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105th Congress, 2d Session – – – – – – – – – – – – – House Document 105–235

# STREAMBANK EROSION PROTECTION PROJECT

## COMMUNICATION

FROM

## THE ACTING ASSISTANT SECRETARY (CIVIL WORKS) THE DEPARTMENT OF THE ARMY

TRANSMITTING

A REPORT REGARDING AUTHORIZATION OF A STREAMBANK EROSION PROTECTION PROJECT FOR THE WABASH RIVER AT NEW HARMONY, INDIANA, PURSUANT TO PUB. L. 104–303, SEC. 101(b)(10)

MARCH 25, 1998.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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# LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

19 MAR 1998

REPLY TO
ATTENTION OF

Honorable Newt Gingrich
Speaker of the House
of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

Section 101(b)(10) of the Water Resources Development Act of 1996 authorized a streambank erosion protection project for the Wabash River at New Harmony, Indiana. However, since the erosion problems at New Harmony are a non-Federal responsibility, the project would receive a low budget priority. Therefore, it is not likely that funding for this project will be included in future budget requests.

The authorized project is described in the report of the Chief of Engineers dated December 23, 1996, which includes other pertinent reports and comments. These reports are in response to direction provided in the Conference report and Senate Committee report that accompanied the Energy and Water Development Appropriations Act of Fiscal Year 1995.

The views of the State of Indiana and the Department of the Interior are set forth in the enclosed report.

The authorized project consists of measures to stabilize the left bank of the Wabash River for a distance of about 4,800 feet to prevent erosion-related damage to structures and facilities in the historic town of New Harmony. Structures at New Harmony are currently located about 1,000 feet away from the river bank. Historically, the average rate of erosion at New Harmony is about 52 feet per year.

The project for New Harmony is authorized subject to cost sharing consistent with the Water Resources Development Act of 1986. Based on October 1995 price levels, the total first cost of the authorized project is estimated at $2,983,000, with a Federal cost of about $2,237,000, and a non-Federal cost of about $746,000.

The erosion of streambanks in developed areas is a common occurrence. With limited exceptions — such as where needed to provide emergency protection for public facilities that are necessary for public health, welfare, or vital public services — preventing streambanks from eroding should be a local responsibility. Most of the structures in New Harmony that the project was developed to protect do not provide vital public services, and the project does not otherwise appear to warrant an exception to the general rule that such work is a non-Federal responsibility.

The Office of Management and Budget advises that there is no objection to submitting this report to the Congress for information. A copy of its letter is enclosed in the report.

Sincerely,

John H. Zirschky
Acting Assistant Secretary of the Army
(Civil Works)

Enclosure

# COMMENTS OF THE OFFICE OF MANAGEMENT AND BUDGET

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

OCT 22 1997

The Honorable John H. Zirschky
Acting Assistant Secretary of the
Army for Civil Works
Pentagon - Room 2E570
Washington, D.C. 20310-0108

Dear Dr. Zirschky:

As required by Executive Order 12322, we have completed our review of Assistant Secretary Lancaster's recommendation for the report of New Harmony, Indiana.

The Office of Management and Budget does not object to submission of this report to Congress. However, please indicate in your letter of transmittal that the Administration does not support funding for this project because streambank erosion control is a local responsibility.

Sincerely,

T.J. Glauthier
Associate Director
Natural Resources,
Energy and Science

## COMMENTS OF THE STATE OF INDIANA

INDIANA DEPARTMENT OF NATURAL RESOURCES PATRICK R. RALSTON, DIRECTOR

Division of Water
402 W. Washington St., Rm. W264
Indianapolis, Indiana 46204-2748
317-232-4160
FAX: 317-233-4579

December 10, 1996

Department of the Army - U.S. Army Corps of Engineers
Policy Review Branch, Policy Division
Attn: CECW-AR (SA)
JoAnn Duman
7701 Telegraph Rd.
Alexandria, VA 22315-3861

RE: Final Feasibility Report
Wabash River Streambank Erosion
New Harmony, IN

Dear Ms. Duman:

In response to the October 25, 1996 letter to the Indiana "single point of contact for review of federal programs", please accept the following response: the State of Indiana acting through the Indiana Department of Natural Resources (IDNR) has been an active participant in all previous attempts to control the bank erosion along the Wabash River at New Harmony. The erosion is continuing, outflanking the existing control system and is rapidly impinging on the historic Town of New Harmony.

Further, the State is acting as the "local sponsor" to the COE for the Feasibility Study. Pursuant to this, staff at the IDNR have reviewed and submitted comments regarding the Feasibility Report. It is the position of the IDNR that the COE project is crucial and must proceed in an expedient manner to insure the continued preservation of New Harmony. The State, therefore, strongly concurs and endorses the COE study and proposed project.

Should you have any further questions regarding the State of Indiana's review and project involvement, please contact the IDNR - Division of Water, in specific, the Project Development Section at (317)232-4162.

Sincerely,

Patrick R. Ralston

Patrick R. Ralston
Director

PRR/KES/RAK

cc: Ms. Frances E. Williams, Indiana State Budget Agency

# COMMENTS OF THE DEPARTMENT OF INTERIOR

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

ER-96/707

NOV 20 1996

Mr. Raleigh H. Leef
Acting Chief, Policy Division
Directorate of Civil Works
ATTN: CECW-AR (SA)
7701 Telegraph Road
Alexandria, VA 22315-3861

Dear Mr. Leef:

The Department of the Interior (Department) has reviewed the Chief of Engineers Proposed Report and accompanying Final Feasibility Report for the Wabash River Streambank Erosion Study, New Harmony, Posey County, Indiana. Previous input to the study includes the U.S. Fish and Wildlife Service's (FWS) Planning Aid Letter of September 8, 1995, and several subsequent letters.

Our latest input is a FWS letter of September 18, 1996, providing requested technical assistance review comments regarding the Draft Interim Feasibility Report of August 1996. This letter is included in Appendix H of the Final Feasibility Report. However, we note that there have been no changes made to the text of the report in response to the FWS's comments. The FWS wishes to reiterate its comments, particularly its concerns regarding potential project impacts on *Potamilus capax* (the fat pocketbook), a federally and State (Indiana and Illinois) listed mussel in the project area.

The project description indicates that the proposed northern limit of the riprap does not include the sites where *P. capax* were found during a 1995 survey. However, project maps indicate that an access road for transporting materials to the area is located north of the upstream terminus of the riprap. This road would follow the bank adjacent to the area where *P. capax* were found. We recommend that the project description be revised to include precautions that will be taken to safeguard against sedimentation in this area. We recommend that there should be no construction or stockpiling of materials north of the upstream terminus of the riprap. The access road, particularly above the upstream terminus of the riprap, should be located as far landward from the bank as possible to minimize sedimentation.

Our concerns regarding potential project impacts on *P. capax* will be resolved provided that: 1) all riprap is placed south of the area where *P. capax* were found, and 2) adequate precautions are taken to avoid erosion and sedimentation in the area where *P. capax* were found. With the inclusion of these recommended

protection measures for *P. capax*, the Department would have no objection to implementation of the recommended plan described in the Chief Proposed Report. The FWS would also like to reiterate its comments regarding soil disposal and tree planting in the project area. These comments can be found in its letter of September 18, 1996.

If you have any questions regarding these comments or require additional technical assistance on fish and wildlife resource matters related to the described project, please contact Mr. David Hudak, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121 -- Telephone: (812) 334-4261.

Thank you for providing us the opportunity to comment on the Chief of Engineers Proposed Report and Final Feasibility Report.

Sincerely,

Kenneth D Fraser

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

cc: Robert G. Fuller, Chief
Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

# LETTER TO THE DEPARTMENT OF THE INTERIOR

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

Planning Division
Central Planning Management Branch

18 DEC 1996

Dr. Willie R. Taylor
Director
Office of Environmental Policy
and Compliance
U. S. Department of the Interior
Washington, D.C. 20240

Dear Dr. Taylor:

Thank you for your letter of November 20, 1996, concerning the review of the Chief of Engineer's proposed report and the accompanying final feasibility report on streambank erosion for New Harmony, Indiana. You indicated that the final report did not address the U.S Fish and Wildlife Service's recommendations on the draft report directed at protecting the endangered fat pocketbook mussel from sedimentation attributable to construction activities.

The Louisville District, Corps of Engineers, advised me that they were unable to incorporate the U.S. Fish and wildlife Service's comments dated September 18, 1996, into the project prior to submission of the final report on September 30th. The District has assured me that they will make every effort to accommodate the U. S. Fish and Wildlife Service's recommendations during the preparation of plans and specifications for the project.

Sincerely,

G. EDWARD DICKEY
Chief, Planning Division
Directorate of Civil Works

# STREAMBANK EROSION PROTECTION PROJECT

## REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

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

REPLY TO
ATTENTION OF:

CECW-PC (10-1-7a) 23 DEC 1996

SUBJECT: New Harmony, Indiana (Wabash River)

THE SECRETARY OF THE ARMY

1. I submit for transmission to the Congress my report on streambank protection measures along the Wabash River at New Harmony, Indiana. It is accompanied by the report of the district and division engineers. These reports are in response to the direction provided in the Conference report and Senate committee report that accompanied the Fiscal Year 1995 Energy and Water Development Appropriations Act, approved 26 August 1994.

2. Section 101(b)(10) of the Water Resources Development Act (WRDA) of 1996 authorized construction of a project for streambank protection at New Harmony, Indiana, subject to completion of a final report of the U.S. Army Corps of Engineers on or before 31 December 1996, and subject to the conditions recommended in that final report. This report constitutes the final report of the Corps required by Section 101(b) of WRDA 1996.

3. The authorized project consists of placing stone protection along the left bank of the Wabash River beginning at a point approximately 3100 feet (950 meters) upstream of the State Road 66/U.S. Route 460 bridge at New Harmony and continuing upstream for a distance of 4800 feet (1470 meters). The project will prevent erosion-related damage to structures and facilities located along the Wabash River in the historic town of New Harmony. The first cost of the recommended plan, based on October 1995 price levels, is estimated at $2,983,000. The Federal share of the project is $2,237,000 and the non-Federal share is $746,000 based on the cost sharing requirements of Section 103(a) of WRDA 1986. WRDA 1986 cost sharing is applicable based on the provision of Section 202(a) of WRDA 1996 that the amended cost sharing requirements of WRDA 1996 apply to projects authorized after the date of enactment of the Act.

4. The recommended plan is the national economic development plan. Average annual economic costs, based on an interest rate of 7-5/8 percent and a 50-year period of analysis, are $248,000 including $5,000 for operation and maintenance. The average annual economic benefits attributable to protecting public and private non-profit structures and facilities and significant cultural resources are estimated at $294,000, with net annual benefits of $46,000 and a benefit-to-cost ratio of 1.2. Total average annual economic benefits, including incidental benefits attributable to protecting private structures and facilities, are estimated at $510,000, with net annual benefits of $262,000 and a benefit-to-cost ratio of 2.1.

5. Absent specific congressional authorization, Corps participation in streambank protection is limited to the continuing authority provided by Section 14 of the 1946 Flood Control Act, as amended. Projects implemented under the section 14 authority are subject to a Federal cost limit of $1,000,000 and are prioritized to address emergency situations where public and private non-profit facilities and services and significant cultural resources are threatened. The recommended plan for New Harmony protects private and public property, including significant cultural resources, and is economically justified based solely on benefits to those developments eligible for assistance under section 14. However, the proposed project exceeds the section 14 Federal project cost limitation and the erosion threat is not imminent. Deferring project implementation until the threat is imminent significantly increases project costs, but does not significantly change net benefits. Federal involvement in the proposed project and implementation schedule is warranted based on the protection of public and private non-profit development, the protection of significant cultural resources, and economic efficiency.

6. Washington level review indicates that the proposed plan is technically sound, economically justified, and environmentally and socially acceptable. The proposed project complies with applicable Corps planning procedures and regulations. Also, the views of interested parties, including Federal, State, and local agencies have been considered.

7. Accordingly, I concur in the findings, conclusions, and recommendations of the reporting officers. Federal implementation of the authorized project is also subject to the non-Federal sponsor agreeing to comply with all applicable Federal laws and policies, and to be responsible for the following items of local cooperation.

a. Provide a minimum of 25 percent, but not to exceed 50 percent of total project costs as further specified below:

(1) Provide, during construction, a cash contribution equal to 5 percent of total project costs;

(2) 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;

(3) 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

(4) Provide during construction any additional costs as necessary to make its total contribution equal to 25 percent of total project costs.

b. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government.

c. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.

d. Assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the project or completed functional portions of the project, including mitigation and recreation features without cost to the Government, in a manner compatible with the project's authorized purpose and in accordance with applicable Federal and State laws and specific directions prescribed by the Government in the OMRR&R manual and any subsequent amendments thereto.

e. 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.

f. Hold and save the Government free from all damages arising for 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 Government or the Government's contractors.

g. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.

h. Perform, or cause to be performed, 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), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.

i. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project.

j. 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.

k. Prevent future encroachments on project lands, easements, and rights-of-way which might interfere with the proper functioning of the project.

l. 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, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

m. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, 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".

n. Provide 25 percent of that portion of total cultural resource preservation mitigation and data recovery costs attributable to streambank protection that are in excess of one percent of the total amount authorized to be appropriated for streambank protection.

JOE N. ELLARD
Lieutenant General, USA
Chief of Engineers

# REPORT OF THE DISTRICT ENGINEER

## SYLLABUS

This report presents the results of a feasibility study of streambank erosion problems along the Wabash River at New Harmony, Indiana. This study was authorized, and funds were appropriated by the United States Congress in response to past and present erosion problems that could, in the future, threaten many private and public buildings and grounds within this historic community.

The study area is located in Posey County in southwestern Indiana along the left bank of the Wabash River at approximate River Mile 51.3 (km 82). The streambank erosion problems at New Harmony have been a source of concern for many decades. Continuing erosion will eventually threaten the many culturally and historically significant structures in the community as well as utilities and roads. The estimated value of the public property in the North Street area is about $7.3 M. Beyond the monetary value of the property to be protected, the community is of particular note for its contributions to American intellectual history.

Alternative methods of providing bank protection have been addressed in previous studies. A special streambank erosion report was conducted under the Corps Planning Assistance to States program in 1983. In 1992, an Initial Assesment was completed under the authority of Section 14 of the 1946 Flood Control Act. Three alternatives were investigated for this current feasibility study and are discussed in detail in Section IV of this study. The two structural plans evaluated were commercially available cellular concrete mats and riprap. Of those two, Plan 2, stone protection was selected as the least costly, effective solution to the bank erosion problem and is also the NED plan. The project begins approximately 950 meters (3,100 feet) upstream of the Indiana State Road 66 bridge and continues for a distance of 1470 meters upstream. This plan is economically feasible, implementable from an engineering standpoint, environmentally sound and has a willing sponsor. The estimated total cost for this plan is $2.98 million dollars. The B/C ratio is 1.2.

# Wabash River
# New Harmony, Indiana
# Streambank Erosion Study

## Final Feasibility Report

### I. INTRODUCTION

This report presents the results of a feasibility study of streambank erosion problems along the Wabash River at New Harmony, Indiana. This study was authorized, and funds were appropriated by the United States Congress in response to past and present erosion problems that could, in the future, threaten many private and public buildings and grounds within this historic community.

This feasibility report includes the authorization for the study; a discussion of the study purpose and scope; a discussion of prior studies, reports, and existing erosion control measures; the plan formulation process; the evaluation of alternative plans; a detailed description of the recommended plan; an assessment of local support, and conclusions and recommendations of the study.

#### A. Study Authority

This General Investigation study is funded under the Energy and Water Development Appropriations Act, 1995 (Public Law 103-316, 108 Stat. 1707) dated August 26, 1994.

Senate Report 103-291, dated June 7, 1994 reads as follows:

"The Committee recommendation includes $300,000 for the Corps of Engineers to initiate a feasibility study of the streambank erosion problems along the Wabash River in New Harmony, IN. The Committee understands that a favorable reconnaissance study was completed in 1992 and additional feasibility work is needed to determine the best solution to the erosion problems"

Conference Report (to accompany H.R. 4506), dated August 4, 1994, included $200,000 for completion of this study.

A feasibility Cost Sharing Agreement (FCSA) was entered into in March 1995 between the U.S. Army Corps of Engineers and the Indiana Department of Natural Resources.

B. Study Purpose and Scope

The purpose of this study is to investigate the feasibility and the extent of Federal interest in providing a solution to the streambank erosion problem occurring along the Wabash River at New Harmony, Indiana. This involves an evaluation of alternative methods of preventing river erosion damages to the community of New Harmony. Details of existing bank protection measures will be discussed further in subsequent sections of this report. Since the project involves a straight forward, non-complex bank stabilization, a separate Design Memorandum (DM) will not be done. A request for waiver of a DM was coordinated with and approved by the Ohio River Division by correspondence dated 14 August 1996. This report and supporting data provide all of the engineering data on the selected alternative sufficient to initiate preparation of plans and specifications. Plate 1 shows the relative location of New Harmony in the Wabash Basin. Plates 2 & 2A show the study area.

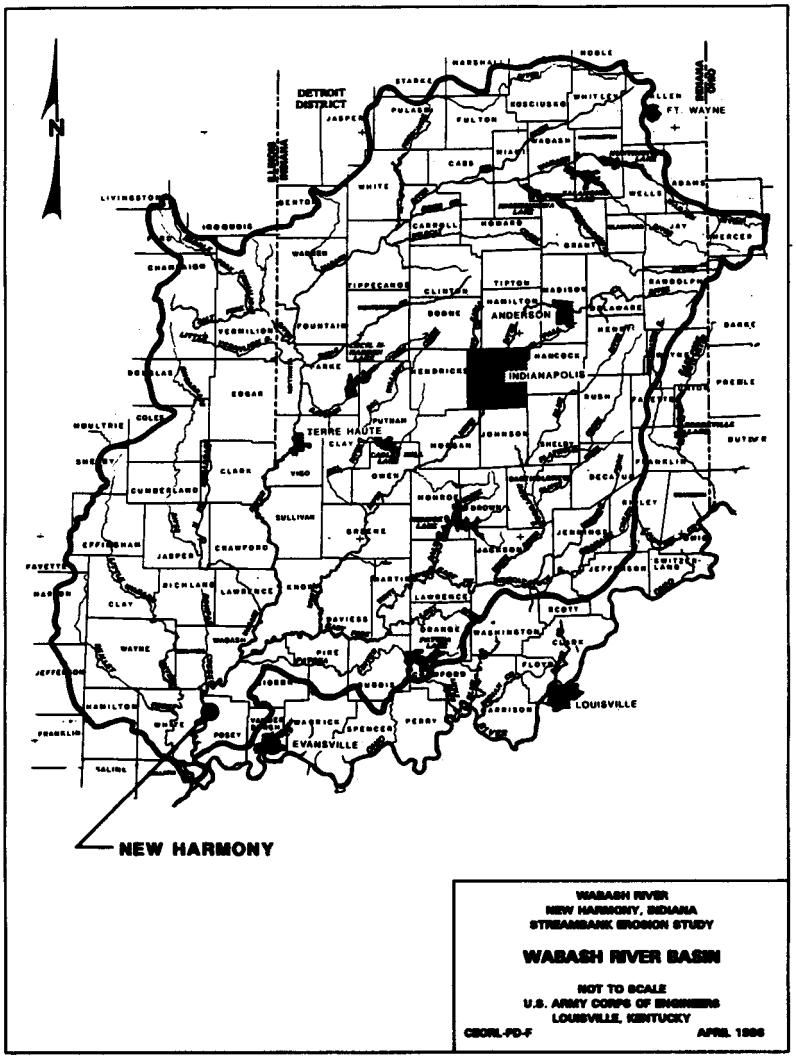
C. Report and Study Process

This report presents the results of the feasibility study, and is prepared in response to the authority previously cited. The report is intended to be sufficient to serve as the decision document for federal involvement in construction of the recommended plan.

D. Study Participants and Coordination

This study is being performed in partnership with the Indiana Department of Natural Resources. Fifty percent of the total study cost was provided by IDNR in the form of cash and in-kind services. Management of the study effort was overseen by an Executive Committee consisting of: Chief, Planning Division, Louisville District, U.S. Army Corps of engineers; Deputy District Engineer for Project Management; and the Director of the Indiana Department of Natural Resources. Staff level management and the technical input for the study was provided by a study team consisting of representatives from technical elements of the Corps' Louisville District and the Indiana Department of Natural Resources, Division of Water.

Coordination with other Federal agencies, Congressional representatives, Indiana Department of Natural Resources, and local interests has been maintained since initiation of the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DETROIT DISTRICT
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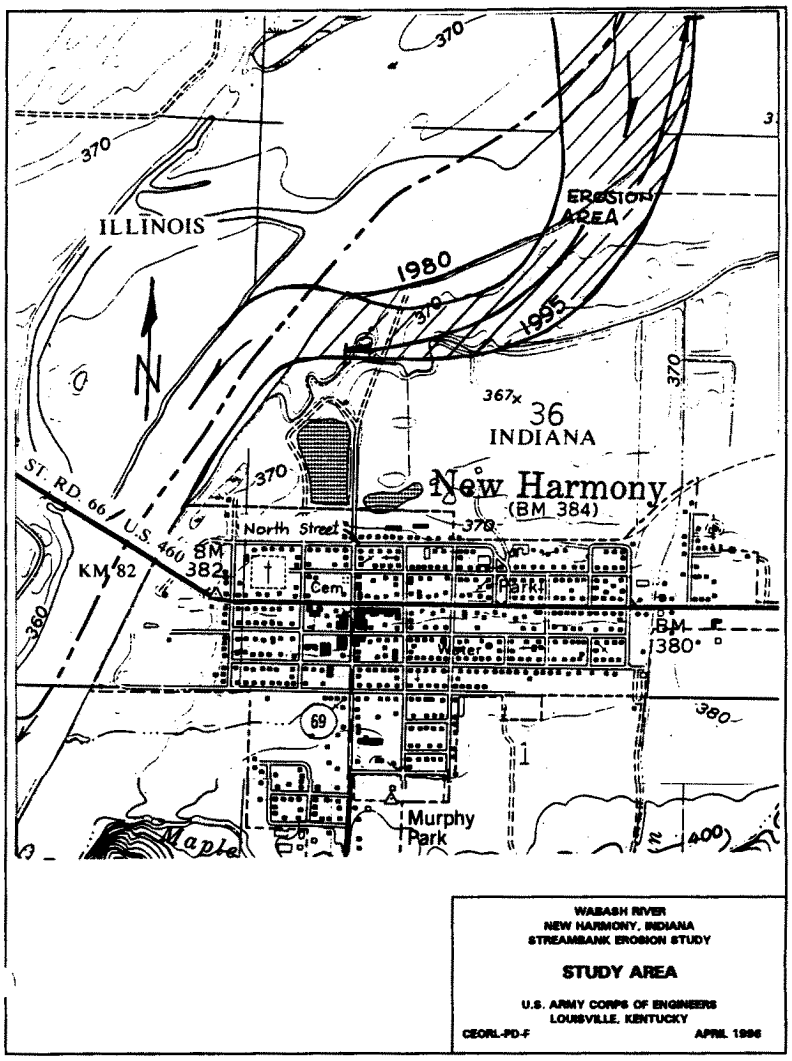
NEW HARMONY
WABASH RIVER
NEW HARMONY, INDIANA
STREAMBANK EROSION STUDY
WABASH RIVER BASIN
NOT TO SCALE
U.S. ARMY CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY
CEORL-PD-F
APRIL 1986

Plate 1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(BM 384)
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North Street
BM 382
KM 82
Cem
Park
Water
BM 380
380
69
Murphy Park
Maple
400
WABASH RIVER
NEW HARMONY, INDIANA
STREAMBANK EROSION STUDY
STUDY AREA
U.S. ARMY CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY
CEORL-PD-F
APRIL 1996

WABASH RIVER
NEW HARMONY INDIANA
STREAMBANK EROSION STUDY

**STUDY AREA**

U S ARMY CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

CEORL-PD-F APRIL 1996

Plate 2A

study. An initial meeting was held in New Harmony, Indiana on December 6, 1994 to discuss the purpose and scope of the study. An interim meeting was held on July 27, 1995 to present an update on study progress. A final public meeting was held in New Hamony on 29 August 1996 to present the results of the study and provide an opportunity for comment (see Appendix J, Coordination). Consultation was initiated early in the study process with the Waterways Experiment Station (WES) and the U.S. Fish and Wildlife Service. A representative from WES attended the initial meeting in New Harmony and conducted a site visit of the area. A report from WES is contained in this report. The U.S. Fish and Wildlife Service's comments and recommendations are addressed in subsequent sections. Coordination has been carried out with the Indiana Department of Natural Rsources (IDNR), Division of Water; Indiana Department of Environmental Management; IDNR, Historic Preservation Office, the White County, Illinois Bridge Commission, and the Illinois Department of Natural Resources.

E. History of Erosion Control Studies & Projects

1. Studies

The streambank erosion problem at New Harmony has been a source of concern for many decades. In the early 1970s the Louisville District investigated the problem with regard to protecting an unpaved public road along the east (left) bank of the Wabash River from New Harmony north about one mile. No action was taken as a result of the study since relocation of the road was found to be the most economically viable solution. The road has subsequently been eroded away.

More recent studies of the problem are as follows.

Spacial Streambank Erosion Report - 1983

This study was conducted under the Corps of Engineers' Planning Assistance to States program (Section 22 of Public Law 93-251, 1974 Water Resources Development Act) at the request of the Indiana Department of Natural Resources. The purpose of the study was to provide preliminary cost estimates for measures to halt the streambank erosion. Eight plans were considered in the report. The construction cost of the plans ranged from about $1,800,000 to $3,700,000 in 1983 dollars. The plan identified as Plan 8 in the 1983 report was believed to be the best plan considered for the town of New Harmony. This plan consisted of placed quarry stone along a 2130 meter (7000 ft). reach of River Bank and was estimated to cost $2,100,000 in 1983 dollars.

Initial Assessment Report - 1992

This study was completed under the authority provided by Section 14 of the 1946 Flood Control Act, as amended. There were

four alternatives considered for this report including a no-action plan and a pilot channel. It was determined that Plan 3 was the most effective way to address the problem. This plan consisted of providing riprap protection for approximately 1600 feet along the Wabash River, just downstream of the new mouth of Gresham Creek formed by the erosion. The riprap would then be extended along the left bank of Gresham Creek for a distance of about 610 meters (2000 feet). The estimated cost of Plan 3 was $1,130,000 in 1992 dollars. The study concluded that at that time there was no imminent threat to public facilities at New Harmony. Therefore, Section 14 authority was not applicable.

2. Projects

In 1986, the State of Indiana constructed a bank protection project consisting of a jetty system made of cargo netting and steel poles which was designed and installed by a private company. The total length of the project was 2000 meters (6600 feet). This permeable fence jetty system was designed to decrease flow rates of the Wabash River adjacent to the bank to cause sedimentation deposition on the previously eroded bank. Between 1986 and 1991 part of the system was damaged by erosion and river debris. A major rebuild (about 50% of the original project) was completed in 1991. The total length of this system is about 1600 meters (5300 feet).

The existing jetty system has reduced erosion rates from their pre-1986 levels in some locations, but the system is continuing to experience severe degradation. The river has outflanked the jetty system at the downstream end of the proposed project and has also started outflanking numerous landward poles throughout the middle reach of the system. Also, during high water, logs and fallen trees have caused damage to the jetties. Another reason for the failure of the system to perform as expected is the low sediment volume carried by the Wabash River. Except during floods, the main sediment carried is silt and clay particles which do not as easily settle as sand or gravel. It is anticipated that future high flood events would likely cause significantly more damage to the jetty system.

## II. STUDY AREA DESCRIPTION

### A. General Characteristics.

1. Community Description

The historic town of New Harmony, is located in Posey County in southwestern Indiana along the left bank of the Wabash River at approximate River Mile 51.3 (km 82). The town is about 120 miles southwest of Louisville, Kentucky and seven miles south of I-64. The town was founded in 1814 by members of the Harmony Society, a religous sect which had split off from the Lutheran Church in Germany. Members of the Society were known as

Rappites, after their leader Father George Rapp. The Society built a town which grew to nearly 1,000 citizens and prospered for several years in the Indiana Territory. Fearful that prosperity might lead to worldliness and therefore weaken their societal goals, the Rappites sold the town in 1824 to social reformer and industrialist Robert Owen. The community was to make significant contributions to Indiana history over the next forty years. Robert Dale Owen served in Congress and was a delegate to the state convention of 1850. David Dale Owen became the United States Geologist in 1839, and New Harmony was the home of the U.S. Geological Survey until 1856. The Owenites constructed houses, laboratories and public buildings some of which still exist. New Harmony is composed of restored historic buildings from various eras and a number of newer structures illustrating contemporary architecture. New Harmony has been listed in the National Register of Historic Places since 1960.

2. Wabash River

The Wabash River meanders considerably in its lower reaches. About 1820 the course of the Wabash River was altered by the Rappites to cut off an oxbow to provide an energy source to the community. At that time, the Wabash flowed along the perimeter of what is now Ribeye Island, just downstream of New Harmony. The Rappites realized that by diverting the flows of the river across the oxbow, they could cut off about fifteen miles of the river's normal route and harness the power to run a mill. Less than a century later, another major shift in the course of the Wabash River occurred in what is now known as the Bull Island area. This is in the upstream end of the study area. Plates 3 and 4 show the history of changes in channel alignment. Since the formation of the Bull Island cutoff the river has eroded the left streambank immediately downstream (north of New Harmony). In the 1940s a cutoff pilot channel was dredged just upstream of the highway bridge at New Harmony. The bridge is owned and operated by the White County (Illinois) Bridge Commission. The pilot channel grew in width because of erosion but most of the flow remained in the main channel. About 1958 a dike was built across the old (main) channel in an effort to force flows through the pilot channel. Emergency revetment stone was added by the White County Bridge Commission to prevent erosion on the right bank.

B. Environmental Characteristics

1. General

The following description of the environmental characteristics in the study area includes information contained in the U.S. Fish and Wildlife Service planning aid letter dated September 8, 1995.

