e.g., employee vehicle emissions). Both stationary and mobile sources must be included when calculating the total of direct and indirect emissions, but this project involves only mobile sources.

To determine whether the total of direct and indirect emissions for NOx and VOCs would be below the conformity *de minimis* limits, air pollutant emissions generated by the proposed action were calculated. In order to ensure a conservative evaluation, the preferred alternative, with the most equipment operating over the longest duration was assessed in detail because any other alternative would result in fewer emissions. To develop the evaluation, a list of equipment that could be used to conduct the project was developed based on the engineering estimates for the project. To quantify the emissions, each piece of equipment to be used for the project was assumed to operate for the duration assigned in the MCACES Equipment Backup.

Given the hours of operation assumed, emissions were estimated from equipment-specific emission factors recommended by the EPA for fuel-burning equipment (USEPA, 1998 and USEPA, 2000) that could be used. Based on the equipment described for implementing the proposed actions and assumed hours of operation to construct the features, the evaluation was developed to determine whether the total emissions from direct and indirect sources for each pollutant would exceed the *de minimis* thresholds. They did not. The total of direct and indirect sources for NOx and VOCs for the preferred alternative resulted in a predicted release of 84.02 tons of NOx (81.99 tons direct emissions + 2.03 tons indirect emissions) and 4.90 tons of VOCs (2.90 tons direct emissions + 2.0 tons indirect emissions). These figures represent 28 percent of the annual limit for NOx and 3 percent of the annual limit for VOCs. Therefore, no conformity assessment is required. Because projected emissions are below threshold levels, the action is exempt from further conformity analysis.

Direct Emissions Calculation Summary

	Excavators	Front End Loader	Dozer	Backhoe	Dump Truck	Crane	Vibrating Roller	Vibrating Compactor	Static Roller	Asphalt Paver	Grader	Clamshell Bucket	Truck
Specification	CAT M315	CAT 973C	CAT D7R Series II	CAT 3116	End Dump	CAT 500D	CS 433E	CB 534C	PF 209B	Gomaco GP2000	CAT 615C Series II	CAT 3116	CAT 725
Engine/ Capacity	3054 TA	3306 TA	3176C		18 CY	Truck Boom	CAT 3054T	CAT 3054T	CAT 3054T	4-71T Detroit Diesel Engine	Cat 3306	CAT 3116TA	CAT 3176B
Horsepower	114	210	240	201	260	200	100	100	100	190	265	201	451
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
	Emission Factors (grams/hp-hr)*												
NOx	7.53	6.5	6.37	9.38	8.38	8.38	8.38	8.38	8.38	8.38	6.5	9.38	6.37
VOCs	0.66	1.1	0.09	0.07	0.68	0.68	0.68	0.68	0.68	0.68	1.1	0.07	0.09
	Horsepower x Emission Factor (g/hr)												
NOx	858.42	1365	1528.8	1885.38	2178.8	1676	838	838	838	1592.2	1722.5	1885.38	2872.87
VOCs	75.24	231	21.6	14.07	176.8	136	68	68	68	129.2	291.5	14.07	40.59
	Emission Amounts (tons/hour)**												
NOx	0.0009	0.0015	0.0017	0.0021	0.0024	0.0018	0.0009	0.0008	0.0009	0.0018	0.0019	0.00210	0.00320
VOCs	0.00008	0.00025	0.00002	0.00002	0.00019	0.00015	0.00007	0.00007	0.00007	0.00014	0.00032	0.00002	0.00004
	Hours of Machinery Operation – Preferred Alternative***												
	639	5142	1445	3128	1411	841	415	859	352	48	358	420	17884
	Total Release (tons/hr x hrs)												
NOx	0.60	7.74	2.44	6.5	3.393	1.55	0.38	0.79	0.33	0.08	0.68	0.897	56.63
VOCs	0.05	1.31	0.03	0.05	0.27	0.13	0.03	0.06	0.03	0.01	0.12	0.01	0.80

*Emission factors taken from EPA Report No. NR-009A, Exhaust Emission Factors for Nonroad Engine Modeling--Compression-Ignition, USEPA Office of Mobile Sources, Assessment and Modeling Division. Where specific equipment data were not included, Average Emission Test Results for 1988-1995 Model Engine Years (Appendix B) were used.

** Conversion factor of grams per ton: 907,185

*** Hours of operation derived from MCACES Equipment Backup dated November 1, 2003.

Direct Emissions Totals for 36-Month Project: NOx – 81.99 Tons; VOCs – 2.90 Tons

Indirect Emissions Calculation Summary

	Light Duty Gas-Powered Vehicle	Light Duty Gas-Powered Truck
	Emission Factors (grams/mile)*	
NOx	0.6005	0.861
VOCs	0.7766	0.6633
Vehicle Miles Driven	1,260,000	1,260,000
	Total Indirect Emissions (grams)	
NOx	756,630	1,084,860
VOCs	978,516	835,758
	Total Indirect Emissions (tons)**	
NOx	0.83	1.20
VOCs	1.08	0.92

Indirect Emissions Totals for 36-Month Project: NOx – 2.03 Tons; VOCs – 2.00 Tons

* Emission Factors Taken from EPA's AP-42 Compilation of Air Pollutant Emission Factors, Appendix H, Light-Duty Gasoline Vehicles (Table 1.1A.1) and Light-Duty Gasoline Trucks (Table 2.1A.1)

** Conversion factor of grams per ton: 907,185

Emissions per mile used for light duty gas-powered vehicle and light duty gas-powered truck are average of value for vehicles from 1990-1998 assuming 50,000-mile emission level.

Assumes 50 vehicles per day, 20 days per month, 40 mile round trip per day commute, for 36 month project. (50 x 20 x 40 x 36 = 2,520,000 miles).

Assume half of miles are with a light duty gas-powered vehicle and half are with a light duty gas-powered truck.

Direct and Indirect Emissions Summary for the Conformity Assessment

Pollutant	Direct Emissions (tons)	Indirect Emissions (tons)	Total Emissions (Tons)	Annual Emissions (Tons)*	Annual Limit	Percent of Limit
NOx	81.99	2.03	84.02	28	100 tons/yr	28%
VOCs	2.90	2.00	4.90	1.36	50 tons/yr	3%

*Annual Emissions calculated by dividing total emissions by three for the three-year project.

GENERAL CONFORMITY - RECORD OF NON-APPLICABILITY

Project Name: Bloomsburg Local Flood Damage Reduction Project, Bloomsburg, Pennsylvania

Project Point of Contact:
Bill Abadie, Environmental Team Leader
U.S. Army Corps of Engineers
P.O. Box 1715, Baltimore, MD 21203-1715
Phone: 410-962-4713

General Conformity under the Clean Air Act, Section 176 has been evaluated for the project described above according to the requirements of 40 CFR 93, Subpart B. The requirements of this rule are not applicable to this project/action because:

__________ The project/action is an exempt action under 40 CFR 93.153(c) or (d), (SPECIFY APPLICABLE EXEMPTION CATEGORY AND REGULATORY CITATION)

OR

___X___ Total direct and indirect emission from this project/action have been conservatively estimated at 28 tons per year for NOx and 1.36 tons per year for VOCs and are well below the conformity threshold value established at 40 CFR 93.153(b) of 100 tons per year for NOx and 50 tons per year for VOCs;

AND

The project/action is not considered regionally significant under 40 CFR 93.153(i).

Supporting documentation and emissions estimates appear in the Supplemental EIS for this project.

SIGNED ____________________
Bill Abadie, Environmental Team Leader

PROGRAMMATIC AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND THE PENNSYLVANIA STATE HISTORIC PRESERVATION OFFICE
FOR THE
BLOOMSBURG FLOOD DAMAGE REDUCTION PROJECT
BLOOMSBURG, HEMLOCK TOWNSHIP, COLUMBIA COUNTY, PENNSYLVANIA

WHEREAS, the U.S. Army Corps of Engineers, Baltimore District, (hereinafter "Corps"), in conjunction with the Town of Bloomsburg, Pennsylvania (hereinafter "Town of Bloomsburg") is proposing to provide flood damage reduction for the Towns of Bloomsburg and Fernville, Pennsylvania as shown on the map at Attachment A to this Programmatic Agreement (PA); and

WHEREAS, construction of the Bloomsburg Local Flood Protection project (hereinafter "Bloomsburg FDR project") was authorized by the U.S. House Committee on Transportation and Infrastructure Resolution dated September 14, 1995; and

WHEREAS, the proposed Bloomsburg FDR project is considered an "undertaking" as defined in Section 106 of the National Historic Preservation Act (16 U.S.C. §470f) and its implementing regulations, 36 CFR Part 800, and is therefore subject to that act; and

WHEREAS, the Town of Bloomsburg is the Non-Federal Sponsor for this project; and

WHEREAS, the Corps is consulting with the Pennsylvania State Historic Preservation Office, (hereinafter "PA SHPO") pursuant to 36 CFR Part 800; and

WHEREAS, the Corps and the PA SHPO have identified the Pennsylvania Department of Environmental Protection (hereinafter "PA DEP") and the Town of Bloomsburg as consulting parties in this undertaking as defined in 36 CFR Part 800.6(c)(3) and have invited them to be concurring parties to this PA; and

WHEREAS, the Corps, PA DEP, and the Town of Bloomsburg, in consultation with the PA SHPO, have conducted initial efforts to identify historic properties located within the area of potential effect for the Bloomsburg FDR project, including archaeological and architectural investigations, as documented in the reports listed in Attachment B to this PA; and

WHEREAS, additional investigations to identify, evaluate, and treat potential historic properties are required before implementation of the proposed Bloomsburg FDR project; and

WHEREAS, the Corps has initiated and will continue a process to seek and consider the views of the public on this undertaking, as evidenced by Public Meetings regarding the Bloomsburg FDR project held on February 24, 2000, April 2002, and June 16, 2005, and notification in the Federal Register on May 13, 2005; and

WHEREAS, implementation and fulfillment of the actions described in the Stipulations in this PA are wholly and entirely contingent upon the receipt of project funding;

NOW, THEREFORE, the Corps, the PA SHPO, PA DEP, and the Town of Bloomsburg agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

I. TREATMENT OF HISTORIC PROPERTIES. The Corps shall ensure that the following steps are taken to mitigate any potential adverse effect to any National Register of Historic Places listed or eligible properties identified in the project area:

A. IDENTIFICATION, EVALUATION, AND TREATMENT OF ARCHEOLOGICAL AND ARCHITECTURAL HISTORIC PROPERTIES

1) Identification: In consultation with the PA SHPO, the Corps shall complete and report survey efforts to identify any archeological or architectural resources that are potentially eligible for inclusion in the National Register of Historic Places and that may be impacted by development of the proposed project. The Corps shall provide a draft report on the results of the identification survey to the PA SHPO for review and comment. All identification work shall be accomplished in accordance with the performance standards outlined in Stipulation IV of this PA.