The project area lies in the portion of the river commonly referred to as the lower Wabash River which has a shallow

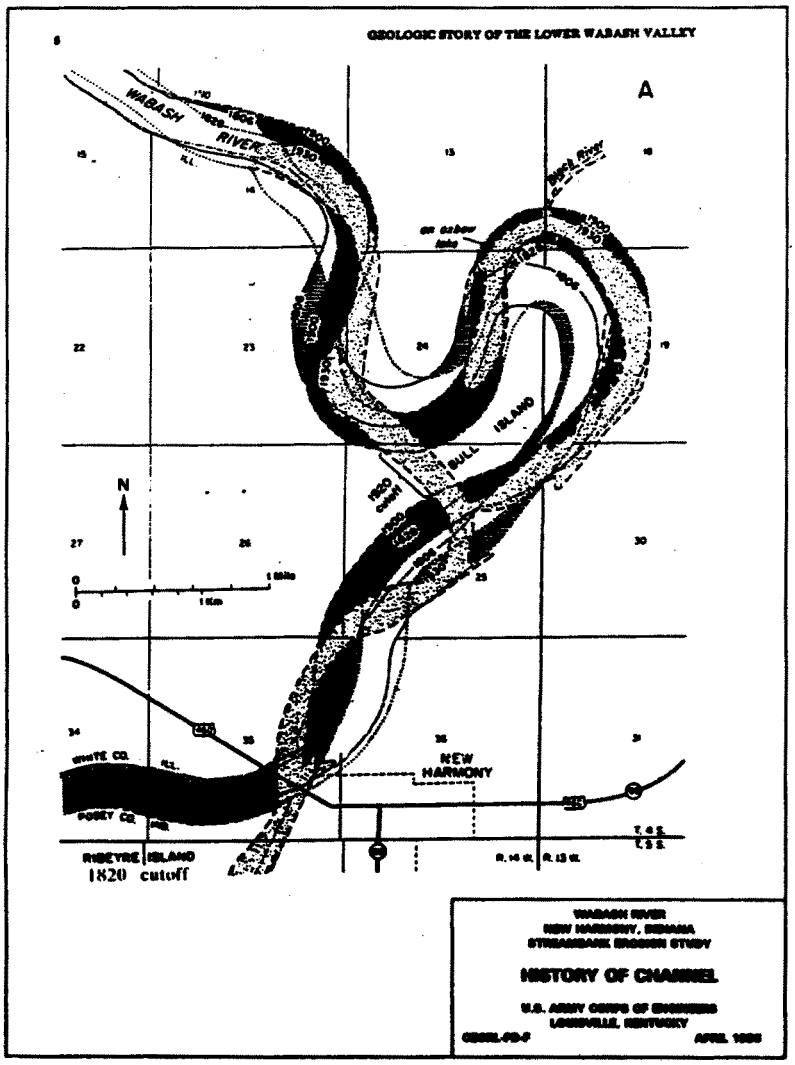

GEOLOGIC STORY OF THE LOWER WABASH VALLEY
A
WABASH
RIVER
ISLAND
BULL
N
NEW
HARMONY
WHITE CO.
POSEY CO.
RIBEYRE ISLAND
1820 cutoff
WABASH RIVER
NEW HARMONY, INDIANA
STREAMBANK EROSION STUDY
HISTORY OF CHANNEL
U.S. ARMY CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Plate 3

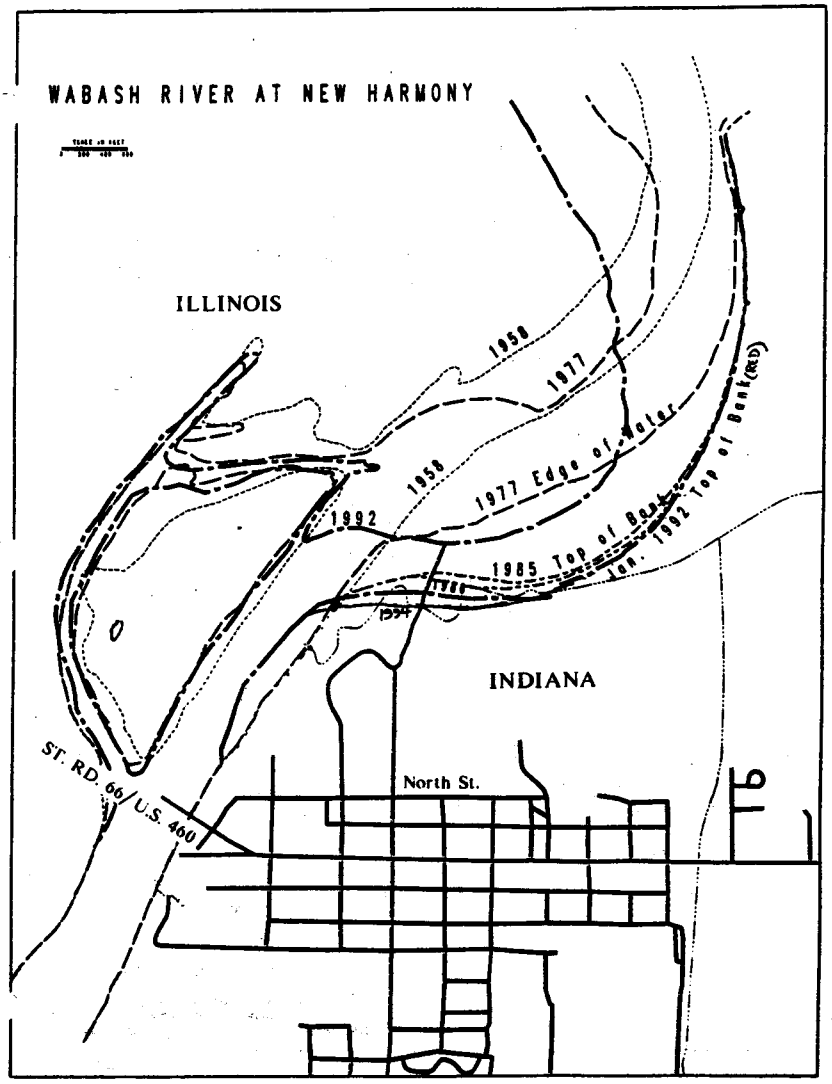

WABASH RIVER AT NEW HARMONY
ILLINOIS
INDIANA
1958
1977
1958
1977 Edge of Water
1992
1985 Top of Bank
Jan. 1992 Top of Bank(RED)
North St.
ST. RD. 66/U.S. 460

Plate 4

gradient of 0.5 feet per mile. Through continual erosion and deposition the river meanders are constantly migrating downstream. Point bars and cut banks are common, providing varied channel depths and bank characteristics. The river bottom consists principally of sand, along with silt and gravel. Virtually all of the flood plain forests of the lower Wabash Valley have been cleared. The project area is now intensively farmed with row crop agriculture being the primary use.

The lower Wabash River hosts a typical range of fish and mussel species common to large rivers. The streambank in the project area has scattered herbaceous and sapling cover. Overall, the project's proposed construction corridor sustains limited wildlife habitat.

2. Wetlands

Large blocks of wetlands or forested fish and wildlife habitat are scarce. The remaining fish and wildlife habitat exists primarily in small fragments. No wetlands will be affected by this project.

3. Threatened and Endangered Species.

The project area is within the range of the Federally and State endangered Indiana bat (myotis sodalis), bald eagle (Haliaeetus leucocephalus), least tern (Sterna antillarum anthalassos), and fat pocketbook mussel (Potamilus capax). As stated in the Fish and Wildlife Planning Aid Letter, dated September 8, 1995, potential impacts on Federally and State listed endangered fat pocketbook mussel in the project area constitutes the major concern of the FWS with regard to the proposed project. Coordination has been maintained with the FWS during the study process in order to resolve this issue. Further discussion of endangered mussel issue is contained in description of the recommended plan in Section V of this report. No threatened or endangered species will be adversely affected by the proposed project.

4. Cultural Resources.

The Community of New Harmony is of particular note for its intangible contributions to American intellectual history. The community was originally founded in 1804 by George Rapp and later sold to Scottish industrialist Robert Owens. His social experiment failed in 1826. However, despite its short life, the almost religious emphasis placed on education and self-improvement was to have a profound effect on this small town until the eve of the Civil War. Contributions to American society include the establishment of the first kindergarten, the first trade school, the first free public school, and one of the first free libraries in America.

A visual inspection of the proposed project area was undertaken by qualified Louisville District personnel on Tuesday, 11 July 1995. Field methods consisted of two (2) boat assisted traverses along the eroding banks. This effort was directed toward examining the steeply cut bank for any indication of profiled features, burials, or midden, exposed artifacts, or evidence of historic (pre-1946) construction or depositional episodes. Although the area was partially examined from the top of bank, it was not feasible to conduct a detailed study of the exposed soil due to the high (steep) angle of bank drop-off.

No evidence of prehistoric or early (pre-1946) historic era cultural materials were observed. Consistently, the only materials noted were of obviously recent origin (e.g., beverage cans, plastic milk jugs, a refrigerator, and a truck wheel and tire).

Coordination with the Indiana State Historic Preservation Officer indicated that no sites are currently known within the Indiana portion of the proposed bank protection area. It is noted, however, that seven (7) previously reported archaeological sites (12Po69, 161, 165, 206, 785, and 786, and INDOT 65-43) are situated within one (1) mile of the examined riverbank. Discussions with local residents familiar with the area indicated that they were not aware of any cultural resources along the length of the examined banks of the project.

Coordination with Mr. Michael Anslinger of the Anthropology Museum and Laboratory of Indiana State University, Terre Haute, Indiana, in August 1983 indicated that as of that date no archaeological sites had been reported within the Indiana portion of the project area. On the basis of site locational information on file in Terre Haute, Mr. Anslinger noted that the majority of sites known at that time were typically associated with: (1) well defined flood plain knolls; (2) first terraces; or (3) ridges. The relatively flat flood plain immediately adjacent to the examined shoreline conforms to none of these topographic categories.

Three additional sites being considered as potential spoil disposal areas were examined in February 1996. There were consistently negative findings at each of these parcels.

Recognizing that archaeological sites are present near the project area, the lack of any observed early artifactual materials (both prehistoric and historic) in concert with available site location information (i.e., topographic features associated with known sites) fails to build a solid case for additional cultural resource studies in the specific areas of project impact. No additional cultural resource investigations are recommended for the riverbank areas affected by the proposed bank stabilization project.

5. Hazardous, Toxic, and Radiologic Waste (HTRW)

A site reconnaissance of the project area was made by Louisville District personnel. The area was surveyed by boat and several locations were inspected more closely by foot. In addition, supplemental information was obtained from interviews with persons familiar with the site history and a review of published information. Three proposed soil disposal sites, which were suggested by New Harmony officials, were also included in the assessment.

Based on the information obtained, the probability that hazardous/toxic substances or related issues could significantly impede development of the project appears minimal. The most likely source of any hazardous, toxic, or radioactive waste (HTRW) concerns in the project area would be nonpoint source pollution from pestcides and fertilizers used on farm fields. However, it is unlikely that contamination from these sources will be encountered during construction of project features. One of the proposed disposal sites, located at the New Harmony sewage treatment plant, contains concrete, earth, brick, and rock fill material as well as a small coal pile. There is a slight potential for the presence of polynuclear aromatic hydrocarbons (PNAs) in the vicinity of the coal pile. Deatils of the site investigation are contained in the HTRW Appendix.

C. Hydraulic & Hydrologic Characteristics

1. General

The Wabash River, the second largest tributary of the Ohio River, originates in Mercer County, Ohio, about 15 miles east of the Indiana-Ohio state line. It flows in a northwesterly direction to the vicinity of Huntington, Indiana and thence westerly and southerly forming the lower boundary between Indiana and Illinois. It joins the Ohio River about half way between Mt. Vernon, Indiana and Shawneetown, Illinois. The principal tributaries entering the Wabash along its 475 miles of length are the Salamonie, Mississinewa, Eel, Tippecanoe, Vermilion, Embarras, White, Patoka, and Little Wabash Rivers. Together, the Wabash and all of its tributaries drain an area of 33,100 square miles. The drainage area of the Wabash River at New Harmony is 29,260 square miles.

The project area at New Harmony lies along the lower Wabash River. With a shallow gradient of 0.5 feet per mile the lower Wabash meanders widely. At the present time the river is shifting towards the southeast resulting in the erosion of the left bank.

2. Climate

New Harmony is located in Posey County on the Wabash River in the southwestern part of Indiana. In the winter, the

average temperature is 34° F, and the average daily minimum temperature is 25° F. In the summer, the average daily temperature is 76°, and the average daily maximum temperature is 88° F.

3. Precipitation

The precipitation in the New Harmony area is fairly well distributed throughout the year. Of the total annual rainfall amount of 42 inches, about 23 inches, or 55 percent, usually falls during April through September, which includes the growing season for most crops. In two years out of ten, the rainfall in April through September is less than 18 inches.

4. Flows

Under existing conditions, the Wabash River at New Harmony flows in a southeast direction impinging on the left bank and forcing the river to make a sharp turn towards the west. This results in the main channel flows occurring along the existing bank and creates higher velocities along the bank increasing erosive forces. The average at-bank velocities during high flow conditions are 3.1 meters/sec (10.2 feet/sec).

D. Geologic Characteristics

1. General

The Lower Wabash River flows in an alluvium valley, encompassed in rock, which averages about 15 kilometers in width. The alluvium averages about 30 meters in depth and can go as deep as 40 meters. Bedrock is known to be at the Old Dam, 2 kilometers south of New Harmony, and at Mumford Hills, 10 kilometers north of New Harmony. The bedrock consists of sandstone and shales of Pennsylvanian age. The alluvial fill consists of unconsolidated silt, sand, and clay with some fine gravel and organic muck. These are found in thin alternating layers with cross bedding and cut and fill structures.

2. Physiography

The history of the Wabash is clearest since the last glacial advance over the area (about 140,000 years ago). The last major glaciation advanced to Terre Haute, Indiana, 80 kilometers to the north, releasing high quantities of glacial outwash sediments into the Lower Wabash Valley. The sediments filled the valley 10 to 13 meters higher than the current flood plain and caused the river to aggrade. Several lakes were formed which were later drained.

When the last glacier still occupied the Great Lakes, blocking the outlet to the Atlantic Ocean, Lake Erie overflowed

into the Wabash River. The overflow contained relatively little sediment. The Maumee Terrace was formed during this period. New Harmony is built on part of this Terrace.

The process of lateral planation and meander development are important processes in floodplain formation. Lateral planation consisting of lateral erosion and backfilling account for the existing meanders and the floodplain. Some meanders are abandoned by a cutoff, forming an oxbow lake; e.g Lost Lake (surrounding Bull Island just north of New Harmony). When cutoffs occur, the river velocity increases and directs its flow at the bank on the next downstream curve. The cutoff at Bull Island occurred about 1920, and the river north of New Harmony has been eroding the left bank toward New Harmony since that time.

3. Groundwater

Four aquifer types were delineated in the Lower Wabash River Basin. The principle aquifer in the basin is the outwash and alluvial sand and gravel in the Wabash River valley. These thick sand and gravel deposits are relatively clean, well sorted, and coarse grained. Yields as much as 2,700 gallons per minute have been obtained from this aquifer, which is 150 feet deep in places. The aquifer boundary generally follows the flood plain along the river, and was mapped as surficial sand and gravel in the northern part of the basin and gravel in the southern part of the basin.

Discharge from surficial and buried sand and gravel aquifers in the basin is typically toward the Wabash and its tributaries. Regional discharge from the bedrock aquifers appears to be upward to the Wabash River.

4. Soils

The Corps of Engineers drilled 23 borings along the Wabash River north of New Harmony in 1956. Only two of these borings went to rock. The closest of the two to the eroding bank showed rock at elevation 83 meters above sea level. The Corps of Engineers also drilled 8 borings in the floodplain between the Wabash and New Harmony from July 20th to July 27th 1983. These borings indicated 3 to 5 meters of clays and silts with occasional sand lenses and layers of organic materials. These materials were deposited by the Wabash River and its floodplain processes. Below approximately 5 meters, a clean sand and gravel, glacial outwash materials, were encountered. The depth of these borings was from 12 to 16 meters and did not reach bedrock which was estimated to be at an average depth of 30 meters. Soil properties as well as boring logs for 1983 are contained in the Geotechnical Appendix.

# III. PROBLEMS, NEEDS, AND OPPORTUNITIES

## A. Description of Erosion Area

### 1. History of Erosion

Much of the main stem of the Wabash River in the vicinity of New Harmony behaves in a fashion typical of low gradient, post-glacial streams flowing in a broad, flat valley of glacial outwash deposits. Streambank erosion and a meander process have been occurring at New Harmony at least from the time of the early settlement of the area. The 1820 cutoff made by the Rappites downstream of New Harmony to run their mill altered the course of the Wabash River and created a shorter, steeper course. Less than a century later, another major shift in the course of the Wabash River occurred at what is now known as the Bull Island area upstream of the severe erosion zone. In 1958 the channel was further altered by construction of a pilot channel to protect a highway bridge owned and operated by the White County Bridge Commission. Thus, there have been three substantial changes in the length and direction of the Wabash River at or near New Harmony within about a century and a half.

In 1983, at the request of the Indiana Department of Natural Resources, the Louisville District prepared a report on the erosion problem at New Harmony under the authority of the "Planning Assistance to States" program. Eight different plans to arrest the erosion were evaluated. Although a plan consisting of riprap protection was identified to protect the town of New Harmony, the Corps had no authority to construct the plan and local interests did not wish to participate in such a plan. In 1986, the State of Indiana constructed a bank stabilization project utilizing a fence jetty system consisting of poles and cargo netting. This system has shown limited results and erosion is continuing behind large portions of the protection.

### 2. Rate of Erosion

As stated above, the erosion process has been occurring for many years. During the period from 1930 to 1991 the Wabash River has migrated 980 meters (3200 feet) towards the north side of New Harmony. The average rate of erosion for this period is greater than 16 meters (52 feet) per year. The rate of erosion for this period varied from a low of 9 meters (30 feet) per year during 1958-1966 to a high of 42 meters (138 feet) per year during 1978-1982.

Based on the history of the problem at New Harmony, erosion rates in the future are difficult to predict. The primary erosion mechanism is the result of the forces of the current undercutting the bank. Major floods can have a tremendous effect

on the rate of erosion. Flooding that occurred in May 1996 caused a considerable amount of erosion. Local officials estimate that as much as 50-100 feet of bank was lost in some areas. Photos of the May 1996 flood are shown as Exhibit 2. The Wabash River currently flows in a south-southeast direction until it reaches the bend north of New Harmony. At this point the river makes a sharp turn at a 1000 meter (3300 feet) bend and the bank is easly erodible at its base. The thalweg is adjacent to the left bank which increases erosion toward New Harmony. The results of the subsurface investigation indicate that the soil profile stays relatively constant and erosion will not be retarded as the Wabash channel approaches New Harmony.

3. Expected Conditions Without Project

The existing jetty system is continuing to experience severe degradation in spite of renovation work done in 1991. The river has outflanked the jetty system at the downstream end and has also started to outflank numerous landward poles throughout the middle reach of the system. See Exhibit 1 for photos. Significant flood events would cause considerably more damage to the jetty system. It is unlikely that a project will be constructed at this time by non-Federal interests if there is no Federal action now. If a bank protection plan is not implemented erosion will continue. Evidence gathered through field investigation and aerial photographs over recent years indicates that the angle of attack of the current has been increasing. Given that fact, it is logical to assume that the rate of erosion will increase as the erosive forces increase. Figure 1 shows historic and predicted rates of erosion.

Therefore, the question is not whether New Harmony is at risk, but rather when the approaching threat will be imminent. New Harmony has been listed on the National Register of Historic Places since 1960. Among the early buildings of particular interest are the Double Log House, the oldest structure in town; David Lenz House, Harmonist frame residence restored and furnished by the Colonial Dames of America; and a Pottery Studio. Contemporary architecture is represented by the Atheneum, the internationally acclaimed visitors center and the Roofless Church commemorating New Harmonys religious heritage. Plate 5 shows future conditions and facilities that would be threatened when the eroding bank reaches "crisis" condition.

Since it is estimated that there are about 335-365 meters from the eroding bank to the nearest public facilities on the north side of town, it is not unreasonable to assume that this could occur in the near future. Erosion at the 1958-1966 rate of 42 meters/year would destroy historic facilities within nine years from the present. Accelerated erosion rates would destroy buildings and facilities earlier. Any "crisis" condition bank protection project in the future would logically be undertaken prior to actual damage to the historic facilities. That future action would be similar to, but larger in scope and cost.

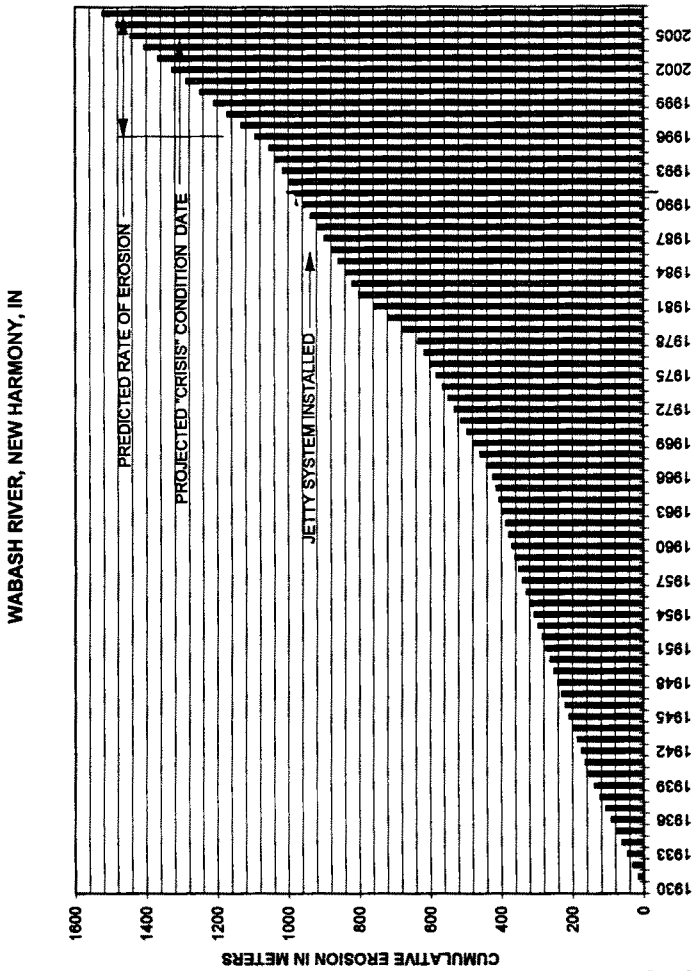

WABASH RIVER, NEW HARMONY, IN
PREDICTED RATE OF EROSION
PROJECTED "CRISIS" CONDITION DATE
JETTY SYSTEM INSTALLED
CUMULATIVE EROSION IN METERS
1600
1400
1200
1000
800
600
400
200
0
1930
1933
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005

FIGURE 1

WABASH R @ NEW HARMONY
WHITE COUNTY
ILLINOIS
POSEY COUNTY
INDIANA
N
WABASH
RIVER
Wayside
Shrine
Tillich Park
Gresham Creek
FUTURE "CRISIS"
CONDITION
Barn Abbey
Pond
Private Residences
Private Residences
City Street
Green House
New Harmony Inn
Complex
NEW HARMONY,
INDIANA
Atheneum
City Street
Double Log Cabin &
David Lenz House
Roofless Church
Main Street
Red Geraneum Restaurant

Plate 5

# IV. ALTERNATIVE PLANS

## A. Introduction

This section discusses planning objectives and constraints and presents the alternatives considered. A detailed description of the selected plan will follow. The selection process incorporates planning objectives and constraints, issues identified during the study process, and desires of local and state interests in an effort to identify a recommended bank protection plan. The expertise of the Waterways Experiment Station was also included in the selection process.

## B. Planning Objectives and Constraints

The objective of the planning process employed herein is to develop plans to halt the bank erosion along the Wabash River in the vicinity of New Harmony, Indiana, a historic community of national significance. Plans must contribute to National Economic Development (NED), that is, benefits must exceed project costs, while protecting environmental quality.

For a water resources project to be considered viable, the following constraints must be met:

- The plan must be economically feasible.
- The plan must be publicly acceptable.
- The plan must be environmentally acceptable.
- The plan must be institutionally implementable.
- The project requires cost sharing by a non-federal sponsor.

## C. Scoping Activities

Since the initiation of the feasibility study process there have been two meetings at New Harmony to discuss objectives and solicit comments and suggestions. The meetings were attended by representatives from the Louisville District, state and local interests, Congressional interests, and the media.

The initial meeting was held on December 6, 1994. In addition to the above, a representative from the Waterways Experiment Station (WES) was in attendance. The purpose of the meeting was to discuss what had been done in the past and determine a direction for the current study effort. The cost sharing aspects of project implementation were also discussed as well as an estimate of the time required to complete a study. Subsequent to the meeting, a site visit was made. The WES representative viewed the project area by boat to gather field data for evaluation.

An interim meeting was held in New Harmony on July 28, 1995. The purpose of this meeting was to provide an update on what had

been accomplished. An overview was provided on the engineering work that had been done to date. This included a review of alternatives considered, and the most likely solution based on input from WES and field investigations.

D. Local Desires

Throughout this study coordination has been maintained with the Indiana Department of Natural Resources and the town of New Harmony. Based on comments received the primary issue is to determine the most cost effective way to stop the advance of erosion along the Wabash River and protect the historically significant town of New Harmony.

E. Description and Screening of Alternative Plans

As discussed in Section I, paragraph E of this report, recent studies of the problem were completed in 1983 and 1992. The most recent prior study, a 1992 Initial Assessment completed under the authority of Section 14, evaluated four plans, including a no-action plan and pilot channel. Of the two bank protection plans considered, it was determined that the most effective way to address the problem was to provide riprap protection along a 490 meters (1600 feet) length of the Wabash River just downstream of Gresham Creek and thence up the left bank of the creek for 610 meters (2000 feet) (Plan 3). The other plan, Plan 4, involved placing riprap around the fence jetties along the Wabash River.

It was determined by WES that including armoring the left bank of Gresham Creek as recommended in Plan 3 of the 1992 Initial Assessment relied on an uncertain scour and launch method. This method was not considered reliable in terms of protection or structural reliability. This alternative would expose the project to an unacceptably high level of risk of unsatisfactory performance. For this reason it was not considered further.

As mentioned above, a pilot channel was also considered in the 1992 Section 14 Initial Assessment Report. Given this previous effort and the experience of the engineering team it was apparent that any channel modification, including restoring the old channel at Bull Island, would not be a viable solution for the following reasons.

- Environmentally Unacceptable. The old channel (cutoff area) has acreted and become an established mature wetland ecosystem which is deemed by Indiana Department of Natural Resources and state fish and wildlife as an environmentally sensitive area. The U.S. Fish and Wildlife Service describes this area in the Planning Aid letter, dated September 8, 1995 as follows:

  "The northern edge of the proposed project area is the Lost Lake/Old Channel slough. This area is a system of

oxbow ponds, including 2 large ponds, associated with an old channel of the Wabash River. The old channel surrounds Bull Island (Illinois), which lies to the east of the present channel. The area at the widest point in each of the large oxbow ponds is approximately as wide as the present Wabash River channel (Ewert 1989). The pond banks are low and silty. There is a wide variety of emergent woody and herbaceous vegetation along portions of the shorelines."

"This area is the highest quality natural area that is immediately associated with the proposed project. National Wetland Inventory (NWI) maps illustrate the extensive network of wetlands associated with the slough and adjoining drainage. Several State-listed species are known to be associated with this area, including: hieroglyphic river cooter, eastern mud turtle, Eastern bloodleaf, wooly dutchman's pipe, and deciduous holly. In addition, many other Federally and Indiana State listed species may potentially utilize this area, including: Indiana bat, evening bat, swamp rabbit, bald eagle, and copperbelly water snake."

- Cost Prohibitive.

The majority of the old channel has filled with sediment since the cutoff was constructed. There would be major excavation required (estimated at 4.2M cubic meters) to return the channel to its original condition. Excavation costs alone would be in excess of $25M.

To direct the river into the old channel would require a barrier dam approximately 200 meters wide, seven meters in height with a two meter top width. The construction cost for this item is expected to exceed $2M.

- Flood Control Mitigation Costs.

The return to the original channel would significantly increase the channel length which would result in increases in the water surface elevations upstream. This would effect the protection level of the Tri-County levee on the Illinois bank potentially requiring the levee to be raised.

The alternatives developed for this feasibility study were based on review of previous studies, field investigations, coordination with WES, and current detailed topographic maps and soundings. The following is a description of the alternatives considered.

Plan 1 - No Action Plan

If no action is taken now, the bank will continue to erode until imminent threat, or "crisis" condition is reached. At that time many historical and culturally significant structures would be threatened. The State of Indiana, Department of Natural

Resources has previously invested about $1.2M for construction and rehabilitation of the existing jetty system and it is highly unlikely that they would pursue a project similar to the recommended plan at this time if there is no Federal action now. However, because of the interest in preserving the unique structures in New Harmony future action would likely be taken to provide bank protection when a "crisis" condition is reached. The future action would be similar to, but greater in scope and cost than the project recommended in this report. Based on estimated future rates of erosion this could occur within nine years. Further analysis of this alternative is contained in the Economic Appendix.

Plan 2 - Stone Protection

This plan provides stone protection along the left bank of the Wabash River for a length of 1470 meters (4800 feet) beginning at a point approximately 950 meters (3100 feet) upstream of the State Highway 66 bridge. The stone protection will consist of a 0.6 meter (2 foot) layer of 93.2 kg (205#) maximum size stone over a layer of granular filter material. Thickened toe protection and end protection will be provided to prevent undermining. The existing fence jetty system will be removed in the area of stone protection to facilitate placement and reduce turbulence. Estimated cost is $2.98 million.

Plan 3 - Cellular Concrete Mat (CCM)

This alternative would involve the placement commercially available cellular concrete mats which can be either interlocking or cabled. It was determined that cabled block mats, which are mechanically placed from either the river or land, would be the only possibility. Since the Wabash is not navigable, placement would be from top of bank. The estimated cost of this alternative, based on information obtained from commercial sources, is $19.1 million.

As mentioned above, the alternatives considered were based in part on coordination with WES. In evaluating the situation and reviewing previous studies, it was the opinion of WES that placing bank protection along the Wabash River was the best method to use. Plan 2 in this feasibility report is similar to Plan 4 in the 1992 Initial Assessment in the fact that both plans would place riprap only along the Wabash River. The main diference is removal of the fence jetty system for the current plan.

## V. RECOMMENDED PLAN

### A. Description

The recomended plan is to provide stone bank protection beginning at a point approximately 950 meters upstream of the State Highway 66 bridge and continuing upstream for a distance of 1470 meters. The stone protection will consist of a 0.6 meter

thick layer of 93.2 kg maximum size stone over a 0.2 meter thick layer of granular filter material placed on a slope no steeper than 1.5H to 1V. The present design slope is 2H to 1V throughout most of the project length which better conforms to the existing bank line. A minor amount of upper bank shaping will be done which will provide a smooth, uniform slope for placement of the stone protection and reduce the quantity of stone necessary to protect the bank. Thickened stone toe protection and upstream and downstream end protection will be provided to protect against undermining. An existing fence jetty system consisting of cargo netting attached to steel poles will be removed to facilitate placement of the stone and reduce turbulence and debris within the area of protection. Since the Wabash River is not currently a navigble river, the stone protection will be placed by mechanical means from the overbank area. Excess material from bank grading will be utilized to partially fill a low upper bank area in the downstream portion of the project. The low area is actually a part of the old Gresham Creek which has been severed by the advancing erosion of the bank. Filling this section of the old creek bed will eliminate a break in height of the upper bank line allowing for smooth uniform placement of stone protection along this section of the project. Any remaining excavated soil could be spread along the overbank area or placed in spoil areas located outside the project limits. The location of these spoil areas are shown on Plate X-1 of the plans included in the Design Appendix. Debris and other materials removed from the bank line will be disposed of at a suitable disposal site. All areas disturbed by project construction will be smooth graded and seeded or repaired as necessary. Haul routes will utilize only several blocks of paved city streets. Coordination with local officials indicates no objection to access routes as planned. Hardwood seedlings will be planted within the available right-of-way in areas not required for operation and maintenance of the project.

B. Operation & Maintenance, Repair, Replacement, and Rehabilitation.

Operation and maintenance of the project will be performed by the non-federal sponsor. All riprap must be kept free of overgrowth to allow for inspection of the riprap. The protection will need to be inspected in the spring and fall each year. A copy of the inspection report should be forwarded to the District engineer by April 15 and October 15. This inspection should be scheduled at a time when the river is at or near low water. Additional inspections of the riprap will be required after each flood event and any debris deposited on the riprap must be removed. While the riprap blanket is designed to be flexible and allow for movement, if there is settlement or loss of slope, bank caving or sloughing, wave or currnet wash to the extent that the bank is exposed, then repair to the damaged areas will be required. Repair of the riprap will consist of placing additional riprap to prevent erosion.

C. Design Considerations

Under existing conditions, the river north of New Harmony flows in a southeast direction directly impinging on the affected left bank forcing the river to make a very sharp bend to the west. This situation results in the main channel being along the eroding bank creating higher velocities at the point of attack. Based on these unusual conditions, a 93.2 kg (205#) maximum size stone is recommended. Another factor that is present is the existing fence jetty system. This system can create unfavorable flow conditions that can become worse as debris collects. For this reason it is recommended that the jetty system be removed in the project area.

D. Environmental Considerations

An Environmental Assessment was prepared during this study and is included in the report. As a result of that assessment it was concluded that the selected plan will not cause any significant adverse impacts. A Finding of No Significant Impact (FONSI) is also included in this report.

Section 404 of the Clean Water Act is applicable since stone will be placed below ordinary high water. A copy of the 404 (b)(1) Evaluations is included with the Environmental Assessment in this report. A public notice will be sent to all interested parties during review of this Draft Feasibility Report. A Section 401 water quality certification has been requested from the State of Indiana. Receipt of the 401 Water Quality Certification will be required prior to construction

This study has been coordinated with the U.S. Fish and Wildlife Service (FWS). In their initial Planning Aid Letter dated September 8, 1995, the FWS reported that such federally endangered species as the Indiana Bat (Myotis sodalis), bald eagle (Haliaeetus leucocephalus), and least tern (Sterna antillarum anthalassos) may occur in the project vicinity. However, of primary concern to the FWS were the potential impacts of the proposed project on the fat pocketbook (Potamilus capax) a federally and state endangered mussel. As a result of the FWS concerns the Louisville District conducted a mussel survey in the project area in October 1995. The results of the survey verified the presence of the endangered mussel near the upstream end of the project area. These results were provided to the FWS. The current design of the selected plan was coordinated with the FWS, and this plan avoids impacts to the endangered mussel without affecting the overall integrity of the bank protection plan. By letter dated February 2, 1996 the FWS concurred. A final coordination letter, dated September 18, 1996, was received. Copies of the FWS letters are contained in the FWS Appendix.

E. Construction Cost and Cost Apportionment

The detailed feasibility level cost estimate for the recommended plan is contained in the MCACES cost estimate in the Cost Appendix. A summary of the estimate is shown in Table 1 below.

Table 1
**Cost Estimate - Recommended Plan**
**October 1995 Price Levels**

| | |
|---|---|
| Bank Stabilization | $2,606,000 |
| Planning, Engineering & Design | $ 150,000 |
| Construction Management | $ 144,000 |
| Lands and Damages | $ 83,000 |
| Total First Cost | $2,983,000 |

The costs of the project are apportioned between the Federal government and the local sponsor in accord with Public Law 99-662, Section 103, (November 17, 1986). This legislation directs that non-federal interests provide: all lands, easements, and rights-of-way; disposal areas; and all alterations of utilities, streets, highways, bridges, and storm drains necessary for the project construction. In addition, the local sponsor shall provide a cash contribution of 5 percent of the total project first cost assigned to structural flood bank protection during construction. Local sponsors shall further hold and save the United States free from damages due to construction works, and assume operation and maintenance responsibilities for the works after completion in accord with regulations prescribed by the Secretary of the Army.

A summary of the Federal, non-federal cost apportionment of the recommended plan is shown in Table 2 below.

**Table 2**
Cost Apportionment
Wabash River, New Harmony, IN
Plan 2-Recommended Plan

| Item | Federal | Non-Federal |
|---|---|---|
| Construction Cost | $2,907,000 | - 0 - |
| LERRDS | _____ | $ 76,000 |
| TOTAL | $2,907,000 | $ 76,000 |
| 5% Cash Contribution | -$149,000 | $149,000 |
| Additional Cash | -$520,750 | $520,750 |
| TOTAL | $2,237,250 (75%) | $745,750 (25%) |

Federal and non-federal cost sharing for streambank erosion projects are defined by cost sharing requirements for flood damage reduction projects. The above cost apportionment is based on current law. The Administration has initiated the development of a new cost sharing policy for flood damage reduction projects which may affect the above apportionment. Depending on new agreements between the Administration and Congress cost sharing may change in the future.

The sponsor, the Indianapolis Department of Natural Resources, has demonstrated the financial capability to participate in construction of the project and has provided a Letter-of-Intent and financial capability statement whcih are contained in Appendix K.

F. Real Estate

Real estate required for this project consists of the rights-of-way and construction easements necessary for access, staging areas and construction, disposal areas and maintenance of the project. The estimated real estate required for this plan consists of 32.3 acres of a Non-Standard Channel Improvement Easement and 7.7 acres of Temporary Work Area Easement for road access. There will be three road accesses. One is along the Wabash River, another is along a dirt field road running from Griffin Road to the river and the third runs from North Street in New Harmony along Main Street to Old Gresham Creek. Another temporary work area easement will be required for two potential spoil areas, one consisting of 10.12 acres and the other 1.55 acres, which will be used in conjunction with this bank

stabilization project. Acquiring the real estate is the reponsibility of the non-Federal sponsor. Details are contained in the Real Estate Appendix.

G. Economic Considerations

In order to test the economic feasibility of the proposed plan, a benefit to cost ratio (BCR) was computed. The average annual benefits were compared to the average annual cost for Plan 2, and for Plan 1, which entails implementing the longer streambank protection plan in the future.

Since the imminent danger plan would not be constructed until an estimated 9 years hence, the present worth of the value of the property protected was calculated, and amortized over the 50 year period of analysis to derive the benefits. As a sensitivity analysis, the pessimistic 6-year imminent danger plan, the 11-year, and the 13-year imminent danger plans were also analyzed. The current Federal interest rate is 7 5/8 percent.

Structure and land values used in this report are based on Posey County Courthouse tax assessment records. Historic New Harmony, formerly a private, non-profit organization which has become part of the University of Southern Indiana (USI), has preserved and restored several original buildings. USI owns the five historic buildings on the north side of North Street, including the Atheneum visitors center. The Town of New Harmony owns the well field. The public vacant land used in the evaluation is located between the Atheneum and a historic building. The annual costs of the plans considered in this report are calculated by amortizing the total cost of the project over the project's economic life at the current interest rate. For the sensitivity analysis, the present worth of the cost of the project was amortized over the project life. The cost of future protection is significantly greater than the current cost of protection because of the erosion that would occur in the interim. Since this data shows that essentially the same benefits are produce by the recommended plan (Plan 2) and a plan constructed six years hence, the NED plan would be the less costly, or recommended plan (Plan 2). Table 3 below summarizes the cost and benefits for Plan 2.

Table 3

Cost and Benefits
Plan 2

| FIRST COST ($1,000) | ANNUAL COST ($1,000) | ANNUAL BENEFITS ($1,000) | BENEFIT/ COST RATIO |
|---|---|---|---|
| 2,980 | 248 | 294 | 1.2 |

Details of the economic analysis are contained in the Economic Appendix.

## VI. CONCLUSIONS & RECOMMENDATIONS

### A. Conclusions

If no action is taken the Wabash River will continue to erode the bank in the vicinity of New Harmony and in the near future, threaten the historic and unique structures. Beyond the monetary value of the property to be protected, the community of New Harmony, Indiana is of particular note for its contributions to American intellectual history.

There is a reasonable probability that emergency action would be required within the next nine years. Although this estimate is based on historic rates of erosion, the angle of attack of the Wabash River on the bank is becoming more severe with each event. Accelerated rates of erosion could cause a "crisis" condition to be reached earlier. Action to halt this "crisis" condition would take place in the future and constitutes the "Without Project Condition"in which no Federal action is implemented now.

Three alternatives were investigated for this study and are discussed in detail in Section IV of this study. The two structural plans evaluated were commercially available cellular concrete mats and riprap. Of those two, Plan 2, stone protection was selected as the least costly, effective solution to the bank erosion problem and is also the NED plan. This plan is economically feasible, implementable from an engineering standpoint, environmentally sound and has a willing sponsor. The estimated total cost for this plan is $2.98 million dollars. The B/C ratio is 1.2.

Considering the cultural and historical uniqueness of New Harmony, and, based on the information contained in this report, a project to stabilize the left bank of the Wabash River in the vicinity of New Harmony, Indiana is considered to be in the overall public interest.

### B. Recommendations

Federal and non-Federal cost sharing for streambank erosion projects are defined by cost sharing requirements for flood damage reduction projects. The Administration has initiated the development of a new cost sharing policy for flood damage reduction projects. I recommend that improvements for streambank erosion protection in the Wabash River Basin (Plan 2 described herein) be authorized subject to cost sharing that is consistent with Administration policy. This recommendation is

also subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including the following requirements:

a. 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;

b. 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;

c. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government;

d. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project;

e. Hold and save the Government free from all damages arising for 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 Government or the Government's contractors;

f. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs;

g. Perform, or cause to be performed, 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), 42 USC 9601-9675, that may exist in, on, or

under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government;

h. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project;

i. 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;

j. Participate in and comply with applicable Federal floodplain management and flood insurance programs in accordance with section 402 of Public Law 99-662;

k. Prevent future encroachments on project lands, easements, and rights-of-way which might interfere with the proper functioning of the project;

l. 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, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

m. Comply with all applicable Federal and State laws and regulations, including section 601 of the Civil Rights Act of 1964, Public Law 88-352, 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";

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 the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the Indiana Department of Natural Resources; interested Federal agencies; and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Harry L. Spear
Colonel, Corps of Engineers
Commander and District Engineer

View looking downstream. Note
debris buildup and damage to netting.
Netting completely gone from large
number of poles.

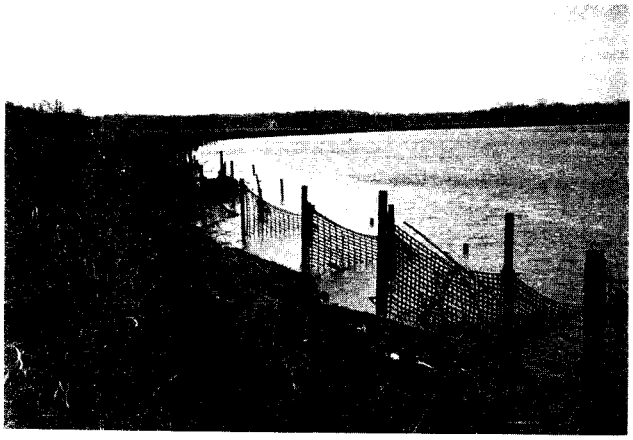
Same as above
Jetty system being outflanked
by erosion.

Exhibit 1

View looking upstream. Note severe erosion behind jetty system.

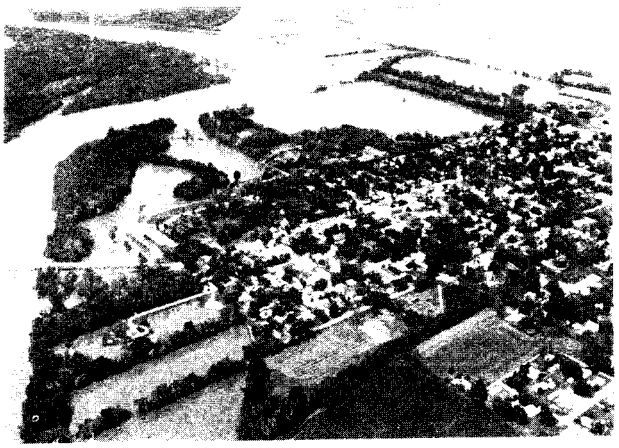
View looking upstream. Note poles in channel with cargo netting gone.

Exhibit 1



View looking downstream from upstream end of project. Note jetty system being outflanked.

Exhibit 1



PHOTOGRAPH 1 - View looking northeast of New Harmony, Indiana during flooding of May 1996

PHOTOGRAPH 2 - View looking south of New Harmony, Indiana during flooding of May 1996

EXHIBIT 2

# APPENDIX A
# HYDRAULIC ANALYSIS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| 3. | EFFECTS ON ILLINOIS BANK | 45 |
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# APPENDIX A
# HYDRAULIC ANALYSIS

## 1. INTRODUCTION

The New Harmony gage is located at kilometer 82.9 on the Wabash River. At the present time the river is shifting towards the southeast, resulting in the left bank eroding over approximately 1870 meters (between kilometers 83.4 and 84.6). This movement is typical of the meander pattern of the river. In the past, the river has formed cut-offs upstream and downstream. As a result of the river action, the left bank eroded, and in an attempt to protect the bank a jetty system (pipes and netting) was installed. The objective of this protection was to slow velocities to the point that there would be sedimentation and bank regeneration. However, scour of the banks continued and debris carried by the river destroyed some of the protection. Once is was apparent that the system would not function as designed, assistance was requested of the Corps of Engineers in an attempt to save what remained. An initial investigation was undertaken in 1992 to assess what could be done to protect the bank. This previous study resulted in a recommendation utilizing riprap to protect either along the river bank or along Gresham Creek (sacrificing the land between the river and the creek).

Based on technical advice from experts at the Waterways Experiment Station (WES), the current recommended plan for this study consists of protecting entirely along the Wabash River bank and would require placing approximately 1870 meters of riprap along the bank. However, it is our determination that the upstream end of the existing bank is stable with the exception of some local scour around the existing jetties, and approximately 200 meters of riprap could be eliminated if the jetties in this area were removed. Also, at the downstream end, there are approximately 200 meters of bank showing signs of becoming stable and being protected by a developing point bar. If this bank is not protected by riprap, then approximately 200 meters of protection can be eliminated provided jetties in this reach are removed. Any additional erosion that may occur at the downstream end would be minimal. If this 200 meter reach were to be protected it would cause a perception that a hard point had been created to permanently direct flow perpendicular to the Illinois bank. Therefore, since any additional erosion would likely be minimal, it is recommended that the end protection be extended further into the bank instead of protecting the additional 200 meters. These changes would result in the length of protection being reduced to approximately 1470 meters.

Enclosure 1 contains river mapping with starting and ending points shown for with and without jetties. For accurate project

limits see the Civil Design Appendix. In this study the primary objective was to analyze flow conditions and the river bank geometry to size the riprap required to protect the bank. Also, there was an assessment regarding the effects the project would have on the Illinois bank just downstream of the proposed project.

## 2. BANK PROTECTION ANALYSIS

Based on the geometry of the river and the bank, exact use of the computer program (RIPRAP15) to size riprap is limited. Under existing conditions, the river flows in a southeast direction impinging on the left bank and forcing the river to make a very sharp turn towards the west. This situation results in the main channel being along the existing bank and creates higher velocities along the bank prior to the river turning west. As a result the average channel velocity from the HEC-2 analysis is not usable in the RIPRAP15 program. Therefore, to accurately define at-bank velocities requires dividing the channel into sections. From this a main channel velocity can be determined. This main channel velocity is then used in the RIPRAP15 program with the appropriate information on radius of curvature, top width, depth of flow, rock density and slope of the protection, to calculate rock size. Due to the amount of riprap that would be placed underwater, the blanket thickness of the riprap should be increased by 50 percent. Results of the analysis are in Enclosure 2. These results are based on worst case conditions.

While the analysis indicated that a riprap size of 68.2 kg (150 lb) maximum size stone is sufficient, based on conditions that exist, a 93.2 kg (205 lb) maximum size stone is recommended. This larger rock size is required due to the unusual conditions that are present (river impinging on the bank and expanding sand bar). The toe and end protection that are used in the project design are based on EM 1110-2-1601, Method C. The end protection has been modified to increase the extension of the riprap into the bank from 2 times the layer thickness to 3.3 times the layer thickness. The primary mechanisms of erosion at this location are scour (undermining) and saturation and subsequent sloughing. An additional factor that is present and difficult to assess is the existing attempt at protection. The existing jetty system can create unfavorable flow conditions that can be made worse as debris collects. It is recommended that the existing protection be removed or the riprap size be increased to 132.7 kg (293 lb) maximum size stone. A typical riprap placement section is shown in Enclosure 3.

Another possible method of protection as mentioned in the WES report is the use of cellular concrete mats (CCM). However, while utilizing this method in place of riprap is acceptable, past experience indicates that the cost of riprap is typically

less than any other method of protection.

3. EFFECTS ON ILLINOIS BANK

Based on the existing conditions, the Illinois bank is already being directly impinged on by the river approximately 400 meters upstream from the State Highway 66 bridge. As the river turns west, along the project site, its flow is directly into the Illinois river bank. As a result, the existing riprap protection is starting to fail. As the erosion of the Indiana bank has progressed, the direction of the river was shifted more directly toward the Illinois bank. These changing conditions resulted in higher velocities occurring along the Illinois bankline. This condition is most severe where direct impingement occurs, presently near the upstream end of the riprap protection, approximately 400 meters upstream from the State Highway 66 bridge..

However, protection of the Indiana bank will not negatively impact the riprap on the Illinois bank. Regardless of what is done on the Indiana bank, the riprap on the Illinois bank will continue to fail; and eventually all the riprap will unravel. If the riprap fails, the Illinois bank would likely be subjected to significant erosion. Therefore, regardless of what is done on the Indiana bank, eventually this bank will need to be protected to preserve flow conditions through the highway bridge. Also, if the Wabash River were allowed to erode further south (toward New Harmony), its flow will impinge even more directly on the Illinois bank. This problem should be addressed by Illinois sponsorship in a separate project. The WES report stated that failure to provide a dependable alignment into the bridge will result in long-term channel alignment instability at the bridge. The only way to provide a dependable alignment into the bridge is to protect the Indiana and, eventually, the Illinois bank. It is recommended that Illinois authorities consider overlaying the existing riprap, and possibly riprap extension, consisting of a 93.2 kg (205 lb) maximum size stone. This situation should be monitored by the White County Bridge Commission and could be addressed as a separate project in the future if Corps of Engineers' assistance is requested and contingent on future funding for the Continuing Authorities program.

## 4. FLOOD FREQUENCIES

Flood frequencies and the Ordinary High Water elevations are in Table 1 below, velocities are in Table 2:

TABLE 1

WABASH RIVER AT NEW HARMONY

| Exceedence Probability (Percent) | Water Surface Elevation (Meters) |
|---|---|
| OHW | 110.4 |
| 100.0 (1 Year) | 112.7 |
| 50.0 (2 Year) | 113.0 |
| 20.0 (5 Year) | 113.4 |
| 10.0 (10 Year) | 113.8 |
| 4.0 (25 Year) | 114.2 |
| 2.0 (50 Year) | 114.6 |
| 1.0 (100 Year) | 114.9 |
| 0.2 (500 Year) | 115.6 |

TABLE #2

AT BANK VELOCITIES
ALONG THE AREA TO BE PROTECTED

| STATION (Meters) | VELOCITIES (meters/sec) Toe of Slope | Mid Bank | Top of Slope |
|---|---|---|---|
| 0+520 * | 2.4 | 2.2 | 1.6 |
| 0+700 | 3.0 | 2.5 | 1.8 |
| 0+900 | 3.1 | 2.6 | 1.9 |
| 1+100 | 3.0 | 2.5 | 1.8 |
| 1+500 | 2.5 | 2.3 | 1.6 |
| 1+990 ** | 2.4 | 2.1 | 1.5 |

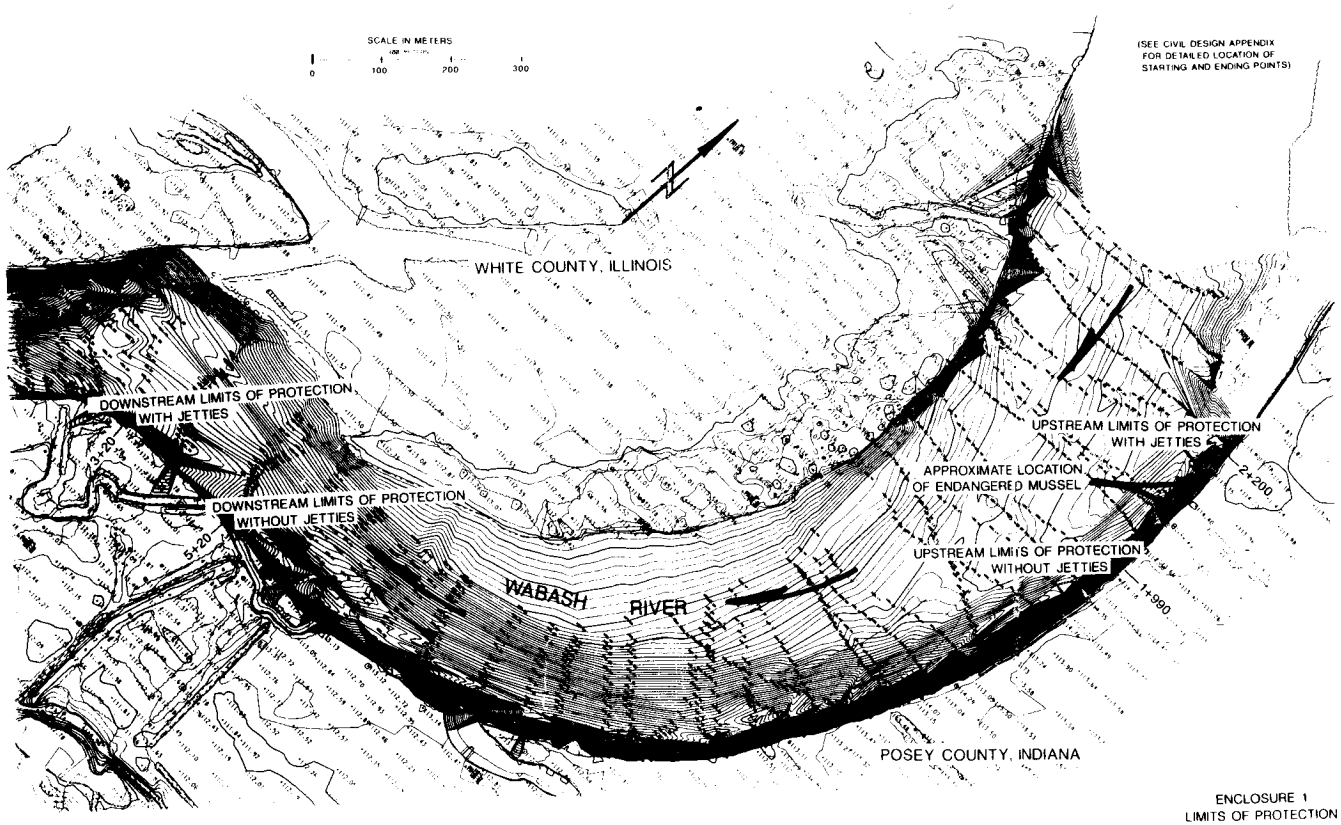
These are estimated velocities based on the rivers geometry at these locations.
* Downstream End of Proposed Protection.
** Upstream End of Proposed Protection.

## 5. HYDROGRAPHS

Enclosure 4 contains the hydrographs for the Wabash River at New Harmony, Indiana from October 1981 through May 1994.

## 6. OPERATION, MAINTENANCE, REPAIR REPLACEMENT & REHABILITATION

All riprap must be kept free of overgrowth to allow for inspection of the riprap. The protection will need to be inspected in the spring and fall each year. A copy of the inspection report should be forwarded to the District engineer by April 15 and October 15. This inspection should be scheduled at a time when the river is at or near low water. Additional inspections of the riprap will be required after each flood event and any debris deposited on the riprap must be removed. While the riprap blanket is designed to be flexible and allow for movement, if there is settlement or loss of slope, bank caving or sloughing, wave or current wash to the extent that the bank is exposed, then repair to the damaged areas will be required. Repair of the riprap will consist of placing additional riprap to prevent erosion.




ENCLOSURE 1
LIMITS OF PROTECTION

# RIPRAP DESIGN
# STONE SIZING

*Input Parameters*:

| | | |
|---|---|---|
| Specific Weight of Stone (kg/cubic meter) | - | 2646.6 |
| Minimum Centerline Bend Radius (meters) | - | 460.0 |
| Surface Water Width (meters) | - | 120.0 |
| Flow Depth (meters) | - | 6.1** |
| Channel Side Slopes | - | 1.5H:1V |
| Average Channel Velocity (meters/sec) | - | 2.1 |
| Stone Layer Thickness/D100 maximum | - | 1.0 |
| Riprap Design Safety Factor | - | 1.1 |
| Computed Local Depth Average Velocity (meters/sec) | - | 3.1 |
| Local Channel/Average Channel Velocity | - | 1.44 |

*Correction Factors*:

| | | |
|---|---|---|
| Correction for Layer Thickness | - | 1.0 |
| Side Slope Correction Factor | - | 1.53 |
| Correction for Secondary Currents | - | 1.17 |

** The minimum flow depth is the worst case condition, producing the largest D30 size.

RIPRAP SIZING:

Computed D30, (meters) - 0.19

D30 (minimum) from gradation should be greater than or equal to computed D30.

USING GRADATION FROM ETL 1110-2-120

For stone having a specific weight of 2646.6 kg/cubic meter and placed to a layer thickness of 0.46 meters.*

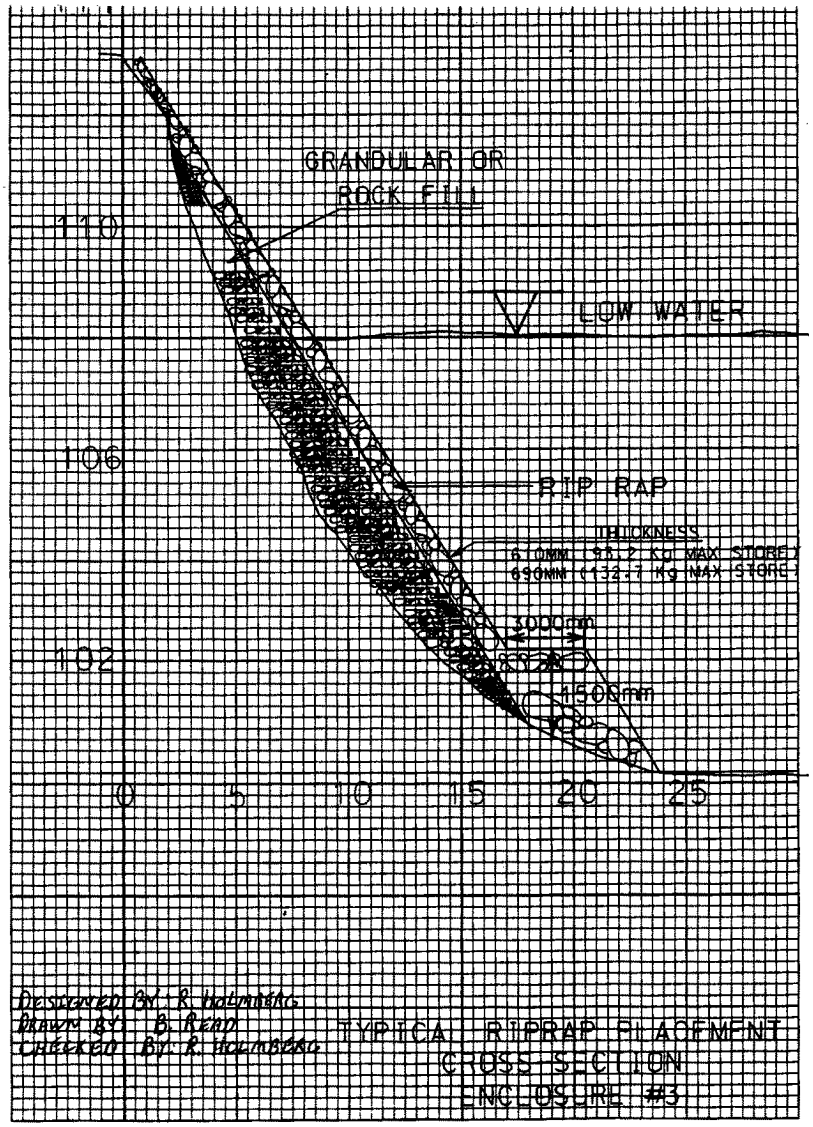
Selected Minimum D30 = .22 m

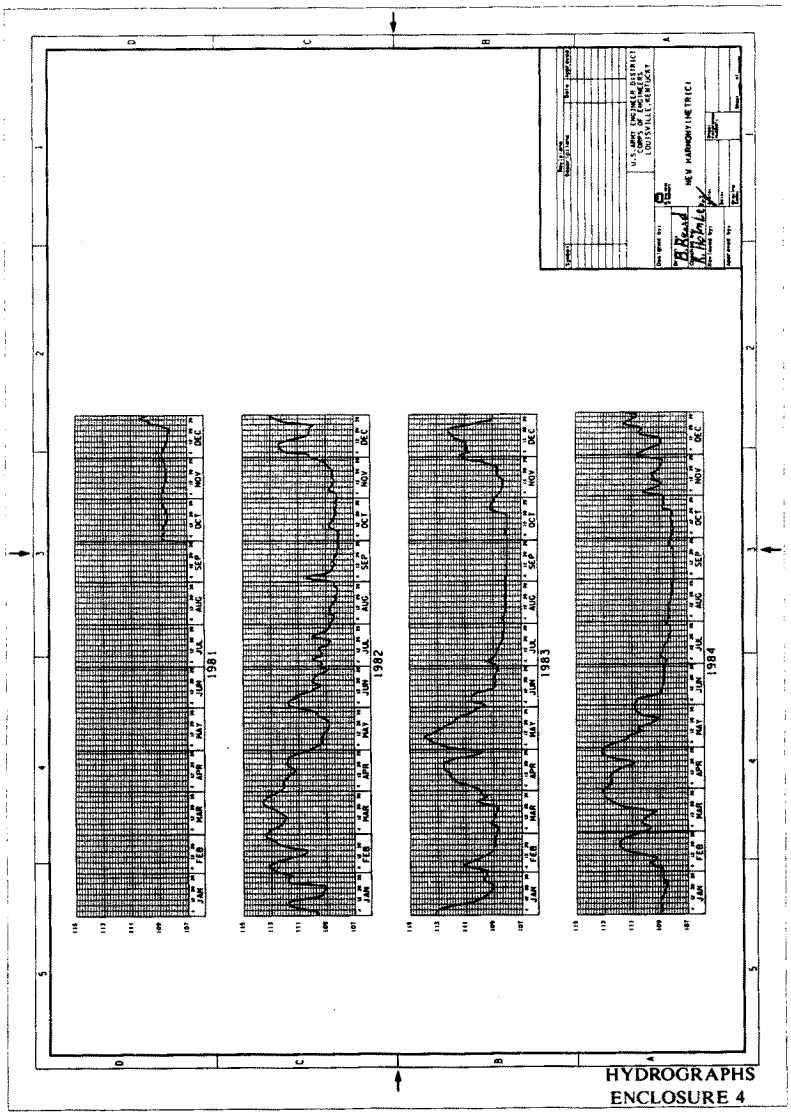
Selected Minimum D90 = .32 m

| Percent Lighter by Weight | Stone Weight, Kilograms Minimum | Maximum |
|---|---|---|
| W100 | 53.2 | 132.7 |
| W50 | 26.4 | 39.1 |
| W15 | 8.2 | 19.5 |

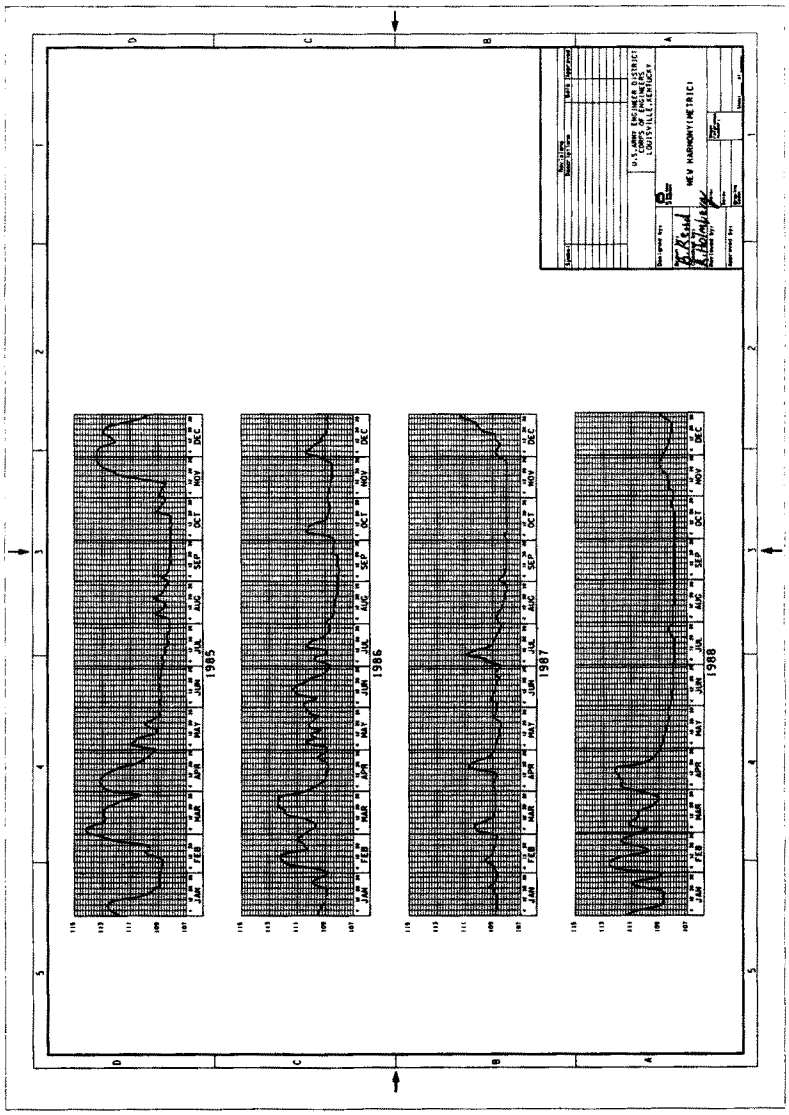
* For underwater placement this dimension should be increased by 50%.