2. Evaluation: In consultation with the PA SHPO, the Corps shall evaluate the National Register eligibility of any identified archeological sites or architectural resources that might be impacted by the proposed project. The Corps shall provide a draft report on the results of the evaluation efforts to the PA SHPO for review and comment. All evaluation work shall be performed in accordance with the performance standards in Stipulation IV of this PA.

3. Treatment: If evaluation identifies properties eligible for inclusion in the National Register of Historic Places, the Corps shall develop a plan for their avoidance, protection, recovery, or destruction without recovery, and public education/interpretation, in consultation with the PA SHPO. The Corps shall submit the treatment plan to the PA SHPO for review and comment. Unless the PA SHPO objects within 30 days after receipt of the plan, the Corps shall ensure that it is implemented prior to and in coordination with project ground disturbing activities within or immediately adjacent to the site area(s).

Should data recovery investigations or other adverse effect mitigation be warranted, the Corps shall ensure that a treatment plan is developed in consultation with the PA SHPO, consistent with the performance standards outlined in Stipulation IV of this PA. The plan shall specify, at a minimum:

a. the property, properties, or portions of properties where data recovery or other documentation is to be carried out, and any property that will be destroyed without data recovery or documentation;

b. research questions to be addressed through data recovery or other documentation, with an explanation of their relevance and importance; the research methods to be used, with an explanation of their relevance to the research questions; and, the methods to be used in analysis, data management, and data dissemination, including a schedule;

c. proposed disposition of recovered materials and records;

d. proposed methods for involving the interested public in the data recovery or other documentation, and for disseminating the results of the work to the interested public; and, a proposed schedule for the submission of progress reports to the PA SHPO.

The Corps and the PA SHPO will meet on-site to evaluate the success of the fieldwork phase of any data recovery program or documentation, near the end of the fieldwork efforts. The Corps shall submit a management summary to the PA SHPO documenting the completion of fieldwork for 15 day review. Upon receipt of written concurrence from the PA SHPO, the Corps may proceed with construction activities in the site areas concurrently with completion of the remaining laboratory, analyses, and reporting phases of the data recovery or documentation work.

4) Protection: The Corps, PA SHPO, PA DEP, and the Town of Bloomsburg will make reasonable efforts to ensure that the information on protected archeological site locations is kept confidential and will only make that information available to responsible personnel for construction or management purposes.

II. CONTINGENCY PLAN FOR THE DISCOVERY OF ARCHAEOLOGICAL RESOURCES IN THE LOCAL FLOOD PROTECTION PROJECT AREA DURING CONSTRUCTION

In accordance with 36 CFR §800.13(a)(2), if previously undetected archaeological resources are discovered during construction of the FDR project, the Corps will cease, or cause to stop, any activity having an effect on the resource. The Corps will immediately notify the PA SHPO, PA DEP, and the Town of Bloomsburg of the discovery, and will consult with these parties to determine if any investigation of the resource is required. Any investigation of the resource will be performed in accordance with the Contingency Plan found in Attachment C of this PA.

III. PUBLIC INTERPRETATION

In addition to any technical reports, the Corps shall ensure that a non-technical report, exhibit, WebPage, brochure, interpretive display, video, or other interpretive/educational mechanism is prepared that incorporates and synthesizes any adverse effect mitigation conducted in association with the Bloomsburg FDR project. The report or other mechanism will be suitable for dissemination to the general interested public, with the goal of creating a better understanding of the historic architectural or archaeological resources of the project area. This report or other mechanism will include information obtained from previous archaeological research conducted by the Corps, PA DEP, and the Town of Bloomsburg. The non-technical report or other mechanism shall also include historic photographs of the property, as they are available and appropriate. The PA SHPO, PA DEP, and the Town of Bloomsburg shall be provided with an opportunity to review and comment on this non-technical report or other mechanism. The Corps shall take these comments into account in developing the final product. The report or other mechanism will be completed after the completion of the treatment and mitigation measures stipulated in this PA.

IV. PERFORMANCE STANDARDS

A. Professional Qualifications

All work performed under the provisions of this PA shall be conducted be persons meeting the relevant professional qualification standards in the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (36 CFR 61).

B. Standards and Guidelines

All work performed under the provisions of this PA shall be conducted in accordance with the following standards and guidelines, as relevant:

Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (36 CFR 61);

Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68);

Archeological Resources Protection Act (16 USC 470aa- 470*ll*);

Advisory Council on Historic Preservation's *Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites* (1999);

Pennsylvania Bureau for Historic Preservation's *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations.* (Pennsylvania Historical and Museum Commission 1991).

C. Standards for Cultural Resource Reports

The Corps will insure that a technical report describing the results of all of the archaeological investigations, resource recordation, research, data analyses, monitoring, and other work performed as a part of this PA will be prepared. The report shall include fieldwork results, maps and photographs. The report shall be written in accordance with the Pennsylvania Bureau for Historic Preservation's *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations* (Pennsylvania Historical and Museum Commission 1991). The PA SHPO shall be provided an opportunity, not to exceed 60 calendar days, to review and comment on a draft version of the report. If no responses are received within 60 calendar days of confirmed receipt, concurrence may be assumed.

D. Curation Standards

All artifacts, specimens, and samples recovered from private property as a result of this investigation belong to the property owner and will be documented, curated, and conserved, as necessary, according to the standards found in 36 CFR 79, *Curation of Federally-Owned and Administered Archaeological Collections.* The artifacts, specimens, and samples will be provided to the property owner upon completion of any analysis performed as part of this PA.

All artifacts, specimens, and samples recovered as a result of this investigation from property owned by the Town of Bloomsburg are the property of the Town of Bloomsburg and will be documented, curated, and conserved, as necessary, according to the Pennsylvania Bureau for Historic Preservation's *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations.* (Pennsylvania Historical and Museum Commission 1991) standards and will be curated in the Pennsylvania State Museum.

V. DISPUTE RESOLUTION.

A. Should any party to this PA object in writing to the Corps regarding any actions carried out or proposed with respect to the Corps' Section 106 responsibilities or implementation of this PA, the Corps shall consult with the objecting party to resolve the objection. If, after initiating such consultation, the Corps determines that the objection cannot be resolved through consultation, the Corps shall forward all documentation relevant to the objection to the Advisory Council on Historic Preservation (hereinafter "Council"), including the Corps's proposed response to the objection. Within 30 days after receipt of all pertinent documentation, the Council shall exercise one of the following options in accordance with 36 CFR §800.7:

1) Advise the Corps that the Council concurs in the Corps' proposed response to the objection, where-upon the Corps shall respond to the objection accordingly;

2) Provide the Corps with recommendations, which the Corps shall take into account in reaching a final decision regarding its response to the objection; or

3) Notify the Corps that the objection will be referred for comment pursuant to 36 CFR §800.7, and proceed to refer the objection and comment. The resulting comment shall be taken into account by the Corps in accordance with 36 CFR §800.7(c)(4).

B. Should the Council not exercise one of the above options within 30 days after receipt of all pertinent documentation, the Corps may assume the Council's concurrence in its proposed response to the objection.

C. The Corps shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; the Corps's responsibility to carry out all actions under this PA that are not the subjects of the objection shall remain unchanged.

D. If a dispute should arise regarding the implementation of Stipulation II or the Contingency Plan found in Attachment D to this PA, the Corps will follow the procedures outlined at 36 CFR §13(b)(3).

VI. RESOLUTION OF OBJECTIONS BY THE PUBLIC

At any time during implementation of the measures stipulated in this PA, should any objections pertaining to any such measure or its manner of implementation be raised by a member of the public, the Corps shall notify the parties in this PA and take the objection into account, consulting with the objector and, should the objector so request, with any of the parties to this PA to resolve the objection.

VII. REVIEW OF IMPLEMENTATION

If the stipulations have not been implemented within two years after execution of this PA, the parties to this agreement shall review the PA to determine whether revisions are needed. If revisions are needed, the parties to this PA shall consult in accordance with 36 CFR Part 800 to make such revisions. Review of the implementation of the stipulations of this PA will take place at a minimum of every two years until all stipulations have been implemented or the PA has been terminated.

VIII. AMENDMENT PROCESS.

Any party to this PA may propose to the other parties that it be amended, whereupon the parties will consult in accordance with 36 CFR §800.7(c)(1) to consider such an amendment. This agreement shall not be revised or amended in any manner whatsoever unless the revision or amendment is in writing, and is agreed upon by all of the parties.

IX. TERMINATION

A. If the Corps determines that it cannot implement the terms of this PA, or if the PA SHPO determines that the PA is not being properly implemented, the Corps or the PA SHPO may propose to the other parties to this PA that it be terminated.

B. The party proposing to terminate this PA shall so notify all parties to this PA, explaining the reasons for termination and affording them at least 30 days to consult and seek alternatives to termination. The parties shall then consult.

C. Should such consultation fail, the Corps or the PA SHPO may terminate the PA by so notifying all parties.

D. Should this PA be terminated, the Corps shall either:

1) Consult in accordance with 36 CFR §800.6(a)(1) to develop a new PA; or

2) Request the comments of the Council pursuant to 36 CFR §800.7(a)(2).

E. The Corps and the Council may conclude the Section 106 process with a PA between them if the PA SHPO terminates consultation in accordance with 36 CFR §800.7(a)(2).

X. SUNSETTING/DURATION

If the terms of this PA have not been implemented within eight years from the date of this signed PA, this PA shall be considered null and void unless extended by the written agreement of the parties hereto. In such event the Corps shall notify the parties to this PA, and if it chooses to continue with the Bloomsburg FDR project, shall re-initiate review of the Bloomsburg FDR project in accordance with 36 CFR Part 800.

XI. DEFINITIONS

A. Unless otherwise specified herein, the term *"days"* means Federal business days.

B. The term *"date of this signed PA"* means the date of the last signature affixed hereto.

XII. KEY OFFICIALS

The key officials specified in this PA are considered to be essential to ensure maximum coordination and communication between the parties and the work being performed. Upon written notice, each party may designate an alternate to act in place of the designated key official, in an emergency or otherwise. Any notice which the parties may desire or may be required hereunder to give or deliver to the other parties shall be deemed sufficiently given or delivered, if in writing, and sent by registered or certified mail, return receipt requested, first class, postage prepaid, addressed to the appropriate key contacts set forth below, and the time of delivery of such notice shall be deemed to be the time when the same is so mailed.