RIPRAP DESIGN
ENCLOSURE #2


GRANDULAR OR
ROCK FILL
110
LOW WATER
106
RIP RAP
THICKNESS
610MM 93.2 Kg MAX STORE
690MM (132.7 Kg MAX STORE
1000mm
102
1500mm
0
5
10
15
20
25
DESIGNED BY: R. Holmberg
DRAWN BY: B. READ
CHECKED BY: R. Holmberg
TYPICAL RIPRAP PLACEMENT
CROSS SECTION
ENCLOSURE #3




HYDROGRAPHS
ENCLOSURE 4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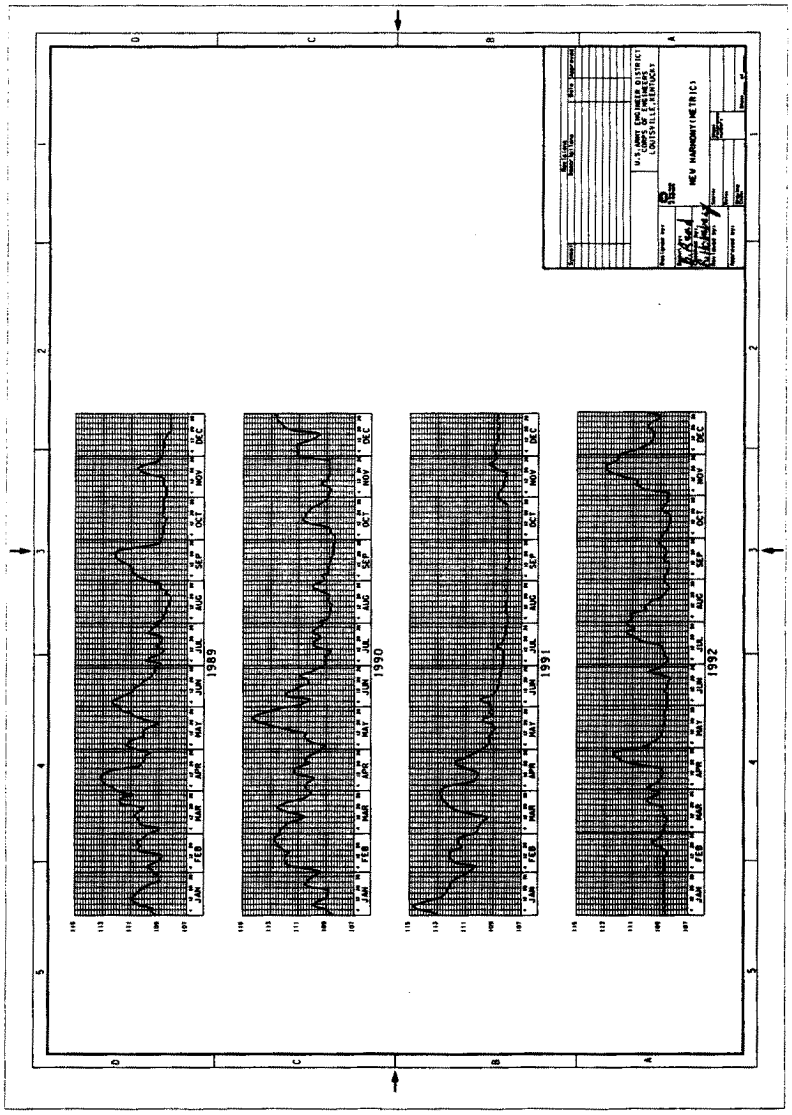
NEW HARMONY (METRIC)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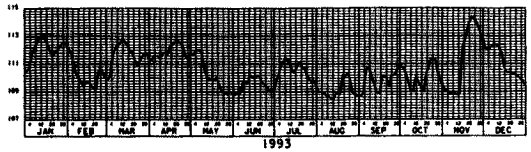


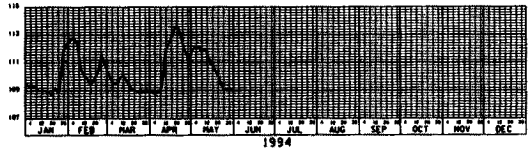


U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

NEW HARMONY (METRIC)

# APPENDIX E

## ECONOMICS

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**ECONOMIC APPENDIX**
**WABASH RIVER**
**NEW HARMONY, INDIANA**

**BENEFIT ANALYSIS**

## 1. INTRODUCTION

There exists in New Harmony the threat to many structures and consequently the safety of the residents due to severe stream bank erosion along the left bank of the Wabash River. The erosion, if allowed to continue unchecked, threatens initially, on the north side of the first street in it's path (North Street), four historic public buildings. This includes the internationally acclaimed visitor center, the Atheneum. Other valuable commercial buildings such as the New Harmony Inn complex as well as residential properties are located on the north side of North Street. In addition, New Harmony's primary water supply source are the deep wells and appurtenant buildings located 23 meters south of North Street.

## 2. THE STUDY AREA

The study area is located near the southwest corner of Indiana along the banks of Wabash River between kilometers 83.4 and 84.6. The historic town of New Harmony is located in Posey County approximately 4.3 kilometers south of Interstate Highway 64. See Plate 1 for a general area map. The main report contains in Section II.A.1. a detailed description of the unique history and cultural significance of this city.

## 3. DESCRIPTION OF THE PROBLEM

Streambank erosion and a stream meander process have been occurring at New Harmony at least from the time of early settlement of the area. Around the year 1820, the course of the Wabash River was altered by local interests to provide an energy source to the community. Around 1906, the Wabash River began to meander across an ox-bow near New Harmony. About 1958, the channel was further altered by construction of a pilot channel to protect a highway bridge. Thus, there have been three substantial changes in the length and direction of the Wabash River at or near New Harmony within the last 150 years.

The State of Indiana constructed a bank stabilization project in 1986 which utilizes a system of fence jetties designed and installed by a private company. Though streambank erosion has continued in the river reach of the fence jetties, the jetties have reduced the rate of erosion which was experienced prior to their installation. Erosion is continuing behind the fence poles and areas where the jetties have been removed. The river has outflanked the jetty system at the downstream end of the project.

At present there is a minimum of 488 meters of riverbank immediately downstream of the project along the Wabash River that remains unprotected from the erosive forces of the river.

The eroding riverbank is now (February 1996) within approximately 365 meters of public structures in New Harmony.

As stated earlier, the erosion has been occurring for many years. During the 62 year period, 1930 through 1991, the Wabash River migrated 1006 meters towards the north side of New Harmony. The average rate of erosion for this period is greater than 16 meters per year. The rate of erosion during this period varied from a low of 9 meters per year during 1958-1966 to a high of 42 meters per year during 1978-1982.

Given the history of the problem at New Harmony, erosion rates in the future are difficult to predict. Major floods can have a tremendous effect on the rate of erosion. The most optimistic estimate or least threatening scenario for an erosion rate would be 9 meters per year. The most pessimistic estimate for an erosion rate would be 61 meters per year. Since there are about 335-365 meters from the eroding bank to the nearest public facility , a crisis situation could occur at New Harmony within 6 years or occur at the other extreme, as much as 40 years from now. A reasonable assumption would be that within 9 years New Harmony could experience erosion which could pose an imminent threat to public facilities and private buildings along the northeastern edge of the community.

In the event there is no Federal action--the without project condition, it is unlikely that anyone will build a project at this time. A project would not likely be undertaken until the erosion reached an imminent threat condition. However, because of the local and national historical significance of the public and private structures, it is likely that future action would be undertaken to protect against bank erosion *at the time of imminent failure*. The future action would be similar to, but larger in cost and scope, than the project now recommended in the report. The future damages that would occur, if there is no federal action now, represent the potential benefits for the recommended plan.

## 4. ALTERNATIVE PLANS

Two possible alternative plans to protect the historic community of New Harmony against the erosive forces of the Wabash River were considered for this report. These plans are discussed below:

a. Plan 1 - NO ACTION/IMMINENT DANGER The no action plan and the without project condition are the same. The town of New Harmony is an irreplaceable historic site. Partial relocation of threatened historic facilities is not practical since the state of Indiana, the Historic New Harmony, Inc., and other concerned parties would view removal of the structures from their

historical physical context as unacceptable. The Atheneum is not suitable to relocation. The only feasible "no action" plan would be delayed action to protect the town at it's upstream limits when the danger of the caving bank is imminent. At which time the extent of the area of erosion would require the larger, more expensive project. The estimated construction cost of the recommended plan is $2,983,000. This increases to $6,830,000 under the imminent threat condition.

b. Plan 2 - STONE PROTECTION. This plan provides stone bank protection beginning at a point approximately 950 meters upstream of the State Highway 66 bridge and continues upstream for a distance of 1470 meters. The stone protection will consist of a 0.6 meter thick layer of 93.2 kg(205 lb) maximum size stone over a 0.2 meter thick layer of granular filter material placed on a slope no steeper than 1.5 horizontal to 1 vertical. The present design slope is 2 horizontal to 1 vertical throughout most of the project length which better conforms to the existing bank line. A minor amount of upper bank shaping will be accomplished which will provide a smooth, uniform slope for placement of the stone protection and reduces the quantity of stone necessary to protect the bank. Thickened stone toe protection and upstream and downstream end protection will be provided to protect against undermining. An existing fence jetty system consisting of cargo netting attached to steel poles will be removed to facilitate placement of the stone protection and reduce turbulence and debris within the area of protection. The Wabash River is not a navigable river in terms of providing access for placement of stone materials. The stone protection will be placed by mechanical means from the overbank area. Excess material from bank grading will be utilized to fill a low upper bank area in the downstream portion of the project. This low area is actually a part of Gresham Creek which has been severed by the advancing erosion of the bank line. The original mouth of Gresham Creek was downstream of its present location. Filling this section of old creek bed will eliminate a break in height of the upper bank line allowing for a smooth uniform placement of stone protection along this section of the project. Any remaining excavated soil could be spread along the overbank area. Debris and other materials removed from the bank line will be disposed of at a suitable disposal site. All areas disturbed by project construction will be smooth graded and seeded or repaired as necessary. Hardwood seedlings will be planted within the available right-of-way in areas not required for operation and maintenance of the project.

## 5. ECONOMIC ANALYSIS

In the case of New Harmony, it has been determined that a no action plan is impractical. Likewise, relocation of many of the buildings such as the Atheneum is infeasible. The most likely

situation to develop, in lieu of immediate action is crisis protection of the town in the future when the erosion creates an imminent threat to buildings and facilities. The flood reduction benefits for the recommended plan are based on the average annual equivalent value of the future damages prevented. The damages are based on estimates of property value, assuming that once the erosion reaches the structures, the properties would be destroyed, or rendered useless.

In order to test the economic feasibility of the proposed plan, a benefit to cost ratio (BCR) was computed. The average annual flood reduction benefits were compared to the average annual cost for Plan 2, and for Plan 1--which entails implementing the longer streambank protection plan in the future.

Since the imminent danger plan would not be constructed until an estimated 9 years hence, the present worth of the value of the property protected was calculated, and amortized over the 50 year period of analysis to derive the benefits. As a sensitivity analysis, the pessimistic 6-year imminent danger plan, the 11-year, and the 13-year imminent danger plans were also analyzed. The current Federal interest rate is 7 5/8 percent.

Structure and land values used in this report are based on Posey County Courthouse tax assessment records. Table 1 shows the 1996 property values, the present worth of the property values for the 6,9,11, and 13 year imminent danger scenarios and the annual benefits which are the annualized present worth values.

The annual costs of the plans considered in this report are calculated by amortizing the total cost of the project over the project's economic life at the current interest rate. For the sensitivity analysis, the present worth of the cost of the project was amortized over the project life. Table 2 is a summary of first costs, annual costs, annual benefits, BCR and average annual net benefits for each plan considered.

As shown in Table 2, based on public property alone, the recommended plan is the NED plan with net benefits of $46,000 and a B/C ratio of 1.19. If both public and private property are considered, the net benefits become $262,000 and the B/C ratio is 2.06.

The data of Table 2 show that the net benefits produced by implementing the recommended plan (net benefits=$262,000) are greater than the plan deferring protection by 9 years (net benefits = $218,000) when the threat becomes imminent. The data shows that the maximum net benefits (net benefits = $273,000) are produced by the plan deferring protection by 6 years. The benefits for this plan are based on the assumption that imminent threat occurs 6 years in the future. An evaluation of the recommended plan based on the same assumption would yield the same total benefits and since the recommended plan has a lower

average annual cost, it would yield greater net benefits than the plan deferring protection by 6 years. Therefore, the recommended plan is still the recommended plan when total property and just not public property is considered.

This sensitivity analysis considers only North Street and the property on the north side of North Street. If the erosion is left unchecked, it could continue on toward the center of town increasing the damages dramatically to both public and private facilities and likely destroy the city's main water supply source before natural stabilization occurred. If the analysis were based on erosion continuing to Granary Street(one additional block), the recommended plan would have net benefits of $356,000 for public property alone and $717,000 for all property. The corresponding B/C ratios are 2.48 and 3.98.

The value and categories of property north of North Street, and on to Granary Street was obtained through coordination with local officials. There are eight high value public properties north of North Street, with a total value in excess of $5,805,000. Five of these properties are owned by the University of Southern Indiana (USI). These USI properties were previously owned by Historic New Harmony Inc. (HNHI). HNHI was a non-profit organization established to preserve the towns historic structures and was later absorbed by USI. The other three properties are owned by the Robert Lee Blaffer Trust (a non-profit foundation for the preservation of historical buildings).

There are 15 private structures north of North Street with a total value in excess of $5,193,000. There are an additional 11 public properties between the north side of North Street and Granary Street, with an estimated value of $3,873,000. Included in the analysis were damages to public properties such as roads, utilities, and vacant land (see Table 1 for the value of those public facilities).

## 6. RISK AND UNCERTAINTY

New Harmony is at risk from the continued threat of streambank erosion. However, there is uncertainty related to when the erosion will threaten the city. The answer to that question depends on the rate of erosion. As stated above, this analysis assumes the time frame for an imminent threat from erosion is 9 years, and is based on an erosion rate of 39 meters/year. An erosion rate of 61 meters/year was observed following an approximately 20% chance flood event in 1983. Figure 1 shows the yearly peak discharges at the Mount Carmel gage. The figure shows that the 1983 flood was exceeded three times between then and 1993. The jetty system was constructed in 1986 and has since been outflanked by the caving bank and is now ineffective. There is a 87% chance that a 20% chance exceedence flood will occur within the next 9 years and that such an event could again produce an erosion rate of 61 meters/year.

The rate of erosion is also affected by the angle of attack on the streambank. As the angle increases toward 90 degrees (head-on), the rate of erosion increases. Aerial photographs of the caving bank taken over the years show that the attack angle is increasing and it is reasonable to assume that the rate of erosion is likely to increase in future years.

Table 2 summarizes the results of the economic analysis.

TABLE 1

NEW HARMONY, INDIANA
ECONOMIC ANALYSIS
FY96 PRICE LEVEL
7 5/8% INT. RATE

| 1996 VALUES :NORTH STREET & ABOVE | | PRESENT WORTH | | | | ANNUAL BENEFITS | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 6 YEAR | 9 YEAR | 11 YEAR | 13 YEAR | 6 YEAR | 9 YEAR | 11 YEAR | 13 YEAR |
| **PUBLIC PROPERTY** | | | | | | | | | |
| STRUCTURES* | $5,805,100 | $3,735,000 | $2,996,000 | $2,587,000 | $2,233,000 | $292,000 | $234,000 | $202,000 | $175,000 |
| VACANT LAND | 25,000 | 16,000 | 13,000 | 11,000 | 10,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| ROADS | 500,000 | 322,000 | 258,000 | 223,000 | 192,000 | 25,000 | 20,000 | 17,000 | 15,000 |
| UTILITIES | 957,000 | 616,000 | 494,000 | 426,000 | 368,000 | 48,000 | 39,000 | 33,000 | 29,000 |
| SUB-TOTAL | 7,287,100 | 4,689,000 | 3,761,000 | 3,247,000 | 2,803,000 | 366,000 | 294,000 | 253,000 | 220,000 |
| **PRIVATE PROPERTY** | | | | | | | | | |
| RESIDENTIAL** | 547,800 | 352,000 | 283,000 | 244,000 | 211,000 | 28,000 | 22,000 | 19,000 | 17,000 |
| COMMERCIAL*** | 4,645,820 | 2,989,000 | 2,398,000 | 2,070,000 | 1,787,000 | 234,000 | 188,000 | 162,000 | 140,000 |
| VACANT LAND | 150,000 | 97,000 | 77,000 | 67,000 | 58,000 | 8,000 | 6,000 | 5,000 | 5,000 |
| SUB-TOTAL | 5,343,620 | 3,438,000 | 2,758,000 | 2,381,000 | 2,056,000 | 270,000 | 216,000 | 186,000 | 162,000 |
| TOTAL PROPERTY | 12,630,720 | 8,127,000 | 6,519,000 | 5,628,000 | 4,858,000 | 636,000 | 510,000 | 439,000 | 382,000 |

* Represents 8 structures.
** Represents 10 structures.
*** Represents 5 structures.

TABLE 2

NEW HARMONY, INDIANA
ECONOMIC ANALYSIS
ALTERNATIVE PLANS
FY96 PRICE LEVEL
7 5/8% INT. RATE

| ITEM | RECOMMENDED PLAN | ALTERNATIVE WITHOUT PROJECT CONDITIONS: IMMINENT DANGER PLAN 6-YEARS | IMMINENT DANGER PLAN 8-YEARS | IMMINENT DANGER PLAN 11-YEARS | IMMINENT DANGER PLAN 13-YEARS |
|---|---|---|---|---|---|
| **INVESTMENT COSTS** | | | | | |
| CONSTRUCTION FIRST COST | $2,983,000 | $6,830,000 | $6,830,000 | $6,830,000 | $6,830,000 |
| INTEREST DURING CONST | 112,000 | 256,000 | 256,000 | 256,000 | 256,000 |
| TOTAL INVESTMENT COST | 3,095,000 | 7,086,000 | 7,086,000 | 7,086,000 | 7,086,000 |
| PRESENT WORTH | 3,095,000 | 4,560,000 | 3,657,000 | 3,156,000 | 2,726,000 |
| INTEREST & AMORTIZATION | 242,000 | 357,000 | 286,000 | 247,000 | 213,000 |
| OPERATION & MAINTENANCE | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| INSPECTION | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| TOTAL ANNUAL CHARGES | 248,000 | 363,000 | 292,000 | 253,000 | 219,000 |
| **ANNUAL BENEFITS** | | | | | |
| **DAMAGE REDUCTION TO:** | | | | | |
| **PUBLIC PROPERTY** | | | | | |
| STRUCTURES | 234,000 | 292,000 | 234,000 | 262,000 | 175,000 |
| VACANT LAND | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| ROADS | 20,000 | 25,000 | 20,000 | 17,000 | 13,000 |
| UTILITIES | 29,000 | 38,000 | 29,000 | 33,000 | 29,000 |
| SUB-TOTAL | 284,000 | 356,000 | 284,000 | 253,000 | 220,000 |
| **PRIVATE PROPERTY** | | | | | |
| RESIDENTIAL | 22,000 | 28,000 | 22,000 | 19,000 | 17,000 |
| COMMERCIAL | 188,000 | 234,000 | 188,000 | 162,000 | 140,000 |
| VACANT LAND | 6,000 | 8,000 | 6,000 | 5,000 | 5,000 |
| SUB-TOTAL | 216,000 | 270,000 | 216,000 | 186,000 | 162,000 |
| TOTAL PROPERTY | 510,000 | 636,000 | 510,000 | 439,000 | 382,000 |
| TOTAL ANNUAL BENEFITS | 510,000 | 636,000 | 510,000 | 439,000 | 382,000 |
| **BENEFIT TO COST RATIO** | | | | | |
| PUBLIC PROPERTY | 1.19 | 1.01 | 1.01 | 1.00 | 1.00 |
| TOTAL PROPERTY | 2.06 | 1.75 | 1.75 | 1.74 | 1.74 |
| **NET BENEFITS** | | | | | |
| PUBLIC PROPERTY | 46,000 | 3,000 | 2,000 | 0 | 1,000 |
| TOTAL PROPERTY | 262,000 | 273,000 | 218,000 | 186,000 | 163,000 |

## APPENDIX G

## ENVIRONMENTAL AND CULTURAL RESOURCES

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**ENVIRONMENTAL ASSESSMENT**
**NEW HARMONY STREAMBANK PROTECTION PROJECT**
**POSEY COUNTY, INDIANA**

I. PROPOSED ACTION. The recommended project consists of the placement of approximately 1470 meters of stone bank protection on the left bank of the Wabash River beginning at a point approximately 950 meters upstream of the State Highway 66 bridge at New Harmony, Indiana. A minimal amount of bank shaping will be necessary to provide a smooth and stable slope. Thickened stone toe protection and upstream and downstream end protection will be provided to protect against undermining. An existing fence jetty system consisting of cargo netting attached to steel poles will be removed from the project area prior to placement of the new bank protection.

This General Investigation study was authorized under the Energy and Water Development Appropriations Act, 1995 (Public Law 103-316, 108 Stat. 1707) dated August 26, 1994.

II. NEED. The Wabash River meanders considerably in its lower reaches, creating caving bank conditions. Severe degradation continues despite the installation of a fence jetty bank protection system. The Town of New Harmony would eventually be threatened if the erosion is allowed to spread. A stone bank protection project is required to prevent further erosion.

III. EXISTING ENVIRONMENTAL SETTING. The New Harmony streambank erosion project is located on the Wabash River (between kilometers 83.4 and 84.6) in southwestern Indiana. The area under study is to the north of the town of New Harmony, which is located in northwestern Posey County. Land use in the proposed project area is predominantly agricultural.

The Wabash River is the second longest tributary of the Ohio River and drains 72,800 square kilometers. The lower Wabash has a shallow gradient and meanders widely creating cutbank erosion and sand bar deposition. Opposite the eroding bank at the project site is a broad, sandy shoal. Maximum depths in the project reach are around 8 to 9 meters.

The lower Wabash River harbors a typical range of fish species common to large rivers. The river is utilized to some extent by commercial fishermen and offers some good sport fishing, especially for catfish. The Wabash is also noted for the large number of mussels which were once commercially harvested. Recent regulations issued by the Indiana Department of Natural Resources now prohibit commercial harvesting of mussels.

The adjacent floodplain which was originally densely forested has been extensively cleared for agriculture. The first 150 meters or so of the southern end of the project is bordered by a mature woodlot composed mainly of silver maple. The remainder of the project reach is bordered by agricultural land with a few scattered trees along the edge of the river bank. Most of the bank, which is actively eroding, is devoid of vegetation. At the upstream end of the project reach there is some herbaceous cover such as cocklebur, trumpet creeper, goldenrod, and morning glory. Some silver maple, cottonwood, and sycamore saplings are also present. Overall, the construction corridor provides limited habitat for terrestrial wildlife.

The U. S. Fish and Wildlife Service has reported that there are a number of Federally and State listed threatened and endangered animals and plants that may occur in the vicinity of the proposed project. The species of particular concern with respect to impacts from project construction is the fat pocketbook mussel, (Potamilus capax), which has been reported from the lower Wabash River. On October 23, 1995 a mussel survey using divers was conducted by the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. The survey collected Potamilus capax at two sites, which resulted in the reconsideration of the upper project limits. It was determined that the upstream end of the stone protection could be moved downstream so as to avoid this endangered species. Both sites are now located above the upstream limit of riprapping and outside the area of impact.

No currently listed National Register historic properties will be affected by the proposed plan. An examination of the project site by a Louisville District archaeologist has found no evidence of prehistoric or historic archaeological sites within the project construction area.

A Phase I Environmental Site Assessment was performed by the Louisville District to determine the presence of hazardous, toxic, or radioactive waste (HTRW) concerns. The site visit indicated no reasonable probability of HTRW concerns.

The proposed action is not in a non-attainment area for priority pollutants and is not subject to the requirements of 40 CFR part 93 of the Clean Air Act.

## IV. ALTERNATIVES CONSIDERED.

A. No Action. If there is no Federal action now, it is unlikely that a project would be built at this time and the bank would continue to erode. Because of the local and national historical significance of New Harmony, it is likely that future action would be taken at the time of imminent threat. Any future action would be similar to, but larger in scope, than the recommended plan.

B. Concrete Mat Systems. These systems were found to be economically infeasible or impractical from an engineering standpoint.

C. Stone Protection. The recommended plan described in the Proposed Action.

V. IMPACTS OF THE PROPOSED ACTION. The project will cause a minor localized increase in sedimentation and turbidity levels of the Wabash River during construction. In the long-term, with bank erosion stabilized, sedimentation will be reduced. Removal of fallen trees and woody drift and debris will eliminate some fish habitat. However, the riprap placed on the bank will provide a source of food and cover for fishes. It is also likely that *Potamilus capax* and other species of mussels will colonize this riprap along the Wabash River within several years.

It is not anticipated that operation and maintenance activities will affect mussels or other aquatic organisms. Operation and maintenance specifications will require that herbicides used for vegetation clearing be approved for use adjacent to aquatic environments. Removal of drift trees and snags should not significantly affect any mussels colonizing the riprap.

Water quality considerations relating to the discharge of fill material into the Wabash River are discussed in Exhibit 1, Section 404(b)(1) Evaluation.

Riparian vegetation will be eliminated by project construction. Areas required for construction staging, materials stockpiling, and a portion of spoil disposal will be located on open agricultural land adjacent to the project site causing negligible impact.

An additional proposed spoil disposal area is on the old fair grounds at the east end of town. There are no significant natural resources, cultural resources, nor HTRW concerns associated with this site. A second proposed spoil disposal area at the New Harmony sewage treatment plant is also available, but was not selected due to the unknown nature of past fill activities. Haul routes to the old fairgrounds disposal site will pass through New Harmony. The increased truck traffic generated by this and other aspects of the project will cause temporary increases in general traffic congestion and disruption.

The project plan includes a proposal to plant a strip of trees behind the riprap to replace trees which were lost and to stabilize the maintenance right-of-way disturbed by construction. This strip of trees would connect with trees regenerating to the north of the project. Together they would provide a wooded riparian corridor along this section of the river which would

link significant natural areas above and below the project area. The revegetated strip would help control erosion and runoff and provide food and cover for wildlife.

No threatened or endangered species will be adversely affected by the proposed project.

No cultural resource or National Register historic property will be affected by the proposed work.

Results of the hazardous and toxic waste investigations indicate no reasonable probability of hazardous or toxic waste contamination on the project site.

The only anticipated air quality discharges associated with the proposed action are those temporary discharges typically associated with construction (e.g., exhaust from construction equipment, fugitive dust emissions, etc.)

As required by Section 122 of Public Law 91-611, it has been determined that the considered construction will have no significant impact on the following:

a. Air, noise, and water pollution;

b. Destruction or disruption of man-made and natural resources, aesthetic values, community cohesion, and the availability of public facilities and services;

c. Adverse employment effects and tax and property value losses;

d. Injurious displacement of people, businesses, and farms;

e. Disruption of desirable community and regional growth.

VI. STATUS OF ENVIRONMENTAL COMPLIANCE. Described below is the current status of compliance for the significant environmental requirements which are applicable to the project.

National Environmental Policy Act (NEPA) With the completion of public review of the Draft Feasibility Report, Environmental Assessment and the proposed Finding of No Significant Impact (FONSI) it has been determined that the FONSI will satisfy the requirements of NEPA.

Clean Water Act (CWA) Section 404 of the CWA is applicable since filling will occur below the Ordinary High Water elevation of the Wabash River. A copy of the Section 404(b)(1) Evaluation is included as Exhibit 1. Section 401 Water Quality Certification has been requested from the State of Indiana.

A National Pollution Discharge Elimination System (NPDES) permit is required for storm water drainage by the CWA. Construction activities covered by an NPDES permit include any clearing, grading, excavating, grubbing or filling activities that result in the disturbance of five or more total acres of land. Therefore, the proposed construction of the New Harmony project will require an NPDES permit. As part of the NPDES permit a Pollution Prevention Plan (PPP) must be prepared. The PPP must include a site description and must describe the erosion and sediment controls to be implemented on the project. The NPDES permit will be requested during the preconstruction engineering and design stage of the project after project specifications have been completed.

Clean Air Act The proposed action is not in a non-attainment area for priority pollutants and is not subject to the requirements of 40 CFR part 93 of the Clean Air Act.

Fish and Wildlife Coordination Act (FWCA) The study has been coordinated with the U.S. Fish and Wildlife Service. Their comments are contained in their Planning Aid Letter and a final report which are included in the Final Feasibility Report.

Endangered Species Act (ESA) The U.S. Fish and Wildlife Service in its Planning Aid Letter, has reported a number of Federally and State listed threatened and endangered animals and plants that may occur in the vicinity of the proposed project. Project design modifications have resolved concerns regarding the fat pocketbook mussel, (*Potamilus capax*).

National Historic Preservation Act A cultural resource investigation has been conducted on the project area. The negative results have been coordinated with the Indiana State Historic Preservation Officer. No additional cultural resource investigations are recommended.

Comprehensive Environmental Resource Compensation & Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) These two acts pertain to hazardous, toxic and radiological waste (HTRW). A Phase I Environmental Site Assessment indicated no reasonable probability of HTRW concerns.

Farmland Protection Policy Act (FPPA) This act directs Federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands. The Natural Resources Conservation Service was contacted and has determined that sites affected by the project do not contain farmland covered by the FPPA.

Floodplain Management EO 11988 The objectives of Executive Order 11988 have been considered in the formulation of plans for this study. The following determinations have been made in response to requirements of Executive Order 11988 which pertains to floodplain management.

In order to achieve the desired objective of streambank erosion protection the considered project must be located in the floodplain. No practical non-floodplain alternative exists. The considered actions do not conflict with applicable state and local standards concerning floodplain protection. The considered action will not significantly affect the natural and beneficial values of the floodplain.

Protection of Wetlands (EO 11990) There will be no impacts on wetlands from the construction or operation of the project.

Intergovernmental Review of Federal Programs (EO 12372) The New Harmony project has been coordinated with Federal, State, and local government agencies having jurisdictional responsibilities, special expertise, or otherwise having an interest in the project. The Feasibility Report, Environmental Assessment, and Finding of No Significant Impact will be provided to these entities for a minimum 30-day review, prior to finalizing these documents.

VII. PUBLIC INVOLVEMENT AND COORDINATION. The development of the New Harmony Streambank erosion study has been the subject of Federal, state, municipal, organizational, and individual communication and discussion. Public comment received on the Draft Feasibility Report and Environmental Assessment has been considered prior to signing the Finding of No Significant Impact.

Responses to comments and the original Finding of No Significant Impact are included in the Final Feasibility Report.

# FINDING OF NO SIGNIFICANT IMPACT
# NEW HARMONY STREAMBANK PROTECTION PROJECT
# POSEY COUNTY, INDIANA

## Purpose

The following is prepared pursuant to the requirements of 40 CFR 1501.4(e) and 33 CFR 230.11 to document my findings concerning the environmental aspects of a proposed action.

## Proposed Action

The proposed action consists of the placement of approximately 1470 meters of stone bank protection on the left bank of the Wabash River beginning at a point approximately 950 meters upstream of the State Highway 66 bridge at New Harmony, Indiana. An existing fence jetty system will be removed from the project area prior to placement of the bank projection.

## Alternatives Considered

The alternatives considered were:

No action
Concrete mat systems
Proposed plan

## Factual Considerations

An environmental assessment evaluated the impacts that the proposed action and alternatives would have on key resources of the area. This evaluation concluded that the considered action would have no significant adverse impact on:

Water quality or wetlands
Aquatic and terrestrial habitats
Threatened or endangered species
Cultural resources
Socioeconomic structure of the area

There is no reasonable probability of hazardous or toxic contamination on the project site.

## Other Considerations

As the considered project is within a floodplain, the procedures required by Executive Order 11988, Floodplain Management, have been applied and a determination has been made that no practicable alternative exists to locating the action in a floodplain. In addition, as appropriate, any requirements involving Executive Order 11988 and Section 404 of the Clean

Water Act will be complied with prior to implementation and action.

Public participation has been an integral part of the planning process for this project and coordination has been maintained with U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service, the State of Indiana, local officials, and interested individuals.

Finding

In view of the foregoing considerations, it is my finding that the proposed action does not constitute a major Federal action having a significant effect on the human environment. As a result, I have determined that an environmental impact statement is not required for this project.