The key contact for the Corps is Mr. Scott C. Watson, Cultural Resources Program Manager, U.S. Army Corps of Engineers, Baltimore District, P.O. Box 1715, Baltimore, MD 21203-1715, (410) 962-9500, FAX (410) 962-2948, e-mail: scott.c.watson@usace.army.mil

The key contact for the PA SHPO is Mr. Stephen McDougal, Bureau for Historic Preservation, Pennsylvania Historical and Museum Commission, Commonwealth Keystone Building, 400 North Street 2nd Floor, Harrisburg, PA 17120-0093, (717) 772-0923, FAX (717) 772-0920, e-mail: smcdougal.pa.us

The key contact for PADEP is Mr. Scott Cox, Bureau of Waterways Engineering, Rachel Carson State Office Building, P.O. Box 8460, Harrisburg, PA 17105-8460
e-mail: sscox@state.pa.us

The key contact for the Town of Bloomsburg is Ms. Carol Mas, 301 East Second Street, Bloomsburg, PA, 17815, (717) 570-7123 Ext. 125, FAX (717) 784-1518, e-mail: cmas@bloomsburgpa.org

XIII. IMPLEMENTATION OF THIS PA

This PA may be implemented in counterparts, with a separate page for each signatory, and the Corps will ensure that each party is provided with a complete copy. This PA will become effective on the date of the last signature.

****

Execution of this PA, submittal of the PA to the Council in accordance with 36 CFR Part 800.6(b)(1)(iv), and implementation of its terms is evidence that the U.S. Army Corps of Engineers, Baltimore District, has afforded the Council an opportunity to comment on the undertaking and its effects on historic properties, and that the U.S. Army Corps of Engineers, Baltimore District has taken into account the effects of the Bloomsburg FDR project on historic properties.

U. S. ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT

By:____ Date:_________________
Col. Robert J. Davis, Jr., District Engineer, U.S. Army Corps of Engineers, Baltimore District

PENNSYLVANIA STATE HISTORIC PRESERVATION OFFICE

By:____ Date:_________________
Ms. Jean Cutler, Pennsylvania State Historic Preservation Officer

CONCURRING:

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

By:____ Date:_________________
Mr. Michael D. Conway, Director, Bureau of Waterways Engineering Pennsylvania Department of Environmental Protection

TOWN OF BLOOMSBURG, PENNSYLVANIA

By:____ Date:_________________
Mr. Charles Coffman, Mayor, Town of Bloomsburg, Pennsylvania

ATTACHMENT A
Location of Bloomsburg FDR

ATTACHMENT B

Reports Documenting the Results of Cultural Resource Investigations Conducted for the Bloomsburg FDR Project

Blomster, Jeffery P. and Philip A. Perazio
1999 *"A Phase I Archaeological Investigation of the Planned Bloomsburg Flood Protection Project, Bloomsburg, Columbia County, Pennsylvania."* Prepared by Kittatinny Archaeological Research, Inc for the Bureau of Waterways Engineering, Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania.

Presler, Kira M. and Philip A. Perazio
2002 *"Preliminary Archaeological Investigation to Locate Lock #4 of the North Branch Canal, Planned Bloomsburg Flood Protection Project, Town of Bloomsburg, Columbia County, Pennsylvania."* Prepared by Kittatinny Archaeological Research, Inc for the Bureau of Waterways Engineering, Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania.

Jones, Thomas E.
2004 *"Phase I Historic Resource Survey for the Bloomsburg Local Flood Protection Project, Bloomsburg, Pennsylvania."* Prepared by Thomas E. Jones, Historic Preservation Planner, for the Bureau of Waterways Engineering, Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania.

ATTACHMENT C

Contingency Plan for the Discovery or Identification of Unexpected Cultural Resources in the Bloomsburg FDR Project Area During Construction

Contingency Plan

The following plan outlines the procedures to be followed in the event that cultural resources are encountered during construction activities associated with the Bloomsburg FDR project. The Contingency Plan is required under Stipulation II of this PA.

Under the provisions of Stipulation II of this PA, if previously undiscovered cultural resources are discovered during construction of the Bloomsburg FDR project, the Corps shall ensure that the resources are immediately secured and protected against damage. Work shall cease in the area of the resources, but may proceed elsewhere on the project.

The Corps shall immediately contact the PA SHPO to inform them of the discovery. The Corp and the PA SHPO shall each identify a Point of Contact (POC) and alternate POCs to be notified in the event of the discovery of undiscovered cultural resources.

Within 24 hours of notification of the discovery of potentially significant resources in the Bloomsburg FDR project area, the Corps and the PA SHPO will consult on the significance of the resources and determine the need for additional treatment of the resources, if any. This consultation may take place on site or via telephone or electronic mail.

If the Corps and the PA SHPO determine that additional treatment of the resources is necessary, the treatment will consist of documentation of the resource through standard archaeological data recovery excavations (Stipulation I(A)(3) of this PA), or standard cultural resource drawings, plans, profiles, and photographic recordation, as appropriate. Exposure of the resource will be limited to the construction footprint of the project. Documentation of the resource will be completed within a maximum time limit of 48 hours after the need for additional treatment has been determined (i.e., documentation will be completed within 72 hours from the time of discovery). All treatment of historic properties will follow the requirements of Stipulation IV of the PA.

If the Corps or the PA SHPO determines that further investigation of the previously undiscovered cultural resource is not necessary, construction activities may resume with no further action required. Any disagreement among the Corps and the PA SHPO regarding the treatment of previously undetected archaeological resources shall be handled pursuant to Stipulation V of this PA regarding dispute resolution.

All costs associated with this contingency plan are limited to/may not exceed the amount of funding appropriated by the Corps from Congress for this purpose. The allocation and expenditure of these funds will be performed in consultation with the parties to this PA.

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

REAL ESTATE PLAN

May 2004

THE TOWN OF BLOOMSBURG, COLUMBIA COUNTY, PENNSYLVANIA FLOOD DAMAGE REDUCTION PROJECT

Final Integrated Feasibility Report & Environmental Impact Statement

REAL ESTATE PLAN

August 2005

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REAL ESTATE PLAN

1. GENERAL

This Real Estate Plan (REP) is part of the Bloomsburg, Pennsylvania Local Flood Protection Project Feasibility Study. Authorization for the Bloomsburg Reconnaissance Study was provided by the U.S. House of Representatives, Committee on Transportation and Infrastructure resolution, dated September 12, 1996. The Bloomsburg Reconnaissance Study produced by the Corps in 1998 determined that there was both Federal and non-Federal interest in pursuing a local flood protection project. In June 1999, the Corps and the Town of Bloomsburg executed a feasibility cost-sharing agreement. The Town of Bloomsburg is the Non-Federal Sponsor for this study. Bloomsburg is located in central Columbia County at the confluence of Fishing Creek and the Susquehanna River. The proposed flood protection project consists of approximately 12,000 linear feet of a combination of earthen levee, mechanically stabilized earthen wall, and floodwall along the left bank (looking downstream) of Fishing Creek, crossing the Fairgrounds parking area and then running generally north in the area of the right bank of the Susquehanna River (roughly a 'U'-shape), all in the Town of Bloomsburg. Along the right bank (looking downstream) of Fishing Creek in Fernville, Hemlock Township, approximately 5,000 linear feet of a combination of earthen levee, mechanically stabilized earthen wall, and floodwall will be constructed. Construction of the flood protection will increase flooding on the Fernville side of Fishing Creek downstream from the end of the levee/wall in Montour Township. Some degree of increased flooding is also suspected in the area upstream of the constructed project on both sides of Fishing Creek.

2. REAL ESTATE REQUIREMENTS

2.1 Description of Land, Easements, Rights of Way and Roadway Requirements

Standard Temporary Work Area Easements (TWAE) will be required for access and staging during construction. The duration of the TWAE is projected to be 3 years to allow for acquisition and construction schedule requirements. Construction, operation, and maintenance of the flood protection components will require a standard perpetual flood protection levee easement for partial acquisitions or fee simple interest for full acquisitions (total takes). Fee simple interest is required where an easement acquisition leaves an uneconomic remnant as the remainder. Fee simple is also required where the impact of increased flooding due to the project reaches the level of a full take.

A preliminary Takings Implication Assessment (TIA) conducted by the Army Corps of Engineers, Baltimore District, Office of Counsel, dated 10 July 2003, evaluated the effect of increased flooding caused by the project. The TIA considered increased flooding impacts due to increased depth, duration, velocity, frequency, and area of flooding. The existing hydrological & hydraulic analysis and lowest and first floor opening elevation data suggests that there will be some amount of additional, increased flooding to a small area nearest to the northern side of Fishing Creek (right bank) in Montour Township. The area in question is generally bounded by

Fishing Creek to the south, by its tributary of Hemlock Creek to the east, a line some yards north of Perry Avenue, and Route 42 to the west. The area includes a two-story cottage built near Fishing Creek, five stationary-mounted mobile homes, 8 homes along both sides of Perry Avenue, and a Columbia County services agency building. Four of the mobile homes (tax assessor's parcel numbers 2505A07700, 2505A07300, 2505A07303, and 2505A07304) will experience, as a result of the additional increased flooding, a minimum of about one-third of a foot, and a maximum of approximately two feet, flowing under the undercarriage areas at a frequency of about once every five years, and from a minimum of about two to a maximum of four feet (and in the cases of mobile homes on lots 2505A07700 and 2505A07300, including some flooding through their first floor openings) on an average of once every ten years. All four of these mobile homes will likely experience, due to the addition of the increased flooding, three feet or more of flooding above their first floor openings at least once every twenty-five years. The homes at 8, 9, 10 and 14 Perry Avenue will receive, as a result of the additional increment of increased flooding, well over one foot or more of flooding above their first floor openings at a frequency of at least once every twenty-five years. All or most of the remaining buildings appear to receive their first, albeit less than 50%, threat of possible first floor flooding at about the once in twenty-five year event, although the cellar, crawl space, or basements of 18 and 20 Perry Avenue will likely be nearly full of water.

The TIA found that, due to the increased depth and frequency of flood events caused by the project, increased flooding would probably rise to the level of a taking and require a full take (fee simple acquisition) of the following: the cottage located on tax assessor's parcel number 2505A07500; mobile homes (trailers) on tax assessor's parcel numbers 2505A07700, 2505A07300, 2505A07303, and 2505A07304; and single-family residences at 4 Perry Avenue (2505A05300) and 5 Perry Avenue (portion of parcel 2505A05100). Although elevation data is incomplete, the trailer park on the right bank of Fishing Creek on downstream side of State Route 42 (parcel number 2505A06500) is also considered to be a probable full take since the increased flooding impact appears to be similar to the that of the four trailers noted above.

The TIA also notes that the homes at 8,9,10, and 14 Perry Avenue will all receive over one foot of water above their first floor opening at a new frequency of at least once every twenty-five years, which is an impact similar to the comparable homes at 4 and 5 Perry Avenue at the once in ten years frequency. As a result, the case for a legal taking would likely be much more problematic. Although an argument can be made that this frequency of flooding is insufficient to reach the level of a taking, a court might view any established evidence of diminution of fair market value as sufficient to find at least a partial taking. For these properties where there is increased flooding from project construction and operation which could rise to the level of a take of some type, a standard flowage easement (occasional flooding) with the standard provision (#4) to allow existing specific, minimally-impacted residences to remain in the increased flooding area is planned to be purchased. For cost estimating purposes, the value of this flowage easement is considered to be 25% of the fee simple value of these properties.

There is also likely to be some level of increased flooding in the area above the Railroad Street bridge along Fishing Creek, particularly on the left bank, where a water treatment plant, three residential structures (with uses including a bed & breakfast constructed in 1838 and multi-unit apartments), and an electric substation are located. The water treatment plant, originally constructed in the 1870's, services Bloomsburg. It is located immediately adjacent to Fishing Creek and is reportedly subject to frequent flooding under existing conditions. Preliminary elevation data indicates that the three residential structures will not experience increased flooding from the project. Analysis of this area is incomplete due to a lack of data, including base topographical information and hydrological/hydraulic modeling analysis.

The areas described above, together with this area above Railroad Street along Fishing Creek, will be evaluated further in a final TIA to be completed during PED.

Estimated required acreages by estate are as follows: fee simple 13.1 acres; perpetual flood protection levee easement 31.3 acres; perpetual flowage easement (occasional flooding) 1.2 acres; temporary work area (including staging) 9.4 acres.

2.2 Standard Estates:

2.2.1 Fee

The fee simple title to (the land described in Schedule A) (Tract Nos. ____), subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

2.2.2 Flood Protection Levee Easement

A perpetual and assignable right and easement in (the land described in Schedule A) (Tract Nos. ____) to construct, maintain, repair, operate, patrol and replace a flood protection levee, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however to existing easements for public roads and highways, public utilities, railroads and pipelines.

2.2.3 Temporary Work Area Easement

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract Nos. ____), for a period not to exceed three years, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a work area, including the right to move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the Bloomsburg Local Flood Protection Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however to existing easements for public roads and highways, public utilities, railroads and pipelines.

2.2.4 Flowage Easement (Occasional Flooding)

The perpetual right, power, privilege and easement occasionally to overflow, flood and submerge (the land described in Schedule A) (Tract Nos. ____) (and to maintain mosquito control) in connection with the operation and maintenance of the _______ project as authorized by the Act of Congress approved ______, together with all right, title and interest in and to the structures and improvements now situate on the land, except fencing and also excepting the structure(s) now existing on the land, described as ________ , which may be maintained on the land provided that no portion of the structure(s) located below elevation _____ feet, mean sea level, shall be utilized for human habitation to the extent that sleeping accommodations will be maintained therein; provided that no other structures for human habitation shall be constructed or maintained on the land except as may be approved in writing by the representative of the United States in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of landfill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

2.3 Non-Standard Estates:

There are no non-standard estates required for this project.

2.4 Current Ownership:

Ownership information is attached as Exhibit A. In the Town of Bloomsburg, there are approximately 21 fee simple (18 residential, 3 commercial) and 22 perpetual flood protection levee/TWAE easements (19 residential, 3 commercial/agricultural). Construction, operation, and maintenance of the flood protection components in Fernville (Hemlock Township) will require 1 residential fee simple acquisition and 40 residential perpetual flood protection levee/TWAE easements. 12 residential parcels on the Fernville side of Fishing Creek (Montour Township) will require 8 fee simple and 4 flowage easement acquisitions. In summary, the project will require acquisition of a total of approximately 27 residential and 3 commercial parcels in fee simple, 59 residential and 3 commercial perpetual flood protection levee easements, and 4 residential flowage easements. Staging areas will be identified during PED but are estimated to require approximately one acre in Bloomsburg (recreational/agricultural use area) and one acre on the Fernville side of Fishing Creek (residential land use area) for planning cost estimating purposes. Construction access will occur from public roads adjacent to the project area.

2.5 Real Estate Mapping

Mapping indicating the location of project construction, operation, and maintenance real estate requirements is attached as Exhibit B.

3. EXISTING FEDERAL PROJECTS

There are no existing Federal projects within the proposed project area.

4. EXISTING FEDERALLY OWNED LANDS

There are no Federally owned lands within the project area.

5. LANDS OWNED BY THE NON-FEDERAL SPONSOR

The NFS owns 3 parcels in the project area. These parcels are adjacent to each other along a narrow, vacant strip of land between West Second Street and Fishing Creek (assessor's parcel numbers 05W0704500, 05W0704600, and 05W0704700). Approximately .43 acres of the planned flood protection levee easement is located on these parcels.

6. NAVIGATIONAL SERVITUDE

Navigational servitude does not apply to this project since no real estate interests are required within the beds of the Susquehanna River below the ordinary high water mark. Fishing Creek is not a navigable waterway and is, therefore, not subject to the dominant rights of navigational servitude.

7. INCREASED FLOODING

Construction of the project will increase flooding in the area of State Route 42 on the right side of Fishing Creek in Montour Township. Some level of increased flooding is also anticipated in the area above Railroad Street along Fishing Creek. See paragraph 2 above for increased flooding information for these areas.

8. BASELINE COST ESTIMATE FOR REAL ESTATE

A detailed cost estimate for the project, in MCACES format, is included as Exhibit C. The cost estimate outlines the Non-Federal Sponsor's administrative, land, and P.L. 91-646 relocation costs to accomplish the project's real property requirements, including the Corps' administrative costs to assist and monitor the Non-Federal Sponsor's real property acquisition. This real estate cost estimate does not include costs for utility/facility relocations. Impacts to utilities have been estimated by the project engineering team members and included in the project cost estimate. This issue will be addressed further during PED. Required utility/facility relocations are the responsibility of the NFS.

9. PUBLIC LAW 91-646 RELOCATIONS

Overall, the project will require relocation of 27 residences, 4 businesses and the trailer park (29 tenants). There are 19 residential and 4 business P.L. 91-646 relocations required for this project in Bloomsburg. One residence in Fernville will require relocation. In Montour Township, 7 residences and a trailer park will require relocation. Residential relocations estimates are based on the maximum replacement housing payment for owner-occupants of $22,500 plus $2,500 moving expense (total of $25,000 per relocation). The trailer park consists of 29 trailers which are rented by the occupants. For this REP, it is assumed that approximately half (15) of the trailers will be moved at a cost of $2,500 each and the remainder (14) will be acquired due to the aged, poor, hence, unmovable condition of the trailers. The maximum replacement housing payment for tenants of $5,250 and a $2,500 moving expense ($7,750 total) is used to estimate relocation expenses for each of the 29 tenant-occupants of the trailer park. Based on discussions with the NFS, it is anticipated that there will be adequate replacement housing for the displaced residents and that replacement locations are available for the trailer park.

10. MINERAL ACTIVITY

There is no known mineral activity within the project area.

11. TIMBER RIGHTS

There are no known timber rights within the project area.

12. ASSESSMENT OF NON-FEDERAL SPONSOR ACQUISITION CAPABILITY

An Assessment of the Non-Federal Sponsor's Acquisition Capability is included as Exhibit D. The NFS has contracted with SEDA-COG to perform required real estate acquisitions. The NFS will, if necessary, need assistance from the Corps to condemn properties owned by another township; Hemlock Township, specifically, owns 8 unimproved parcels that are required for the project. It is considered unlikely that such a condemnation will be necessary.

13. ZONING

The enactment of zoning ordinances is not proposed to facilitate acquisition.

14. ACQUISITION SCHEDULE

Following execution of a Project Cooperation Agreement, approximately 24 months will be needed to acquire the necessary real estate interests. Acquisition actions include obtaining title information, survey/legal descriptions, tract appraisals, negotiations with property owners, and, as applicable, residential/business relocations and eminent domain (condemnation) proceedings for each acquisition. SEDA-COG will perform the acquisition actions and has agreed with the 24 month acquisition timeframe. A more detailed schedule will be created and coordinated with the NFS and the other team members during PED.

15. UTILITY AND FACILITY RELOCATIONS

Utility and facility relocations required by the project have not been specifically determined at this time. Further investigations will be completed during PED. General impacts to public utilities and facilities as known to date are identified here. As discussed previously, the Irondale water treatment plant owned by United Water Pennsylvania appears to be impacted to some extent by increased flooding, as does an electrical sub-station owned by Pennsylvania Power and Light. Based on limited data, discussions and meetings between Corps' engineering representatives, the project manager, the NFS and the treatment plant managers, a plan has been proposed by the team to address increased flooding concerns upstream of the project using standard flood proofing techniques. The equipment will be raised inside the treatment plant and a currently unutilized 2.0 million-gallon brick reservoir will be lined and covered with a floating roof. An asphalt berm will be built inside the fence line of the electrical substation. The costs to construct these items have been estimated by Engineering Division and applied to the project cost estimate. In order to assure that the Corps and the NFS have the necessary rights to inspect and to protect the integrity of the project into the future, some type of flood proofing agreement will be required between the NFS and the owners of the facilities. The agreement will need to run with the land and be consistent with what other Districts have used for similar situations. Conditions will be included to control future construction on the property. The consideration will be the expense estimated to complete the flood proofing. Once more information is obtained during PED and the impacts of the increased flooding are better known the flood proofing agreements will be drafted and coordinated within the Corps as necessary prior to execution.

A combination fiber-optic/petroleum line runs perpendicular to the flood protection (wall) and crosses under Fishing Creek upstream of the double-track bridge (Red Mill Road). The current plan calls for this to be encased in concrete and allowed to remain in place. Existing roads/streets in the area of Eleventh Street in Bloomsburg and Drinker Street in Fernville will be raised to allow access over the levee. There is a closure structure across the SEDA-COG North Shore Railroad. Construction will require intermittent closing of the rail line for approximately four hours maximum. Based on information from SEDA-COG, this could be scheduled so that there would be no disruption to the railroad operation, minimizing or eliminating any associated impacts to railroad safety and operations costs.

Utility and facility relocations are the responsibility of the NFS. Attorney's Opinions of Compensability will be prepared during PED. This real estate plan does not include any estimated real estate costs for utility/facility relocations. Estimates have been prepared by Engineering Division for the construction of the items discussed above and are included in the overall project cost estimate. These requirements will be further evaluated and more specific responsibilities will be assigned during PED.

16. ENVIRONMENTAL CONCERNS

To date, no CERCLA-regulated HTRW has been identified in the project area. Preliminary hazardous, toxic, and radioactive waste (HTRW) investigations have been performed under Pennsylvania Department of Environmental Protection (PADEP) Act 2 Medium-Specific Standards. HTRW contamination exceeding these standards was identified, including metals (arsenic, zinc, barium) and gasoline components (benzine, toluene). None of the HTRW is CERCLA-regulated since the amounts of contamination identified do not meet or exceed reportable quantities as specified under CERCLA. Metals were detected in samples from the entire footprint of the protection in Bloomsburg. Act 2 residential thresholds for HTRW were exceeded. This will require a cap on any soil disturbed during construction, but not removal of the metals. This contamination is in the vicinity of West First Street and West Second Street between Railroad Street and State Routes 42/11. Act 2 non-residential thresholds were not exceeded for metals, so no special handling is required. Act 2 non-residential thresholds were exceeded for the gasoline components identified on portions of tax assessor's parcel number 05W0900500 (fairgrounds-owned by Columbia County Agricultural, Horticultural and Mechanical Association) which was reportedly a former dump site. Disturbed contaminated material of this type will have to be disposed of off-site at an Act 2 permitted facility. Carpet fibers were also identified, indicating at least some industrial waste at the site. Real estate cost estimates in this Real Estate Plan do not reflect an HTRW impact, which will be further investigated during PED. The project construction cost estimate includes projected HTRW remediation. The NFS is aware that any required remediation of CERCLA-regulated HTRW is their responsibility.