9/27/96
Date

Harry L. Spear
Colonel, Corps of Engineers
Commander and District Engineer

**EXHIBIT I**
**Section 404(b)(1) Evaluation**
**New Harmony Streambank Protection Project**
**Posey County, Indiana**

I. PROJECT DESCRIPTION

A. Location. The proposed project would be located on the left bank of the Wabash River beginning at a point approximately 950 meters upstream of the State Highway 66 bridge at New Harmony, Indiana.

B. General Description. The proposed action consists of the placement of approximately 1470 meters of stone bank protection. An existing fence jetty system will be removed from the project area prior to placement of the new bank protection.

C. Authority and Purpose. This General Investigation Study was authorized under the Energy and Water Development Appropriations Act, 1995 (Public Law 103-316, 108 Stat. 1707) dated August 26, 1994. The purpose is to prevent further bank erosion.

D. General Description of the Dredged or Fill Material. The material which will be placed below ordinary high water in the Wabash River consists of 37,000 cubic meters of riprap and 3500 cubic meters of granular stone.

E. Description of the Proposed Discharge Site. Stone placement will take place along a 1470 meter reach of Wabash River bank. Most of the bank is actively eroding and devoid of vegetation. At the upstream end of the project reach there is some herbaceous cover and sapling trees. The river bank provides limited habitat for aquatic and terrestrial wildlife.

F. Description of Disposal Method. Sound engineering practices will be followed during all phases of project construction. The fill material will be placed by mechanical means so as to produce a well-constructed and stable structure.

2. FACTUAL DETERMINATIONS

"Factual Determination" as required by Section 230.11 of the Environmental Protection Agency's Final Guidelines of December 24, 1980 include the following:

A. Physical Substrate Determinations. Minor changes to the physical substrate will occur because of the construction.

B. Water Circulation, Fluctuation, and Salinity Determinations. Water chemistry, odor, taste, dissolved oxygen

levels, nutrients, and eutrophication will not be significantly affected by the fill operations. Current patterns, stream flow and velocity, and hydrologic regime will not be adversely affected by the fill operations. Salinity is not a consideration.

C. Suspended Particulate and Turbidity Determinations. Turbidity levels will be elevated locally during construction. Following construction activities, turbidity levels will return to preconstruction levels. The fill materials will be obtained from clean commercial site sources. There will be no effect on the chemical and physical properties of the Wabash River. Primary production in the river will not be affected due to suspended particulates and turbidity. After construction the project will have no post-construction suspended particulates or turbidity that will affect fisheries.

D. Contaminant Determination. The fill material will be obtained from commercial, pollution-free sources. There is no reason to believe that the considered fill material is a carrier of contaminants. This meets the testing exclusion criteria.

E. Aquatic Ecosystem and Organism Determination. An insignificant amount of substrate will be disturbed; the trophic levels of the aquatic system will not be significantly affected. The considered fill area does not provide significant wildlife habitat.

F. Proposed Fill Site Determinations. The placement of the fill is determined by engineering requirements. Placement of the fill materials will not violate Indiana water quality standards. There will be no effect on municipal water supplies; no recreation fishery will be affected.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. No cumulative effects to the aquatic ecosystem of the stream can be attributed to the disposal of the fill materials associated with the construction of the considered project.

H. Determinations of Secondary Effects on the Aquatic Ecosystem. No significant adverse secondary effects to the aquatic ecosystem can be identified from the proposed placement of the fill materials.

3. FINDING OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. The proposed construction fulfills the economic, engineering, and environmental requirements associated with project development under the applied authority. No practicable alternatives to the proposed

discharge site which will have less adverse impact on the aquatic ecosystem exist.

B. Compliance with Applicable State Water Quality Standards. As required by Section 401 of the Clean Water Act, Water Quality Certification Waiver has been requested from the State of Indiana.

C. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. The fill placement operations will not violate Section 307 of the Clean Water Act.

D. Compliance with Endangered Species Act of 1973, as Amended. Based on available information, it has been determined that no species, or the critical habitat thereof, will be affected by the considered work.

E. Evaluation of Extent of Degradation of the Waters of the United States. The considered placement of fill will result in no significant adverse impact on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, shellfish, wildlife, and endangered species. Life stages of aquatic and terrestrial species will not be adversely affected. No significant adverse effects on aquatic ecosystem diversity, productivity, and stability will occur. Recreational, aesthetic, and economic values will not be adversely affected.

F. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. Appropriate steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem of the affected streams include sound engineering design and careful placement of fill material. In addition, the contractor(s) placing of fill material will be governed by detailed contract specifications to prevent pollution and damage to the aquatic system as a result of construction activities and fill placement. The provision of a firm substrate will improve habitat variety and water quality.

4. EVALUATION RESPONSIBILITY

On the basis of the guidelines, the considered disposal site for the fill material is specified as complying with the requirements of these guidelines.

Date: 9/30/96

Harry L. Spear
Colonel, Corps of Engineers
Commander and District Engineer

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
*We make Indiana a cleaner, healthier place to live*

*Evan Bayh*
*Governor*
*Michael O'Connor*
*Commissioner*

100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Telephone 317-232-8603
Environmental Helpline 1-800-451-6027

September 30, 1996

VIA CERTIFIED MAIL P 451 343 195

Mr. Robert Fuller
Chief, Planning Division
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Attention: Mr. Keith Hoss

Dear Mr. Fuller:

Re: Section 401 Water Quality Certification
Project: New Harmony Bank Stabilization
Notice: N/A
Posey County

Office of Water Management staff have reviewed your correspondence dated September 9, 1996, requesting Section 401 Water Quality Certification for a bank stabilization project sited on the Wabash River at river kilometer 82 north of New Harmony, Posey County. Specifically, the U.S. Army Corps of Engineers plans to stabilize 1470 linear meters of severely eroded riverbank by placing stone revetment riprap along the left bank of the Wabash River from river kilometer 83.4 to 84.6. Minor bank grading and shaping will be required in some locations to properly install the riprap. This project is needed because continued erosion along this section of the Wabash River threatens cultural and historic resources within the town of New Harmony.

Based on the available information, it is the judgment of this office that the proposed project will not cause a significant impact to water quality provided that conditions set forth by the State are incorporated into the project. Therefore, subject to the following conditions, the Indiana Department of Environmental Management (IDEM) hereby grants Section 401 Water Quality Certification for the project described in your correspondence dated September 9, 1996:

1. Physical disturbance of banks, submerged vegetation and riparian vegetation, especially large trees which provide shade to the Wabash River, should be limited to that which is absolutely necessary to the conduct of the project.

2. The contractor performing the actual operations must comply with Section 311 of the Federal Clean Water Act and with 327 IAC 2-6 (formerly Indiana Stream Pollution Control Board Regulation 330

IAC 1-6-1) concerning spills of oil and hazardous materials.

3. Deposition of dredged or excavated materials and all earthwork operations will be carried out in such a manner that soil erosion and sediment runoff to any nearby watercourse are controlled and minimized. The use of straw bale barriers, silt fencing, or an earthen berm around disturbed areas is recommended to prevent soil from leaving the construction site. Information and assistance regarding control of construction-related soil erosion are available from the Soil and Water Conservation District offices, collocated with the local field office of the USDA Natural Resources Conservation Service in each county, and the regional field offices of the Indiana Department of Natural Resources' Division of Soil Conservation, whose administrative office is at 402 W. Washington Street, Room W264, Indianapolis, IN 46204. Areas used for deposition of dredged materials should be provided with temporary dikes or bulkheads for separation and retention of solids. Vegetative cover should be established on dredged or excavated material as soon as possible.

4. Contact the Recommendation Section of the Indiana Department of Natural Resources at 317/232-4164 regarding the possible requirement of a permit from the Indiana Department of Natural Resources.

5. All construction sites five acres or greater are subject to 327 IAC 15-5 (Rule 5) which requires an erosion control plan. Contact Ms. Anne Burget of the IDEM Permits Section at 317/233-1864 regarding the requirements of this general permit rule.

6. Placement of spoil materials shall be in upland areas only. Under no circumstances should wetlands be filled, excavated, or dredged, and no flowing body of water shall be blocked or otherwise impinged by bank stabilization activities.

7. Where possible, woody vegetation shall be replaced or replanted along the top of the bank. We recommend a buffer zone be established along the top of the bank where native trees and plants can regrow and to provide a setback for agricultural activities to insure that row crops are not planted along the top of the stabilized bank.

8. All conditions and recommendations set forth in the U.S. Fish and Wildlife Service (USFWS) letter to your office dated September 18, 1996, are hereby incorporated into this certification as conditions by reference. These conditions and recommendations set forth by USFWS shall be incorporated into the project and completed as stated.

This certification is effective 18 days from the mailing of this notice unless a petition for review and a petition for stay of effectiveness are filed within this 18 day period. If a petition for review and a petition for stay of effectiveness are filed within this period, any part of the permit within the scope of the petition for stay is stayed for 15 days, unless or

until an Environmental Law Judge further stays the permit in whole or in part.

This decision may be appealed in accordance with IC 4-21.5, the Administrative Orders and Procedures Act. The steps that must be followed to qualify for review are:

1. You must petition for review in a writing that states facts demonstrating that you are either the person to whom this decision is directed, a person who is aggrieved or adversely affected by the decision, or a person entitled to review under any law.

2. You must file the petition for review with the Office of Environmental Adjudication (OEA) at the following address:

   Office of Environmental Adjudication
   ISTA Building
   150 West Market Street
   Suite 618
   Indianapolis, IN 46204

3. You must file the petition within eighteen (18) days of the mailing date of this decision. If the eighteenth day falls on a Saturday, Sunday, legal holiday, or other day that the OEA offices are closed during regular business hours, you may file the petition the next day that the OEA offices are open during regular business hours. The petition is deemed filed on the earliest of the following dates: the date it is personally delivered to the OEA; the date that the envelope containing the petition is postmarked if it is mailed by United States mail; or, the date it is shown to have been deposited with a private carrier on the private carrier's receipt, if sent by private carrier.

Identifying the permit, decision, or other order for which you seek review by permit number, name of the applicant, location, or date of this notice will expedite review of the petition.

Note that if a petition for review is granted pursuant to IC 4-21.5-3-7, the petitioner will, and any other person may, obtain notice of any prehearing conferences, preliminary hearings, hearings, stays, and any orders disposing of the proceedings by requesting copies of such notices from the OEA.

Granting of Section 401 Water Quality Certification does not relieve the applicant from the responsibility of obtaining any other permits or authorizations that may be required for this project or related activities from the IDEM or any other agency or person.

If you have any questions about this certification, contact Mr. Andrew Pelloso, Project Manager, of my staff at 317/233-2481, or you may contact the Office of Water Management through the IDEM Environmental Hotline (1-800-451-6027).

If you have procedural questions regarding filing a petition for review you may contact the OEA at 317-232-8591.

Sincerely,

R. J. Henley

R.J. Henley
Assistant Commissioner
Office of Water Management

cc: Lori Pruitt, USFWS

DEPARTMENT OF THE ARMY
ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P. O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

September 9, 1996

Planning Division
Environmental Analysis Branch

Dr. Dennis Clark, Section Chief
Section 401 Water Quality Program
Office of Water Management
Indiana Department of
Environmental Management
P.O. Box 6015
Indianapolis, IN 46206-6015

Dear Dr. Clark:

Enclosed is a copy of the Draft Interim Feasibility Report for the New Harmony, Indiana Streambank Erosion Project. Included in the document are the Environmental Assessment, unsigned Finding of No Significant Impact and the preliminary copy of the project's 404 Evaluation.

A 401 Water Quality Certification is required for this proposed work under the Clean Water Act and is hereby requested.

Sincerely,

ORIGINAL SIGNED

Robert G. Fuller
Chief, Planning Division

Enclosure

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Historic Preservation
and Archaeology
402 W. Washington St., Rm. 274
Indianapolis, Indiana 46204
317-232-1646

May 21, 1996

Robert W. Woodyard
Chief, Environmental Analysis Branch
Department of the Army
U.S. Army Engineer District, Louisville
Corps of Engineers
Post Office Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Woodyard:

We have reviewed the three potential spoil disposal areas related to the proposed bank protection project in New Harmony, Posey County, Indiana.

No known historical, architectural, or archaeological sites listed in or eligible for inclusion in the National Register of Historic Places will be affected by this project.

If any archaeological artifacts or human remains are uncovered during construction, federal law and regulations (16 USC 470, et seq.; 36 CFR 800.11, et al.) and, additionally, state law (Indiana Code 14-21-1), require that work must stop and that the discovery must be reported to the Division of Historic Preservation and Archaeology within two (2) business days.

We appreciate the opportunity to be of service.

Very truly yours,

Daniel J. Foggarty

Patrick R. Ralston
State Historic Preservation Officer

PRR:JAM:MMD:smg

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P. O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

March 25, 1996

Planning Division
Environmental Analysis Branch

Mr. Patrick R. Ralston
State Historic Preservation Officer
Department of Natural Resources
Indiana Government Center South Rm W256
402 West Washington Street
Indianapolis Indiana 46204

Dear Mr. Ralston:

As studies have progressed regarding the proposed bank protection project at New Harmony, Indiana, an in-house examination of three (3) considered spoil disposal areas was undertaken during the period February 27-28, 1996, by Mr. Donald B. Ball (Archaeologist, SOPA) of this office. Since these studies are supplemental to an earlier reconnaissance of the primary areas of project impact, a separate formal report will not be prepared. A copy of the noted report (entitled "An Archaeological Reconnaissance of a Considered Bank Protection Area on the Wabash River near New Harmony, Posey County, Indiana", dated August 1983) has been previously furnished to your office.

Descriptions follow of the three areas examined. Extracts from the applicable U.S.G.S. 7.5' quadrangles are attached.

Site #1 - Maple Hill Cementery (cf. U.S.G.S. 7.5 minute "Solitude, Indiana-Illinois" quadrangle, 1981 edition). Site is located at the junction of South Main Street (State Highway 69) and Old Dam Road just south of downtown New Harmony. Situated immediately adjacent to a small, seasonal stream in a well entrenched hollow, this area measures ca. 300 feet in length by variably 45-50 feet in width. No previous interments are known in this area nor are any early structures known to have been erected here. Cemetery personnel hope to raise the elevation of this portion of the cemetery about three (3) feet with the spoil. As the majority of the cemetery is situated on very steep terrain and is near capacity, this extra space is obviously needed to continue interments at this facility. No evidence of archaeological remains was encountered. Field methods consisted of on-site observations of small areas of exposed earth (particularly the left bank of the adjacent stream) and a series of shovel tests (8 holes) along the centerline of the parcel's long axis. Surface visibility (at best) was ca. 5%; soil was a dark brown silty clay loam.

Site #2 - Treatment Plant (cf. U.S.G.S. 7.5 minute "New Harmony, Indiana-Illinois" quadrangle, 1980 revised edition). This proposed site has been actively used by the city for several years as a spoil area for earth removed from various community projects. This tract was originally rather low lying and ca. 4-6 feet of earth appear to have been dumped there in years past. This area measures ca. 200 by 250 feet. The city wishes to add three (3) additional feet of fill. A number of broken soft-fired brick fragments, concrete slabs, miscellaneous scrap metal fragments, window glass (green tint), bottle glass (light green and clear), etc. were noted. As these materials all represent secondary deposition (a dump site), they have no CRM importance. This parcel is located on the eastern edge of New Harmony near the left bank of the Wabash River.

Site #3 - Old Fair Grounds (cf. "New Harmony" quadrangle). Situated just outside the eastern edge of New Harmony, this generally flat field contains several low spots which the city desires to fill to make the land more suitable for construction associated with a proposed industrial park. This parcel (apparently used in 1995 as a soybean field) measures ca. 1,000 N-S by 500 feet (minimum) E-W though the low spots near its center likely occupy only 10-15% of the tract. Surface visibility was variably 10-15%. Shovel probes revealed a dark brown silt soil. Field methods consisted of a total of six (6) short axis transects across the lowest areas with shovel probes each 40-50 feet. Excluding stray scraps of metal and bottle sherds, no artifactual materials were noted nor were local contacts aware of any historic area construction on the tract.

In light of the consistently negative findings at each of these parcels, no further investigations are recommended.

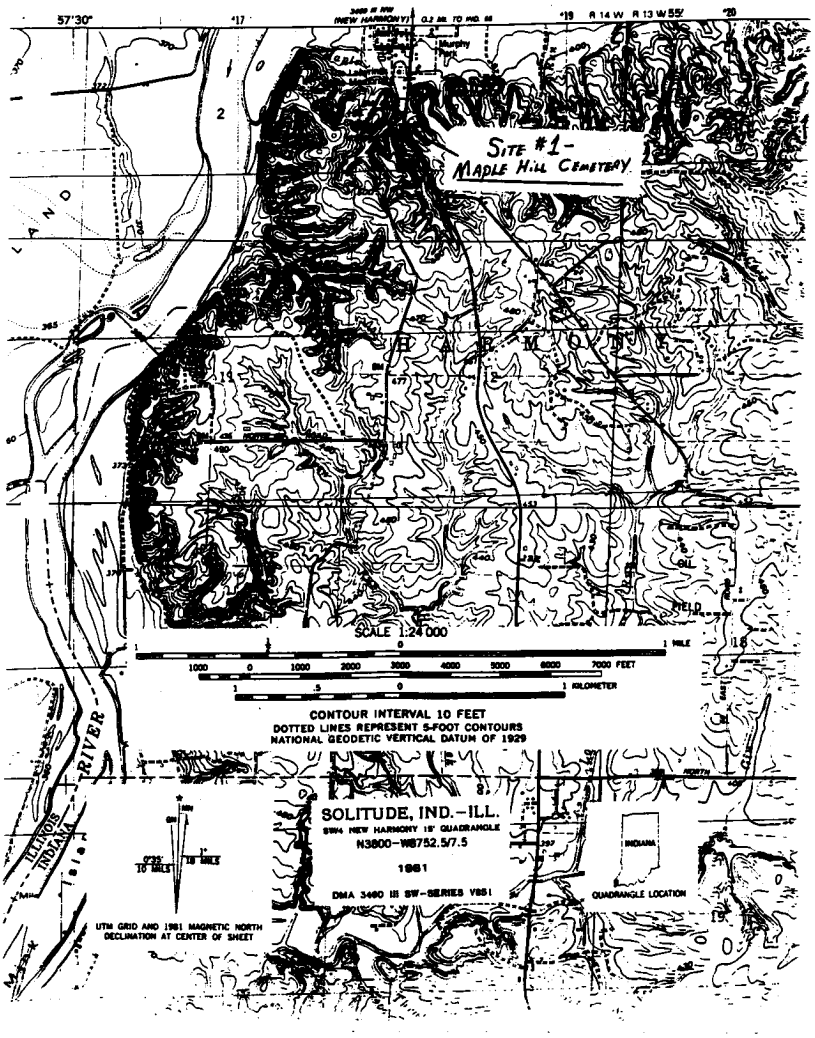
To expedite this matter, your comments are requested by Friday, April 26, 1996.

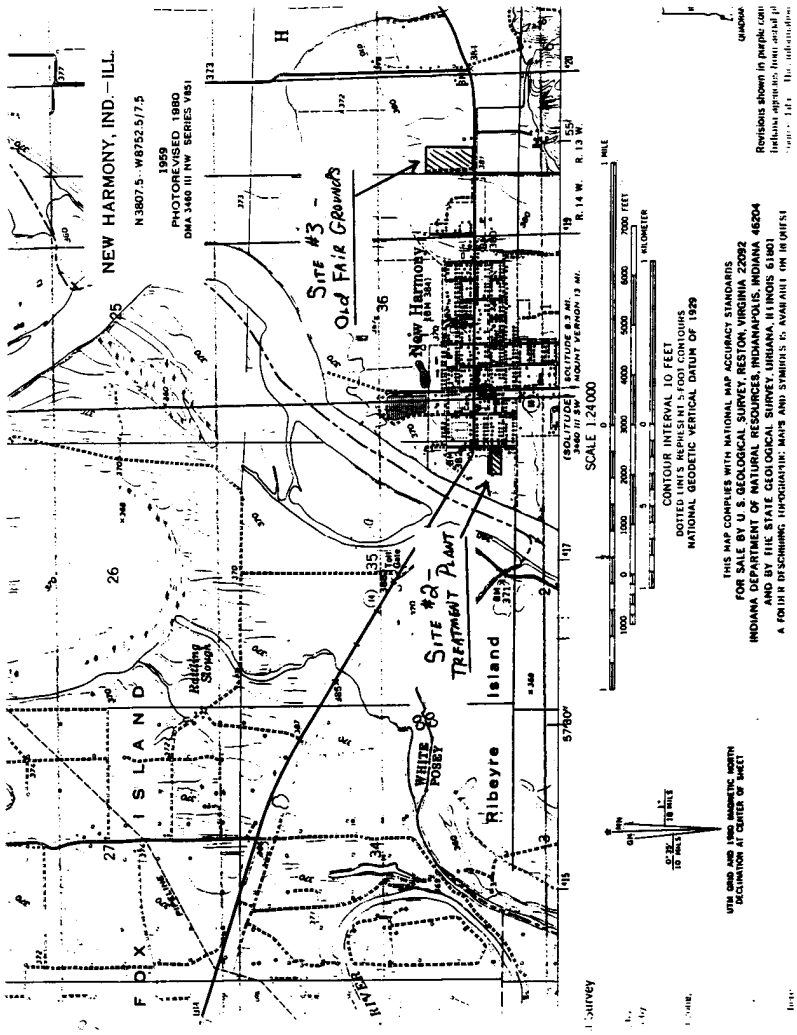
Questions concerning field methods and related matters may be directed to Mr. Ball at (502) 582-5696.

Sincerely,

Robert W. Woodyard
Chief, Environmental Analysis Branch

Enclosures
As stated


Site #1-
Maple Hill Cemetery
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
SOLITUDE, IND.-ILL.
SW4 NEW HARMONY 15' QUADRANGLE
N3800-W8752.5/7.5
1981
DMA 3460 III SW-SERIES V881
UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET
QUADRANGLE LOCATION
INDIANA
ILLINOIS
RIVER


NEW HARMONY, IND.—ILL.
N 3807.5—W 8752.5/7.5
1959
PHOTOREVISED 1980
DMA 3460 III NW SERIES V851
SITE #3 - OLD FAIR GROUNDS
SITE #2 - TREATMENT PLANT
New Harmony
Ribeyre Island
WHITE POSEY
FOX ISLAND
RIVER
Rattling Slough
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
INDIANA DEPARTMENT OF NATURAL RESOURCES, INDIANAPOLIS, INDIANA 46204
AND BY THE STATE GEOLOGICAL SURVEY, URBANA, ILLINOIS 61801
UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P. O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

February 1, 1996

Planning Division
Environmental Analysis Branch

Mr. Patrick R. Ralston
State Historic Preservation Officer
Department of Natural Resources
Division of Historic Preservation and Archaeology
Indiana Government Center South - Rm W256
402 West Washington Street
Indianapolis, Indiana 46204

Dear Mr. Ralston:

The present comments are in response to your letter of July 10, 1995, regarding a length of eroding riverbank immediately upstream from New Harmony, Indiana, on the Wabash River. A visual inspection of the proposed area was undertaken by qualified Louisville District personnel on Tuesday, 11 July 1995. Field methods consisted of two (2) boat assisted traverses along the eroding banks. This effort was directed toward examining the steeply cut bank for any indication of profiled features, burials, or midden, exposed artifacts, or evidence of historic (pre-1946) construction or depositional episodes. Although the area was partially examined from the top of bank, it was not feasible to conduct a detailed study of the exposed soil due to the high (steep) angle of bank drop-off.

No evidence of prehistoric or early (pre-1946) historic era cultural materials were observed. Consistently, the only materials noted were of obviously recent origin (e.g., beverage cans, plastic milk jugs, a refrigerator, and a truck wheel and tire).

Previous coordination with your staff indicated that no sites are currently known within the proposed bank protection area. It is noted, however, that seven (7) previously reported archaeological sites (12Po69, 161, 165, 206, 785, and 786, and INDOT 65-43) are situated within one (1) mile of the examined riverbank. Discussions with local residents familiar with the area indicated that they were not aware of any cultural resources along the length of the examined bank.

Coordination with Mr. Michael Anslinger of the Anthropology Museum and Laboratory of Indiana State University, Terre Haute, Indiana, in August 1983 indicated that as of that date no archaeological sites had been reported within the Indiana portion of the project area. On the basis of site locational information

on file in Terre Haute, Mr. Anslinger noted that the majority of sites known at that time were typically associated with: (1) well defined flood plain knolls; (2) first terraces; or (3) ridges. The relatively flat flood plain immediately adjacent to the examined shoreline conforms to none of these topographic categories.

Recognizing that archaeological sites are present near the project area, the lack of any observed early artifactual materials (both prehistoric and historic) in concert with available site location information (i.e., topographic features associated with known sites) fails to build a solid case for additional cultural resource studies in the specific areas of project impact. No additional cultural resource investigations are recommended for the riverbank area affected by the proposed bank stabilization project.

The information presented herein is supplemental to a study entitled "An Archaeological Reconnaissance of a Considered Bank Protection Area on the Wabash River near New Harmony, Posey County, Indiana" (dated August 1983) submitted to your office in October 1984. A separate report will not be prepared for the present effort which effectively re-examined the same area.

To expedite this matter, your comments are requested by Friday, March 1, 1996.

Questions concerning either the present or former field studies should be directed to Mr. Donald B. Ball (Archaeologist, SOPA) of this office at (502) 582-5696 or -6475.

Sincerely,

Robert W. Woodyard
Chief, Environmental Analysis Branch

.NDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Historic Preservation
and Archaeology
402 W. Washington St., Rm. 274
Indianapolis, Indiana 46204
317-232-1646

July 10, 1995

Donald B. Ball
Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Ball:

We have reviewed the feasibility study to determine the best solution to the Wabash riverbank erosion problem in New Harmony, Posey County, Indiana.

No known historical or architectural sites listed on or eligible for inclusion in the National Register of Historic Places will be affected by this project.

A review of our records indicates that the proposed project area has not been assessed by a professional archaeologist. However, based on our knowledge of the region, the proposed project area is physiographically suitable to contain archaeological resources. Furthermore, seven (7) previously recorded archaeological sites (12Po69, 161, 165, 206, 785 and 786 and INDOT 65-43) are located within one (1) mile of the project area. In order to determine the effects of this project on archaeological resources and as part of the Federal Agency Official's responsibilities to identify historic properties, pursuant to 36 CFR 800.4, we will need an archaeological reconnaissance level survey. As part of the reconnaissance survey, the exposed riverbank should also be examined. Additionally, depending on the nature of the project, an archaeological subsurface reconnaissance may be required. If the project will require extensive earthmoving activities, a detailed archaeological subsurface reconnaissance proposal must be submitted to our division for review and comment. The survey must be done in accordance with the Secretary of the Interior's "Standards and

Guidelines for Archaeology and Historic Preservation" (48 FR 44716). A description of the survey methods and results must be submitted to the Division of Historic Preservation and Archaeology for review before we can comment further. Please refer to the enclosed list of qualified archaeologists.

In the event that sites which are eligible for the National Register of Historic Places are discovered, the applicant must follow the rules and regulations established by the Advisory Council on Historic Preservation (found at 36 CFR Part 800) to implement federal Public Laws 89-665, 94-422, and 96-515, and Executive Order 11593.

Thank you for submitting this project for our review.

Very truly yours,

Patrick R. Ralston
State Historic Preservation Officer

PRR:DKO:MMD:smg

enclosure

Archaeologists
Qualified Professisonal List
February 1994

According to federal regulations, an archaeologist who undertakes or supervises archaeological investigations must meet minimum professional qualifications established by the Department of the Interior. The following individuals and institutions meet the Department of the Interior requirements for archaeological work (an * denotes institutions which hold archaeological records):

*Archaeological Resources Management Service, Ball State University, Muncie, Indiana; Donald R. Cochran, Dir. 317/285-5328

*Glenn A. Black Laboratory of Archaeology, Bloomington, Indiana; Christopher S. Peebles, Director, General Inquiries 812/855-9544

Gray and Pape Cultural Resources Consultants, Cincinnati, Ohio; Marlesa A. Gray and Kevin Pape 513/287-7700

*Indiana State University, Anthropology Laboratory, Terre Haute, Indiana; C. Russell Stafford, Director 812/237-3997

*Indiana University-Purdue University at Ft. Wayne, Dept. of Anthropology, Ft. Wayne, IN; Robert Jeske, Dir. 219/481-6676

Landmark Archaeological and Environmental Services, Lebanon, Indiana; Thomas C. Beard, President 317/325-2682

*Notre Dame University, Department of Anthropology, Notre Dame, Indiana; James O. Bellis 219/239-5645

3D/Environmental Services, Cincinnati, Ohio; John Doershuk, Principal Investigator 513/922-8199

BZ Engineering, Inc., Archaeological Services Division; Allan P. VanDyke, Director 414/257-3674

Archaeological Services Consultants, Inc., Columbus, Ohio; Shaune Skinner, President 614/268-2514

KEMRON Environmental Services, Cincinnati, Ohio 45212; Laura Clifford, Principal Investigator 513/631-3900

Commonwealth Cultural Resources Group, Jackson, Michigan; Donald I. Weir 517/788-3973

GAI Consultants, Inc., Monroeville, PA; Jack B. Irion, Archaeological Manager 412/856-6400

*Purdue University, West Lafayette, Indiana; R. Criss Helmkamp 317/494-4668

Midwest Archaeological Research Services, Inc., Harvard, Illinois 60033; Rochell Lurie and M. Catherine Bird, Principal Investigators 815/943-3199

Patrick Archaeology, Glen Ellyn, Illinois 60137; Douglas Kullen, Principal Investigator 708/858-7050

Michael Baker Jr., Inc., Cultural Resources Section, Coraopolis, PA 15108; Ronald C. Carlisle, Director 412/269-4600

Great Lakes Research, Williamston, MI 48895; Mark C. Branstner, General Partner 517/655-3975

Cultural Horizons, Inc., Harrodsburg, KY 40330; Nancy Ross-Stallings, Principal Investigator 606/734-2277

SE Technologies, Inc., Bridgeville, PA 15017-2839; James P. Dwyer, Senior Archaeologist 412/257-6015

Cultural Resource Analysts, Inc., Lexington, Kentucky 40508; Chuck Niquette 606/252-4737

Roberts/Schornick & Assoc., Inc., Norman, OK 73072; Stanley D. Bussey 405/321-3895

MAAR Associates, Inc., Newark, DE 19715; Ronald Thomas, V-P, 302/368-5777

Archaeological and Historical Consultants, Inc., Centre Hall, PA 16828; David Rue, Sr. V-P, 814/364-2135

Algonquin Archaeological Consultants, Inc., Cincinnati, Ohio 45220; Rebecca Hawkins, 513/861-3313

There may be other archaeologists qualified to do archaeological investigations in Indiana, however, such individuals must first submit their professional credentials to the Division of Historic Preservation and Archaeology to determine that they meet the standards.

"ARCHEOQPLIST"

# APPENDIX H

## FISH AND WILDLIFE SERVICE COORDINATION

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# APPENDIX H
# FISH AND WILDLIFE COORDINATION

## 1. INTRODUCTION

Coordination has been maintained with the Fish and Wildlife Service (FWS) during the course of this study. Included in this appendix are copies of correspondence between the Louisville District and the FWS.

The purpose of this section is to recognize recommendations that the U.S. FWS has proposed. The following is a summary of recommendations contained in the FWS letter dated September 18, 1996 and the response to each. The primary concern of the FWS was the potential impacts to the endangered mussel *Potamilus Capax* (fat pocketbook). Early coordination with the FWS resulted in a satisfactory resolution to this issue.

a. Comment: "We recommend that there should be no construction or stockpiling of materials north of the upstream terminus of the riprap. The access road, particularly above the upstream terminus of the riprap, should be located as far landward from the bank as possible to minimize sedimentation."

Response: Concur. Areas required for construction staging, materials stockpiling, and a portion of spoil disposal will be located on open agricultural land adjacent to the project site causing negligible impact.

b. Comment: "We recommend that there be no overbank spoil disposal in areas where there is existing woody vegetation." We further recommend that the old Gresham Creek channel (at the southern end of the project area) not be used for soil disposal, except at the point where the old creek bed meets the river bank."

Response: Concur. Spoil will be placed to avoid impact. The old Gresham Creek channel will only be filled as necessary at the downstream end to provide a uniform slope for placement of stone protection.

c. Comment: "We recommend planting a minimum of 3 rows of native hardwood tree species at 12-15 foot spacing. In addition to planting trees, any disturbed soil areas should be revegetated as quickly as feasible."