17. ATTITUDES OF THE LANDOWNERS

There is general support for flood protection in the project area due to historical flood events.

18. NOTIFICATION TO NON-FEDERAL SPONSOR

The NFS has been notified in writing by letter dated February 23, 2000 of the risks associated with real estate acquisition prior to execution of a Project Cooperation Agreement.

19. RISK ANALYSIS

Some substantial risks exist on this project, described as follows:

1. There is no topographical data for the area along Fishing Creek upstream from Railroad Street. No hydrological/hydraulic analysis has been performed for this area. Real estate impacts and costs will be further evaluated and estimated during PED.
2. The design is approximately 35% complete, rather than a more typical 65% complete design. Additionally, there is no specific design information for the area above Railroad Street on Fishing Creek. Therefore the real estate requirements are more likely to change in the future compared to other projects.
3. There is no mapping or specific design indicating location or impact to existing utilities.

To plan for these risks, a number of actions have been taken:

- a 15% contingency has been added to all administrative real estate cost estimates; a 25% contingency has been added to the land value; and a 10% contingency has been applied to the 91-646 relocations, which are already estimated at a worst-case scenario.
- a plan to address the unknown but suspected increased flooding upstream of the project has been investigated and chosen by the team. Related tasks and costs have been estimated and incorporated into the cost estimate of the project.
- a Preliminary TIA has been prepared for the known area of increased flooding downstream of the project and real estate costs have been associated with the impacts discussed in the TIA.

EXHIBIT A

Acquisitions for the Levee/Wall in the Town of Bloomsburg

A. Partial Acquisitions: Perpetual Flood Protection Levee and Temporary Work Area Easements

Relo (R or B or N)	relo/move	PARCEL_NO	OWNER	MAILING_AD
N		05W04 01800	KLINGER THOMAS & DEBRA	405 WEST FIRST STREET
N		05W07 03000	SEELY LARRY V & BELINDA F	585 WEST MAIN STREET
N		05W07 03200	May, William & Sarah	456 West 3rd St
N		05W07 03400	DAVIS JAMES M	PO BOX 457
N		05W07 03700	Northwestern Human Services	603-607 West Main St
N		05W07 04000	HOWE MARY C & MICHAEL E ETAL	615 WEST MAIN STREET
N		05W07 04200	LINN ROBERT A II	641 WEST MAIN STREET
N		05W07 04400	SYLVESTER SUSAN M & JOSEPH P	643 WEST MAIN STREET
N		05W07 04500	TOWN OF BLOOMSBURG	KEYSTONE PARK
N		05W07 04600	TOWN OF BLOOMSBURG	301 EAST MAIN STREET
N		05W07 04700	TOWN OF BLOOMSBURG	~900 W 2nd St
N		05W07 06100	Hidlay, William Jr.	904 West 2nd St
N		05W07 06000	Long, John & Laura	908 West 2nd St
N		05W07 05700	FORNWALD RICHARD L & DONNA L	920 WEST MAIN STREET
N		05W07 05300	BROWN ROSALIE	936 WEST MAIN STREET
N		05W09 00500	COLUMBIA COUNTY AG, HORT & MECHANICAL ASSN.	620 W THIRD STREET
N		Railroad	North Shore/SEDA COG	
N		05W09 01400	KISTLER STEPHEN C & TINA W	196 STONEY BROOK ROAD
N		05W09 01602	HANOVER BRANDS INCORPORATED	P O BOX 334
N		05W09 01604	MUNICIPAL AUTHORITY OF THE TOWN OF BLOOMSBURG	TOWN HALL
N		05W09 01900	BLOOMSBURG AREA SCHOOL DISTRCT	12TH & RAILROAD STREETS
N		05W09 01700	MUNICIPAL AUTHORITY OF THE TOWN OF BLOOMSBURG	TOWN HALL
22 parcels				

4 commercial/ag, 12 residential, 6 publicly-owned (3 parcels owned by Town) easement (partial) acquisitions

B. Fee Simple-Full Take and Residential/Business Relocation

Relo (Res. or Business)	relo/move	PARCEL_NO	OWNER	MAILING_AD
B	10000	05W04 01700	KLINGER THOMAS & DEBRA	405 WEST FIRST STREET
R	25000	05W04 01600	MACKIEWICZ BENJAMIN T & KAREN	407 WEST FIRST STREET
R	25000	05W04 01500	GLODFELTER ANN L	411 W FIRST ST
R	25000	05W04 01400	CADWALLADER RUSSEL D & DARL R	415 WEST FIRST STREET
R	25000	05W04 01300	LUCAS KELLY M	423 WEST FIRST STREET
R	25000	05W04 01200	ACKER ROBERT A & BEVERLY D	435 WEST FIRST STREET
R	25000	05W04 01100	HRESKO ANNA M & STEIMER BONNIE	441 WEST FIRST STREET
R	25000	05W04 01000	HOUSEKNECHT PAUL H & KAREN M	455 WEST FIRST STREET
R	25000	05W04 00900	KNORR CHARLENE	447 WEST FIRST STREET
R	25000	05W04 00800	SHUMAN JOHN A & THELMA E	232 EAST STREET
R	25000	05W04 00700	HAUCK RAYMOND L & FAYE S	56 CHARLESTON DRIVE
R	25000	05W04 00600	HAUCK RAYMOND L & FAYE S	56 CHARLESTON DRIVE
R	25000	05W04 00500	HEWLETT ROBERT N & MARLENE R	475 WEST FIRST STREET
R	25000	05W04 00300	BROWN ROBERT E	495 WEST FIRST STREET
R	25000	05W07 00500	KOVALEWSKI DAVID A & JANICE M	102 LEONARD STREET
R	25000	05W07 00600	GROSS BARBARA A	100 LEONARD STREET
B	20000	05W07 00400	Knorr, Charles (TLC Auto Repair)	529 Ridge St
B & R	35000	05W07 03601	LINDA MICHAEL L & LINDA LAMON	101 BARTON STREET
R (2)	52000	05W07 03800	CARL BRUCE E JR	P O BOX 51
R	25000	05W07 04100	PARKER EMILIA MARY & CHARLES & LENZINI ARMONDO	584 WEST 3RD STREET
B	20000	05W09 00401/402	PENMAN DENNIS L (LaRue)	Red Mill Rd
21 parcels	$ 537,000 total relocation			

3 commercial, 18 residential fee simple acquisitions

C. SUMMARY: TOTALS IN TOWN OF BLOOMSBURG

Parcels

	residential	commercial	public
Fee simple	18	3	
Easement	13	3	6
total	31	6	6

total of 43 parcels in Town

Fernville Levee/Wall Acquisitions

PARCEL NO	OWNER	MAILING ADDRESS	CITY	STATE	ZIP
Partial Acquisitions:	**Perpetual Flood Protection Levee and Temporary Work Area Easements**				
18 -01A-009-01,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-002-00,000	STANISZEWSKI MARION F & MARY	48 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-004-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-006-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-007-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-008-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-009-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-010-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-012-00,000	VIAL PHILIP L & CAROLE J	118 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-013-00,000	VIAL PHILIP L & CAROLE	118 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-014-00,000	PATTERSON CLARK JR	128 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-015-00,000	FERNVILLE VOLUNTEER FIRE CO	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-016-00,000	TOWNSHIP OF HEMLOCK	26 FIREHALL ROAD	BLOOMSBURG	PA	17815
18 -01A-017-00,000	LONG RANDY S & LYNDA R	168 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-018-00,000	DASHIELL EDGAR A III	198 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-019-00,000	SLOTTERBACK GEORGE E & JANINE	218 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-020-00,000	HALYE LINDA A	228 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-021-00,000	WRIGHT ROSEMARY	58 BUCKHORN ROAD	BLOOMSBURG	PA	17815
18 -01A-022-00,000	STRAUSS JAMES W & DOROTHY A	248 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-023-00,000	GOTTSTEIN WADE & MOLLY K	268 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-024-00,000	GOTTSTEIN WADE & MOLLY K	268 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-025-00,000	RICHELDIFLER JAMES R	288 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-026-00,000	BROBST JAMES E	151 WHITES CHURCH R(	BLOOMSBURG	PA	17815
18 -01A-027-00,000	BROBST JAMES E	151 WHITES CHURCH R(	BLOOMSBURG	PA	17815
18 -01A-028-00,000	BERGER JOHN D & BONNIE LOU 11	338 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-029-00,000	STARR DENNIS F	P O BOX 791	CONYNGHAM	PA	18219
18 -01A-030-00,000	KLINE JAMES P & JOAN E	398 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-031-00,000	MATTHEWS ROBERT J & MELISSA D	408 DRINKER STREET FI	BLOOMSBURG	PA	17815
18 -01A-032-00,000	IVEY STEPHEN L	212 MCGUIRE DRIVE	BLOOMSBURG	PA	17815
18 -01A-033-00,000	CARL DENNIS C & HEIDI E	428 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01A-034-00,000	MCCLOSKEY WALTER	1006 WOOD VALLEY RO	WAYCROSS	GA	31501
18 -01B-019-11,000	ERWINE INC	75 MARKET STREET	BLOOMSBURG	PA	17815
18 -01B-019-07,000	ERWINE INC	75 MARKET STREET	BLOOMSBURG	PA	17815
18 -01B-019-04,000	HARVEY GORDON L	508 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-019-20,000	MCMAHON RONALD R & SHARON K	528 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-019-18,000	MILLER ERIC J & TAMMY W	538 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-019-19,000	AUKER ANNA MARY	548 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-019-16,000	AUKER ANNA MARY	548 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-019-08,000	PARKER PATRICIA M	558 DRINKER STREET	BLOOMSBURG	PA	17815
18 -01B-020-00,000	MCMAHON RONALD R & SHARON K	26 FIREHALL ROAD	BLOOMSBURG	PA	17815

crosses road, ends on above parcel on landward side of road

40 parcels

8 Hemlock Township
32 Residential (27 owners)

Fee Simple-Full Take and Residential Relocation

18 -01B-019-17,000	ENT C JOSEPH & CAROL	518 DRINKER STREET	BLOOMSBURG	PA	17815

Relocation:
$ 25,000

Induced Flooding Area-Montour Township

Damage	Relo (R or B or N)	Relo/move	PARCEL_NO	OWNER	Note	MAILING_AD
100%	TRAILER PARK (29 trailers)	262250	25 05A06500	ONOFRIO THOMAS E SR (Trailer Park)	trailer park	7025 NEW BERWICK HWY
25%	N		25 05A05700	ENTZMINGER BETINA I		14 PERRY AVENUE
25%	N		25 05A05600	ANCERAVAGE VINCENT R & LISA A		10 PERRY AVENUE
25%	N		25 05A05500	CARMEL BRUCE M & SHERRY M		8 PERRY AVENUE
100%	R	25000	25 05A07500	SWISHER WILLIAM F & SARAH TRU	cottage at creek	3852 CARR HILL ROAD
100%	R	25000	25 05A05300/5301	MARTZ MELVIN		4 PERRY AVENUE
100%	R: 5 perry only	25000	25 05A05100 (portion)	ROBERTS AUTOMOTIVE SERVICE CENTER LLC	5 and 9 Perry	1089 LIGHTSTREET RD
25%	N: 9 perry only		25 05A05100 (portion)	ROBERTS AUTOMOTIVE SERVICE CENTER LLC	5 and 9 Perry	1089 LIGHTSTREET RD
100%	R	25000	25 05A07700	SWISHER MICHAEL TODD	TL1	195 DEUSSEN DRIVE
100%	R	25000	25 -05A-073-00,000	HAUCK CHARLES L & DELORIS A	TL3	R R 2 BOX 202-4
100%	R	25000	25 05A07303	ECKROTH MYRON P	TL4	16 SPAID AVENUE
100%	R	25000	25 05A07304	BORICH JOHN E & VICTORIA A	TL5	218 E 9TH STREET

relos $ 437,250

12 parcels
8 fee
4 flowage easement

36 residential relocations

EXHIBIT B

EXHIBIT C

Feasibility Study Cost Estimate-MCACES Format

Real Estate Acquisition Requirements

Total Project: Town of Bloomsburg, Fernville-Hemlock Township, Montour Township Combined

Bloomsburg, Pennsylvania Local Flood Protection Project

		Private			Commercial			Public			Requirement		
		#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102-----	ACQUISITIONS												
010201---	By Government												
010202---	By Non-Federal Sponsor (NFS)												
01020201	Survey and Legal Descriptions										47,500	7,125	54,625
01020102	Title Evidence										57,900	8,685	66,585
01020203	Negotiations										86,000	12,900	98,900
010203---	By Government on Behalf of NFS												
010204---	Review of NFS												
01020401	Survey and Legal Descriptions										19,000	2,850	21,850
01020402	Title Evidence										19,000	2,850	21,850
01020403	Negotiations										15,400	2,310	17,710
	SUBTOTAL										244,800	36,720	281,520
0103-----	CONDEMNATIONS												
010301---	By Government												
010302---	By Non-Federal Sponsor (NFS)										21,000	3,150	24,150
010303---	By Government on Behalf of NFS										10,000	1,500	11,500
010304---	Review of NFS										3,500	525	4,025
	SUBTOTAL										34,500	5,175	39,675
0105-----	APPRAISALS												
010501---	By Government												
010502---	By Non-Federal Sponsor (NFS)										78,750	11,813	90,563
010503---	By Government on Behalf of NFS												
010504---	Review of NFS										63,850	9,578	73,428
	SUBTOTAL										142,600	21,390	163,990
0106-----	PL 91-646 ASSISTANCE												
010601---	By Government												
010602---	By Non-Federal Sponsor (NFS)										116,000	17,400	133,400
010603---	By Government on Behalf of NFS												
010604---	Review of NFS										12,000	1,800	13,800
	SUBTOTAL										128,000	19,200	147,200
0107-----	TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701---	By Government												
010702---	By Non-Federal Sponsor (NFS)												
010703---	By Government on Behalf of NFS												
010704---	Review of NFS												
010705---	Other												
010706---	Damage Claims												
	SUBTOTAL												
0115-----	**REAL ESTATE PAYMENTS**												
011501---	Land Payments												
01150101	By Government												
01150102	By Non-Federal Sponsor (NFS)										3,373,045	843,261	4,216,306
01150103	By Government on Behalf of NFS												
01150104	Review of NFS										19,000	2,850	21,850
011502---	PL 91-646 Assistance Payments												
01150201	By Government												
01150202	By Non-Federal Sponsor (NFS)										999,250	99,925	1,099,175
01150203	By Government on Behalf of NFS												
01150204	Review of NFS										12,000	1,800	13,800
011503---	Damage Payments												
01150301	By Government												
01150302	By Non-Federal Sponsor (NFS)												
01150303	By Government on Behalf of NFS												
01150304	Review of NFS												
	SUBTOTAL										4,403,295	947,836	5,351,131
Account 02 Facility/Utility Relocations (Construction cost only)													
			REAL ESTATE ACQUISITION TOTAL								$4,953,195	$1,030,321	$5,983,516

Feasibility Study Cost Estimate-MCACES Format
Real Estate Acquisition Requirements
Levee/Wall in Town of Bloomsburg
Bloomsburg, Pennsylvania

		Private			Commercial			Public			Requirement		
		#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102—	ACQUISITIONS												
010201—	By Government												
010202—	By Non-Federal Sponsor (NFS)												
01020201	Survey and Legal Descriptions	31	500	15,500	4	500	2,000	6	500	3,000	20,500	3,075	23,575
01020102	Title Evidence	31	600	18,600	4	750	3,000	6	600	3,600	25,200	3,780	28,980
01020203	Negotiations	30	1,000	30,000	4	2,000	8,000	3	2,000	6,000	44,000	6,600	50,600
010203—	By Government on Behalf of NFS												
010204—	Review of NFS												
01020401	Survey and Legal Descriptions	31	200	6,200	4	200	800	6	200	1,200	8,200	1,230	9,430
01020402	Title Evidence	31	200	6,200	4	200	800	6	200	1,200	8,200	1,230	9,430
01020403	Negotiations	30	200	6,000	4	200	800	3	200	600	7,400	1,110	8,510
	SUBTOTAL										113,500	17,025	130,525
0103—	CONDEMNATIONS												
010301—	By Government												
010302—	By Non-Federal Sponsor (NFS)	3	3,000	9,000							9,000	1,350	10,350
010303—	By Government on Behalf of NFS												
010304—	Review of NFS	3	500	1,500							1,500	225	1,725
	SUBTOTAL										10,500	1,575	12,075
0105—	APPRAISALS												
010501—	By Government												
010502—	By Non-Federal Sponsor (NFS)	31	750	23,250	4	2,000	8,000	6	750	4,500	35,750	5,363	41,113
010503—	By Government on Behalf of NFS												
010504—	Review of NFS	31	650	20,150	4	1,000	4,000	6	650	3,900	28,050	4,208	32,258
	SUBTOTAL										63,800	9,570	73,370
0106—	PL 91-646 ASSISTANCE												
010601—	By Government												
010602—	By Non-Federal Sponsor (NFS)	19	2,000	38,000	4	1,000	4,000				42,000	6,300	48,300
010603—	By Government on Behalf of NFS												
010604—	Review of NFS	19	200	3,800	4	200	800				4,600	690	5,290
	SUBTOTAL										46,600	6,990	53,590
0107—	TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701—	By Government												
010702—	By Non-Federal Sponsor (NFS)												
010703—	By Government on Behalf of NFS												
010704—	Review of NFS												
010705—	Other												
010706—	Damage Claims												
	SUBTOTAL												
0115—	REAL ESTATE PAYMENTS												
011501—	Land Payments												
01150101	By Government												
01150102	By Non-Federal Sponsor (NFS)										2,149,116	537,279	2,686,395
01150103	By Government on Behalf of NFS												
01150104	Review of NFS	31	200	6,200	4	200	800	6	200	1,200	8,200	1,230	9,430
011502—	PL 91-646 Assistance Payments												
01150201	By Government												
01150202	By Non-Federal Sponsor (NFS)										537,000	53,700	590,700
01150203	By Government on Behalf of NFS												
01150204	Review of NFS	19	200	3,800	4	200	800		200		4,600	690	5,290
011503—	Damage Payments												
01150301	By Government												
01150302	By Non-Federal Sponsor (NFS)												
01150303	By Government on Behalf of NFS												
01150304	Review of NFS												
	SUBTOTAL										2,698,916	592,899	3,291,815
Account 02 Facility/Utility Relocations (Construction cost only)													
			REAL ESTATE ACQUISITION TOTAL								$2,933,316	$628,059	$3,561,375

Feasibility Study Cost Estimate-MCACES Format
Real Estate Acquisition Requirements
Fernville, Hemlock Township
Bloomsburg, Pennsylvania

		Private			Commercial			Public			Requirement		
		#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102—	ACQUISITIONS												
010201—	By Government												
010202—	By Non-Federal Sponsor (NFS)												
01020201	Survey and Legal Descriptions	33	500	16,500		500		8	500	4,000	20,500	3,075	23,575
01020102	Title Evidence	33	600	19,800		750		8	600	4,800	24,600	3,690	28,290
01020203	Negotiations	28	1,000	28,000		2,000		1	2,000	2,000	30,000	4,500	34,500
010203—	By Government on Behalf of NFS												
010204—	Review of NFS												
01020401	Survey and Legal Descriptions	33	200	6,600		200		8	200	1,600	8,200	1,230	9,430
01020402	Title Evidence	33	200	6,600		200		8	200	1,600	8,200	1,230	9,430
01020403	Negotiations	28	200	5,600		200		1	200	200	5,800	870	6,670
	SUBTOTAL										97,300	14,595	111,895
0103—	CONDEMNATIONS												
010301—	By Government												
010302—	By Non-Federal Sponsor (NFS)	3	3,000	9,000							9,000	1,350	10,350
010303—	By Government on Behalf of NFS							1	10,000	10,000	10,000	1,500	11,500
010304—	Review of NFS	3	500	1,500							1,500	225	1,725
	SUBTOTAL										20,500	3,075	23,575
0105—	APPRAISALS												
010501—	By Government												
010502—	By Non-Federal Sponsor (NFS)	33	750	24,750				8	750	6,000	30,750	4,613	35,363
010503—	By Government on Behalf of NFS												
010504—	Review of NFS	33	650	21,450				8	650	5,200	26,650	3,998	30,648
	SUBTOTAL										57,400	8,610	66,010
0106—	PL 91-646 ASSISTANCE												
010601—	By Government												
010602—	By Non-Federal Sponsor (NFS)	1	2,000	2,000							2,000	300	2,300
010603—	By Government on Behalf of NFS												
010604—	Review of NFS	1	200	200							200	30	230
	SUBTOTAL										2,200	330	2,530
0107—	TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701—	By Government												
010702—	By Non-Federal Sponsor (NFS)												
010703—	By Government on Behalf of NFS												
010704—	Review of NFS												
010705—	Other												
010706—	Damage Claims												
	SUBTOTAL												
0115—	REAL ESTATE PAYMENTS												
011501—	Land Payments												
01150101	By Government												
01150102	By Non-Federal Sponsor (NFS)										253,829	63,457	317,286
01150103	By Government on Behalf of NFS												
01150104	Review of NFS	33	200	6,600		200		8	200	1,600	8,200	1,230	9,430
011502—	PL 91-646 Assistance Payments												
01150201	By Government												
01150202	By Non-Federal Sponsor (NFS)										25,000	2,500	27,500
01150203	By Government on Behalf of NFS												
01150204	Review of NFS	1	200	200		200			200		200	30	230
011503—	Damage Payments												
01150301	By Government												
01150302	By Non-Federal Sponsor (NFS)												
01150303	By Government on Behalf of NFS												
01150304	Review of NFS												
	SUBTOTAL										287,229	67,217	354,446
Account 02 Facility/Utility Relocations (Construction cost only)													
			REAL ESTATE ACQUISITION TOTAL								$464,629	$93,827	$558,456