Response: The project plan includes planting a strip of trees along the top of bank behind the riprap. Details will be addressed during plans and specifications. Disturbed areas will be revegetated.

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX (812) 334-4273

September 18, 1996

Robert G. Fuller, Chief
Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

Dear Mr. Fuller:

This letter provides the U.S. Fish and Wildlife Service's (FWS) comments on the Interim Feasibility Report on the proposed bank erosion project on the Wabash River in New Harmony, Posey County, Indiana. These comments are in response to a technical assistance request from the Corps of Engineers, as forwarded under the Department of Interior's letter dated August 30, 1996 (ER 96/0575). These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the FWS Mitigation Policy.

As stated in previous correspondence, potential impacts on *Potamilus capax* (the fat pocketbook), a Federally and State (Indiana and Illinois) listed mussel in the project area, constitute the major concern of the FWS with regard to the proposed project. The project description indicates that the proposed northern limit of the riprap does not include the sites where *P. capax* were found during a 1995 survey. The exact location of *P. capax*, relative to the proposed northern limit of riprap, is difficult to determine based on maps provided in the Interim Feasibility Report. It is our understanding that all riprap will be placed south of the area in which *P. capax* was documented; this largely resolves our concerns regarding potential project impacts on this species.

The project maps indicate that an access road for transporting materials to the area is located north of the upstream terminus of the riprap; this road would follow the bank adjacent to the area where *P. capax* were found. Provided that precautions are taken to safeguard against sedimentation in this area, project impacts on *P. capax* can be avoided. We recommend that there should be no construction or stockpiling of materials north of the upstream terminus of the riprap. The access road, particularly above the upstream terminus of the riprap, should be located as far landward from the bank as possible to minimize sedimentation.

Regarding soil disposal, the Interim Feasibility Report states that "...excavated soil could be spread along the overbank area...". We recommend that there be no overbank spoil disposal in areas where there is existing woody vegetation. This will reduce impacts to natural woody vegetation, which is already sparse along the Wabash River in the project area. We further recommend that the old Gresham Creek channel (at the southern end of the project area) not be used for soil disposal,

except at the point where the old creek bed meets the river bank. The feasibility report states that filling at this point is necessary to allow for smooth uniform placement of stone protection. Disturbance to the remainder of the old creek channel should be avoided.

The Interim Feasibility Report includes a proposal "...to plant a strip of trees behind the riprap to replace tress which were lost and to stabilize the maintenance right-of-way disturbed by construction. This strip of trees would provide a wooded riparian corridor along this section of the river which would link significant natural areas above and below the project area. The revegetated strip would help control erosion and runoff and provide food and cover for wildlife." We fully support this aspect of the project. Specifically, we recommend planting a minimum of 3 rows of native hardwood tree species at 12-15 foot spacing. In addition to planting trees, any disturbed soil areas should be revegetated as quickly as feasible. A strip of wooded vegetation behind the riprap would serve multiple purposes. Benefits include reduced erosion and runoff from adjacent agricultural areas; a source of food and cover for wildlife; a dispersal/migration corridor for wildlife; a source of woody debris for in-stream cover; and enhanced aesthetics along the Wabash River corridor. A strip of woody vegetation behind the riprap would also provide additional bank stabilization. Maximum benefits will be realized if this strip of trees extends along the entire length of the project area, connecting existing forested areas above and below the project area. A wooded riparian corridor along this section of the river would be particularly valuable, because it would link significant natural areas above and below the project area.

In addition to the stated benefits, maintaining/enhancing a corridor of riparian vegetation in the project area is also consistent with the local communities' vision for the river corridor, as expressed in the Wabash River Heritage Corridor Plan (WRHCP). The WRHCP was developed throughout 1992 and early 1993 through regional public planning meetings and meetings of the Wabash River Heritage Corridor Commission. The plan demonstrates the commitment of communities along the Wabash to recognize, protect, and enhance the cultural and natural resources of the Wabash River corridor. As such, projects which directly affect the character of the river corridor should be consistent with the goals of this plan. The first of the 6 goals listed in the plan is: "To promote the improvement of the natural environment of the corridor."

Thank you for providing the FWS the opportunity to comment on the Interim Feasibility Report. If you have any questions or require additional technical assistance, please contact Lori Pruitt at (812) 334-4261, extension 211.

Sincerely yours,

David C. Hudak
Supervisor

cc: Bob Woodyard
John Jurgensen
Steve Jose, Indiana Division of Fish and Wildlife, Indianapolis, IN
Andrew Pelloso, Indiana Dept. of Environmental Management, Indianapolis, IN
Regional Director, FWS, Twin Cities, MN, ATTN: Lyn MacLean (ES-DHC)
Mark Bagdovitz, BFA, Arlington, VA
Gordon Leisch, OEPC, Washington, DC

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX 334-4273

IN REPLY REFER TO:

February 2, 1996

Robert G. Fuller, Chief
Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

Dear ~~Mr. Fuller~~ Bob:

This letter pertains to the U.S. Fish and Wildlife Service's (FWS) comments (submitted in a 9/8/95 Planning Aid Letter) on the proposed bank erosion project on the Wabash River in New Harmony, Posey County, Indiana. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the FWS Mitigation Policy.

We received the revised project maps from Bob Woodyard on January 18, 1996. On January 26, Lori Pruitt of this office spoke to Keith Hoss and discussed the revised project plans. The purpose of this letter is to clarify and reiterate comments made during that phone conversation.

The project maps indicate that the proposed northern limit of the riprap has been revised. The project area no longer includes the sites where the fat pocketbook, (*Potamilus capax*), a Federally and State (Indiana and Illinois) endangered mussel, were found during recent sampling.

The project maps indicate that an access road for transporting materials to the area is located north of the upstream terminus of the riprap; this road would follow the bank adjacent to the area where *P. capax* were found. Provided that precautions are taken to safeguard against sedimentation in this area, project impacts on *P. capax* can be avoided. We recommend that there should be no construction or stockpiling of materials north of the upstream terminus of the riprap. The access road, particularly above the upstream terminus of the riprap, should be located as far landward from the bank as possible to minimize sedimentation.

The location for spoil disposal from bank shaping has not yet been addressed. We recommend that the creek channel along the bank at the southern edge of the project area should not be used for spoil disposal.

Finally, we restate our recommendation that revised project plans should include planting a strip of trees behind the riprap to replace those which will be lost in the process of shaping and armoring the bank (in the southern portion of the project area). We recommend planting a minimum of 3 rows of native hardwood tree species at 12-15 foot spacing. In addition to planting trees, any disturbed soil areas should be revegetated as quickly as feasible. A strip of wooded vegetation behind the

riprap would serve multiple purposes. Benefits include reduced erosion and runoff from adjacent agricultural areas; a source of food and cover for wildlife; a dispersal/migration corridor for wildlife; a source of woody debris for in-stream cover; and enhanced aesthetics along the Wabash River corridor. A strip of woody vegetation behind the riprap would also provide additional bank stabilization. Maximum benefits will be realized if this strip of trees extends along the entire length of the project area, connecting existing forested areas above and below the project area. A wooded riparian corridor along this section of the river would be particularly valuable, because it would link significant natural areas above and below the project area.

In addition to the stated benefits, maintaining/enhancing a corridor of riparian vegetation in the project area is also consistent with the local communities' vision for the river corridor, as expressed in the Wabash River Heritage Corridor Plan (WRHCP). The WRHCP was developed throughout 1992 and early 1993 through regional public planning meetings and meetings of the Wabash River Heritage Corridor Commission. The plan demonstrates the commitment of communities along the Wabash to recognize, protect, and enhance the cultural and natural resources of the Wabash River corridor. As such, projects which directly affect the character of the river corridor should be consistent with the goals of this plan. The first of the 6 goals listed in the plan is: "To promote the improvement of the natural environment of the corridor."

Thank you for providing the revised project maps; these maps largely resolve concerns regarding potential project impacts on *P. capax*. If you have any questions or require additional technical assistance, please contact Lori Pruitt at (812) 334-4261, extension 211.

Sincerely yours,

David C. Hudak
Supervisor

cc: Bob Woodyard
John Jurgensen

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P. O. B
LOUISV

January 17, 1996

Planning Division
Environmental Analysis Branch

Mr. David C. Hudak, Supervisor
Bloomington Field Office
United States Department of the Interior
620 South Walker Street
Bloomington, Indiana 47403-2121

Dear Mr. Hudak:

Enclosed are current plans for the proposed streambank protection project on the Wabash River at New Harmony, Indiana. As you have stated in your Planning Aid Letter you have particular concerns regarding potential impacts on the fat pocketbook mussel, (Potamilus capax), a Federally and state endangered mussel.

You previously have been sent a copy of the mussel survey performed by Dr. Andrew Miller of the U.S. Army Engineer Waterways Experiment Station plus a more detailed map indicating the locations of the sampling sites used in the study. As you will see from consulting these documents, the upstream terminus of riprapping is below Site 1 where P. capax was collected and above Site 2 where P. capax was not collected. This project design would provide protection from bank erosion without impacting the P. capax population at the project site.

Please provide your comments on the proposed plan.

Robert W. Woodyard
Chief, Environmental Analysis Branch

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX 334-4273

IN REPLY REFER TO:

December 13, 1995

Robert G. Fuller, Chief
Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

Dear Mr. Fuller:

This letter pertains to the U.S. Fish and Wildlife Service's (FWS) comments (submitted in a 9/8/95 Planning Aid Letter) on the proposed bank erosion project on the Wabash River in New Harmony, Posey County, Indiana. A follow-up letter was sent on September 22, 1995, reiterating FWS concerns regarding potential project impacts on the fat pocketbook, (*Potamilus capax*), a Federally and State (Indiana and Illinois) endangered mussel.

s a result of these concerns, the Corps conducted a mussel survey in the project rea in October 1995. On November 20, 1995 we received a copy of the final report on the mussel survey, which verfiad the presence of *P. capax* on the project area. Specimens of *P. capax* were found at 2 sampling sites in the northern portion of the project area.

A biologist from this office contacted Keith Hoss and Mike Turner on November 21, 1995, to confirm that we received the report. We also reiterated our willingness to work with the Corps to resolve concerns regarding the potential for the project to impact Federally endangered species. During that conversation, we indicated that unless the project area is revised to eliminate the northern portion, where *P. capax* were found, then formal consultation under Section 7 of the Endangered Species Act should be initiated. The formal consultation process may take up to 135 days to complete. Previously, John Jurgensen indicated that the Corps intends to complete a final report on the project by May 1996. We are sending this letter as a reminder of the time frame required for formal consultation, so that you can avoid any unneccesary delays in the project.

If you have any questions or require additional technical assistance, please contact Lori Pruitt at (812) 334-4261, extension 211.

Sincerely yours,

David C. Hudak
Supervisor

cc: Bob Woodyard
John Jurgensen

# Suitability of a Reach of the Wabash River Near New Harmony, Indiana, for the Endangered Fat Pocketbook Mussel, *Potamilus capax* (Green, 1832)

Andrew C. Miller

November 1995

Environmental Laboratory
U.S. Army Engineer Waterways Experiment Station
Vicksburg, MS 39180-6199

**Suitability of a Reach of the Wabash River Near New Harmony, Indiana, for the Endangered Fat Pocketbook Mussel, Potamilus capax (Green, 1832)**

## Introduction

Project Background. At the request of personnel of the U.S. Army Engineer District, Louisville (ORL), a reach of the Wabash River near New Harmony, Posey County, Indiana, was surveyed for freshwater mussels (family: Unionidae) on 23 Oct 95. The objective was to evaluate the effects of a plan to stabile eroding banks located approximately 2 km upriver of the Highway 14 Bridge leading into New Harmony. In addition to stabilizing a section of the left descending bank (LDB) using riprap, portions of partially eroded riprap along the right descending bank (RDB) will be repaired.

Specific attention was directed toward collecting the endangered fat pocketbook mussel (*Potamilus capax* (Green, 1832)) (U.S. Fish and Wildlife Service 1994). The fat pocketbook was collected at three locations in the Wabash River in 1987 (Cummings et al. 1987) and 1989 (Cummings et al. 1990). In 1989 Cummings found 67 live *P. capax* at 3 of 12 study sites. This species is characterized by an extremely inflated, moderately thick shell. Historically, its range included the upper Mississippi River in Minnesota and Wisconsin southeast to the Wabash and Ohio Rivers and west to the St. Francis River drainage in Arkansas (Cummings et al. 1990). It is now known from three locations in the central United States: the St. Francis River drainage in Arkansas; the lower Wabash and Ohio Rivers in Illinois, Indiana, and Kentucky; and the Mississippi River in Missouri (Bates and Dennis 1983, U.S. Fish and Wildlife Service 1989).

Ahlstedt and Jenkinson (1987) reported large numbers of *P. capax* in the St. Francis River and adjacent ditches in Arkansas. Based on their studies, and observations by Clarke (1985), the fat pocketbook inhabits sand, mud, and clay in rivers and ditches with moderate to low water velocity. Although large numbers of this species were found by Ahlstedt and Jenkinson (1987), *P. capax* comprised 1% of the mussel fauna in the St. Francis River. In a study conducted for the U.S. Army Engineer District, Memphis, *P. capax* was found in riprap used to protect bridges at four locations in the St. Francis Floodway (Miller 1987). Percent abundance in riprap was greater (6.2%) than in the fine-grained sediments as reported by Jenkinson and Ahlstedt (1987). The St. Francis Floodway, constructed in the 1950s to divert water from the St. Francis River during high flow and to reduce local flooding, is located near Forrest City, Arkansas.

*Potamilus capax* is referred to as bradytictic, a long-term breeder. Eggs are fertilized internally in late summer, mature during fall and winter, then are released in the spring when they infect an appropriate host fish. Cummings et al. (1990) suggested that the host for *P. capax* is either the freshwater drum (*Aplodinotus grunniens*) or the sauger (*Stizostedion canadense*).

## Survey Area and Methods

Study Area. The study area was a 1.0 km reach of the Wabash River near New Harmony, Indiana. The area was approximately 2 km upriver of the Highway 460 Bridge, located at River Mile 51.5, and included approximately 1 km of riverbank. The upriver portion of the area included the southern tip of Bull Island, Illinois (T4S, R14W, Sec. 25) and corresponded to Site 12 of Cummings et al. (1990). Figure 1 depicts the study area and delineates the approximate area to be riprapped along the LDB.

Water level when samples were collected was low and velocities in the river were approximately 25-50 cm/sec. The upper reach of the study area included an embayment at the south end of Bull Island. The embayment was formed by an old oxbow (referred to as Old Channel). A tributary stream, Black River, enters the upper end of Old Channel and contributes to flow in the embayment. Downriver of the embayment the river makes a sharp right turn. Banks along the LDB are steep, eroding, and composed mainly of clay. A previous attempt to stabilize this bank with pilings and netting was not successful. Opposite the right turn is a broad sandy shoal where shells of many mussels were collected, including *P. capax*. Downriver of the shoal the river turns left; at this location the RDB is partially riprapped. This riprap, placed in the late 1950s, has partially failed; sections of the bank have eroded and riprap has been displaced. Divers reported that riprap was missing from the banks but was present off the bank and extended at least 50-75% of the way to mid channel.

Methods. Five sites were searched for mussels on 23 Oct 95. All collecting was accomplished by a four-person dive crew equipped with surface supplied air and communication equipment. Two divers worked together and searched predetermined areas. At sites 2, 3, and 5, one diver collected along the bank and the other worked an offbank area. Semi-quantitative samples were obtained by having divers collect for a specific time period, either 15 or 30 min, while moving their hands over the substratum. All live mussels were retrieved and placed in nylon bags. The amount of collecting time was recorded and converted to area by estimating that a diver covered approximately 5 sq m per min. In addition to collecting mussels, divers collected sediment samples for grain size analysis and organic content.

Mussels were identified and shell lengths measured to the nearest 0.1 mm with a digital caliper. The height, width, and sex of each live *P. capax* was recorded, following procedures used by Cummings et al. (1990). All live mussels were then returned to the substratum unharmed. Personnel had appropriate state and Federal permits to conduct this work. Nomenclature is consistent with Williams et al. (1992).

Sample sites were chosen with the aid of project maps and information from an ORL biologist. All sites were marked on project maps and their location recorded with a Global Positioning System. Table 1 contains a description of each site.

## Results and Discussion

Description of Conditions at Sites Worked by Divers

The following is a description of conditions at each site. Table 2 contains a listing of mussels collected at each site, and Table 3 lists shell lengths of each live mussel.

Site 1. Two divers each spent 30 min collecting mussels in water approximately 2-3 m deep (Figure 1). This area was in the embayment formed by the island. Substratum consisted of sand and silt with a narrow band of detritus (partially decaying organic matter) along the center of the embayment. Material on the bank was a mixture of firmly packed sand and clay. Seven mussels were collected; 5 were *P. capax*. This area was depositional with low water velocity (less than 10 cm/sec) and provides good habitat for *P. capax*.

Non-divers collected shells in shallow water and on the shore along the northern section of the embayment. At least 100 intact shells of *P. capax* were observed. Many were quite large, 120 - 135 mm total shell length. Death could have been the result of stranding during low water or natural mortality.

Site 2. The second site was located immediately downriver of Site 1. This site was transitional between the comparatively slack water of the embayment and the more erosional reach downriver. Both divers collected for 30 min. One diver worked along the bank and collected 3 mussels; all were the fragile papershell, *Leptodea fragilis*. The second diver worked off the bank for a distance of 10-30 m and collected a single *L. fragilis*. No *P. capax* were collected.

Site 3. Site 3 was located along the LDB downriver of the embayment and immediately upriver of a dry creek bed (Figure 1). Substratum along the bank consisted of clay; away from the bank it consisted of cobble and sand covered with 5-50 cm of silt. Divers worked among posts left from the previous bank protection project which caused localized sediment deposition. One mussel (the pink papershell, *Potamilus ohiensis*) was found along the bank although no mussels were found at the offbank location. Because of the clay substratum and comparatively high water velocities, this reach was of little value for *P. capax*.

Site 4. Site 4 was located along the RDB at partially eroded riprap. One diver searched for mussels along the riprap, the other searched the area where high velocity water had displaced riprap. Divers reported that remaining riprap located underwater was covered with 5-10 cm of silt. Riprap extended toward the channel for a distance of approximately 20-30 m. No live mussels or shells were collected.

Site 5. Site 5 was located immediately upriver of Site 1. Conditions were very similar to those at Site 1 and provided good habitat for *P. capax*. Three live mussels were collected along the bank (no *P. capax*), and 2 were collected in the embayment (1 *P. capax*). The floater

(*Pyganodon grandis* (the genus was recently changed from *Anodonta*)), not previously collected alive during this survey, was found.

Conditions at a Sandbar on the Right Descending Bank

Shells of approximately 15 species of mussels were collected at the sand bar along the RDB downriver of the embayment. The species list included the four species collected alive at Sites 1-5 and *Quadrula* spp., *Megalonaias nervosa*, *Pleurobema spp.*, and *Lampsilis* spp. Most of these shells probably originated from upriver mussel beds.

**Summary and Discussion of Findings**

A total of 17 mussels representing 4 species was collected at five sites in a reach of the Wabash River near New Harmony, Indiana. The endangered fat pocketbook, *P. capax*, was found at 2 sites and represented 35% of the fauna. Three other species with thin- to moderately thick shells, the fragile papershell (*L. fragilis*), the fragile heelsplitter (*P. ohiensis*), and the floater (*P. grandis*), represented 35.3%, 23.5%, and 5.9% of the collection.

The upper portion of the study area, immediately south of Bull Island, was good habitat for *P. capax*. It was protected from the erosional force of high velocity river water and sediments were fine-grained and stable. The lower portion of the study area along the eroded banks was comparatively poor habitat for *P. capax*.

At all sites mussels were uncommon. Two hundred and forty min were spent searching underwater at five sites. Total collection rates (where mussels were found), ranged from 0.03 to 0.12 individuals/min, with estimated densities ranging from 0.007 to 0.023 individuals/$m^2$. *Potamilus capax* was found only in the upper section of the project area. Collection rate for this species ranged from 0.033 to 0.083 individuals/min with an estimated density of 0.007 to 0.017 individuals/$m^2$.

In comparison with most mussel beds in large rivers, this reach of the Wabash River had low mussel densities. Density at beds in most rivers ranges from 40 to 80 individuals/$m^2$. Collection rates vary depending upon density, experience of the collector, and type of habitat being searched. For example, in the Sunflower River in central Mississippi, divers collected mussels at the rate of 10-15/min at sites with moderate to low density, typically 5 to 10 individuals/$m^2$.

Many endangered mussels are uncommon and represent a small percentage of the community. In the upper Mississippi River the endangered *Lampsilis higginsi* represents approximately 0.5% of the fauna in beds with a density of about 50 individuals/$m^2$. (At this abundance there would be 1 endangered mussel every 4 sq m.). In the lower Ohio River the endangered orange-foot pimpleback (*Plethobasus cooperianus*) represents approximately 0.1% of the community and is collected rarely.

Previous authors have reported that *P. capax* is usually taken in fine-grained sand or silt in water with moderate to low velocity, usually less than 25 cm/sec. However, this species, and other thin-

shelled mussels, has been collected in riprap along the St. Francis Floodway (Miller 1987). In riprap protecting bridge crossing sites, *P. capax* represented 6.2% of the community (Miller 1987). The community was dominated by another thin-shelled species, *L. fragilis*, which comprised 63.6% of the mussel fauna. *Potamilus capax* was collected at the rate of 0.025 to 0.062 individuals/min, which was similar to rates obtained during this survey. *Potamilus capax* was estimated to be from 0.100 to 0.308 individuals/m of riprapped shore (no density estimates per square meter were made). Crevices among riprap provided stable habitat for thin-shelled species such as *P. capax*.

## Recommendations

Study Design. A single day was spent at this location; dives were made at 5 sites and a total of 240 min were spent searching for mussels. More detailed and accurate information on density and distribution of *P. capax* and other mussels would require more sampling. In addition to timed searches, divers could work premeasured areas to obtain better density data. However, the basic understanding of local conditions; i.e., location and approximate density of *P. capax* and the other mussels, would probably change little.

Value of Eroding Banks for *P. capax*. The erosional zone located downriver of the embayment is of little value for mussels. Placement of riprap should have little to no effect on mussels including *P. capax*. Stabilizing eroding banks with riprap, which would reduce sedimentation downriver and provide substratum and cover for aquatic insects, fishes, and mussels, would be beneficial.

Value of the Upper Project Area for *P. capax*. Placement of riprap in the upper reach of the project area, adjacent to the embayment, could damage *P. capax*. Every effort should be made to restrict the riprap to the bank and keep it from moving into the embayment. Losses could be reduced by moving live mussels from the bank and near bank areas to the center of the embayment.

Once riprap has been placed along the banks, it will not have a negative effect on *P. capax* or other mussels. Riprap is a valuable source of food and cover and is important for fishes (Conner et al., 1983; Pennington et al., 1983; Shields, 1983). Structure that attracts fishes is likely to be colonized by mussels. Although its principle purpose is to stabilize and maintain river channels, the value of riprap for some species of freshwater mussels should not be overlooked. It is very likely that *P. capax* and other species of mussels will colonize this riprap along the Wabash River within several years.

**Literature Cited**

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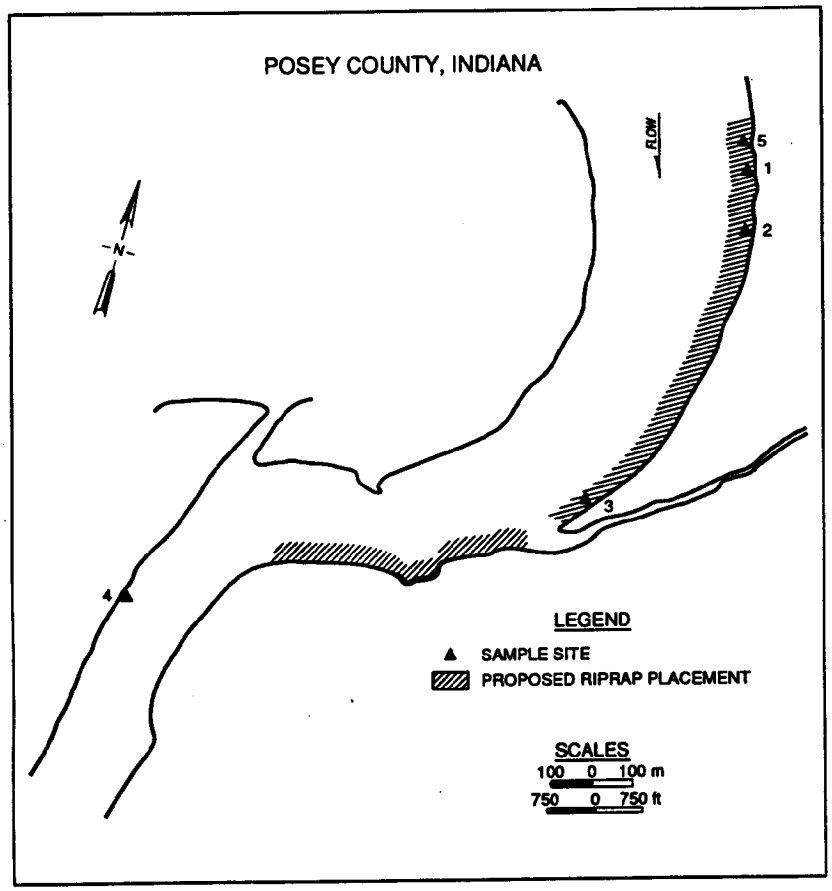


Figure 1. Sites surveyed for *Potamilus capax* in a reach of the Wabash River near New Harmony, Posey County, Indiana, 23 Oct 95. The approximate area that will be riprapped along the LDB is delineated.

Table 1
Description of Sites Surveyed for Mussels at the Bank Stabilization Site in the Wabash River Near New Harmony, Posey Co., Indiana, 23 Oct 95.

| Site | Bank | Description | Sediment Type | Latitude | Longitude | Maximum Depth (m) |
|---|---|---|---|---|---|---|
| 1 | LDB | Embayment | Sandy bank with detritus over silt and sand away from the bank | 38 08.671 | 87 55.469 | 2.13 |
| 2 | LDB | Embayment | Sandy bank and silt and sand away from the bank | 38 08.587 | 87 55.464 | 4.57 |
| 3 | LDB | Eroding Bank | Silt over cobble and sand in channel and clay on the bank | 38 08.275 | 87 56.433 | 8.53 |
| 4 | RDB | Eroding Riprap | Riprap on bank. Where riprap had eroded the bank consisted of clay, sand, and silt | 38 08.134 | 87 56.433 | 7.92 |
| 5 | LDB | Embayment | Sandy bank with detritus over silt and sand away from the bank | 38 08.681 | 87 55.457 | 2.13 |

Table 2.
Percent Abundance of Freshwater Mussels (Unionidae) Collected at Five Locations at the Bank Stabilization Site in the Wabash River, near New Harmony, Posey Co., Indiana, 23 Oct 95.

| Species | Site Number | | | | | | | | | Total Individuals | Percent Abundance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | | 3 | | 4 | | 5 | | | |
| | | Bank | Offbank | Bank | Offbank | Riprap | Eroded | Bank | Offbank | | |
| *Potamilus capax* | 5 | | | | | | | | 1 | 6 | 35.29 |
| *Leptodea fragilis* | 1 | 3 | 1 | | | | | | 1 | 6 | 35.29 |
| *Potamilus ohiensis* | 1 | | | 1 | | | | 2 | | 4 | 23.53 |
| *Pyganodon grandis* | | | | | | | | 1 | | 1 | 5.88 |
| Total time (min) | 60 | 30 | 30 | 15 | 15 | 15 | 15 | 30 | 30 | | |
| Total individuals | 7 | 3 | 1 | 1 | 0 | 0 | 0 | 3 | 2 | 17 | |
| Total species | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 4 | |
| Mussels collected/min | 0.12 | 0.10 | 0.03 | 0.07 | 0.00 | 0.00 | 0.00 | 0.10 | 0.07 | | |
| *P. capax* Collected/min | 0.083 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.033 | | |
| Total Density | 0.023 | 0.020 | 0.007 | 0.013 | 0.0 | 0.0 | 0.0 | 0.020 | 0.013 | | |
| Density of *P. capax* | 0.017 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.007 | | |

Table 3.
Shell Morphometric Data for Bivalves Collected at the Bank Stabilization Site in the Wabash River near New Harmony, Posey Co,. Indiana, 23 Oct 95.

| Site | Location | Species | Sex | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|
| 1 | Offbank | P. capax | Male | 120.89 | 73.23 | 97.76 |
| 1 | Offbank | P. capax | Male | 84.64 | 53.40 | 61.85 |
| 1 | Offbank | P. capax | Female | 130.03 | 74.46 | 100.60 |
| 1 | Offbank | P. capax | Female | 111.41 | 65.70 | 87.87 |
| 1 | Offbank | P. capax | Female | 79.50 | 51.56 | 55.43 |
| 1 | Offbank | P. ohiensis | | 75.21 | | |
| 1 | Offbank | L. fragilis | | 144.57 | | |
| 2 | Bank | L. fragilis | | 120.06 | | |
| 2 | Bank | L. fragilis | | 83.02 | | |
| 2 | Bank | L. fragilis | | 127.85 | | |
| 2 | Offbank | L. fragilis | | 134.17 | | |
| 3 | Bank | P. ohiensis | | 122.49 | | |
| 3 | Offbank | No mussels | | | | |
| 4 | Riprap | No Mussels | | | | |
| 4 | Offbank | No Mussels | | | | |
| 5 | Offbank | P. capax | Male | 137.92 | 73.66 | 106.36 |
| 5 | Offbank | L. fragilis | | 115.10 | | |
| 5 | Bank | P. grandis | | 139.76 | | |
| 5 | Bank | P. ohiensis | | 126.10 | | |
| 5 | Bank | P. ohiensis | | 119.20 | | |

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX 334-4273

IN REPLY REFER TO:

September 22, 1995

Robert G. Fuller, Chief
Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

Dear Mr. ~~Butler~~ Fuller:

This letter pertains to the U.S. Fish and Wildlife Service's (FWS) comments (submitted in a 9/8/95 Planning Aid Letter) on the proposed bank erosion project on the Wabash River in New Harmony, Posey County, Indiana. The Planning Aid Letter describes the fish and wildlife resources of the project area and anticipated impacts to those resources as a result of proposed bank erosion measures.

As stated in our Planning Aid Letter, potential impacts on Federally and State listed mussels in the project area constitute the major concern of the FWS with regard to the proposed project. In particular, we are concerned regarding potential impacts on the fat pocketbook, (*Potamilus capax*), a Federally and State (Indiana and Illinois) endangered mussel. Portions of the lower Wabash River appear to support reproducing populations of this species. Recent surveys suggest a high probability that this species may be present in the project area. Our recommendation was to have a qualified malacologist inspect the project area and provide comments and recommendations regarding the potential impacts of the project on *P. capax*, as well as other Federally and State-listed mussels. After receiving this evaluation, we will be able to provide additional recommendations to the Corps, concerning the potential need for a mussel survey of the project area and formal consultation under Section 7 of the Endangered Species Act.

In a conversation with John Jurgensen, the project study manager, on 9/20/95, he indicated that the Corps intends to complete a preliminary study design within the next few months, and a final report on the project by May, 1996. He further indicated that the FWS's comments had been received and were being incorporated into the project design. We understand that bank erosion in a portion of the project area is severe, and we share the Corps' desire for a timely solution to the potential problem. It is our recommendation to incorporate endangered species concerns at an early stage of study design. Therefore, we want to take this opportunity to reiterate our willingness to cooperate with the Corps to resolve concerns regarding the potential for the project to impact Federally endangered species.

If you have any questions or require additional technical assistance, please contact Lori Pruitt at (812) 334-4261, extension 211.

Sincerely yours,

David C. Hudak

David C. Hudak
Supervisor

cc: Bob Woodyard
John Jurgensen

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX 334-4273

September 8, 1995

Colonel Ralph Grieco
District Engineer
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201

Dear Colonel Grieco:

This is the U.S. Fish and Wildlife Service's (FWS) Planning Aid Letter concerning the proposed bank erosion project on the Wabash River in New Harmony, Posey County, Indiana. This report, requested by the U.S. Army Corps of Engineers (Corps), Louisville District, describes the fish and wildlife resources of the project area and anticipated impacts to those resources as a result of proposed bank erosion measures.