Feasibility Study Cost Estimate-MCACES Format
Real Estate Acquisition Requirements
Induced Flooding-Montour Township
Bloomsburg, Pennsylvania

		Private			Commercial			Public			Requirement		
		#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102------	ACQUISITIONS												
010201---	By Government												
010202---	By Non-Federal Sponsor (NFS)												
01020201	Survey and Legal Descriptions	11	500	5,500	2	500	1,000				6,500	975	7,475
01020102	Title Evidence	11	600	6,600	2	750	1,500				8,100	1,215	9,315
01020203	Negotiations	10	1,000	10,000	1	2,000	2,000				12,000	1,800	13,800
010203---	By Government on Behalf of NFS												
010204---	Review of NFS												
01020401	Survey and Legal Descriptions	11	200	2,200	2	200	400				2,600	390	2,990
01020402	Title Evidence	11	200	2,200	2	200	400				2,600	390	2,990
01020403	Negotiations	10	200	2,000	1	200	200				2,200	330	2,530
	SUBTOTAL										34,000	5,100	39,100
0103------	CONDEMNATIONS												
010301---	By Government												
010302---	By Non-Federal Sponsor (NFS)	1	3,000	3,000							3,000	450	3,450
010303---	By Government on Behalf of NFS												
010304---	Review of NFS	1	500	500							500	75	575
	SUBTOTAL										3,500	525	4,025
0105------	APPRAISALS												
010501---	By Government												
010502---	By Non-Federal Sponsor (NFS)	11	750	8,250	2	2,000	4,000				12,250	1,838	14,088
010503---	By Government on Behalf of NFS												
010504---	Review of NFS	11	650	7,150	2	1,000	2,000				9,150	1,373	10,523
	SUBTOTAL										21,400	3,210	24,610
0106------	PL 91-646 ASSISTANCE												
010601---	By Government												
010602---	By Non-Federal Sponsor (NFS)	36	2,000	72,000							72,000	10,800	82,800
010603---	By Government on Behalf of NFS												
010604---	Review of NFS	36	200	7,200							7,200	1,080	8,280
	SUBTOTAL										79,200	11,880	91,080
0107------	TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701---	By Government												
010702---	By Non-Federal Sponsor (NFS)												
010703---	By Government on Behalf of NFS												
010704---	Review of NFS												
010705---	Other												
010706---	Damage Claims												
	SUBTOTAL												
0115------	REAL ESTATE PAYMENTS												
011501---	Land Payments												
01150101	By Government												
01150102	By Non-Federal Sponsor (NFS)										970,100	242,525	1,212,625
01150103	By Government on Behalf of NFS												
01150104	Review of NFS	11	200	2,200	2	200	400		200		2,600	390	2,990
011502---	PL 91-646 Assistance Payments												
01150201	By Government												
01150202	By Non-Federal Sponsor (NFS)										437,250	43,725	480,975
01150203	By Government on Behalf of NFS												
01150204	Review of NFS	36	200	7,200		200			200		7,200	1,080	8,280
011503---	Damage Payments												
01150301	By Government												
01150302	By Non-Federal Sponsor (NFS)												
01150303	By Government on Behalf of NFS												
01150304	Review of NFS												
	SUBTOTAL										1,417,150	287,720	1,704,870
Account 02 Facility/Utility Relocations (Construction cost only)													
			REAL ESTATE ACQUISITION TOTAL								$1,555,250	$308,435	$1,863,685

EXHIBIT D

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

Bloomsburg Local Flood Protection Project
Bloomsburg, Pennsylvania
Feasibility Study Real Estate Plan

I. <u>Legal Authority</u>:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?

Yes, the non-Federal Sponsor (NFS) for this feasibility study, the Town of Bloomsburg, has the authority to acquire and hold title to real property for project purposes, including areas outside the Town's municipal limits. The project is located in the municipalities of the Town of Bloomsburg, Montour Township, and Hemlock Township. The NFS is considering the formation of a municipal flood protection authority in accordance with Pennsylvania State laws. Such a flood protection authority would also have the necessary authority to acquire and hold title to real property.

b. Does the sponsor have the power of eminent domain for this project?

Yes, with the exception of real property owned by another municipality. The project will require easement acquisitions on portions of approximately 8 unimproved parcels owned by Hemlock Township, over which the NFS does not have eminent domain authority.

c. Does the sponsor have "quick-take" authority for this project?

After filing a Declaration of Taking and depositing the estimated just compensation with the court, possession is granted within a period of 72 hours to 45 days, depending on whether preliminary objection resolution is required.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary?

Yes, as noted above, portions of the project are in Montour and Hemlock Townships.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?

The Town would have condemnation authority over the entire project area with the exception of parcels owned by Hemlock Township.

b. Has the sponsor approved the project/real estate schedule/milestones?

Yes.

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?

N/A. Neither the Town of Bloomsburg nor SEDA-COG have been involved in any other USACE projects.

b. With regard to this project, the sponsor is anticipated to be:

Fully capable.

V. Coordination:

a. Has this assessment been coordinated with the sponsor?

Yes.

b. Does the sponsor concur with this assessment?

Yes.

Prepared by:

Adam Oestreich

Adam Oestreich
Realty Specialist

Reviewed and approved by:

Nina Kelley

Nina Kelley
Chief, Civil Projects Support Branch
Real Estate Division

EXHIBIT D

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

Bloomsburg Local Flood Protection Project
Bloomsburg, Pennsylvania
Feasibility Study Real Estate Plan

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?

Yes, the non-Federal Sponsor (NFS) for this feasibility study, the Town of Bloomsburg, has the authority to acquire and hold title to real property for project purposes, including areas outside the Town's municipal limits. The project is located in the municipalities of the Town of Bloomsburg, Montour Township, and Hemlock Township. The NFS is considering the formation of a municipal flood protection authority in accordance with Pennsylvania State laws. Such a flood protection authority would also have the necessary authority to acquire and hold title to real property.

b. Does the sponsor have the power of eminent domain for this project?

Yes, with the exception of real property owned by another municipality. The project will require easement acquisitions on portions of approximately 8 unimproved parcels owned by Hemlock Township, over which the NFS does not have eminent domain authority.

c. Does the sponsor have "quick-take" authority for this project?

After filing a Declaration of Taking and depositing the estimated just compensation with the court, possession is granted within a period of 72 hours to 45 days, depending on whether preliminary objection resolution is required.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary?

Yes, as noted above, portions of the project are in Montour and Hemlock Townships.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?

The Town would have condemnation authority over the entire project area with the exception of parcels owned by Hemlock Township.

b. Has the sponsor approved the project/real estate schedule/milestones?

Yes.

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?

N/A. Neither the Town of Bloomsburg nor SEDA-COG have been involved in any other USACE projects.

b. With regard to this project, the sponsor is anticipated to be:

Fully capable.

V. Coordination:

a. Has this assessment been coordinated with the sponsor?

Yes.

b. Does the sponsor concur with this assessment?

Yes.

Prepared by:

Adam Oestreich

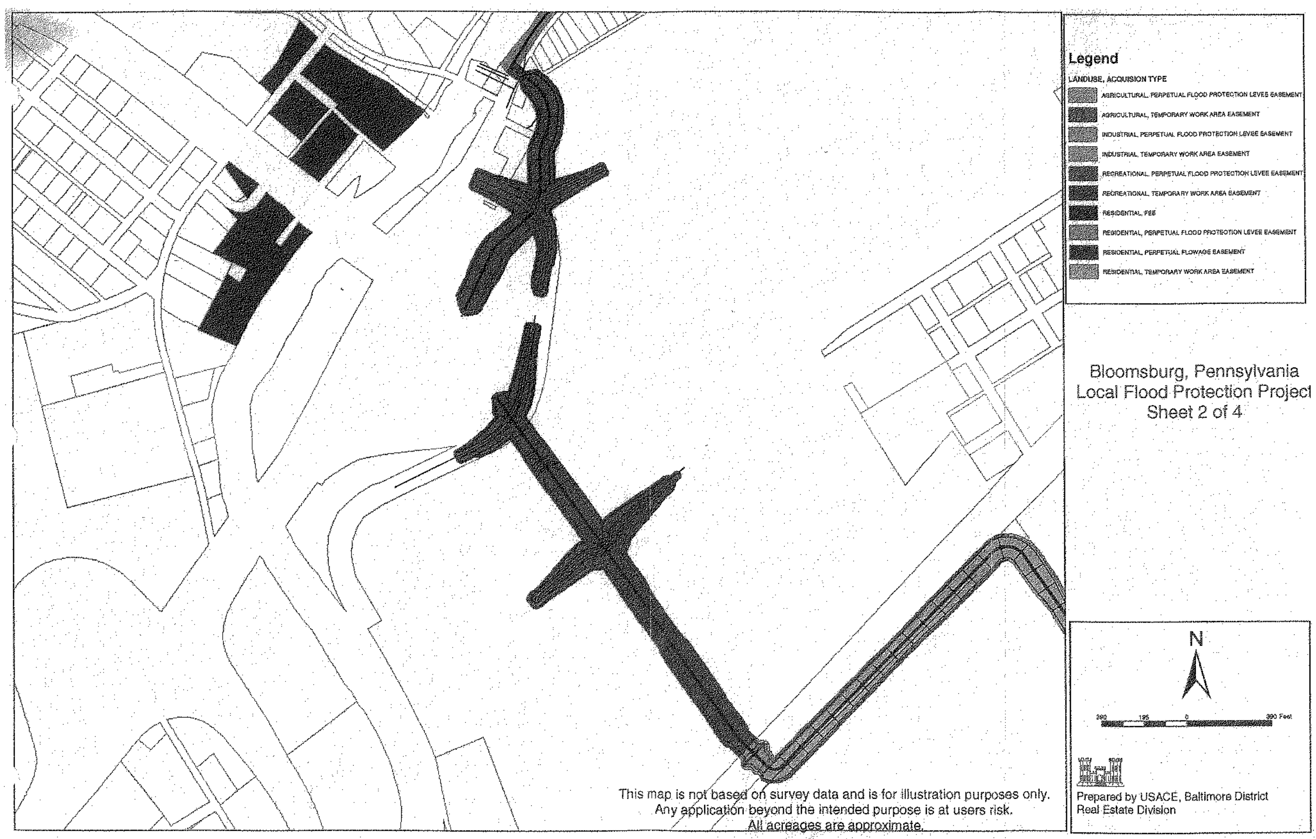
Adam Oestreich
Realty Specialist

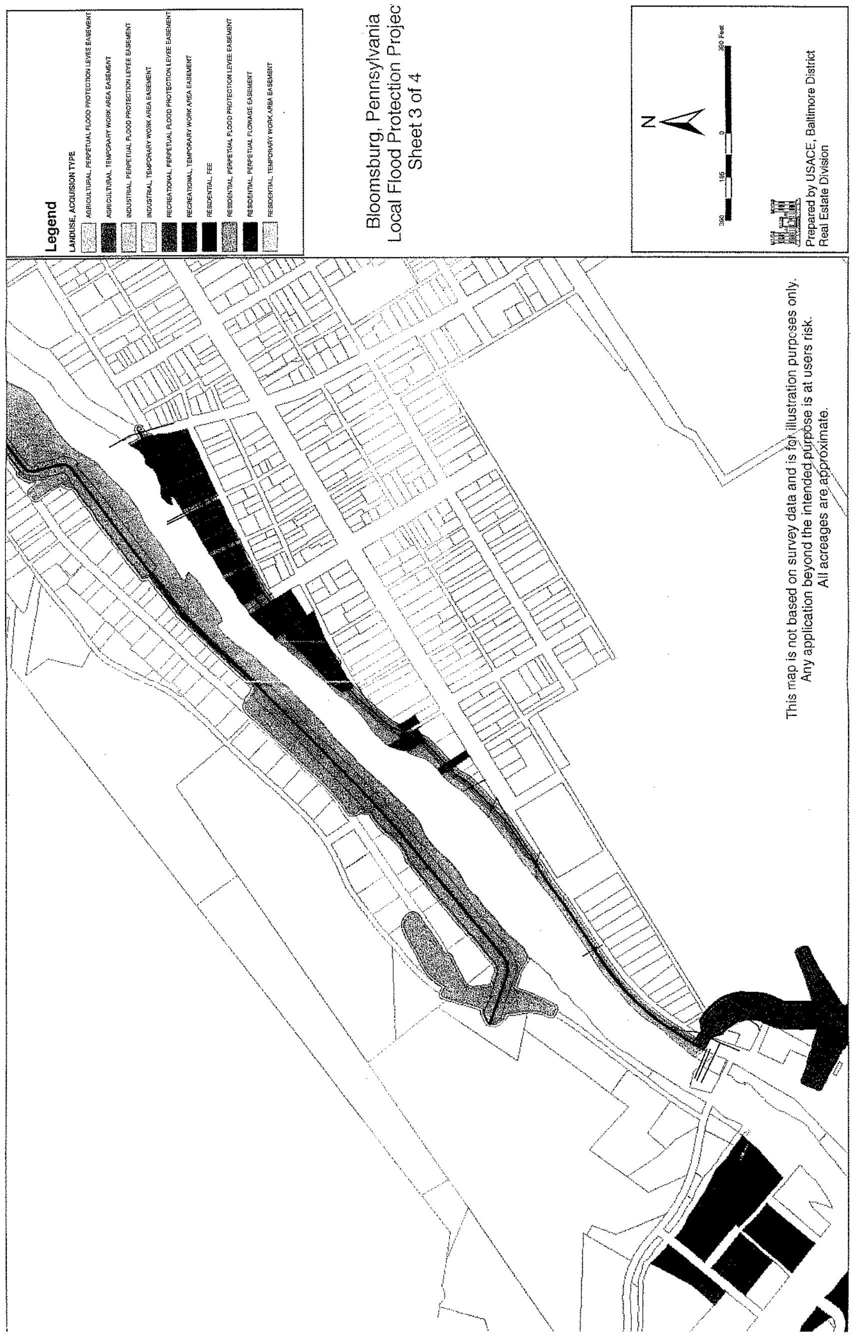
Reviewed and approved by:

Nina Kelley

Nina Kelley
Chief, Civil Projects Support Branch
Real Estate Division


Legend
LANDUSE, ACQUISION TYPE
AGRICULTURAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
AGRICULTURAL, TEMPORARY WORK AREA EASEMENT
INDUSTRIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
INDUSTRIAL, TEMPORARY WORK AREA EASEMENT
RECREATIONAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
RECREATIONAL, TEMPORARY WORK AREA EASEMENT
RESIDENTIAL, FEE
RESIDENTIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
RESIDENTIAL, PERPETUAL FLOWAGE EASEMENT
RESIDENTIAL, TEMPORARY WORK AREA EASEMENT
Bloomsburg, Pennsylvania
Local Flood Protection Project
Sheet 1 of 4
N
390 195 0 390 Feet
Prepared by USACE, Baltimore District
Real Estate Division
This map is not based on survey data and is for illustration purposes only.
Any application beyond the intended purpose is at users risk.
All acreages are approximate.


Legend
LANDUSE, ACQUISITION TYPE
AGRICULTURAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
AGRICULTURAL, TEMPORARY WORK AREA EASEMENT
INDUSTRIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
INDUSTRIAL, TEMPORARY WORK AREA EASEMENT
RECREATIONAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
RECREATIONAL, TEMPORARY WORK AREA EASEMENT
RESIDENTIAL, FEE
RESIDENTIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
RESIDENTIAL, PERPETUAL FLOWAGE EASEMENT
RESIDENTIAL, TEMPORARY WORK AREA EASEMENT
Bloomsburg, Pennsylvania
Local Flood Protection Project
Sheet 2 of 4
N
Prepared by USACE, Baltimore District
Real Estate Division
This map is not based on survey data and is for illustration purposes only.
Any application beyond the intended purpose is at users risk.
All acreages are approximate.


Legend
LANDUSE, ACQUISITION TYPE
AGRICULTURAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
AGRICULTURAL, TEMPORARY WORK AREA EASEMENT
INDUSTRIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
INDUSTRIAL, TEMPORARY WORK AREA EASEMENT
RECREATIONAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
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RESIDENTIAL, TEMPORARY WORK AREA EASEMENT
Bloomsburg, Pennsylvania
Local Flood Protection Projec
Sheet 3 of 4
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390 Feet
Prepared by USACE, Baltimore District
Real Estate Division
This map is not based on survey data and is for illustration purposes only.
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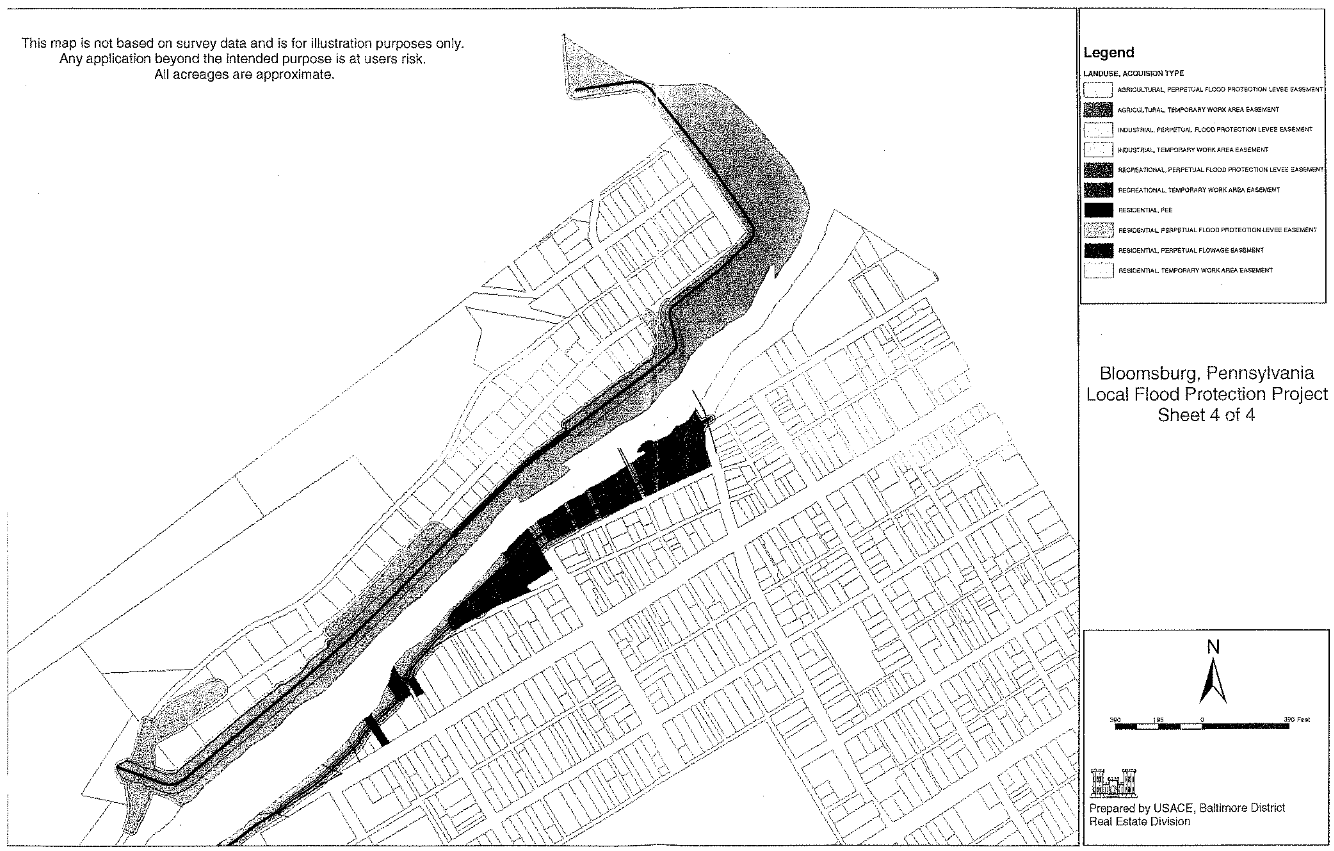
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LANDUSE, ACQUISION TYPE
AGRICULTURAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
AGRICULTURAL, TEMPORARY WORK AREA EASEMENT
INDUSTRIAL, PERPETUAL FLOOD PROTECTION LEVEE EASEMENT
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Bloomsburg, Pennsylvania
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Sheet 4 of 4
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390 195 0 390 Feet
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