On-site evaluation of the project area was made on August 14-15, 1995. Additional information for this report was gathered through review of pertinent literature; review of fish and wildlife surveys which have been conducted in or near the proposed project area; personal communication with researchers with experience in or near the proposed project area; and, personal communication with representatives of the Corps, the Indiana Department of Natural Resources, the Illinois Department of Natural Resources, and the FWS.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C 661 et seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the FWS Mitigation Policy.

PRELIMINARY DESCRIPTION OF THE PROPOSED PROJECT

The following preliminary project description (along with a map) of the bank erosion project on the Wabash River, New Harmony, Indiana was provided by the Corps on 9 August 1995: "The left bank of the Wabash River will be protected using 250# max stone riprap beginning at a point about 2,300 feet (690 meters) upstream of the bridge and continuing upstream for a length of approximately 6,200 feet (1879 meters). A minimum amount of bank shaping will be necessary, primarily at the downstream end, to provide a smooth, stable slope. There is an existing fence jetty system consisting of steel poles and cargo netting placed perpendicular to the banks. The cargo netting will be removed and the poles will be removed or driven in to ground level as necessary. The invert and banks of Gresham Creek will be protected at the confluence with the Wabash River to prevent future head cutting up Gresham Creek. Existing riprap protection on the right bank (Illinois side) would

be repaired where several pockets of erosion have developed."

Most of the following discussion will be based on potential impacts and opportunities in the river channel and on the east bank (Posey County, Indiana) of the Wabash, which is the primary focus of the proposed project. Potential impacts associated with riprap repair on the west bank (White County, Illinois) will also be discussed.

PHYSIOGRAPHY AND LAND USE IN THE PROJECT AREA AND SURROUNDINGS

The Wabash River flows 475 miles from its origin in western Ohio, crossing Indiana before bending south to the Ohio River along the Indiana-Illinois border. As the second largest tributary of the Ohio River, the Wabash River drains 33,100 square miles, including two-thirds of Indiana and one-sixth of Illinois (Carlson et al. 1969). The Wabash River is the largest natural, free-flowing river east of the Mississippi River.

With a shallow gradient of 0.5 feet per mile, the lower Wabash meanders widely (WRBCC 1971). Through continual erosion and deposition, the river meanders are constantly "migrating" downstream, changing the course of the river. The river channel averages over 5 feet deep and 1,200 feet wide, increasing from north to south (ECI 1976). Point bars and cut banks are common, providing varied channel depths and bank characteristics. The river bottom consists principally of sand, along with silt and gravel. Exposed bedrock and shallow riffles are uncommon.

The project area lies in the portion of the river commonly referred to as the lower Wabash River. Prior to settlement, the lower Wabash Valley was almost completely forested. The uplands were dominated by an Oak-Hickory forest and the bottomlands supported a very diverse forest community. Robert Ridgway, a naturalist who compiled extensive descriptions of the vegetation in the lower Wabash Valley in the late 1800's, reported that 90 to 100 species of trees could be found in the area. In addition to supporting an extremely diverse forest community, the rich alluvial bottomlands supported a dense forest, with many trees reaching immense stature. Floodplains, such as those in the lower Wabash Valley, "...nourished the finest hardwood forests of Eastern North America by virtue of their periodic flooding and deposit of fertile alluvium..." (Petty and Jackson 1966).

Virtually all of the magnificent floodplain forests of the lower Wabash Valley have been cleared. Agricultural drainage and flood control projects have made it feasible to convert large acreages of wetlands and forest to agricultural production. The project area is now intensively farmed; row-crop agriculture is the primary land use. Based on forest surveys conducted by the U.S. Forest Service in 1986, 19.1% of Posey County, Indiana was classified as forest land (Smith and Golitz 1988). Large blocks of wetlands or forested fish and wildlife habitat are scarce. The remaining fish and wildlife habitat exists primarily in small fragments.

The New Harmony project area is within the Southern Bottomlands Natural Region of Indiana (Homoya et al. 1985). This region includes the alluvial bottomlands along the rivers and larger streams in southwestern Indiana. This region is distinguished from other bottomland areas in the State by the presence of several species, both plant and animal, with affinities to the southeastern U.S. The soils are mostly neutral-to-acid silt loams. Much of the area floods frequently, or did prior to construction of control structures.

Bottomland forest, the major natural community in this region, is characterized by pecan (*Carya illinoensis*), sugarberry (*Celtis laevigata*), swamp chestnut oak (*Quercus michauxii*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), honey locust (*Gleditsia triacanthos*), catalpa (*Catalpa speciosa*), shellbark hickory (*Carya laciniosa*), sycamore (*Platanus occidentalis*), and green ash (*Fraxinus pennsylvanica*). Southern influence is strongest in swamps and sloughs, where bald cypress (*Taxodium distichum*), swamp cottonwood (*Populus heterophylla*), water locust (*Gleditsia aquatica*), pumpkin ash (*Fraxinus tomentosa*), and overcup oak (*Quercus lyrata*) occur (Homoya et al. 1985). Many southern species of woody shrubs and herbaceous vegetation also occur in this region. In Indiana, many of these species are restricted to this natural area. Within the region, many previously widespread species are found only in the scattered remnants of bottomland forest and forested swamp natural communities.

Schwegman (1973) described the natural divisions of Illinois. In Illinois, the project area falls within the Bottomlands Section of the Wabash Border Division. This division includes the bottomlands and loess-covered uplands bordering the Wabash River. The lowland forests of this Division contain trees typical of more eastern forests such as beech (*Fagus grandifolia*) and tulip-tree (*Liriodendron tulipifera*). Wet prairie and slough marshes are also found in the bottomlands, while mesic and dry forests and prairies persist on the uplands. Sandstone ravines on the western river bank support rare plant communities.

## FISH AND WILDLIFE RESOURCES IN THE PROJECT AREA AND SURROUNDINGS

### Fishes

The lower Wabash River hosts a typical range of large river fish species. At least 87 species of fish have been collected in systematic sampling of the lower Wabash since 1967 (Cochrane 1986). Throughout its middle and lower portions, the Wabash is utilized to some extent by commercial fishermen. Summaries of fish harvest were provided by Cochrane (1986). The Wabash is also noted for the large number of shellfish which were commercially harvested until recent regulations which prohibit commercial harvest.

The lower Wabash offers some good sport fishing, especially for channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), and blue catfish (*Ictalurus furcatus*) (Cochrane 1986). The relatively fast current, lack of vegetated backwaters, high turbidity, and few access sites reduce sport-fishing attractiveness compared to managed reservoirs. Nonetheless, the Wabash is fished regularly in both Indiana and Illinois.

Les Frankland (pers. commun.), Wabash River Project Manager for the Illinois Department of Natural Resources Rivers Program, has conducted fish sampling on the west bank (Illinois side) of the project area. He recently collected 22 species of fish in the area. He has collected and tagged paddlefish (*Polyodon spathula*) along the west bank of the project area. The backwaters of the island on the west bank of the project area are a staging area for paddlefish.

### Wildlife

A great variety of wildlife lives in or migrates through the lower Wabash Valley. Cochrane (1986) lists 21 species of mammals and 62 species of birds which were

representative of the region. Because of the variety of habitats available in the Wabash lowlands, this area supports more herptile (reptile and amphibian) species than any other physiographic province in Indiana (Minton 1972).

According to Bellrose (1976), as many as 300,000 geese and 750,000 ducks migrate along or across the Wabash River every year. The lower Wabash is also an important waterfowl wintering area. The river corridor provides significant wood duck nesting habitat, with high density breeding populations from the mouth up to Mt. Carmel (Bellrose 1976).

Wildlife species hunted or trapped in Posey County, Indiana include: northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), American woodcock (*Philohela minor*), ring-necked pheasant (*Phasianus colchicus*), American crow (*Corvus brachyrhynchos*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), and numerous species of waterfowl. Hunting for wild turkey (*Meleagris gallopavo*) and ruffed grouse (*Bonasa umbellus*) is not permitted in Posey County.

<u>Federally and State Listed Species</u>

Mammals

The New Harmony project area is within the range of the Indiana bat (*Myotis sodalis*), a Federally and State (Indiana and Illinois) endangered species. Protection of the riparian vegetation along drainages is essential to maintaining foraging habitat for Indiana bats. Although forested riparian corridors are not extensive in Posey County, the potential for Indiana bats to use these areas is considered high. During the summers of 1994 and 1995, this species was trapped in similar areas in other southwest Indiana counties (Dr. John O. Whitaker, Jr., Indiana State University, pers. commun.) and there are records of a maternity colony in Sullivan County (Scott Johnson, IDNR Nongame Biologist, pers. commun.). Trapping in Posey County during the summer of 1995 did not yield any Indiana bats, but trapping will continue in 1996 (J.O. Whitaker, Jr., pers. commun.).

The Indiana State endangered evening bat (*Nycticeius humeralis*) was found in bottomland forest sites in Posey County during the summer of 1995 (J.O. Whitaker, Jr., pers. commun.). Additional trapping will be conducted in 1996. This species usually inhabits tree cavities or buildings in summer. Relatively little is known regarding the biology of this species.

The swamp rabbit (*Sylvilagus aquaticus*) is a State endangered species in Indiana. There are historic (Mumford and Whitaker 1982) as well as recent (J.O. Whitaker, Jr., pers. commun.) records of swamp rabbits in the floodplain forests along the Wabash River. There are no recent records in the project area, however, this area is within the historic range of the swamp rabbit and there is potential that this species is present or could recolonize suitable habitat (J.O. Whitaker, Jr., pers. commun.).

Birds

The project area is within the range of the Federally threatened and State (Indiana and Illinois) endangered bald eagle (*Haliaeetus leucocephalus*). The entire length of the Wabash is used at times by this wide-ranging species (Castrale 1995). The

river corridor is used for foraging and nesting.

The Federally and State (Indiana and Illinois) endangered least tern (*Sterna antillarum anthalassos*) uses the Wabash River as a migration corridor. Least terns may have nested at times on Wabash River sandbars, and suitable habitat is still available.

Bachman's sparrow (*Aimophila aestivalis*), an Indiana and Illinois State endangered species, and cerulean warbler (*Dendroica cerulea*), an Indiana State Special Concern species, have ranges which include the project area. Both species are Federal "species at risk" (formerly Federal Category 2 candidate species). Bachman's sparrow is a grassland bird and is probably not found on the project area. Cerulean warblers typically nest in mature deciduous forests and are probably present in forested portions of the project area.

## Herptiles

The copperbelly water snake (*Nerodia erythrogaster neglecta*) occurs in scattered populations in southwestern Indiana and adjoining Kentucky and Illinois. This species is currently proposed for listing as a threatened species by the FWS, and is listed as threatened by the State of Indiana. In the lower Wabash Valley, a remnant population of the species persists although suitable habitat is steadily diminishing. Historically, the species was common, but is now imperiled throughout its range. Summer habitat for this snake is generally associated with forested swamps and adjacent wooded uplands. In the Wabash lowlands, this species is most often found near ponds, sloughs, and ditches (Minton 1972). Upland forests are traditionally used as hibernacula. There are no recent records for this species in the project area, but this may be a reflection of the lack of a survey in the area.

The hieroglyphic river cooter (*Pseudemys concinna hieroglyphica*) is State endangered in Indiana and Illinois. Sloughs and oxbows on the floodplains of major rivers provide optimal habitat for this species. Indiana records of the State endangered hieroglyphic river cooter are located along the Wabash, from the mouth of the Wabash to the mouth of the White River. The most recent surveys for this species in Indiana indicate that the species is rare and geographically limited to the extreme southwestern portion of the state (Ewert 1989). Ewert (1989) observed hieroglyphic river cooters in the Lost Lake/Old Channel slough (at the northern edge of the proposed project area) in 1988. He noted that this area was 1 of only 2 known sites for this species in the State of Indiana. There are also records for this species from White County, Illinois (Herkert 1992).

The eastern mud turtle (*Kinosternon subrubrum subrubrum*) is an Indiana State threatened species. This turtle occurs in quiet, shallow bodies of water (Minton 1972). The Indiana Natural Heritage Database contains a record for the eastern mud turtle in the drainage adjoining the Lost Lake/Old Channel slough (Hank Huffman, IDNR Heritage Ecologist, pers. commun.).

The hellbender (*Cryptobranchus alleganiensis*) is a State Endangered amphibian in both Indiana and Illinois. There is recent (1990) record for this species in the lower Wabash, near the project area in White County, Illinois (L. Frankland, pers. commun.).

## Fishes

Cochrane (1986) summarized records for 13 Federal "species at risk" (formerly

Federal candidates) and/or State-listed (Indiana and Illinois) fish species from the lower Wabash River. At least 8 of those species had been collected since 1975.

### Crustaceans

The Indiana crayfish (*Orconectes indianensis*), an Illinois state endangered and Federal "species at risk" (formerly a Federal Category 2 candidate species), has an extremely limited range in Illinois, which includes the lower Wabash River drainage. This species inhabits rocky riffles and pools of small-to-medium streams. The streams this crayfish inhabits are threatened by pollution, siltation, and desiccation.

### Mussels

The fat pocketbook (*Potamilus capax*), a Federally and State (Indiana and Illinois) endangered mussel, is found in the lower Wabash River. Cummings et al. (1992) provided the following summary of the status of the species in the lower Wabash: "Two live fat pocketbooks were found at the Old Dam, south of New Harmony in 1984. Nine live *P. capax* were found in the lower Wabash River in 1987. All were collected in water 10 to 12 feet deep in mixed silt, mud, and sand... Both juveniles and adults were found and it appeared that a reproducing population was present. Subsequent sampling in the lower Wabash River has turned up additional sites and it appears to be doing well in some areas in the lower Wabash River." In addition to the specimens referred to by Cummings et al. (1992), L. Frankland (pers. commun.) collected a fresh dead shell of a fat pocketbook on the large sandbar on the west bank (Illinois side) of the project area during the summer of 1994.

One live Eastern fanshell pearly mussel (*Cyprogenia stegaria*), a Federally and State (Indiana and Illinois) endangered species, was found in the lower Wabash near Maunie, White County, Illinois in 1984 (Cummings et al. 1992). In the Wabash River, the fanshell occurs in current at depths up to approximately 3 feet over coarse sand and gravel substrates (Parmalee 1967 cited *in* Herkert 1992). This species was once widespread and common in the Wabash River, but its distribution and reproductive capacity have been greatly diminished.

The elephant-ear (*Elliptio crassidens*), an Illinois State threatened mussel, was listed as common in the lower Wabash in 1975 (Clark 1976). Cummings et al. (1992) reported that spot collecting in the lower Wabash in 1984-85 yielded 2 live individuals, but that only shells were found at 8 sites in the lower Wabash in 1987. This species inhabits rivers with swift currents on a stone and coarse gravel substrate at least 6 feet deep (Parmalee 1967 cited *in* Herkert 1992).

The Ohio pigtoe (*Pleurobema cordatum*), an Indiana State Special Concern species, was represented in the lower Wabash only by dead, weathered dead, and sub-fossil shells during the 1987 survey (Cummings et al. 1992). This species is found on gravel and sand substrate in large rivers.

### Plants

Within the project area, 3 Indiana State-listed plants are found in the Lost Lake/Old Channel slough and/or adjoining drainages. These include: Eastern bloodleaf (*Iresine rhizomatosa*), State threatened; wooly dutchman's pipe (*Aristolochia tomentosa*), State watch list; and deciduous holly (*Ilex decidua*), State watch list.

## PROJECT ALTERNATIVES AND POTENTIAL IMPACTS

### Impacts on Riparian Corridor and Associated Fish and Wildlife Resources

Riparian ecosystems are the interface between aquatic and terrestrial habitats. With respect to fish and wildlife resources, riparian areas are characterized by high species diversity, high species densities, and high productivity (Mitsch and Gossenlink 1986). Specifically with reference to the lower Wabash Valley, riparian zones are a vital component of fish and wildlife habitat. In this heavily farmed region, there is often scarce natural vegetation remaining and much of this tends to be associated with riparian areas. Most of the forested habitat remaining in the lower Wabash Valley is in scattered fragments and the riparian corridor along the rivers and tributaries provide pathways for wildlife to disperse and migrate among habitat patches.

The current condition of riparian vegetation varies along the 6,200 feet of bank, which are proposed to be riprapped, on the Indiana side of the project area. There is wooded riparian vegetation on the northern and southern ends of the project area. In the middle-portion of the project area, agricultural fields abut the river bank. A more detailed discussion of the vegetation and potential impacts in each portion of the project area follows.

The northern edge of the proposed project area is the Lost Lake/Old Channel slough (Photo 1). This area is a system of oxbow ponds, including 2 large ponds, associated with an old channel of the Wabash River. The old channel surrounds Bull Island (Illinois), which lies to the east of the present river channel. The area at the widest point in each of the large oxbow ponds is approximately as wide as the present Wabash River channel (Ewert 1989). The pond banks are low and silty. Most of the shorelines are wooded with willows (*Salix* spp.) and silver maples. There is a wide variety of emergent woody and herbaceous vegetation along portions of the shorelines.

This area is the highest quality natural area that is immediately associated with the proposed project. National Wetland Inventory (NWI) maps illustrate the extensive network of wetlands associated with the slough and adjoining drainage (Fig. 1). Several State-listed species are known to be associated with this area, including: hieroglyphic river cooter, eastern mud turtle, Eastern bloodleaf, wooly dutchman's pipe, and deciduous holly. In addition, many other Federally and Indiana State listed species may potentially utilize this area, including: Indiana bat, evening bat, swamp rabbit, bald eagle, and copperbelly water snake.

The proposed project would not directly affect the core of the Lost Lake/Old Channel slough. However, riparian vegetation along the river bank immediately south of the slough (Photo 2) would be destroyed by the placement of riprap. During our site inspection, we observed that the river bank on the upper end of the project area, immediately south of the Lost Lake/Old Channel slough, is not eroding. In fact, the bank has obviously aggraded in this area over the past 10 years. According to local contacts, the small island which serves as a landmark for the northern edge of the proposed project has formed since the jetty system was installed in 1985. The jetty system (which was in the water at the edge of the river channel when installed in 1985) is now completely out of the water and bank vegetation has become established (Photo 3).

In a conversation with John Jurgensen (Corps study manager for the project) on 18

August 1995, he indicated that the map provided by the Corps illustrated the maximum limits of the riprap in the proposed project area. He suggested that the northern portion, where the bank is not currently eroding, could possibly be dropped from the proposed project. We strongly encourage the Corps to consider not placing riprap in this area. The potential adverse impacts of the proposed project on fish and wildlife resources would be greatly reduced by avoiding this area.

The bank in the middle-portion of the project area currently provides minimal habitat for terrestrial wildlife. Fencerows perpendicular to the bank and isolated trees provide limited natural vegetation along the bank in this portion of the project area (Photo 4). In this area, the bank has eroded behind the jetty system, which is now in the river channel.

The river bank at the southern end of the proposed project area supports wooded riparian vegetation, although the riparian vegetation in this area is not as extensive as that associated with the slough on the northern edge of the project. However, this area potentially serves as habitat for the same wildlife and plant species listed for the northern end of the project area. Unlike the northern end of the project area, banks in this portion are severely eroded (Photo 5). In the preliminary project description, the Corps indicated that bank shaping will be necessary in this area to provide a smooth, stable slope for the placement of riprap. Unfortunately, the wooded corridor along this section of the river is relatively narrow (approximately 50 feet or less), and the bank sloping and associated disturbance which would be required would largely eliminate wooded riparian vegetation associated with this portion of the bank.

We recommend that revised project plans should include planting a strip of trees behind the riprap to replace those which will be lost in the process of shaping and armoring the bank. We recommend planting a minimum of 3 rows of native hardwood tree species at 12-15 foot spacing. In addition to planting trees, any disturbed soil areas should be revegetated as quickly as feasible. A strip of wooded vegetation behind the riprap would serve multiple purposes. Benefits include reduced erosion and runoff from adjacent agricultural areas; a source of food and cover for wildlife; a dispersal/migration corridor for wildlife; a source of woody debris for in-stream cover; and enhanced aesthetics along the Wabash River corridor. A strip of woody vegetation behind the riprap would also provide additional bank stabilization. Maximum benefits will be realized if this strip of trees extends along the entire length of the project area, connecting existing forested areas above and below the project area. A wooded riparian corridor along this section of the river would be particularly valuable, because it would link significant natural areas above and below the project area.

In addition to the stated benefits, maintaining/enhancing a corridor of riparian vegetation in the project area is also consistent with the local communities' vision for the river corridor, as expressed in the Wabash River Heritage Corridor Plan (WRHCP 1993). The Wabash River Heritage Corridor Plan (WRHCP) was developed throughout 1992 and early 1993 through regional public planning meetings and meetings of the Wabash River Heritage Corridor Commission. The plan demonstrates the commitment of communities along the Wabash to recognize, protect, and enhance the cultural and natural resources of the Wabash River corridor. As such, projects which directly affect the character of the river corridor should be consistent with the goals of this plan. The first of the 6 goals listed in the plan is: "To promote the improvement of the natural environment of the corridor (WRHCP 1993)."

The map provided by the Corps indicated 3 pockets of erosion in existing riprap on

the Illinois side of the project area which would be repaired as a part of the proposed project. NWI maps illustrate that most of bank on Illinois side is classified as palustrine forested or scrub-shrub wetland (Fig. 1). On-site evaluation confirmed that riparian vegetation is well established in this area with the exception of isolated pockets of erosion in the existing riprap. Bank erosion is limited to isolated pockets; riparian vegetation has become well-established, almost completely obscuring the view of the existing riprap along portions of the bank (Photo 6). Repair of riprap on the Illinois side should be restricted to eroding areas and particular care should be taken to minimize disturbance to river bank vegetation. Numerous shorebirds were observed on a large sandbar (Photo 7) north of the area in which riprap repair has been proposed. Care should be taken not to disturb this area. Provided that these precautions are taken, there should be only minimal impact on plants and terrestrial wildlife on the west bank of the project area.

Impacts on the Wabash River Channel and Associated Fish and Wildlife Resources

Mussels

Potential impacts on Federally and State listed mussels in the project area constitute the major concern of the FWS with regard to the proposed project. In particular, we are concerned regarding potential impacts on the fat pocketbook, a Federally and State (Indiana and Illinois) endangered mussel. Portions of the lower Wabash River appear to support reproducing populations of this species (Cummings et al. 1992). Recent surveys suggest a high probability that this species may be present in the project area (Cummings et al. 1992; K. Cummings, pers. commun.; L. Frankland, pers. commun.).

The proposed project could adversely affect the fat pocketbook in several ways. This species is found in mixed silt, mud, and sand substrates. Because the species is often associated with muddy banks, riprap placed on the bank could potentially be placed on mussels.

In addition to direct project impacts, secondary impacts on mussels could result from short-term increases in sedimentation. Installation of riprap may result in an increase in suspended solids at the site and immediately downstream because of disturbance of the bank and the bed material during the construction phase (Schnick et al. 1982). If barges are used to transport riprap to the project area, towboat motors could disturb the substrate and cause redeposition of sediment in the river channel. Placement (and associated disturbances) of barge-loading facilities is also a concern. Mussels are adversely affected by siltation. Precautions to minimize potential sedimentation should be incorporated into revised project plans.

The presence of endangered mussels in this portion of the Wabash provides additional incentive to plant trees behind the riprap in the project area, as recommended. One of the benefits of planting trees behind the riprap would be reduced erosion and runoff from adjoining agricultural fields. Therefore, a buffer strip of trees between the agricultural fields and the river could benefit mussels, which are adversely affected by siltation and pollution (in this case, agricultural chemicals).

To further evaluate the potential for the proposed project to impact Federally endangered species, we recommend that a qualified malacologist inspect the project area and provide comments and recommendations regarding the potential impacts of the project on *P. capax*, as well as other Federally and State-listed mussels. All

potential impacts, direct and indirect, should be considered. After receiving this evaluation, we will provide additional recommendations to the Corps, concerning the potential need for a mussel survey of the project area and formal consultation under Section 7 of the Endangered Species Act.

**Fishes**

In the long-term, riprap should result in reduced bank erosion, and thus reduced sedimentation. However, increased sedimentation, in the short-term, may result from channel and bank disturbance associated with placement of riprap. Precautions should be taken to minimize the potential for increased sedimentation, which would adversely impact habitat of fish and other aquatic species.

The proposed project also has the potential to adversely impact fish habitat because undercut bank habitat will be lost when riprap is placed on the bank. Other adverse impacts may result from the destruction of woody vegetation immediately adjacent to the bank. Bank vegetation is the major source of root masses and woody debris, which provide in-stream habitat. Loss of bank vegetation also eliminates shade at the edges of the channel. With reference to the proposed project, impacts associated with loss of river bank vegetation will be minimal along portions of the bank which do not currently support woody vegetation. As previously discussed, we recommend that revised project plans drop the northern end of the east bank (which does support woody vegetation and is not eroding).

Some bank vegetation will be lost in the southern end of the project area. However, trees planted behind the riprap would eventually replace existing vegetation and provide some benefits for fish and other aquatic species. Maximum benefits will not be realized because the vegetation will not be immediately adjacent to the channel. Trees removed from this area during the project (for bank shaping) could be used to enhance in-stream habitat. There is a shortage of woody debris, which provides in-stream habitat, in the river channel in the project area. If logs and woody debris (removed from the southern end of the project area for bank shaping) were cabled into the base of the riprap (at the lowest level feasible) these could provide in-stream habitat.

We appreciate the opportunity to comment on the proposed project during the early planning stages and look forward to further coordination in the future. If you have any questions or require additional technical assistance, please contact Lori Pruitt at (812) 334-4261, extension 211.

Sincerely yours,

David C. Hudak

David C. Hudak
Supervisor

cc: Director, Indiana Division of Fish and Wildlife, Indianapolis, IN
IDEM, Division of Water Management, Bradbury St., Indianapolis, IN
Steve Jose, Indiana Division of Fish and Wildlife, Indianapolis, IN

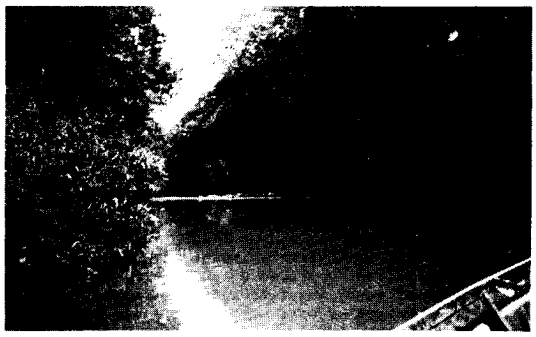

Photo 1. The mouth of the Old Channel approximately marks the northern edge of the proposed project area.

Photo 2. The wooded riparian corridor south of the Old Channel/Lost Lake slough would be destroyed by the placement of riprap along this bank.

Photo 3. The bank has aggraded around the fence jetty in the northern-portion of the project area. Riparian vegetation is established and no bank erosion is evident.

Photo 4. There is limited natural bank vegetation in the middle-portion of the project area. The bank has eroded behind the fence jetty.

Photo 5. The southern-portion of the project area supports a wooded riparian corridor, but the bank is severely eroded.

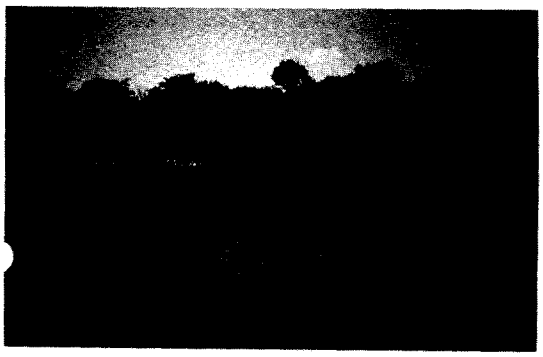

Photo 6. Riparian vegetation on the west bank (Illinois side) of the project area is well-established and almost completely obscures the view of existing riprap.

Photo 7. The large sandbar on the west bank (Illinois side) of the project area provides shorebird habitat.

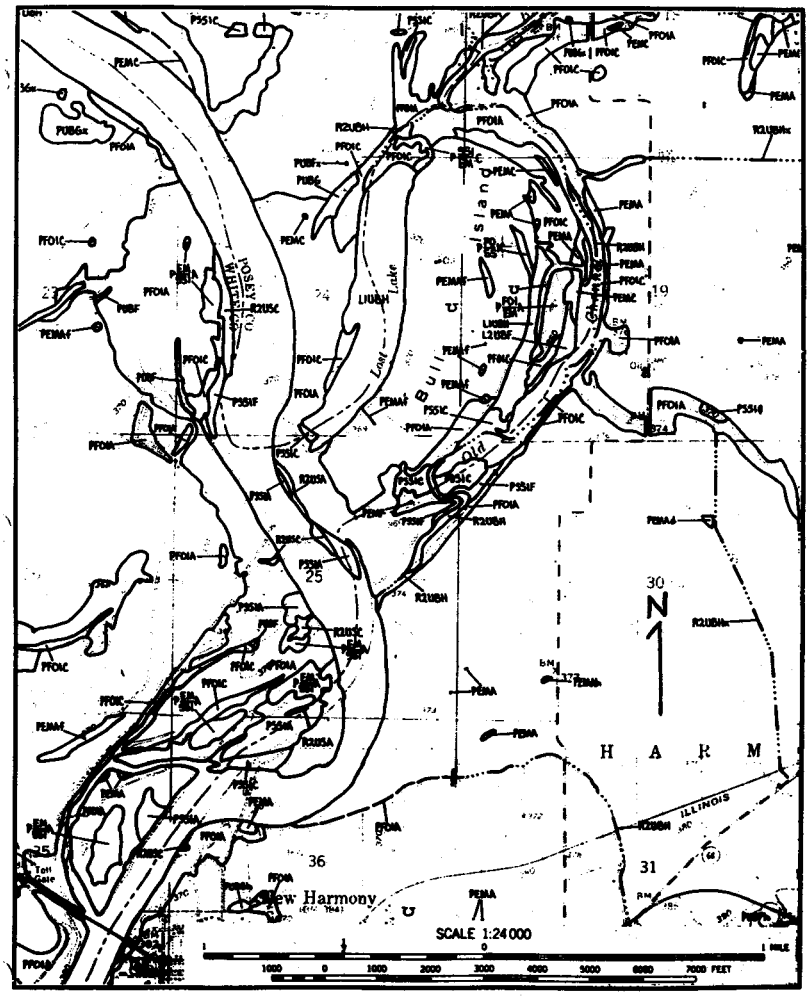


Figure 1. National Wetlands Inventory map of the proposed project area.

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# APPENDIX J
# COORDINATION

## 1. INTRODUCTION

This appendix provides documentation of the public involvement that has been carried out over the course of the study of streambank erosion problems for the Wabash river at New Harmony, Indiana.

## 2. STUDY COORDINATION

Coordination with federal and state agencies, and the Town of New Harmony has been ongoing throughout the study process. Contact was made with representatives of the following agencies.

U.S. Fish and Wildlife Service
Corps of Engineers - Waterways Experiment Station
Indiana Department of Environmental Management
Indiana Department of Natural Resources - Division of Water
Indiana State Historic Preservation Officer
Illinois Department of Natural Resources

Details and letters of coordination with the Fish and Wildlife service and the State Historic Preservation Officer are contained in Appendices G and H. The draft Interim Feasibility Report was circulated for public and agency review in August 1996. A copy of the Notice of Availability a mailing list is attached. A complete list of agencies contacted is provided in the mailing list. Comments were received from the National Park Service and FEMA. Copies of the comments and responses are attached.

Due to the possibility of impacts on the Illinois side of the Wabash River upstream of the SR66 / US 460 bridge, a copy of the preliminary draft was provided to the Illinois Department of Natural Resources for comment. By letter dated May 2, 1996 (copy attached) they concurred with findings in the report.

## 3. PUBLIC COORDINATION

Coordination with the public has been maintained through meetings held to obtain input prior to the start of the study, to provide an update on study progress, and to present the results of the study. A brief overview of the meetings are as follows. Attached to this appendix is a list of attendees for the meetings and a copy of a news release for the final "open house" meeting.

On December 6, 1994 a meeting was held in New Harmony to announce the start of the study and to discuss the scope and objectives of the study. The meeting was attended by representatives of the Indiana Department of Natural Resources, the non-federal sponsor. A representative from the Waterways Experiment Station also attended the meeting.

On July 27, 1995, representatives of the Corps of Engineers study team met with interested parties, including the Indiana Department of Natural Resources and federal representatives, in New Harmony to provide an update on study progress. A presentation on selection of the plans to be considered along with an overview of accomplishments to date was made. Questions and comments generally pertained to differences in current plans and alternatives previously considered, possible impacts to the Illinois side, and the schedule for key activities remaining for the study.

On August 29, 1996 a final "open house" public meeting was held in the New Harmony Town Hall to present the results of the study and answer any question or comments. A copy of the news release is attached. The meeting was attended by representative from Corps of Engineers study team, and the Indiana Department of Natural Resources. Comments were made in support of the project and questions generally involved the projected schedule for when the project will be constructed.

# ATTENDEES ROSTER

SUBJECT: NEW HARMONY, IN

LOCATION: _____ DATE: 6 DEC 94

| NAME | OFFICE | TELEPHONE NUMBER |
|---|---|---|
| JEFF KLEKNER | CORPS OF ENG | 502 582-5794 |
| John Jurgensen | Corps of Eng | 502-582-5848 |
| Matt Abriani | IDNR Div. of Water | 317-233-0316 |
| Joe LaTurner | IDNR Div of Water | 317 232-4162 |
| JOHN SIMPSON | IDNR Div of Water | 317-232-4161 |
| Deborah Burdick | Posey Co News | 812 838-2727 |
| ROB FULLER | CORPS OF ENG | 502 582-5658 |
| DAVE RICE | New Harmony Committee | 812-682-4727 |
| Ed Yancy | New Harmony Committee | 812-682-4884 |
| Gary Watson | New Harmony Com | 812-682-4846 |
| Randy Oswalt | Corps of Engrs. Waterways Exp. Sta | 601-634-3895 |
| Gary Meden | Corps of Engineers | 502-582-5712 |
| George McCollum | Corps of Engineers | [illegible] |
| Frank Gallagher | Lugar & Coats Congressional office | 812-465-6313 |
| Lane A. Ralph | Lugar & Coats Indy office | 317-226-5555 |
| Robert Krieg | Congressman-Elect Hostettler's office | 812-422-4237 |
| FOSTER TOLLIVER | Member NH Riv Com | 812-682-3577 |
| Don Parker | D.K. Parker Co. | 812-682-4434 |
| Raymond Harden | Posey Co Judge Commissioner | 812-682-3435 |
| Michael J. Magner | R.W. Armstrong Bridge Engineer | 317-786-0461 |
| Chris Gwaltney | U.S. Fish & Wildlife NH Riv. Com | (812) 479-2691 |
| James Gray | DNR - STATE PARKS Harmonie State Park | 812-682-4821 |

## ATTENDEES ROSTER

**SUBJECT:** _____

**LOCATION:** _____ **DATE:** _____

| NAME | OFFICE | TELEPHONE NUMBER |
|---|---|---|
| Steve Lemen | IDNR STATE PARKS | (317) 232-4133 |
| [illegible] | [illegible] | [illegible] |
| JOHN DIVINE | McCloskey | 812-334-1111 |
| Ken Smith | IDNR - Water | 317 232 4221 |


DNR
INDIANA DEPARTMENT OF NATURAL RESOURCES
Kenneth E. Smith, Assistant Director
Engineering Branch
Division of Water
402 W. Washington St., Rm. W264
Indianapolis, IN 46204-2748
(317) 232-4221 Fax (317) 233-4579

Nils I. Johansen, Ph.D., P.E.
Professor of Geological Engineering
UNIVERSITY OF ALASKA FAIRBANKS
Department of Mining & Geological Engineering
School of Mineral Engineering
Fairbanks, Alaska 99775-5800
(907) 474-7388 • (907) 474-6635 FAX

UNIVERSITY OF EVANSVILLE
Chris A. Gwaltney, P.E.
Assistant Professor
Department of Mechanical and Civil Engineering
1800 Lincoln Avenue
Evansville, Indiana 47722
Telephone (812) 479-2691

Michael J. Magner
Senior Designer
R.K. ARMSTRONG
2801 S. Pennsylvania St.
Indianapolis, IN 46225-2322
317.788.0461
800.321.6959
FAX: 317.788.0957

ATTENDEES ROSTER
NEW HARMONY, IN
27 JULY 1995

| NAME | OFFICE | PHONE NO. |
|---|---|---|
| John Jurgensen | Corps of Engineers | 502-582-5848 |
| JOHN SIMPSON | INDIANA DNR | 317-232-4161 |
| Matt Abriani | IN DNR | 317-273-0316 |
| HAROLD GUTZWILLER | Congressman John Hostettler | 812/465-6484 |
| Frank Gulledge | U.S. Senators Lugar & Coats | 812-465-6313 (E |
| Jim Kohlmeyer | Posey County News | 812-985-7989 |
| Lane A. Ralph | Senators Lugar/Coats | 317-226-5555 |
| Betsy Whitehead | Sumsville Courier | 812-464-7431 |
| James Gray | Harmonie State Park | 812-682-4821 |
| Chris Gwaltney | River Commission (U of E) | 812 479-269 |
| Mike Magner | R.W. Armstrong & Assoc. (Engineer for White Co. Bridge Comm.) | 317-786-0461 |
| Raymond Andry | White Co. Bridge Commission | 812-682-[illegible] |
| [illegible] | New Harmony | 812-682-3577 |
| JEFF KLEKNER | CORPS OF ENGINEERS | 502 582-5794 |
| Jimmy Elder | White Bridge Comm. Home | 618-382-4937 |
| GARY MEDEN | CORPS of ENGRS | 502-582-5392 |
| Gary Watson | Town of New Harmony | 812-682-3320 |
| Ed Yancy | Town of New Harmony | 812-682-4884 |
| Gary Gerard | Red Geranium Ent. | 812 682 443 |

Encl 1

# NOTICE OF AVAILABILITY

## WABASH RIVER, NEW HARMONY, IN.
## STREAMBANK EROSION
## DRAFT FEASIBILITY STUDY REPORT

The Louisville District of the U.S. Army Corps of Engineers and the Indiana Department of Natural Resources have completed a Draft Feasibility Report regarding streambank erosion problems along the left bank of the Wabash River in the vicinity of New Harmony, Indiana.

The study area is located in Posey County in southwestern Indiana along the left bank of the Wabash River at approximate River Mile 51.3 (km 82). The problem addressed in the study is continuing erosion which will eventually threaten the many culturally and historically significant structures in the community as well as utilities and roads. The estimated value of the public property in the North Street area is about $7.3 M. Beyond the monetary value of the property to be protected, the community is noteworthy for its contributions to American social history.

Three alternatives for protection were investigated for this feasibility study. Of these,stone protection along the east bank of the Wabash River is selected as the least costly, effective solution to the bank erosion problem. The project for protection begins approximately 950 meters (3,100 feet) upstream of the Indiana State Road 66 bridge and terminates 1470 meters (4,800 ft.) upstream. This plan is economically feasible, implementable from an engineering standpoint, environmentally acceptable and has a willing non-federal sponsor. The estimated total cost for this plan is $2.98 million dollars in 1995 price levels. The non-federal sponsor's share consisting of lands, easements, rights-of-way, relocations, disposal areas (LERRD) and cash is estimated at $747,750. The completed project would be operated and maintained by the Indiana Department of Natural Resources.

The objectives of Executive Order 11988, Floodplain Management, have been considered in the formulation of plans. It has been determined that in order to achieve the desired objective of streambank erosion protection the considered project must be located in the floodplain. No practicable non-floodplain alternative exists.

If you wish to review the report you may do so at the following locations:

Workingmen's Institute
P.O. Box 368
New Harmony, IN 47631

New Harmony Town Council
520 E. Church St.
New Harmony, IN 47631

County Commissioners
300 Main St.
Mt. Vernon, IN 47620

The public review period for this Draft Feasibility Report will close on September 23, 1996 after which a Final Report reflecting public input will be prepared and forwarded to the Corps headquarters in Washington, D.C. The recommendation contained in the Draft Feasibility Report 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 the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the Indiana Department of Natural Resources; interested Federal agencies; the local community and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

**Written comments on the Draft Report will be accepted at:**
**U.S. Army Corps of Engineers, P.O. Box 59, Louisville, Ky 40201-0059**
**Attn: CEORL-PD-F, or by INTERNET at: jjurgensen@smtp.orl.usace.army.mil**

HARRY J. SPEAR
Colonel, Corps of Engineers
Commander and District Engineer

## Corps of Engineers to Hold Open House to Discuss Draft Erosion Report

**LOUISVILLE, KY.** -- The Corps of Engineers will hold an Open House from 4 to 8 p.m. August 29, at the New Harmony Town Hall to provide information about a bank erosion study. Interested citizens are welcome to stop by anytime during the open house to review materials and discuss the proposal with Corps staff members.

The Corps' Louisville District and the Indiana Department of Natural Resources have completed a Draft Feasibility Report regarding streambank erosion problems along the left bank of the Wabash River in the vicinity of New Harmony.

The report presents the results of a feasibility study authorized by Congress in response to erosion problems that could eventually threaten many historic private and public buildings and grounds.

Located in Posey County, the study area is along the left bank of the Wabash River near river mile 51. The erosion problem has been a concern for decades.

NEW HARMONY, IN
OPEN HOUSE
AUG 29, 1996

| NAME | |
|---|---|
| Frank Gulledge | SENATORS LUGAR & COATS |
| Grey Watson | Town of New Harmony |
| Ed Yancy | Town of New Harmony |
| Karla Moody | " " " " |
| [illegible] | |
| [illegible] | |
| JAMES L. CLARK | Chairman of WHITE COUNTY Bridge Commission |
| Anissa Maikranz | Cong. John Hostettler |
| Garnet Bambei | Resident |
| Jeff Taylor | P.C. News |
| Eric Pulsifer | " " |
| Jeanne Miller | New Harmony |
| [illegible] | " " |
| [illegible] | " " White Co. Bridge Comm |
| Fred Martin | " " |
| Michael J. Magner | R.W. Armstrong (Engineer for White Co. Br. Comm.) |
| Connie [illegible] | HNH |
| [illegible] | O.K. Parker Co Inc |
| Leslie Booher | New Harmony |
| [illegible] | New Harmony IN |
| Chris Dwaltney | New Harmony IN |
| Jane B. Owen | New Harmony Ind |
| Martin Kenneth Roth | New Harmony Ind 47631 |
| [illegible] | New Harmony In 47631 |
| Karen Chadwick | New Harmony, IN 47631 |
| Joan Alsop | New Harmony In 47631 |
| Emily Yancy | New Harmony In 47631 |
| [illegible] | New Harmony In 47631 |

| | |
|---|---|
| Jennifer Blaylock | New Harmony, In 47631 |
| Herbert Baker | New Harmony Ind 47631 |
| Ann Baker | New Harmony Ind 47631 |
| Lee Blaylock | New Harmony Ind 47631 |
| Susan Hildebrada | New Harmony, IN 47631 |
| Owen Hildebrada | New Harmony, IN. 47631 |
| Neva G. Hays | New Harmony In 476[illegible] |
| Henry K. Cardin | New Harmony In 47631 |
| Estelle Ridgway | New Harmony, In 47631 |
| Henry Ridgway | New Harmony In 47631 |
| Bill Cardin | New Harmony In 47631 |

MAILING LIST
NEW HARMONY, INDIANA

H rable John Hostettler
Re. sentative in Congress
101 N.W. Martin Luther King Jr. Blvd.
Evansville, IN 47708

Honorable Richard G. Lugar
U.S. Senator
101 N.W. Martin Luther King Jr. Blvd
Rm. 122
Evansville, IN 47708

Honorable Dan R. Coats
U.S. Senator
101 N. W. Martin Luther King Jr. Blvd.
Rm 122
Evansville, IN 47708

Ms. Carol M. Bergstrom
Director
Office of NEPA Assistance
Department of Engery
100 Independence Ave SW Rm3G080
Washington, DC 20585

Mr. Richard H. Brown
D ctor
O e of Environment and Energy
Dept of Housing & Urban Development
451 7th St. SW
shington, DC 20410

Mr. Robert D. Bush
Executive Director
Advisory Council on Historic
Preservation
1100 Pennsylvania Ave NW
Washington, DC 20004

Mr. Jonathan P. Deason
Director
Office of Environmental Affairs
Department of Interior
1849 C Street NW (Mail Stop 2340)
Washington, DC 20240

Commander, US Coast Guard
MLC Atlantic
300 E. Main St.
Norfolk, VA 23510-9110

Ms. Christie L. McGue
Executive Director
Fe al Energy Regulatory Comm
82. J. Capitol St. NE
Washington, DC 20426

Mr. Larry Zensinger
Federal Emergency Management Agency
500 C. Streets, SW Rm 714
Washington, DC 20472

Dr. D. James Baker
Administrator
National Oceanic & Atmospheric Admn
Dept of Commerce
14th & Constitution Ave NW, Rm 5128
Washington, DC 20230

Mr. Robert M. Hirsch
Chief Hydrologist
U.S. Geological Survey
12201 Sunrise Valley Dr.
Mail Stop 409
Reston, VA 22092

Mr. Kent Holt
Centers of Disease Control
and Prevention
Special Programs Group
1600 Clifton Rd. NE
Mailstop F29
Atlanta, GA 30333

Ms. Hannah Rosenthal
Regional Director
Dept of Health & Human Services
105 W. Adams
Chicago, IL 60606

Mr. Valdas V. Adamkus
Region V Administrator
Environmental Protection Agency
Planning & Assessment Branch
77 West Jackson Blvd.
Mail Stop NE-19J
Chicago, IL 60604

Mr. Donald H. Castleberry
Regional Director
National Park Service
Dept of Interior
1709 Jackson St.
Omaha, NE 68102

Mr. William J. Carswell, Jr.
Regional Hydrologist
U.S. Geological Survey
National Center
12201 Sunrise Valley Dr.
Reston, VA 22092

Mr. William Hartwig
Regional director
U.S. Fish and Wildlife Service
Department of Interior
Federal Bldg.
St. Paul, MN 55111

Mr. Donald Henne, Regional Officer
Office of Env & Policy Compliance
Department of Interior
Customs House, Rm 217
[illegible] Chestnut St.
Philadelphia, PA 19106

Mr. Richard H. Wilson
Regional Administrator
Dept of Housing & Urban Dev
77 W. Jackson Blvd
Chicago, IL 60604

Mr. Ronald A. Lesniak
Regional Director
Federal Energy Regulatory Comm
230 S. Dearborn, Rm 3130
Chicago, IL 60604

Mr. Floyd J. Marita
Regional Forester
U.S. Dept of Agriculture
Henry S. Reuss Fed Plaza, Rm 500
310 West Wisconsin Ave
Milwaukee, WI 53203

Mr. Burnett Fisher
State Forester
Forestry Division
Department of Natural Resources
1GC-South, Rm W296
Indianapolis, IN 46204

Ms. Joan C. Montfort
Deputy Director
Federal Emergency Mgmt Agency
4th Floor, 175 W. Jackson Blvd
Chicago, IL 60604

Regional Administrator
Federal Highway Administration
1500 Governors Hwy #301
Olympia Fields, IL 60461-1021

Indiana Division Engineer
Federal Highway Administration
U.S. Department of Transportation
575 N. Pennsylvania St. Rm 254
Indianapolis, IN 46204

Mr. Harry Nikides
Director
Div of Soil Conservation
Indiana Dept of Natural Resources
402 W. Washington St., Rm W265
Indianapolis, Indiana 46204

Mr. Robert Eddelman
State Conservationist
Natural Resources Conservation
Service
613 Lakeside Blvd
Indianapolis, IN 46278-2933

Indiana State Historic
Preservation Officer
402 W. Washington St. Rm 274
Indianapolis, IN 46204

Director
Indiana Commission for Agriculture
and Rural Development
150 West Market St., Suite 414
Indianapolis, IN 46204

Honorable Evan Bayh
Governor of Indiana
State Capitol
Indianapolis, IN 46204

Mr. Dave Hudak
Supervisor
Fish and Wildlife Service
U.S. Dept of the Interior
620 South Walker Street
Bloomington, IN 47403-2121

Ms. Susan J. Kennell
State Budget Agency
212 State House
Indianapolis, IN 46204

Mr. Don Lucas
Chief Engineer - Highway
Indiana Dept of Transportation
1101 State Office Bldg.
Indianapolis, IN 46204

Mr. Patrick R. Ralston
Director
Indiana Dept of Natural Resources
402 West Washington
Indianapolis, IN 46204

Ms. JoAnn Macy
District Chief
U.S. Geological Survey
5957 Lakeside Blvd
Indianapolis, IN 46278

Mr. Randall Thornburg
President
County Commissioners
300 Main St.
Mt. Vernon, IN 47620

Mr. Don Hatfield
President of Town Council
520 E. Church St.
New Harmony, IN 47631

Mt. Vernon Democrat
425 Main St.
Mt. Vernon, IN 47620

Posey County News
604 Lockwood Ave
Poseyville, IN 47633

V ingmens' Institute
P.O. Box 368
New Harmony, IN 47631

Berger and Berger Attorneys
New Harmony City Attorneys
313 Main St.
Evansville, IN 47708

Mr. Larry Horton
P.O. Box 502
Mt Vernon, IN 47620

Mr. Kenneth D. Owen
Red Geranium Enterprises
P.O. Box 581
New Harmony, IN 47631

Ms. Jane B. Owen
R Geranium Enterprises
P.O. Box 581
New Harmony, IN 47631

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES
Office of Water Resources
524 South Second Street, Springfield 62701-1787 Jim Edgar, Governor ● Brent Manning, Director

May 2, 1996

Mr. John E. Jurgensen
Planning Division
Louisville District
U.S. Army, Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Jurgensen:

Per your request, we reviewed the draft feasibility study for the Wabash River at New Harmony, Indiana.

Your report notes that the current of the Wabash now impinges on the riprap on the right bank upstream of the highway bridge. Some failure has already occurred and the riprap will unravel eventually unless the revetment is strengthened and extended upstream. Protection of the left bank as proposed in the report will not worsen the problem. Finally, the report recommends that the White County Bridge Commission monitor the situation and request Corps assistance if necessary to protect their bridge. I concur with the findings and recommendation.

Thank you for the opportunity to review and comment on this project.

Sincerely,

Donald R. Vonnahme
Director

cc: John Simpson, IN DNR-DOW
James Stifler, IDOT-DOH w/encl

United States Department of the Interior

NATIONAL PARK SERVICE
Great Plains Systems Office
1709 Jackson Street
Omaha, Nebraska 68102-2571

IN REPLY REFER TO:
ER96/0575 (GPSO-G)

Mr. Robert G. Fuller
Chief, Planning Division
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

SEP 18 1996

Dear Mr. Fuller:

We have reviewed the Draft Interim Feasibility Report for the Wabash River Streambank Erosion Feasibility Study for work proposed in New Harmony, Indiana. The recommended plan calls for approximately 4,823 feet of stone bank-protection along the river, consisting of stones of up to 205 pounds over a layer of granular filter material. Some upper-bank shaping is included in the work.

Section 5(d) of the National Wild and Scenic Rivers Act (Public Law 90-542) requires that: "In all planning for the use and development of water and related land resources, consideration shall be given by all federal agencies involved to potential national wild, scenic, and recreational river areas." In partial fulfillment of the section 5(d) requirements, the National Park Service (NPS) has compiled and maintains a Nationwide Rivers Inventory (NRI). The NRI is a register of river segments that potentially qualify as national wild, scenic, or recreational river areas.

A presidential directive and subsequent instructions issued by the Council on Environmental Quality, and codified in agency manuals, require that each Federal agency, as part of its normal planning and environmental review processes, take care to avoid or mitigate adverse effects on rivers identified in the NRI. Further, all agencies are required to consult with the NPS prior to taking actions which could effectively foreclose wild, scenic, or recreational status for rivers on the inventory.

Portions of the Wabash River are on the NRI. Included is a 54-mile stretch from the river's confluence with the Ohio River to the I-64 bridge crossing in Posey County. The Wabash forms part of the boundary between Illinois and Indiana. It meanders sluggishly through a valley which averages 6 miles in width. Pastoral scenes interspersed with occasional timber stands are common along the river. The Wabash drains a large portion of the two States. It has outstanding recreational and fishing values. Also included on the NRI is a 103-mile portion of the Wabash River in Gibson, Knox, Sullivan, Vigo, Vermillion, and Fountain Counties.

The use of riprap is not compatible with the protection of NRI-river values because it alters the free-flowing character and natural appearance of the river. However, NPS recognizes that bank stabilization measures are rarely--but sometimes--necessary. Consequently, we recommend the use of natural stream bank stabilization (or bioengineering) techniques. Such techniques include cabling tree trunks and brushy material to the bank (Palmitter Method), planting live willow stakes or live willow fascines, constructing live cribwalls, or any combination thereof. Vegetative means of bank stabilization are compatible with protection of scenic river values because they do not alter the natural riverine appearance and encourage revegetation of the riparian corridor.

In the event that a professional familiar with bioengineering techniques determines that bioengineering is not feasible or practicable in this instance, we have the following recommendations: If any rock is used, it should be natural field stone and should be restricted to the minimum necessary to stabilize the actively eroding section. Rocks of up to 205 pounds (as proposed in the report) are not compatible with the values for which this section of the Wabash River was placed on the NRI. Where practicable, stone placed above the high-water mark should be back filled with at least 6 inches of topsoil, then seeded with native grasses and planted with willow stakes. Trees and other woody vegetation existing along the riverbank should not be removed unless absolutely necessary. Care should be taken to ensure disturbing only the minimum amount of river bed, shore land, and vegetation necessary to complete construction.

These comments are provided as technical assistance and do not reflect the views and comments of the Department of the Interior. We look forward to reviewing the feasibility study. If you have any questions, you may reach me at 402-221-3205.

Sincerely,

James M. Grasso
Outdoor Recreation Planner
Stewardship and Partnerships Team

RESPONSE TO DOI/NPS COMMENT

Comment:

The use of riprap is not compatible with the protection of NRI-river values because it alters the free-flowing character and natural appearance of the river. However, NPS recognizes that bank stabilization measures are rarely--but sometimes--necessary. Consequently, were recommend the use of natural stream bank stabilization (or bioengineering) techniques. Such techniques include cabling tree trunks and brushy material to the bank (Palmitter Method), planting live willow stakes or live willow fascines, constructing live cribwalls, or any combination thereof. Vegetative means of bank stabilization are compatible with protection of scenic river values because they do not alter the natural riverine appearance and encourage revegetation of the riparian corridor.

In the event that a professional familiar with bioengineering techniques determines that bioengineering is not feasible or practicable in this instance, we have the following recommendations: If any rock is used, it should be natural field stone and should be restricted to the minimum necessary to stabilize the actively eroding section. Rocks of up to 205 pounds (as proposed in the report) are not compatible with the values for which this section of the Wabash River was placed on the NRI. Where practicable, stone placed above the high-water mark should be back filled with at least 6 inches of topsoil, then seeded with native grasses and planted with willow stakes. Trees and other woody vegetation existing along the riverbank should not be removed unless absolutely necessary. Care should be taken to ensure disturbing only the minimum amount of river bed, shore land, and vegetation necessary to complete construction.

Response:

The Louisville District, Corps of Engineers has determined that riprap is necessary to protect against high velocities causing erosion of the toe of the bank. The minimum elevation that the riprap could be terminated would be one meter above ordinary high water to account for super elevation and potential wave action. This would have about a one meter band where natural stream bank measures could be applied. However, by placing trees on the slope there is change in boundary conditions that could produce unfavorable flow conditions (secondary currents, eddies), resulting in bank scour. Given these factors, the engineering opinion is that the riprap be placed to the top of bank.

Further, the Indiana Department of Natural Resources, Division of

Water recognizes the project area as "an extreme erosion area along a high velocity - high flow regime environment" and recommends "a full course of heavy, revetment stone". This recommendation for heavy stone, which is in accord with Louisville District opinion, would prevent the use of natural field stone. Also the Division of Water with respect to long-term maintenance responsibility "does not recommend any measure that potentially may: inhibit site access; restrict ease of maintenance at the site; or in the case of willow plantings, be potentially invasive of the revetment protection."

With respect to encouraging revegetation of the riparian corridor, the project plan includes a proposal to plant a strip of trees behind the riprap to provide a wooded corridor linking significant natural areas above and below the project.

**Federal Emergency Management Agency**
Region V
175 West Jackson Blvd., 4th Floor
Chicago, IL 60604-2698

September 13, 1996

U. S. Army Corps of Engineers
ATTN: Col. Harry L. Spear
Louisville District
P. O. Box 59
Louisville, KY 40201-0059

Dear Col. Spear:

Thank you for sending us a review copy of the Draft Feasibility Study Report (DFSR) for the Wabash River, New Harmony, Indiana. We would like to take this opportunity and provide you with some comments.

1. The DFSR makes no mention of the Special Flood Hazard (SFHA) as mapped by this agency for the purposes of the National Flood Insurance Program (NFIP).

2. The DFSR makes no mention of the proposed project's impact on the base flood elevation or floodplain delineation on the New Harmony or Posey County Flood Insurance Rate Map.

3. The DFSR makes no mention of the need to obtain State and local floodplain development permits for the proposed action. We encourage the Corps of Engineers to obtain State and local permits in the identified flood hazard area.

4. The DFSR makes no mention of the proposed action's compliance with Executive Order 11988, Floodplain Management.

Thank you for allowing us this opportunity to comment. If you have any questions, please call Anna Pudlo on 312-408-5320.

Sincerely,

Janet M. Odeshoo
Director, Mitigation Division

**RESPONSES TO COMMENTS**
**FEMA, REGION**

**Comment 1:** The DSFR makes no mention of the Special Flood Hazard (SFHA) as mapped by this agency for the purposes of the National Flood Insurance Program (NFIP).

**Response:** The SFHA was not mentioned because the study addresses a streambank erosion matter rather than a flooding problem.

**Comment 2:** The DSFR makes no mention of the proposed project's impact on the base flood elevation or floodplain delineation on the New Harmony or Posey County Flood Insurance Rate Map.

**Response:** Since the recommended project consists of bank protection along the Wabash River at New Harmony, there would be no impact on the flood plain at New Harmony.

**Comment 3:** The DSFR makes no mention of the need to obtain State and local floodplain development permits for the proposed action. We encourage the Corps of Engineers to obtain State and local permits in the identified flood hazard area.

**Response:** The Indiana Department of Natural Resources (IDNR) served as the non-federal, cost sharing partner for this study and coordination was maintained throughout the study. All necessary State, local, and Federal permits will be obtained prior to construction.

**Comment 4:** The DSFR makes no mention of the proposed action's compliance with Executive Order 11988, Floodplain Management.

**Response:** Compliance with EO 11988 is addressed in Section VI of the Environmental Assessment.

APPENDIX K

LOCAL COOPERATION

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Water
402 W. Washington St., Rm. W264
Indianapolis, Indiana 46204-2748
317-232-4160
FAX: 317-233-4579

September 26, 1996

Colonel Harry L. Spear
Commander and District Engineer
U.S. Army Engineer District, Louisville
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Re: New Harmony - Wabash River

Dear Colonel Spear:

This is in response to the request by the Corps of Engineers for a Letter of Intent and Financial Capability Statement. The Indiana Department of Natural Resources (IDNR) has participated in the planning process for the project recommended by the Corps of Engineers in their report entitled "Draft Feasibility Study, Wabash River, New Harmony, Indiana Streambank Erosion Study". The recommended plan consists of placing 1470 meters of riprap along the left bank of the Wabash River in the vicinity of New Harmony.

We understand that the completed bank protection project is intended to be operated and maintained by the Indiana Department of Natural Resources in cooperation with local concerns.

It is the understanding of IDNR that the Corps of Engineers has estimated the cost of the operation and maintenance at $5,000 annually with the total estimated cost of the project at $3,000,000. Based on the President's proposed cost sharing, the Federal share is estimated at $1,500,000 (50%) and the non-Federal share is $1,500,000 (50%). Congress is currently considering changes in the cost sharing of structural flood damage reduction projects. The Federal cost share based on one level being considered by Congress is $1,950,000 (65%) and the non-Federal share is $1,050,000. The Indiana Department of Natural Resources is aware of the proposed changes in cost sharing and wishes to continue with the project, and is aware of its potential responsibilities regarding cost sharing of the project. Further, the Indiana Department of Natural Resources is aware that at the present time the estimated Federal cost based on current law is $2,250,000 (75%) and the non-Federal share is $750,000 (25%).

The Indiana Department of Natural Resources is aware of the following responsibilities as a part of its project participation:

a. 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.

b. 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.

c. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government.

d. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.

e. Hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors.

f. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.

g. Perform, or cause to be performed, any investigations for hazardous substance 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), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government, subject to the negotiated terms of the PCA.

h. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project, subject to the negotiated terms of the PCA.

i. 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, subject to the negotiated terms of the PCA;

j. Participate in and comply with applicable Federal floodplain management and flood insurance programs in accordance with Section 402 of Public Law 99-662.

k. Prevent future encroachments on project lands, easements, and rights-of-way which might interfere with the proper functioning of the project.

l. 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, and performing relocation of construction, operation, and maintenance of the project, and inform all (other?) persons of applicable benefits, policies, and procedures in connection with said act.

m. Comply with all applicable Federal and Commonwealth laws and regulations including Section 601 of the Civil Rights Acts of 1964, Public Law 88-35; 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".

The State of Indiana through the Indiana Department of Natural Resources has the financial capability to provide the non-Federal contribution necessary and attaches, in support of this assurance, a copy of our financial plan. It is the intention of the State of Indiana, acting through the Indiana Department of Natural Resources to use its legal authority for fulfilling the above-listed measures of local cooperation. However, the IDNR intends to fulfill these obligations in conjunction and in cooperation with the Town of New Harmony and other local concerns.

The Indiana Department of Natural Resources has received a copy of the draft project cooperation agreement and is currently reviewing said document. It is understood that the purpose of this letter is to establish intent, and does not constitute a contract involving the expenditure of any set sum of money, nor any legal or financial actions at this time.

Sincerely,

Patrick R. Ralston
Director

PRR/RAK/ACP/dm

fn: j:\newharmo\spear.wpd

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Water
402 W. Washington St., Rm. W264
Indianapolis, Indiana 46204-2748
317-232-4160
FAX: 317-233-4579

September 26, 1996

Colonel Harry L. Spear
Commander and District Engineer
U.S. Army Engineer District, Louisville
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Re: New Harmony - Wabash River

Dear Colonel Spear:

This is a copy of our financial plan to demonstrate that the Indiana Department of Natural Resources (IDNR) has the financial capability to provide the non-Federal contribution necessary for the Streambank Erosion Control Project near New Harmony, Indiana.

**Financial Responsibility**

**Project Cost:** The IDNR understands that the total estimated cost of the project is $3,000,000.

**Non-Federal Cost Share:** Depending upon the cost sharing program that applies at the time that this project is begun, IDNR understands that its percentage of financial responsibility for the total project cost and the total amount will be one of the following scenarios:

| Scenario | % Cost Share | Total IDNR Responsibility |
|---|---|---|
| 1 | 50 | $1,500,000 |
| 2 | 35 | $1,050,000 |
| 3 | 25 | $750,000 |

The IDNR is prepared to accept financial responsibility for each of the above scenarios provided funding will be made available as indicated in the Financial Plan.

**O & M Cost:** The IDNR understands that the estimated cost of the annual operation and maintenance (O & M) for the project is $5,000.

**Financial Plan**

**Project Financing:** IDNR intends to seek legislative support from the Indiana General Assembly for a line item appropriation of state general fund monies to be added to the IDNR Division of Water's Capital Development Fund. I have already had conversations with one of our state senators relative to making such a request.

**O & M Financing:** IDNR intends to finance the cost of the project through the Water Resources Development Fund, account #340-301, which is jointly administered by the IDNR and the Indiana State Budget Agency. This account is generated through IDNR's own funds. Previous funds approved for this project have been in excess of $1,000,000. The project has been assigned #E6-915.

The State of Indiana through the Indiana Department of Natural Resources has the financial capability to provide the non-Federal contribution necessary. It is the intention of the State of Indiana, acting through the Indiana Department of Natural Resources to be responsible for the above referenced costs. However, the IDNR intends to fulfill these obligations in conjunction and in cooperation with the Town of New Harmony and other local concerns.

Sincerely,

Patrick R. Ralston
Director

○